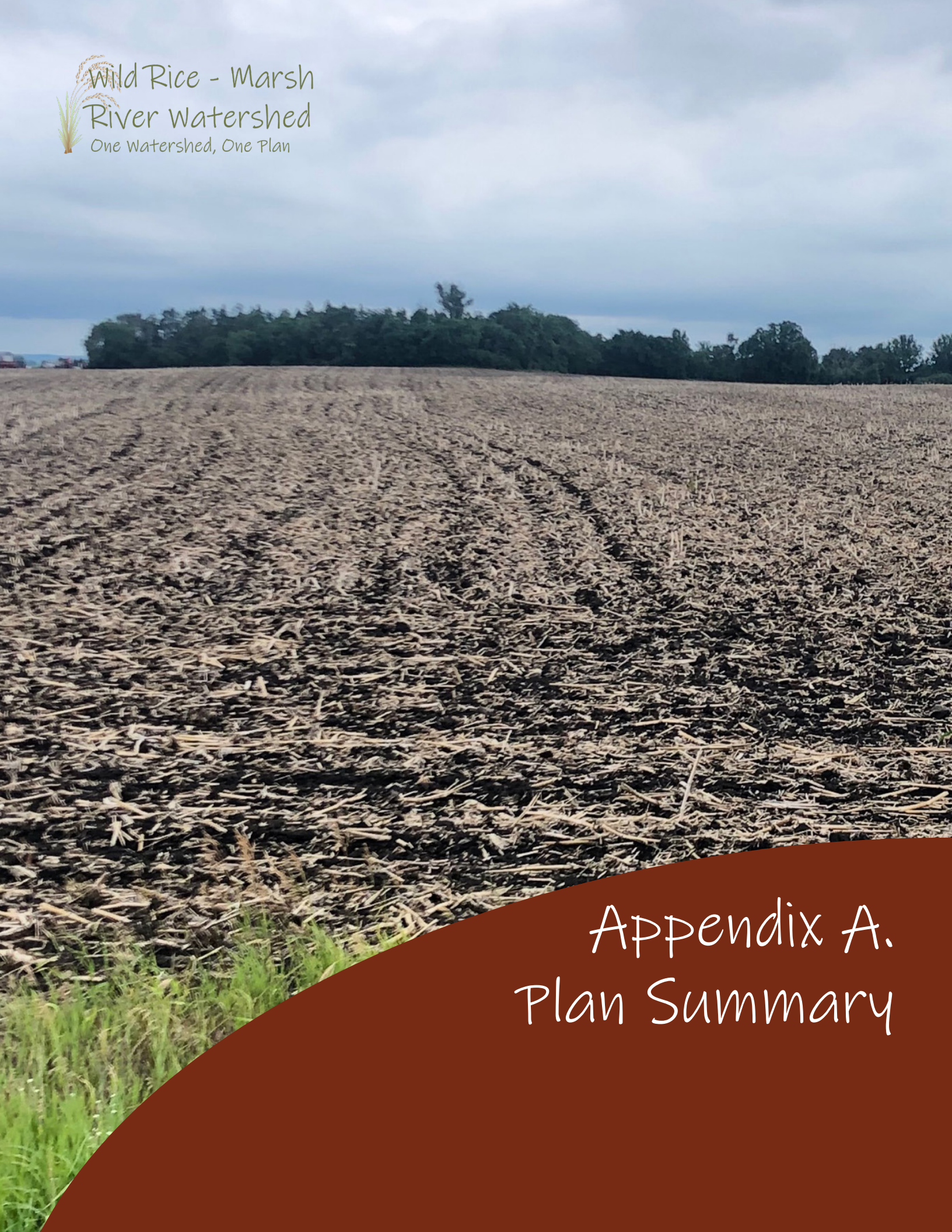




Old Rice - Marsh
River Watershed
One Watershed, One Plan

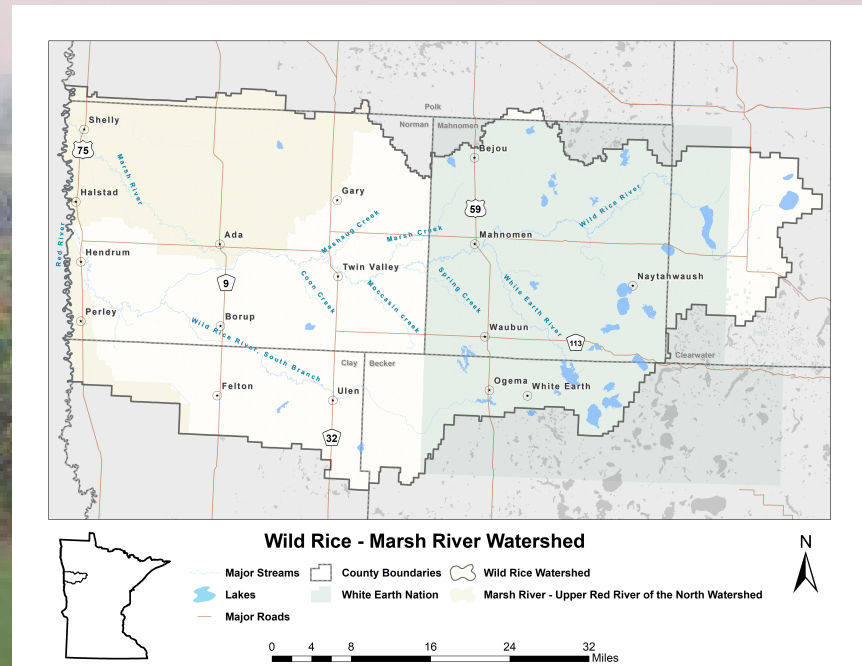
Section 8. Appendices



Appendix A. Plan Summary

Vision Statement

We embrace our ecological, economic, and cultural diversity, and manage the watershed in a fashion that produces plentiful crops, fosters soil health, reduces flood damages, and protects the abundant lakes and rivers within its boundaries for all to enjoy.

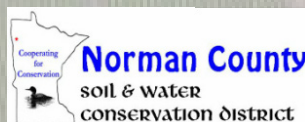
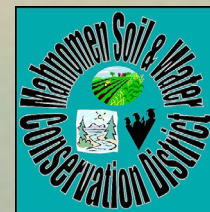


Wild Rice - Marsh River Watershed

One Watershed, One Plan



BECKER COUNTY, MN



For a full copy of the plan, visit:
www.wildricewatershed.org/
onewatershedoneplan

Further Questions or Comments:
Wild Rice Watershed District
218•784•5501 | wildricewatershed.org

What is One Watershed, One Plan?

- Voluntary program and plan
- Aligns water planning along watershed boundaries, including all the counties and watershed districts within the watershed border
- Local priorities, locally driven
- Uses existing authorities and funding mechanisms
- After adopted, implementation funding from the state is obtained through a non-competitive process instead of competitive
- Program website:

<https://bwsr.state.mn.us/one-watershed-one-plan>

Watershed Highlights

- Starts in Clearwater County near Zerkle and drains to the Red River
- Covers six counties: Becker, Clay, Clearwater, Mahnomen, Norman, and Polk
- The Wild Rice Watershed District covers the entire planning area
- The White Earth Nation spans much of the eastern half of the watershed
- Primary towns include: Ada, Halstad, Mahnomen, Twin Valley, White Earth, and Zerkel
- Transitions from lakes and forests in the east to cultivated cropland in the west

Plan Highlights

- Implementation of the Wild Rice Marsh One Watershed One Plan is voluntary, and outreach and incentives will be used to assist with voluntary implementation on private lands
- The plan incorporates modeling tools (PTMApp) to help identify practices on the land to reduce erosion. Practices are targeted where they can reduce the most sediment.
- Land practices have stacked benefits such as sediment reduction, water storage, flood damage reduction, water quality enhancement and habitat enhancement.

Lake Agassiz Plain

Agriculture • Flooding

Goals

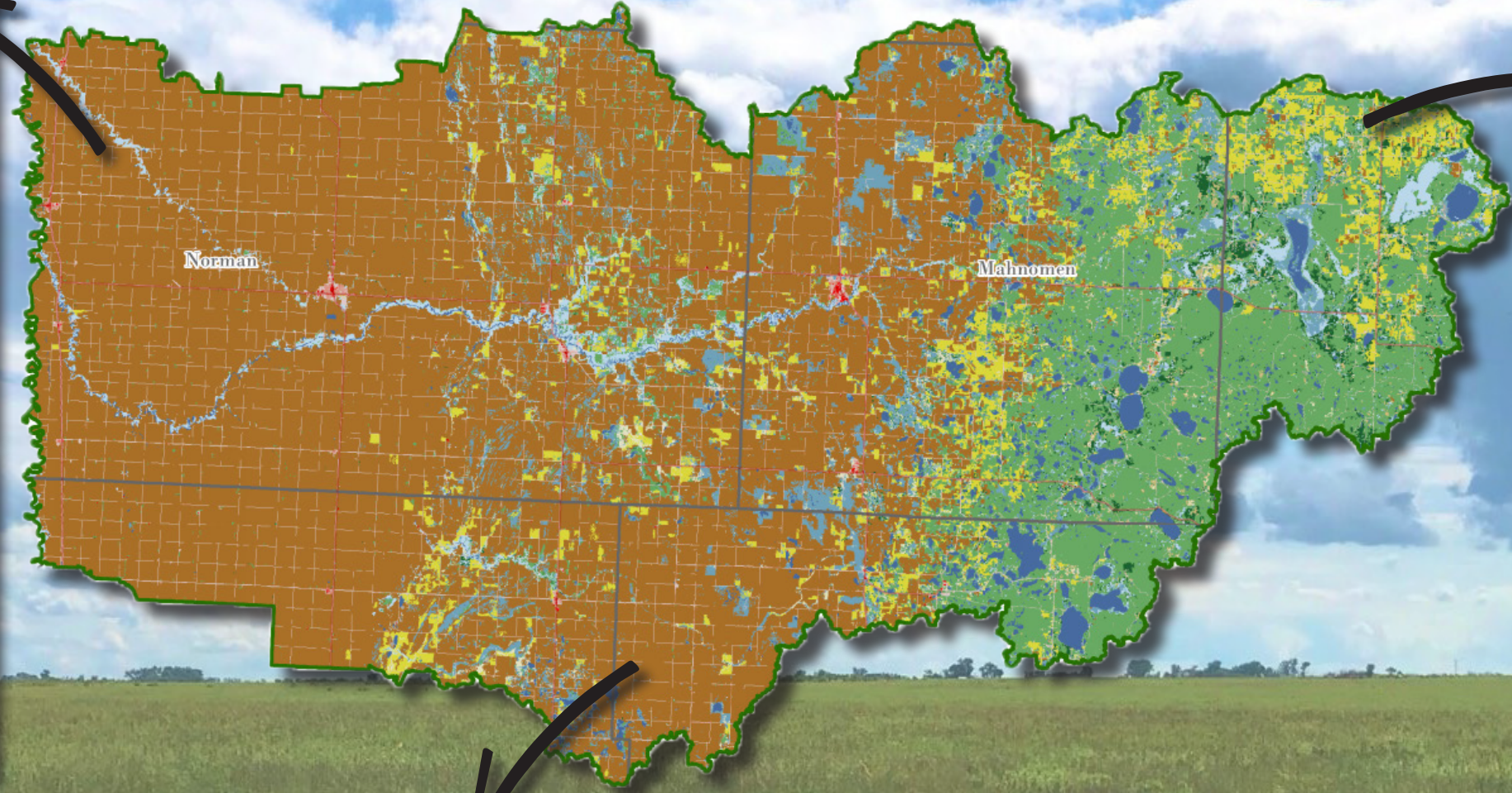
- Flood damage reduction
- Soil health
- Stream and riparian habitat enhancement
- Ditch maintenance and improvement

Actions

- Grade stabilizations
- Ditch maintenance and improvement
- Well sealing

Outcomes

- Reduced erosion and runoff contributing sediment and phosphorus in streams
- Flood damage reduction and protection of communities
- Drainage systems maintained
- Clean drinking water



Headwaters

Lakes • Wild Rice • Forests

Goals

- Forest Management and Protection
- Lakeshore Restoration
- Wild Rice Protection

Actions

- Lakeshore Buffer Planting
- Forest Stewardship Plans, SFIA
- Wild Rice Easements

Outcomes

- Maintain Excellent Water Quality in Lakes and Rivers
- Maintain Wild Rice Harvest
- Maintain Quality Aquatic and Forest Habitat





Transition Zone

Transition • Beach Ridge • Prairie

Goals

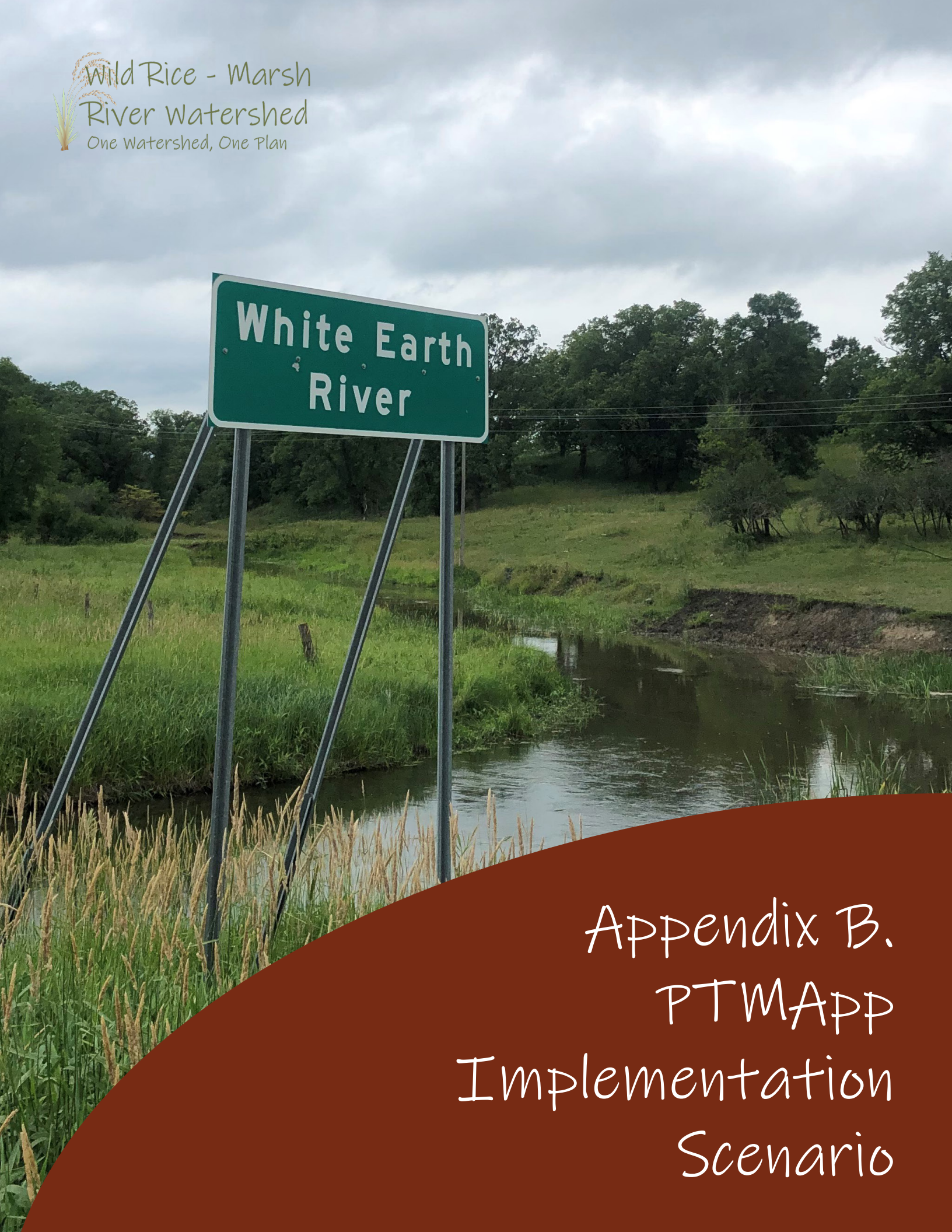
- Sediment reduction
- Phosphorus reduction
- Prescribed grazing
- Soil health
- Increasing water storage
- Stream and riparian habitat enhancement
- Prairie and wetland restoration
- Bacteria reduction
- Drinking water protection
- Land Retirement Programs

Actions

- Water and sediment control basins
- Grade stabilizations
- Cover crops, reduced tillage, crop rotations
- Grazing Plans
- Bacteria reduction (septic systems, fencing and water source for cattle, waste storage facility)
- Increased flood storage
- Stream channel and flood plain enhancement
- Habitat enhancement
- Well sealing
- CRP/CREP

Outcomes

- Reduced erosion and runoff contributing sediment and phosphorus in streams
- Additional flood storage and protection of communities
- Maintain productive agricultural lands
- Important habitat maintained: wetlands, prairies, beach ridges, and calcareous fens
- Clean drinking water



White Earth
River

Appendix B. PTMApp Implementation Scenario

Appendix B. PTMApp Implementation Scenario

The Targeted Implementation Schedule in Section 5 of this plan is based on a PTMApp Implementation Scenario developed by the Steering Committee during the 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 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 Best Management Practices (BMPs) and Conservation Practices (CPs).

PTMApp can be used by Soil and Water Conservation District (SWCD), watershed district, county local water planning, and agency staff and decision-makers to **PRIORITIZE** resources and the issues impacting them, **TARGET** specific fields to place CPs and BMPs, and **MEASURE** water quality improvement by tracking 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.

Wild Rice – Marsh Watershed Approach

PTMApp is a powerful tool, and the decisions made during the analysis shape the desired output. The Steering Committee discussed the PTMApp decisions at meetings on 2/5/2020 and 3/5/2020. The decisions are detailed in Table 1.

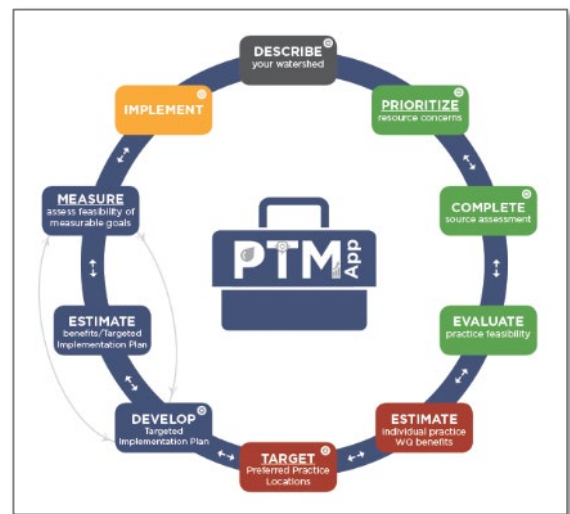


Table 1. PTMApp decisions made during the 2/5/2020 and 3/5/2020 Steering Committee meetings.

#	Decision	Implications	Local Decision – WRM1W1P
1	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.
2	PTMApp Treatment Groups	Which PTMApp treatment groups to include in the Implementation Scenario. The primary reason for eliminating one or more treatment groups could be a low likelihood of use as a conservation practice.	See Table 2.
3	Costs	Costs can represent the “cost” share or total cost. For example, EQIP is the government cost share.	Double EQIP Costs to capture the full cost of the practice + 20% for technical assistance. Soil Health: \$86.04/acre. Determine acreage that can be afforded for a 3-year cost-share.
4	Planning Regions	Allocate funding and practices per planning region	Allocate based on sediment delivery to the outlet of the planning region (Figure 1).
5	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.	Group used priority resource points representing planning region outlets to set goals. The benefits of practices will be summarized both at the planning region outlet and the edge of the field. The “best” practices will be selected based on the highest sediment load reduction at the edge of the field (spreads out practices within the planning region). Practices for the Projects and Practices Implementation Program will be capped (initially) at \$250,000 (rationale: anything over \$250,000 is a Capital Improvement Project).
6	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.	Sediment.
7	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 (Baseline + Watershed-Based Implementation Funding).
8	Approach for incorporating volume reduction benefits into the implementation Scenario	Most water quality goals only consider sediment and nutrients. An incorporation of volume reduction benefits to address an altered hydrology goal could be included with other water quality benefits.	Use HEI proprietary tool to attribute each practice with acre-feet storage reduction benefits.

Feasible PTMApp BMP and CP treatment group outputs were screened based on screening criteria agreed upon by the Steering Committee (Table 2). Using the screening criteria, BMPs and CPs with low potential for water quality benefits were removed from the analysis. See Table 2 for exact criteria.

Table 2: Screening Criteria Approved by Steering Committee

PTMApp Group Code	Treatment Group	Remove BMPs with little runoff volume delivery or constituent removal efficiency				Remove BMPs with low removal magnitudes at the edge-of-field					
		Delivery and Efficiency Selection Criteria (Value must be greater than)				Reduction Magnitude Selection Criteria (Value must be greater than)					
		Percent of 2-Year, 24-hour 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)	BMPs Not Meeting Criteria	BMPs Remaining After Criteria Applied	% of Original BMP Remaining
1	Storage**	50%	10%	10%	10%	0.25	0.25	0.5	75,756	5,467	7%
2	Filtration	50%	10%	10%	10%	0.25	0.25	0.5	25,270	21,917	46%
3	Biofiltration	Not included in plan									
4	Infiltration	Not included in plan									
5	Protection					0.25	0.25	0.5	11,245	27,428	71%
6	Source Reduction					0.25	0.25	1	924	30,691	97%

* Second quartile (Q2; 50th percentile) reduction efficiency was used for all treatment groups except filtration, where the third quartile (Q3; 75th percentile) reduction efficiency was used for TP and TN terms.

**Storage had additional screening criterion for WASCOD screening included in these numbers.

The treatment groups are made up of corresponding NRCS practices as outlined in Table 3.

Table 3. PTMApp Treatment Groups and corresponding NRCS practices.

Project or Practice	NRCS Code	PTMApp Treatment Group Category			
		Storage	Filtration	Protection	Source Reduction
Alternative Tile Intake - Gravel Inlet	606		x		
Alternative Tile Intake - Other Blind Intake	606		x		
Alternative Tile Intake - Perforated Riser Intake	606	x			
Conservation Cover	327				x
Conservation Crop Rotation	328				x
Conservation Tillage	329				x
Constructed Wetlands	N/A	x			
Contour Buffer Strips	332		x		
Contour Farming	330				x
Cover Crop	340				x
Critical Area Planting	342			x	
Culvert Sizing	N/A	x			
Dam	402	x			
Drainage Water Management	554	x			
Filter Strips	393		x		
Forage and Biomass Planting	512				x
Grade Stabilization Structure	410			x	
Grassed Waterways and Swales	412		x	x	
Irrigation Water Management	442				x
Nutrient Management	590				x
Pond for Water Use	378	x			
Prescribed Grazing	556				x
Riparian Forest Buffer	391		x		
Riparian herbaceous Cover	322		x		
Rotational Grazing	N/A				x
Sediment Basin	350	x			
Storm Water Retention Basins	N/A	x			
Stream Channel Stabilization	584			x	
Streambank and Shoreline Protection	580			x	
Strip-cropping	585			x	
Structure for Water Control	587	x			
Terrace	600		x		
Tree/Shrub Establishment	612			x	
Water and Sediment Control Basin	638	x			
Wetland Creation	658	x			
Wetland Restoration	657	x			

Storage practices were further screened to focus on water and sediment control basin (WASCOB) storage practices, as requested by the Steering Committee. PTMApp storage practices represent a variety of different types of BMPs that retain water on the landscape. The NRCS Field Office Technical Guide requirements for practice feasibility by practice is identified in Table 3. For a storage practice to be classified as a WASCOB, at least 10% of the area of that storage BMP was required to meet NRCS suitability criteria for WASCOB installation.

After BMPs were screened, all remaining BMPs were ranked by their total sediment reduction potential at the catchment outlet from highest to lowest. This ranking highlighted all BMPs with the potential to reduce the most sediment at the edge of the field where the BMP would be located.

Each treatment group was allotted a certain funding limit based on Scenario 1 and 2 estimates by the Steering Committee. Targeted BMPs were selected from the highest position on the ranked list (most sediment reduction potential) until each treatment group funding limit was reached.

The Steering Committee recommended the funding available (Level 2: Current + Watershed-Based Implementation Funding) be split between Planning Regions based on their overall sediment contribution to the outlet of the Planning Region (Figure 1). Since the planning regions flow into each other, the catchments only within that planning region were summed.

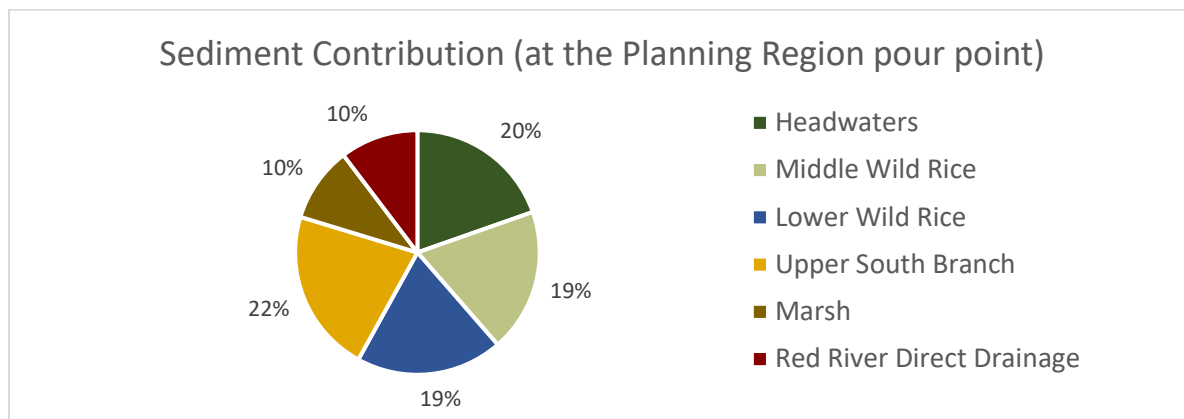


Figure 1. Sediment contribution to the pour point of each planning region.

PTMApp Implementation Scenarios

Headwaters Planning Region

The Table below shows the PTMApp implementation scenario results for the **Headwaters Planning Region**. The next pages have maps showing where practices are located for (1) Scenario 1, (2) Scenario 2, and (3) all feasible practices.

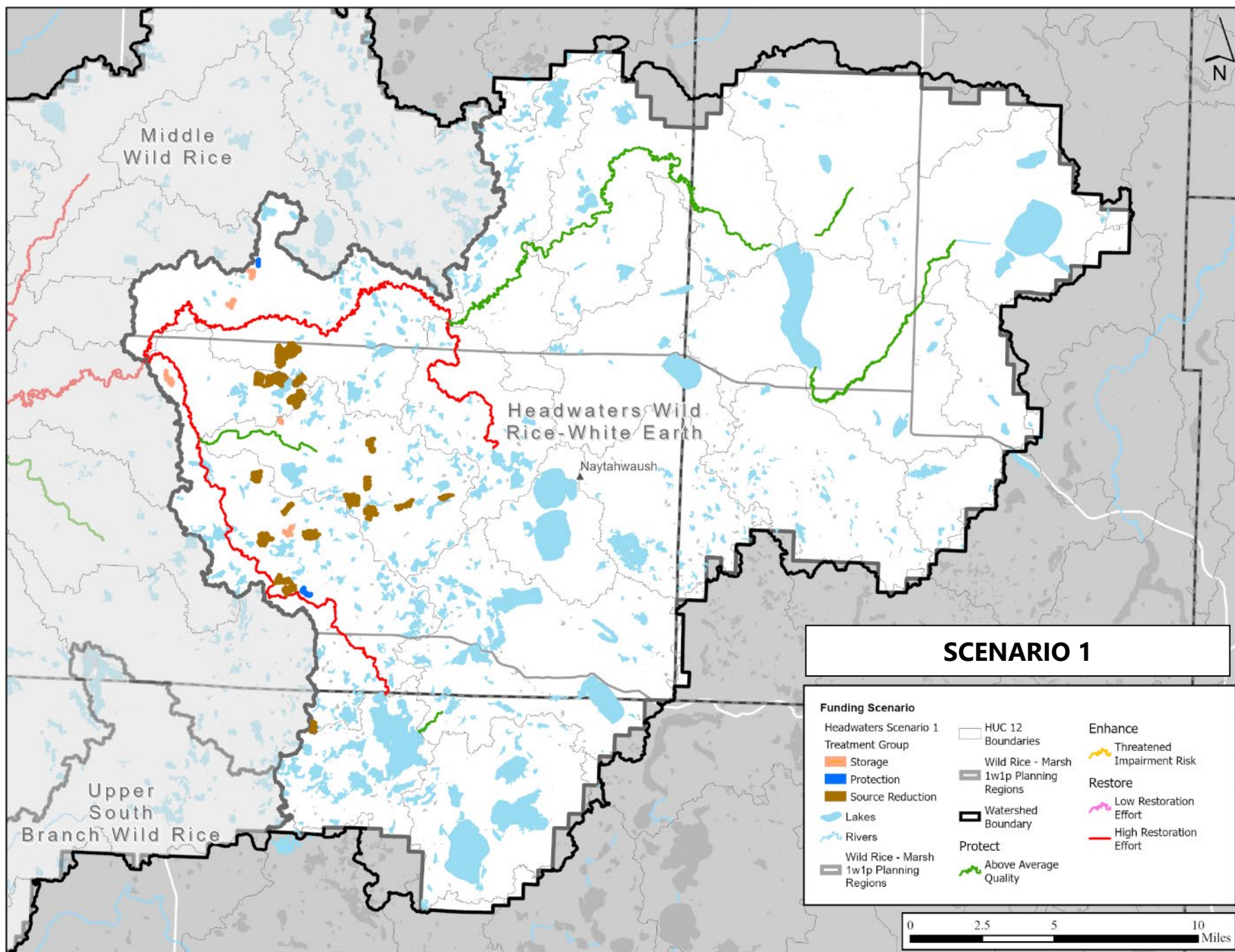
Funding Scenario 1: Current local baseline funding

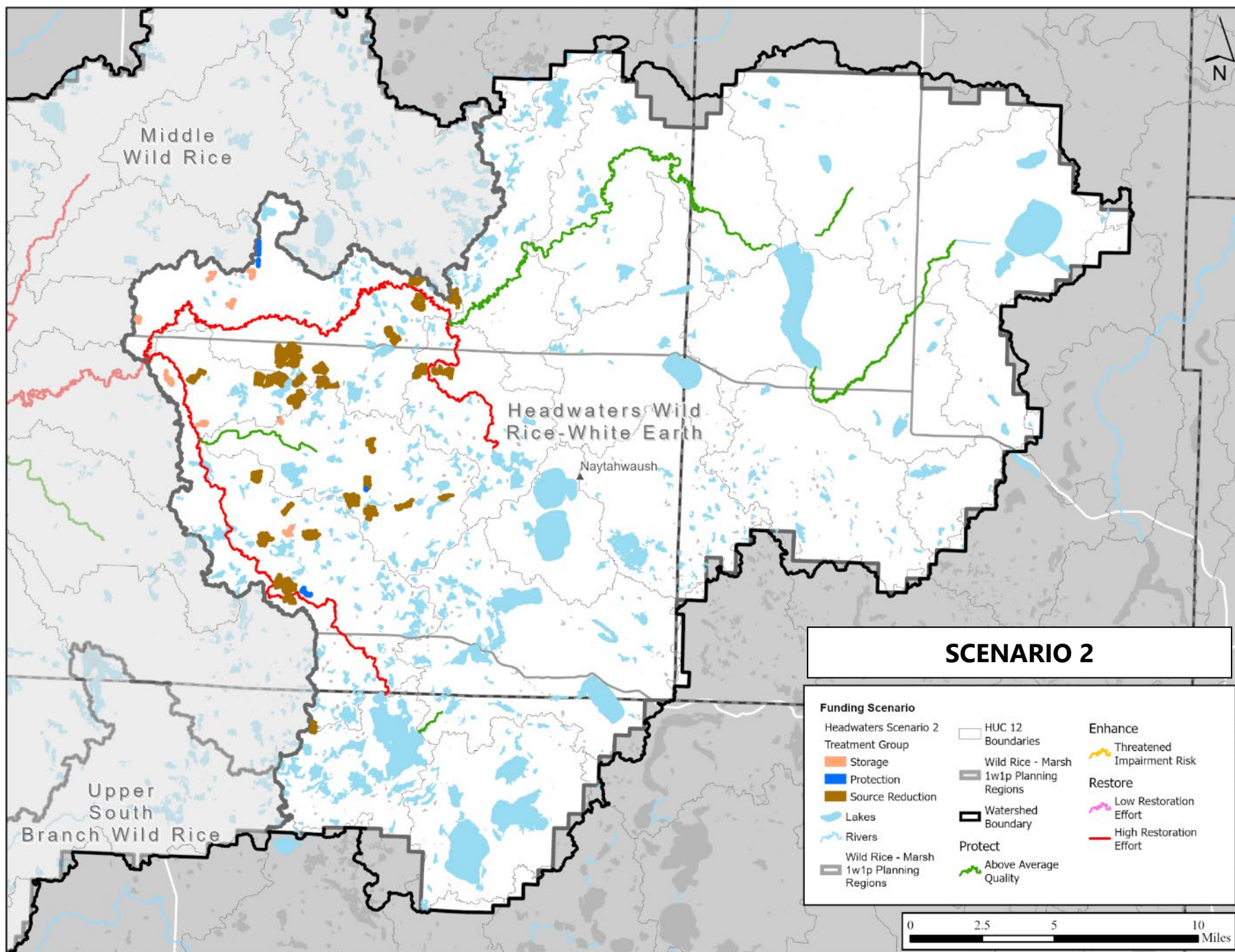
Funding Scenario 2: Current local baseline funding + new Watershed-Based Implementation Funding

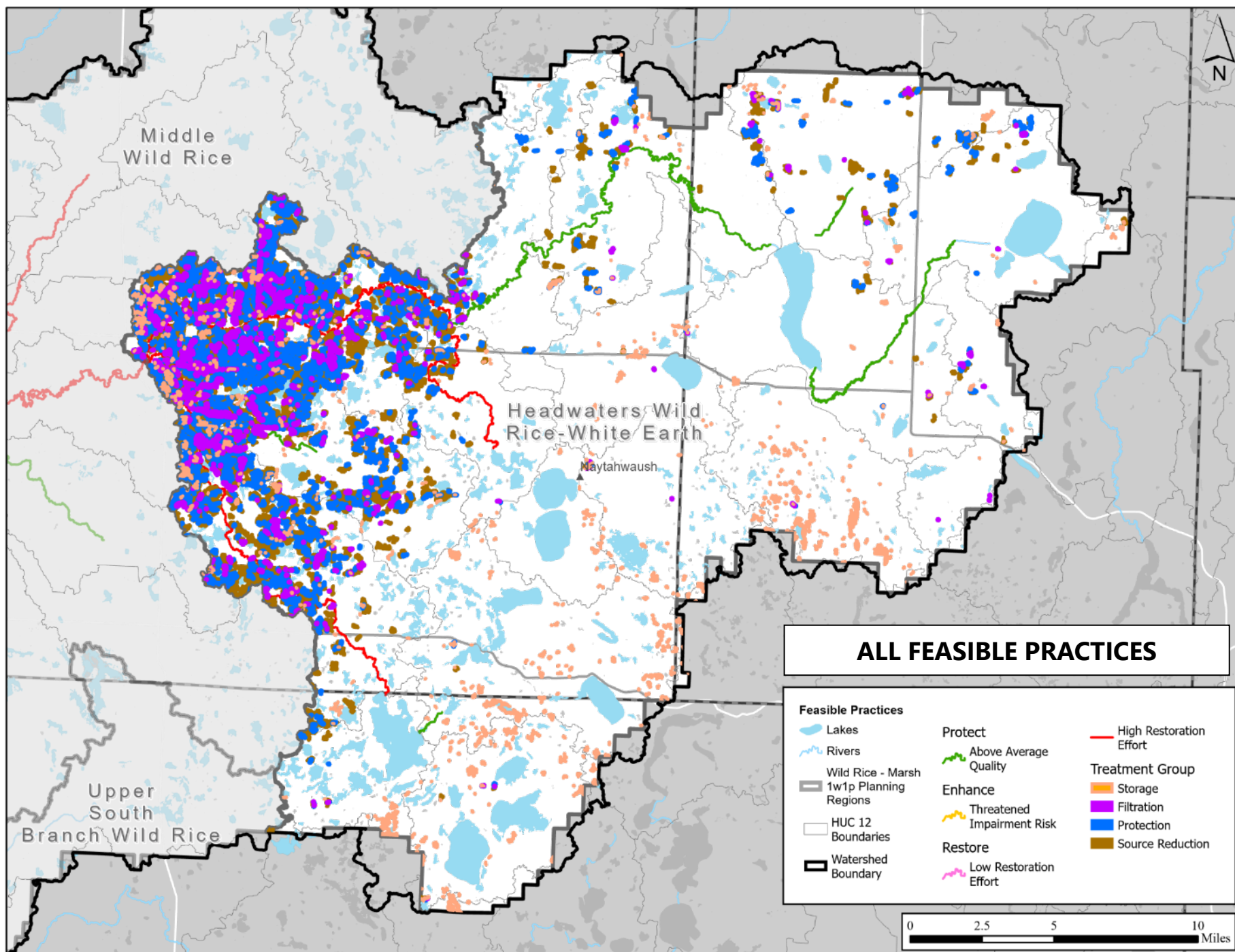
The Wild Rice - Marsh Watershed Partnership will operate at Scenario 2 Funding for the period of the 10-year plan.

BMP Treatment Group*	Funding Scenario	Number of Practices	Total 10-Year Cost (\$)	Values at Catchment Outlet		Values at Planning Region Outlet		Water storage (ac-ft)	Surface area (acres)
				Sediment Reduction (tons/yr.)	TP Reduction (lbs./yr.)	Sediment Reduction (tons/yr.)	TP Reduction (lbs./yr.)		
Storage	1	3	\$208,292	107	29	58	26	12	10
Protection		3	\$20,296	45	1	19	1	0	2
Source Reduction		20	\$210,000	1,584	174	313	96	0	1,256
Scenario 1 Total		26	\$438,588	1,736	204	389	122	12	1,268
Storage	2	8	\$569,510	267	78	155	69	33	24
Protection		4	\$285,774	83	11	32	8	0	33
Source Reduction		33	\$546,000	2,339	280	480	165	0	2,019
Scenario 2 Total		45	\$1,401,284	2,689	370	667	242	33	2,076
Total Load						14,626	13,437		

*See Table 3 for a description of the NRCS practices included in each BMP Treatment Group.







Middle Wild Rice Planning Region

The Table below shows the PTMAApp implementation scenario results for the **Middle Wild Rice Planning Region**. The next pages have maps showing where practices are located for (1) Scenario 1, (2) Scenario 2 and (3) all feasible practices.

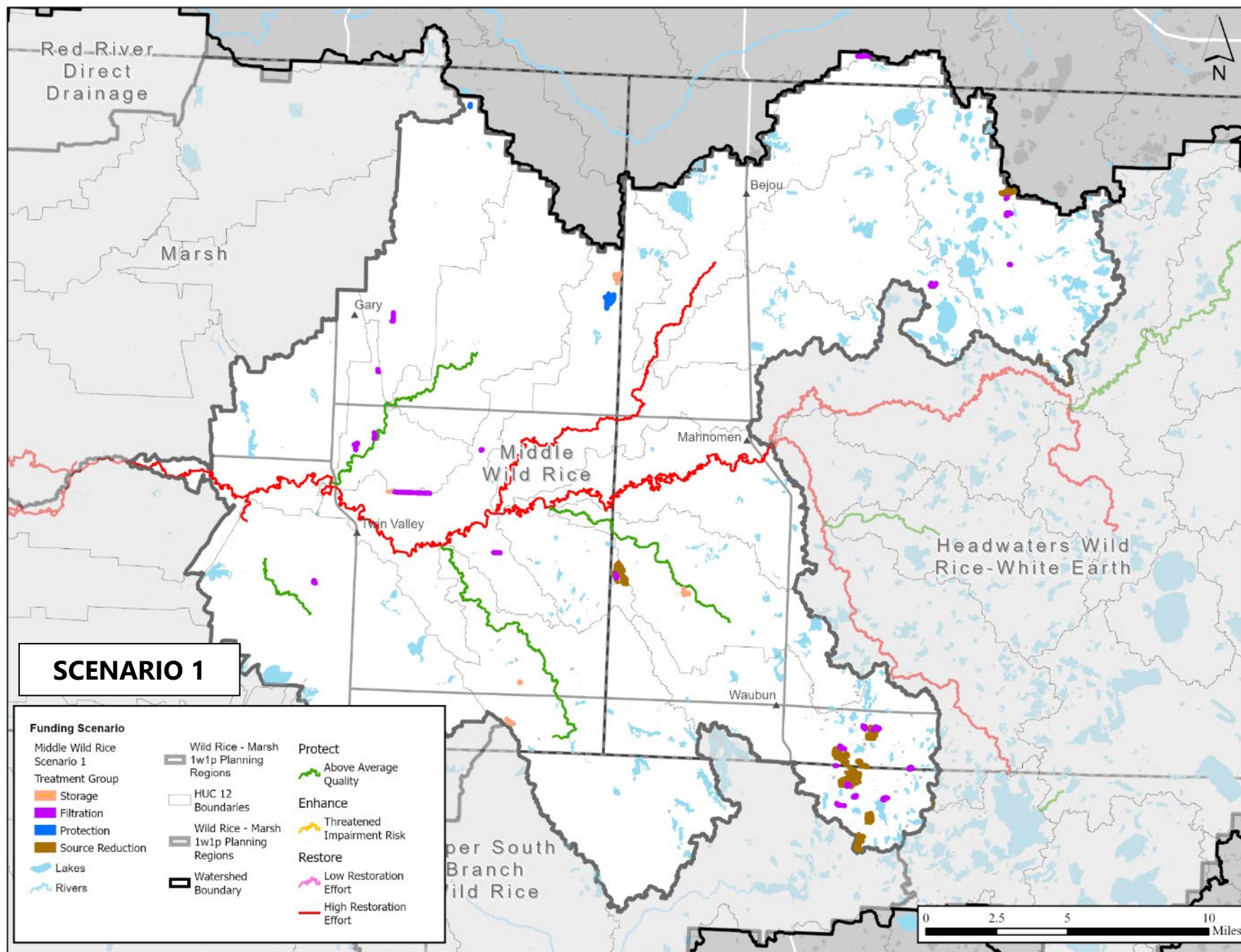
Funding Scenario 1: Current local baseline funding

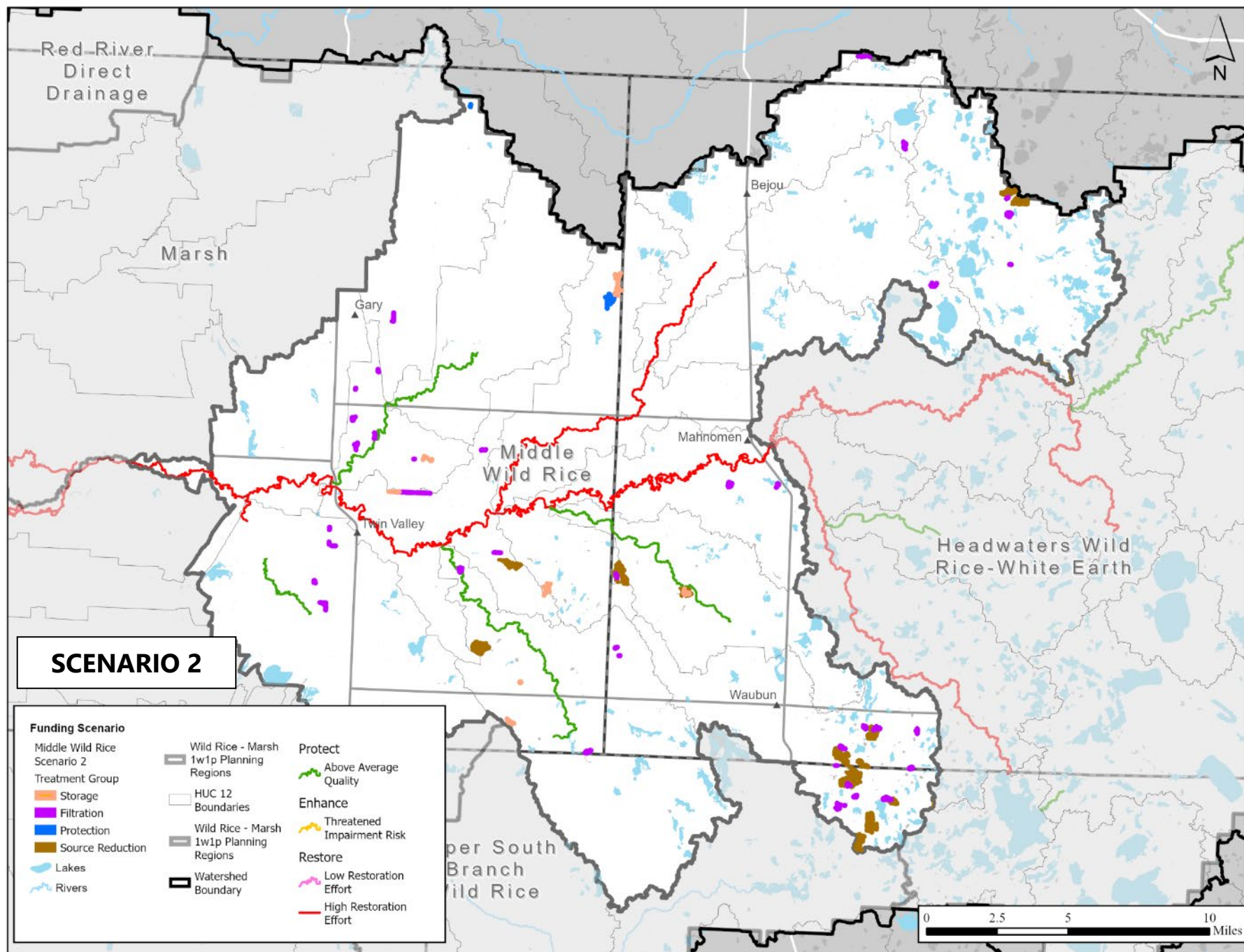
Funding Scenario 2: Current local baseline funding + new Watershed-Based Implementation Funding

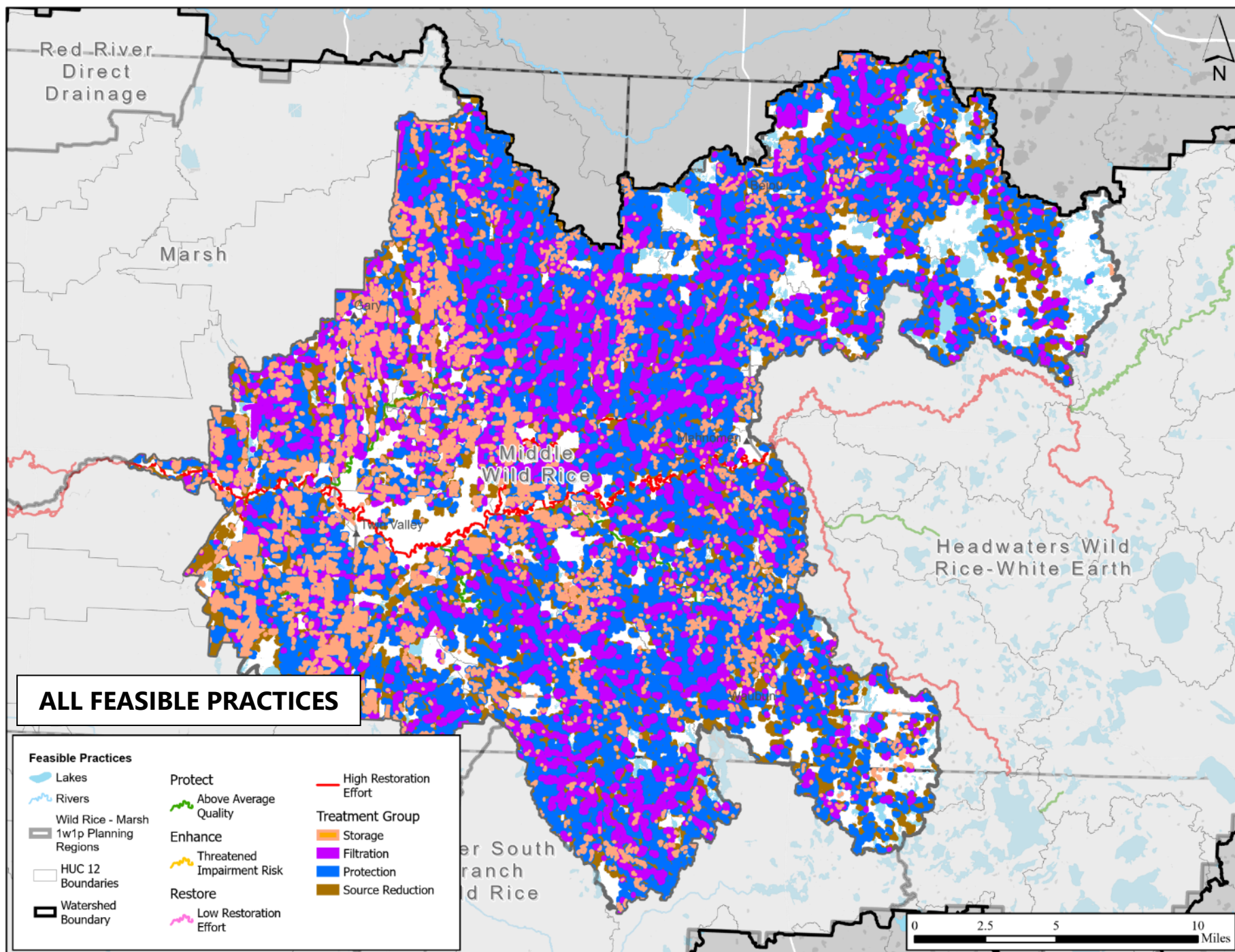
The Wild Rice - Marsh Watershed Partnership will operate at Scenario 2 Funding for the period of the 10-year plan.

BMP Treatment Group*	Funding Scenario	Number of Practices	Total 10-year Cost (\$)	Values at Catchment Outlet		Values at Planning Region Outlet		Additional water storage (ac-ft)	Cumulative Surface area (acres)
				Sediment Reduction (tons/yr.)	TP Reduction (lbs./yr.)	Sediment Reduction (tons/yr.)	TP Reduction (lbs./yr.)		
Storage	1	2	\$199,384	180	18	16	10	11	5
Filtration		13	\$112,548	274	23	40	13	0	59
Protection		2	\$81,814	43	4	3	2	0	10
Source Reduction		7	\$114,000	567	82	34	30	0	593
Scenario 1 Total		24	\$507,746	1,063	127	93	55	11	668
Storage	2	7	\$539,864	497	80	46	42	31	16
Filtration		45	\$291,508	684	93	102	58	0	154
Protection		2	\$129,840	87	6	5	3	0	15
Source Reduction		13	\$148,000	954	154	44	51	0	1,109
Scenario 2 Total		67	\$1,109,212	2,223	332	197	153	31	1,294
Total Load						14,137	43,630		

*See Table 3 for a description of the NRCS practices included in each BMP Treatment Group.







Upper South Branch Wild Rice Planning Region

The Table below shows the PTMAApp implementation scenario results for the **Upper South Branch Wild Rice Planning Region**. The next pages have maps showing where practices are located for (1) Scenario 1, (2) Scenario 2 and (3) all feasible practices.

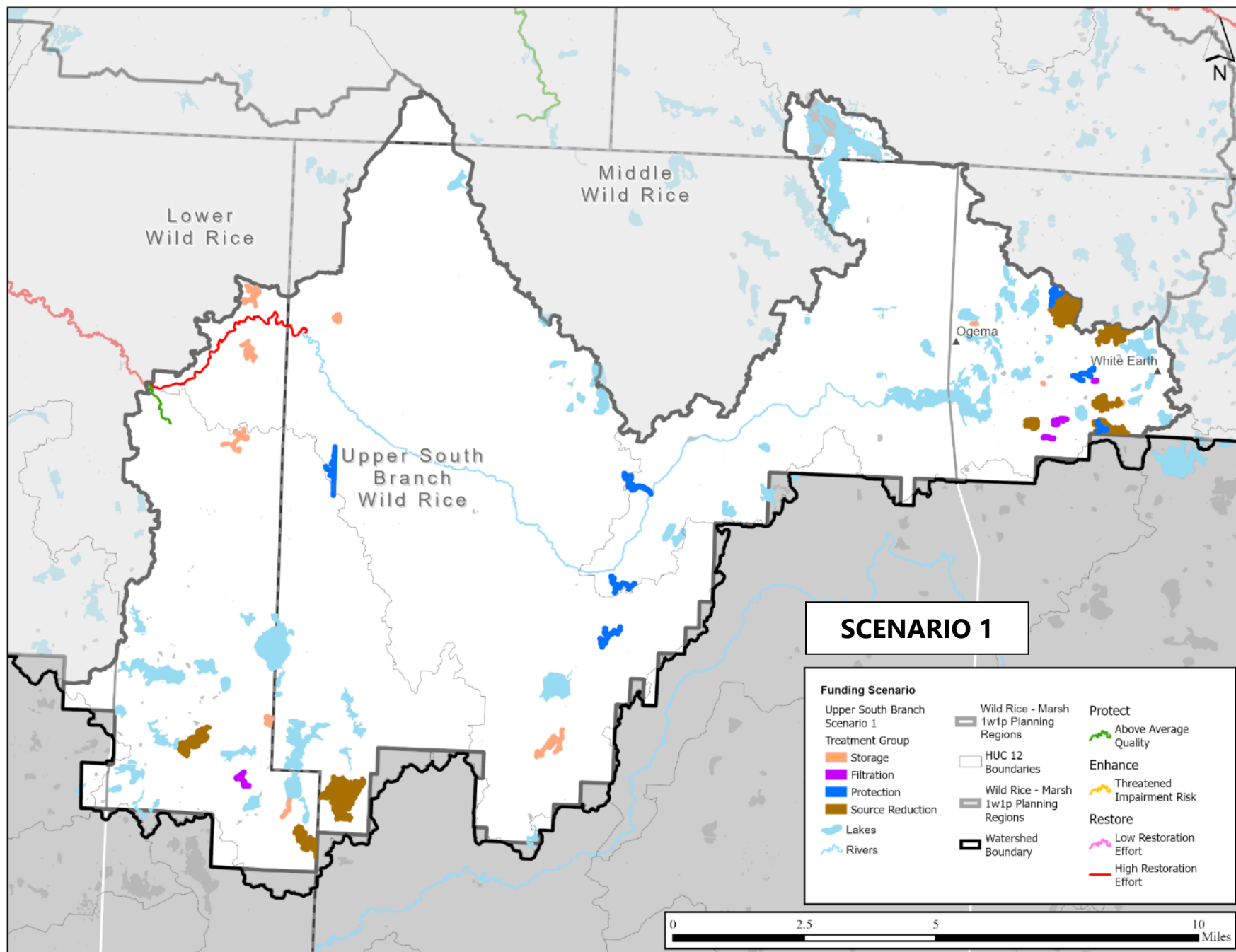
Funding Scenario 1: Current local baseline funding

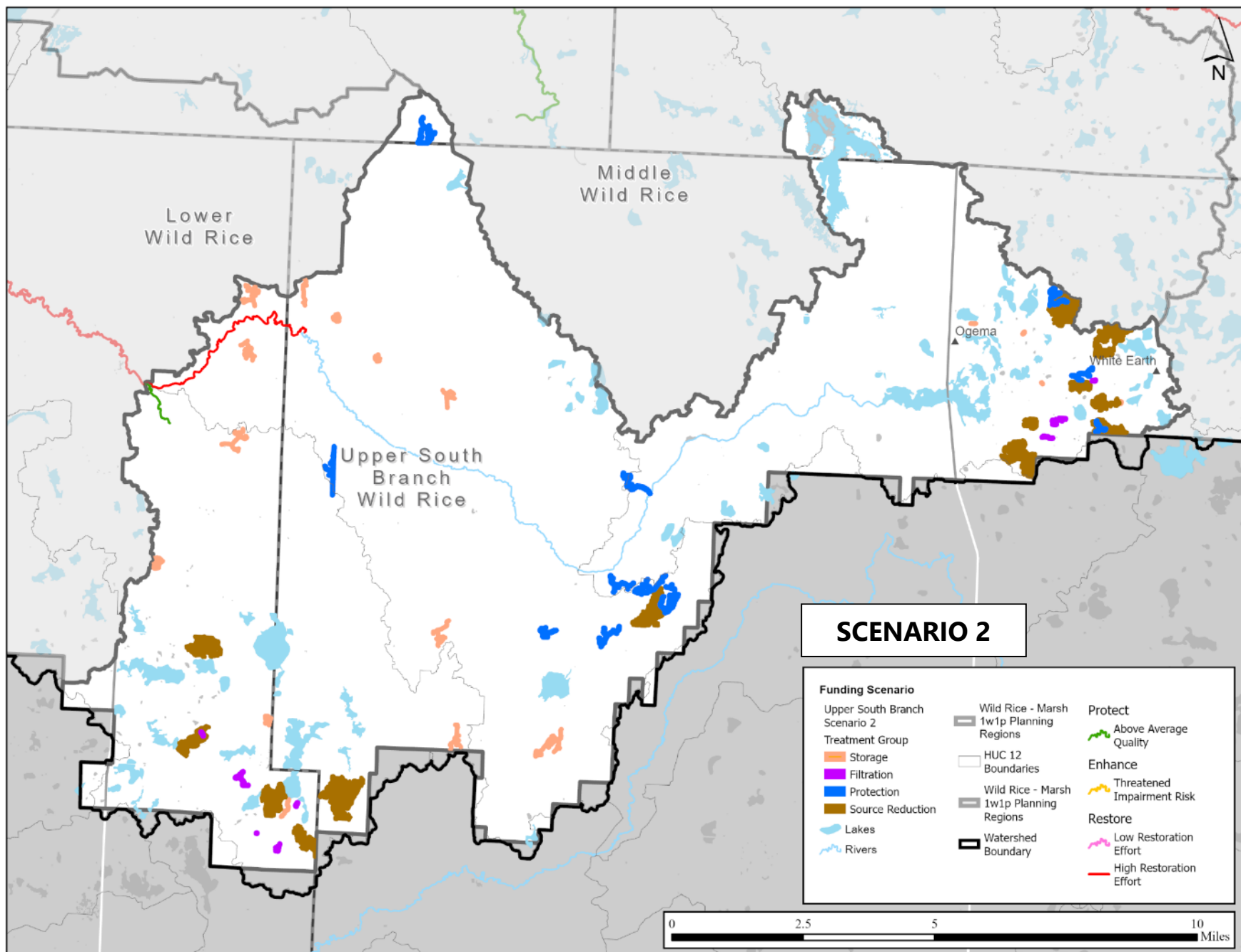
Funding Scenario 2: Current local baseline funding + new Watershed-Based Implementation Funding

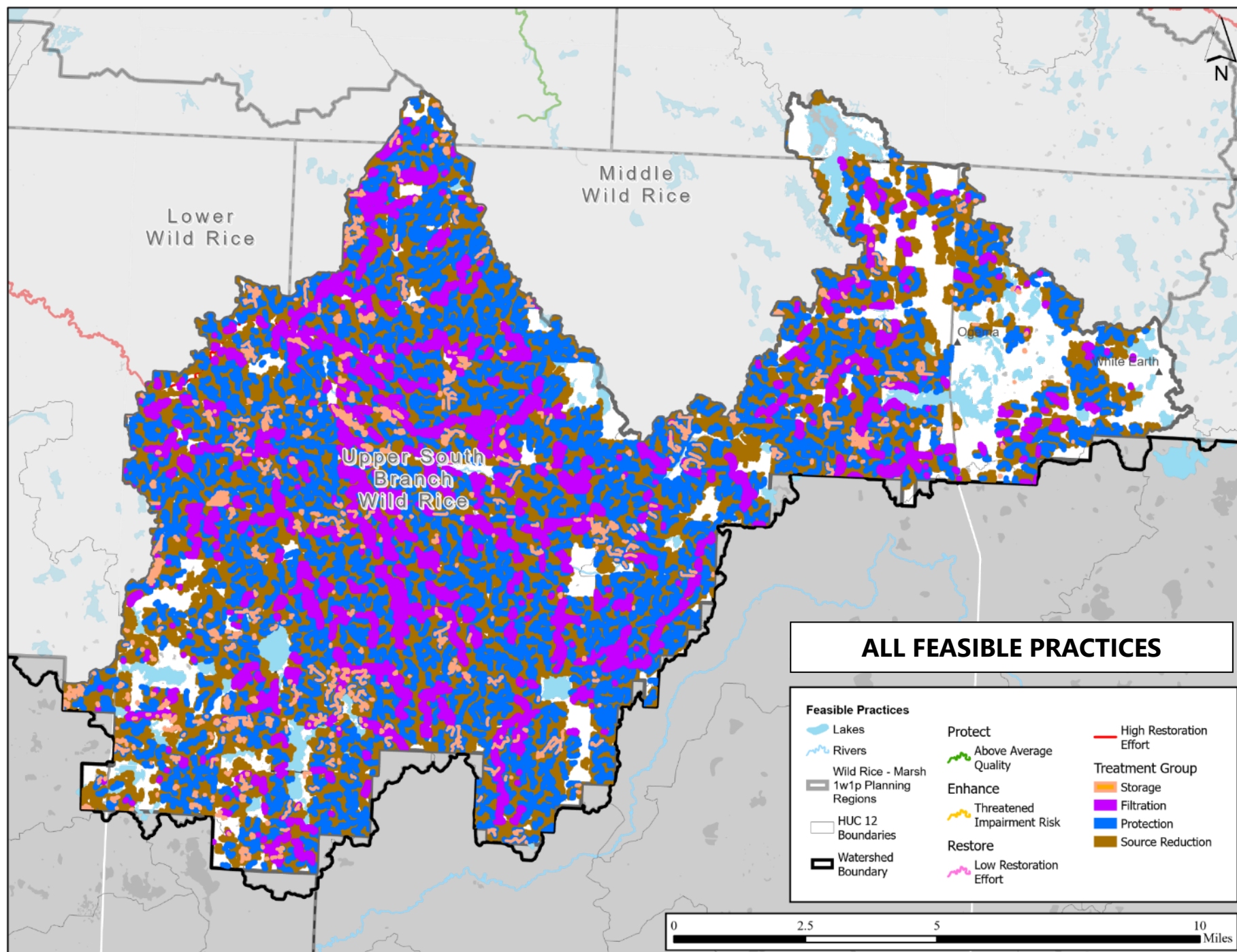
The Wild Rice - Marsh Watershed Partnership will operate at Scenario 2 Funding for the period of the 10-year plan.

BMP Treatment Group	Funding Scenario	Number of Practices	Total 10-year Cost (\$)	Values at Catchment Outlet		Values at Planning Region Outlet		Additional water storage (ac-ft)	Cumulative Surface area (acres)
				Sediment Reduction (tons/yr.)	TP Reduction (lbs./yr.)	Sediment Reduction (tons/yr.)	TP Reduction (lbs./yr.)		
Storage	1	4	\$607,428	183	47	77	36	22	15
Filtration		4	\$49,134	64	5	4	2	0	12
Protection		4	\$173,023	182	17	48	12	0	50
Source Reduction		10	\$132,000	1,008	105	76	45	0	759
Scenario 1 Total		22	\$633,142	1,436	174	205	95	22	837
Storage	2	19	\$1,023,166	490	136	210	108	59	41
Filtration		10	\$79,691	130	11	9	4	0	27
Protection		13	\$274,132	439	59	88	37	0	170
Source Reduction		17	\$343,000	1,424	183	123	85	0	1,319
Scenario 2 Total		59	\$1,719,989	2,484	389	430	233	59	1,558
Total Load						16,153	18,002		

*See Table 3 for a description of the NRCS practices included in each BMP Treatment Group.







Lower Wild Rice Planning Region

The Table below shows the PTMAApp implementation scenario results for the **Lower Wild Rice Planning Region**. The next pages have maps showing where practices are located for (1) Scenario 1, (2) Scenario 2 and (3) all feasible practices.

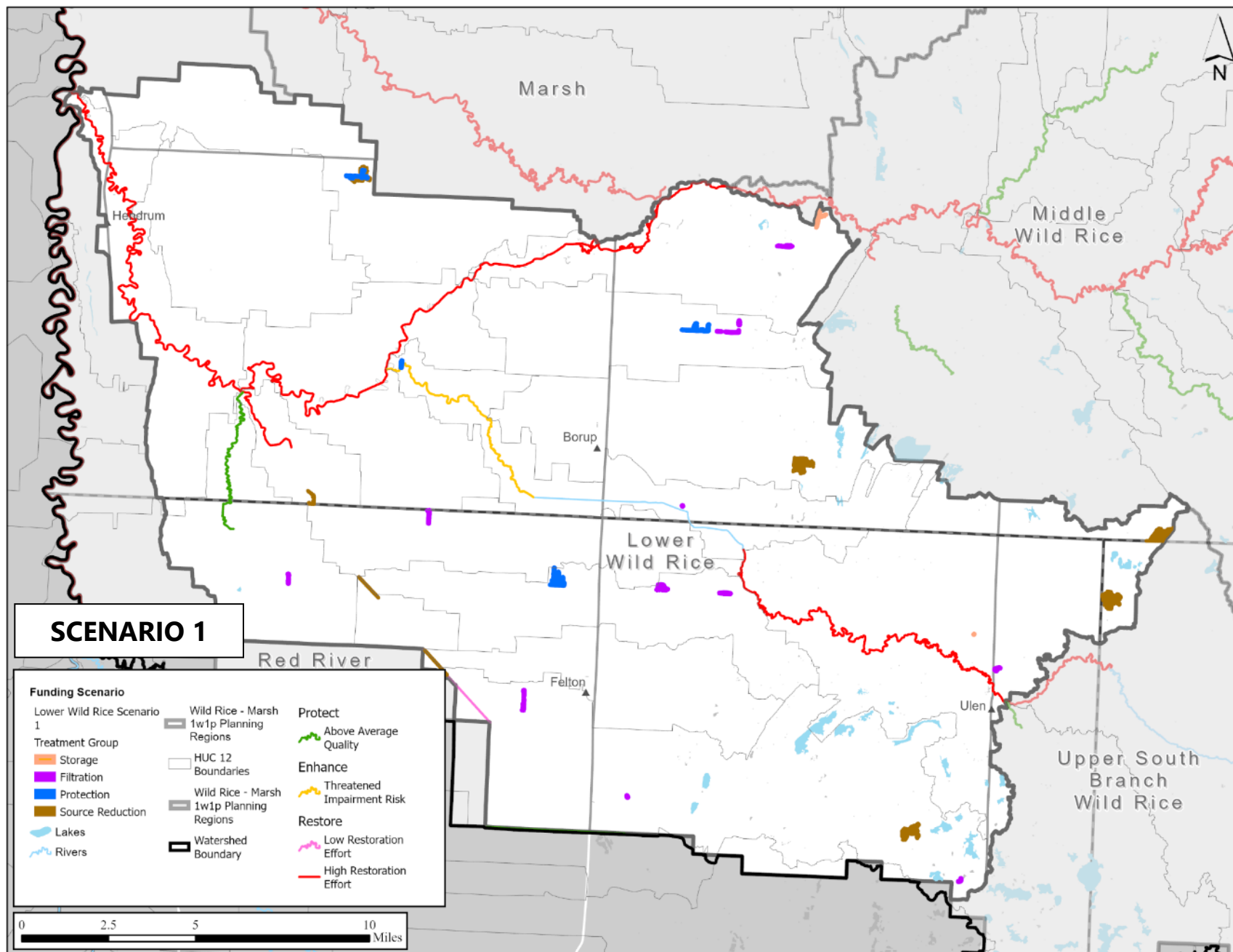
Funding Scenario 1: Current local baseline funding

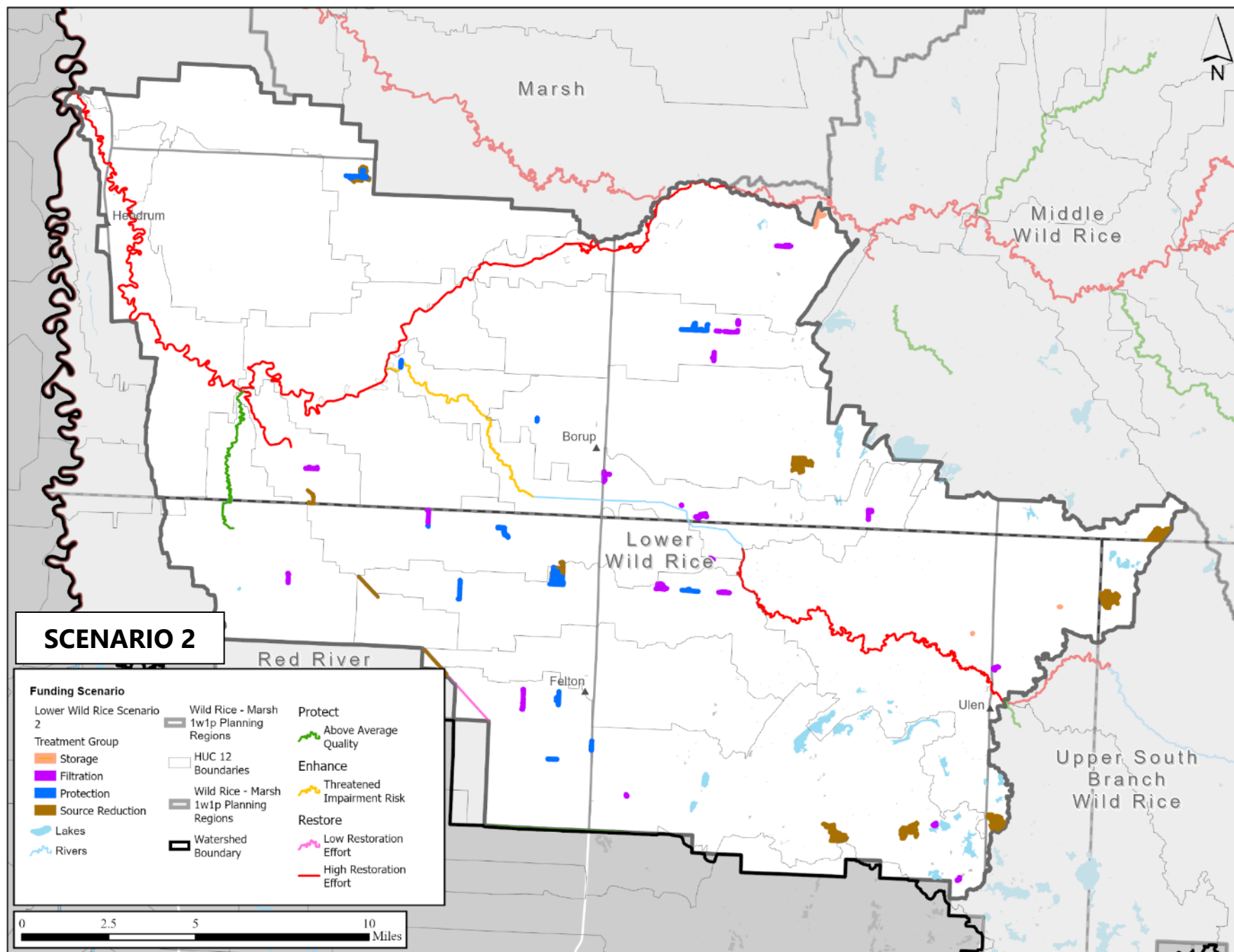
Funding Scenario 2: Current local baseline funding + new Watershed-Based Implementation Funding

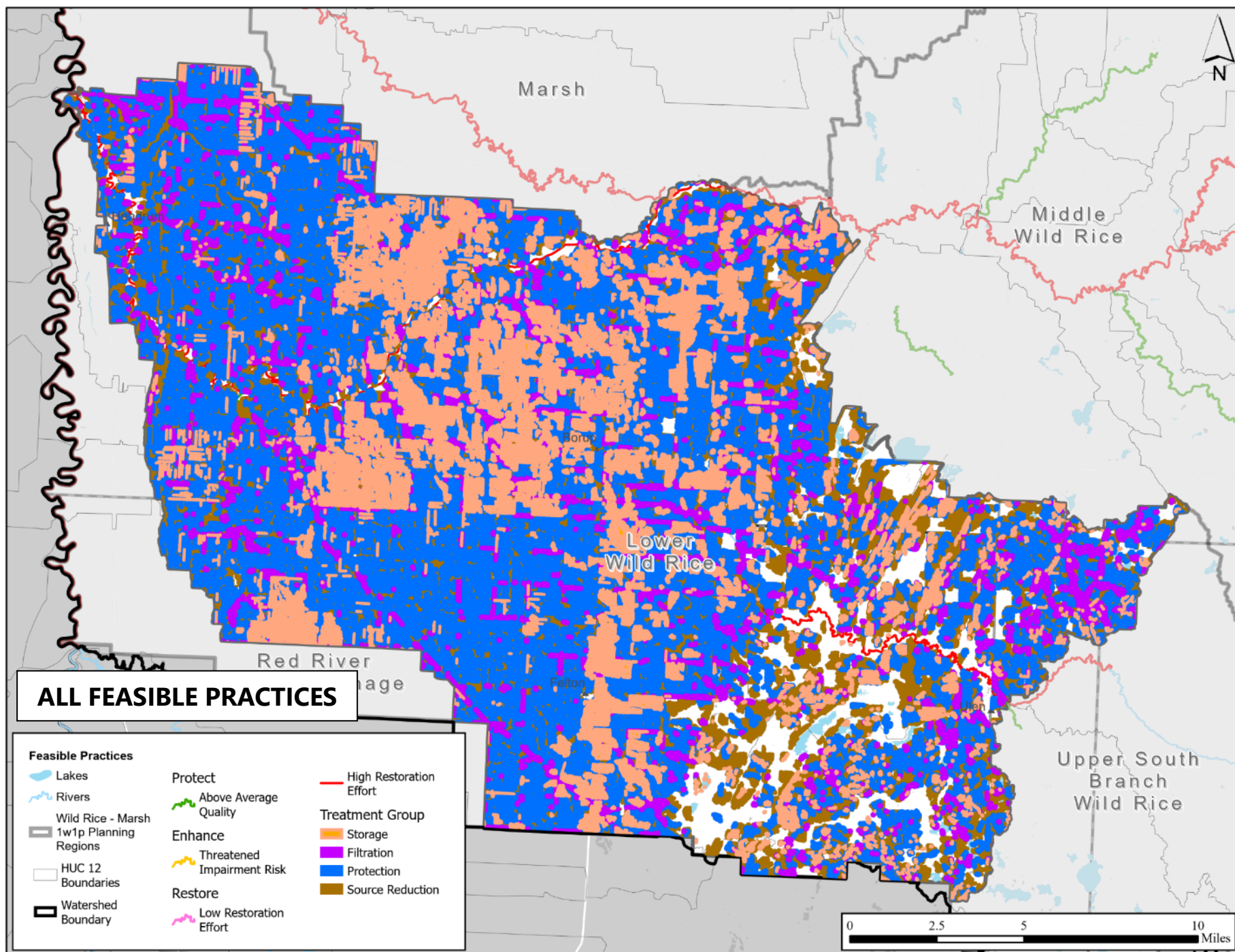
The Wild Rice - Marsh Watershed Partnership will operate at Scenario 2 Funding for the period of the 10-year plan.

BMP Treatment Group	Funding Scenario	Number of Practices	Total 10-Year Cost (\$)	Values at Catchment Outlet		Values at Planning Region Outlet		Additional water storage (ac-ft)	Cumulative Surface area (acres)
				Sediment Reduction (tons/yr.)	TP Reduction (lbs./yr.)	Sediment Reduction (tons/yr.)	TP Reduction (lbs./yr.)		
Storage	1	1	\$92,442	50	6	19	5	3	1
Filtration		8	\$84,100	121	19	8	9	0	30
Protection		2	\$547,930	77	9	32	8	0	28
Source Reduction		8	\$85,500	385	69	48	29	0	500
Scenario 1 Total		19	\$242,136	632	104	107	51	3	558
Storage	2	4	\$185,184	163	30	23	14	11	6
Filtration		18	\$136,476	228	37	16	17	0	72
Protection		12	\$926,328	312	38	62	26	0	109
Source Reduction		11	\$222,000	514	112	53	46	0	807
Scenario 2 Total		45	\$1,469,988	1,216	216	154	103	11	994
Total Load						14,483	46,956		

*See Table 3 for a description of the NRCS practices included in each BMP Treatment Group.







Marsh River Planning Region

The Table below shows the PTMAApp implementation scenario results for the **Marsh River Planning Region**. The next pages have maps showing where practices are located for (1) Scenario 1, (2) Scenario 2 and (3) all feasible practices.

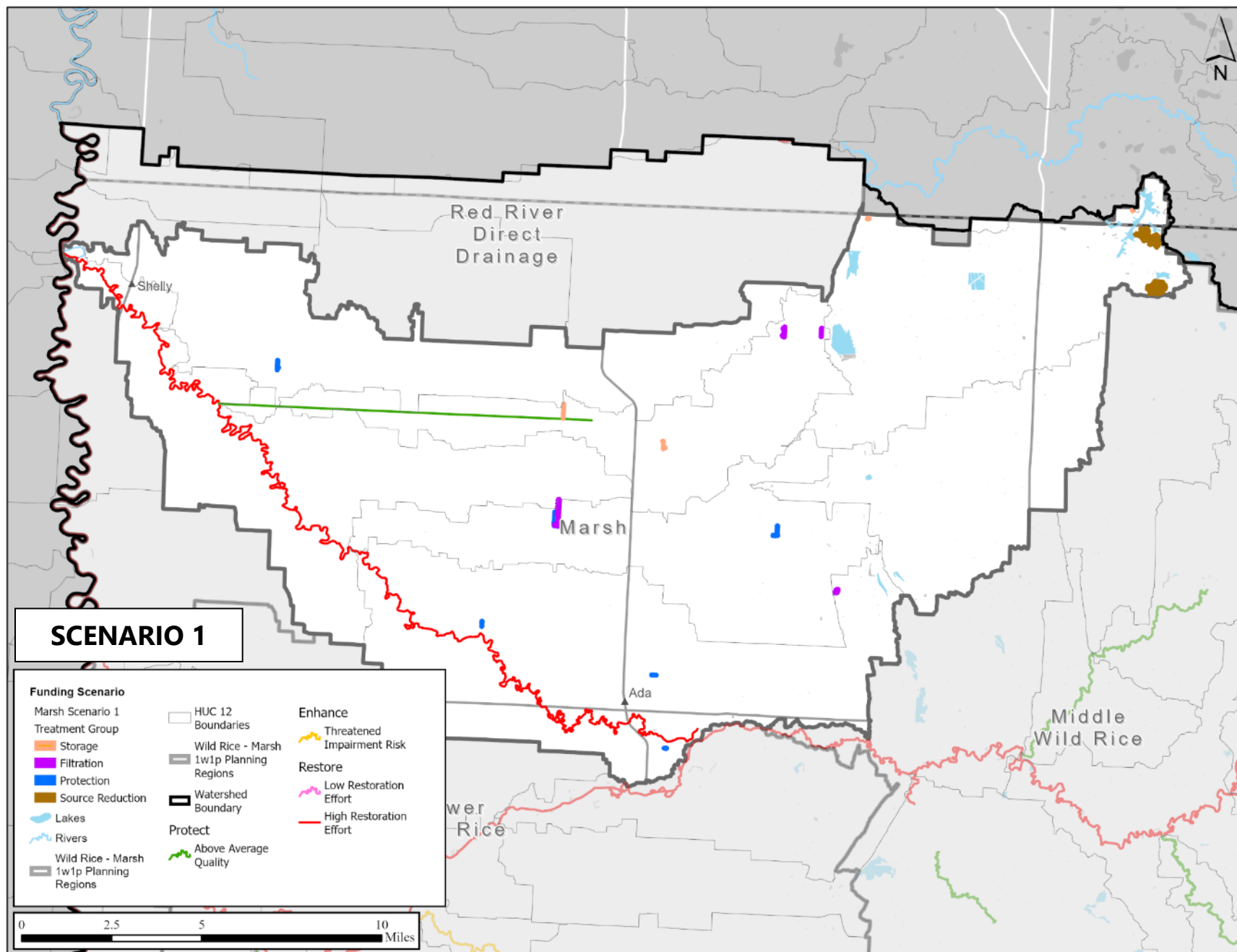
Funding Scenario 1: Current local baseline funding

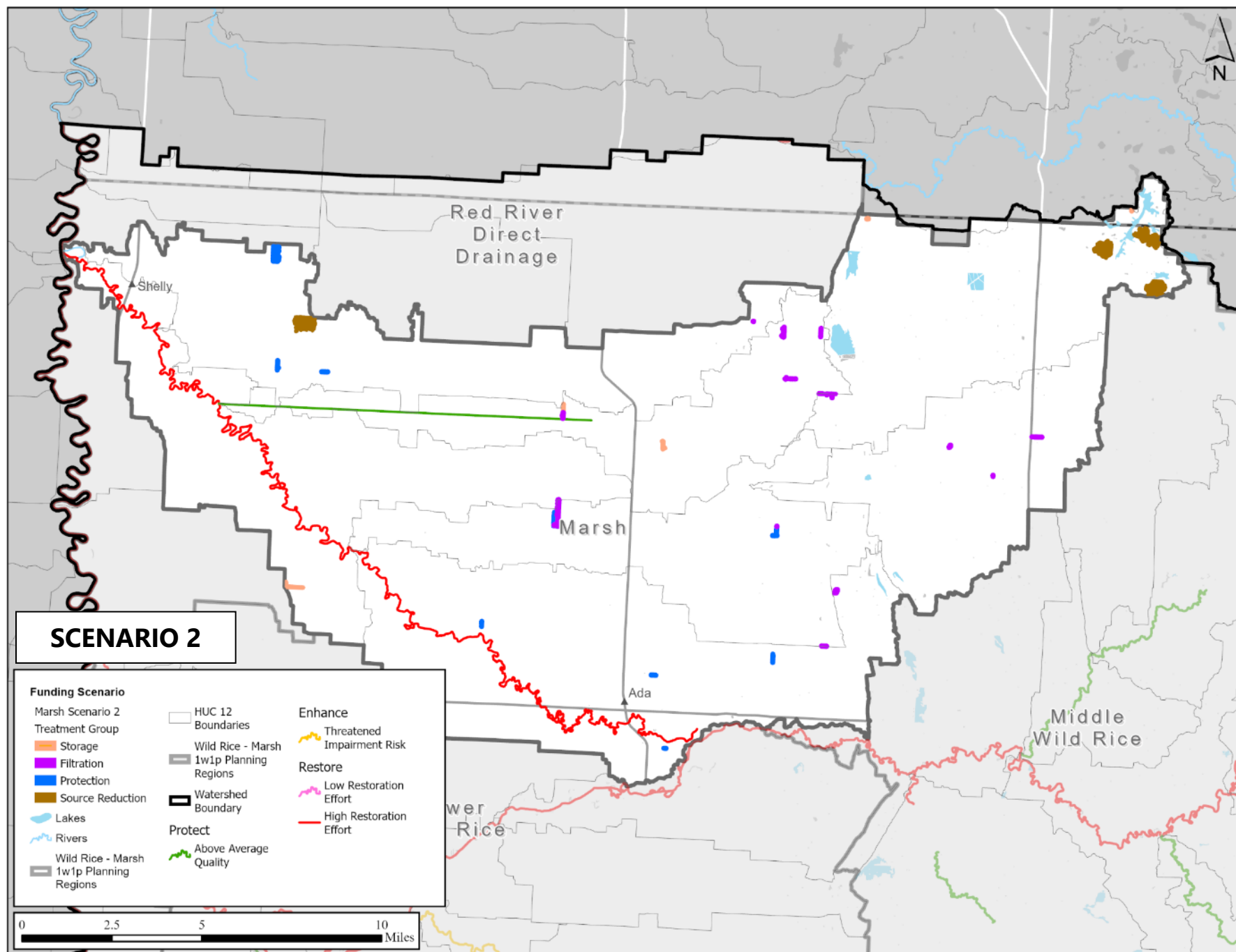
Funding Scenario 2: Current local baseline funding + new Watershed-Based Implementation Funding

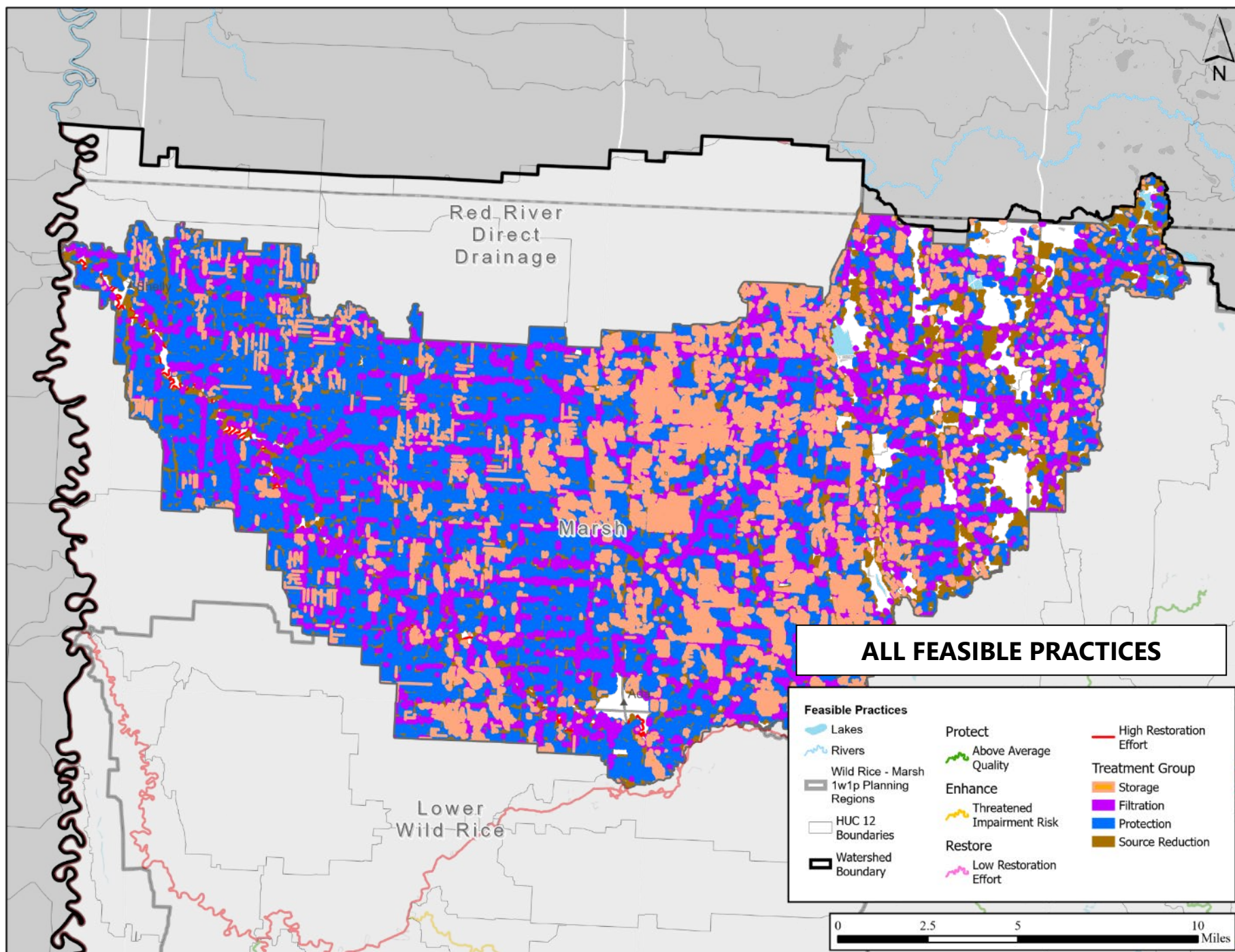
The Wild Rice - Marsh Watershed Partnership will operate at Scenario 2 Funding for the period of the 10-year plan.

BMP Treatment Group	Funding Scenario	Number of Practices	Total 10-Year Cost (\$)	Values at Catchment Outlet		Values at Planning Region Outlet		Additional water storage (ac-ft)	Cumulative Surface area (acres)
				Sediment Reduction (tons/yr.)	TP Reduction (lbs./yr.)	Sediment Reduction (tons/yr.)	TP Reduction (lbs./yr.)		
Storage	1	1	\$25,878	18	3	9	3	1	1
Filtration		9	\$29,592	90	29	4	12	0	16
Protection		2	\$144,126	21	6	5	3	0	17
Source Reduction		2	\$45,000	86	32	1	9	0	231
Scenario 1 Total		14	\$244,596	215	71	17	27	1	264
Storage	2	3	\$78,652	60	13	11	6	5	3
Filtration		21	\$70,014	189	66	8	27	0	37
Protection		9	\$579,344	84	31	12	15	12	47
Source Reduction		4	\$117,000	166	62	15	26	0	446
Scenario 2 Total		37	\$845,010	500	171	46	74	17	532
Total Load						14,483	46,956		

*See Table 3 for a description of the NRCS practices included in each BMP Treatment Group.







Red River Direct Drainage Planning Region

The Table below shows the PTMAApp implementation scenario results for the **Red River Direct Drainage Planning Region**. The next pages have maps showing where practices are located for (1) Scenario 1, (2) Scenario 2 and (3) all feasible practices.

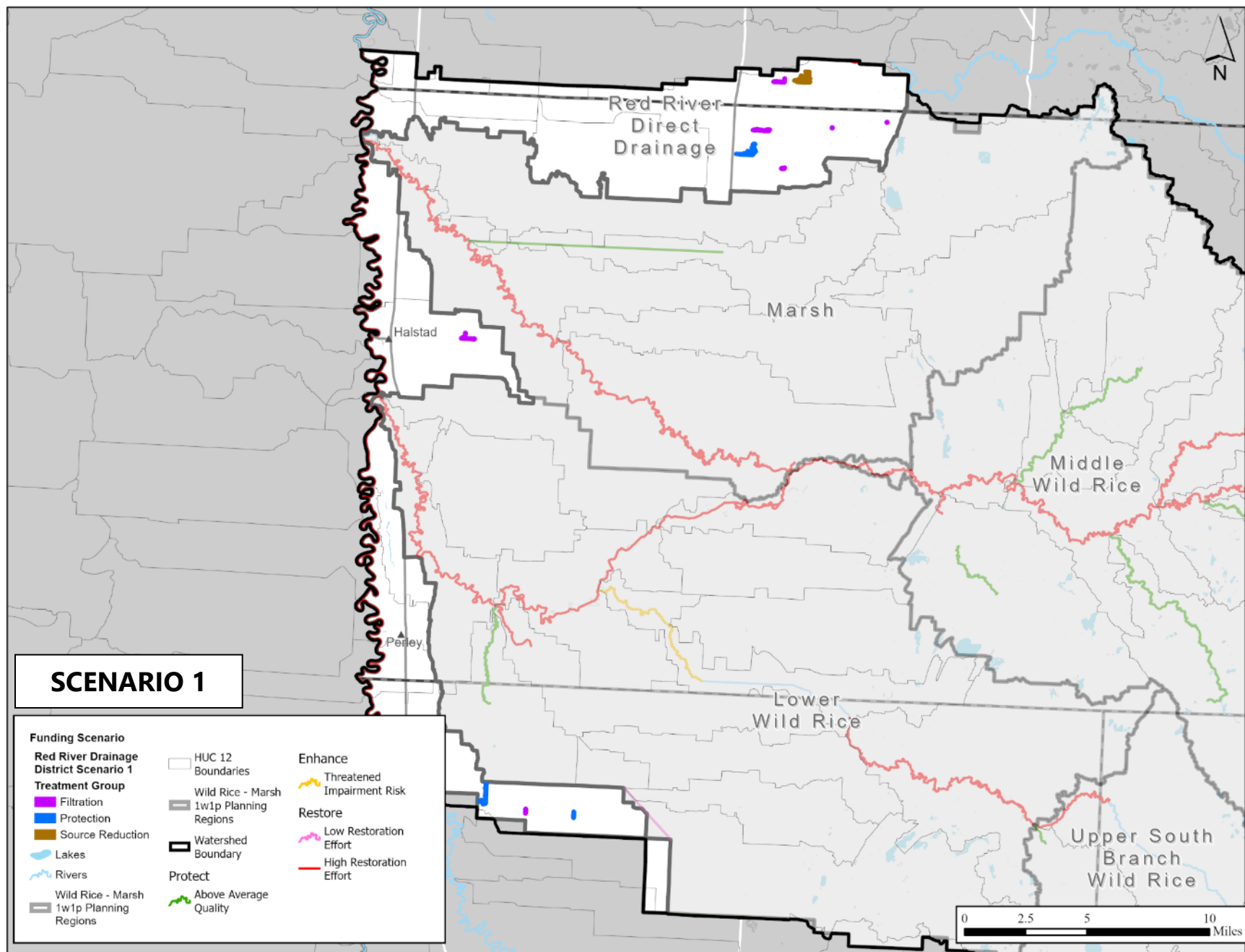
Funding Scenario 1: Current local baseline funding

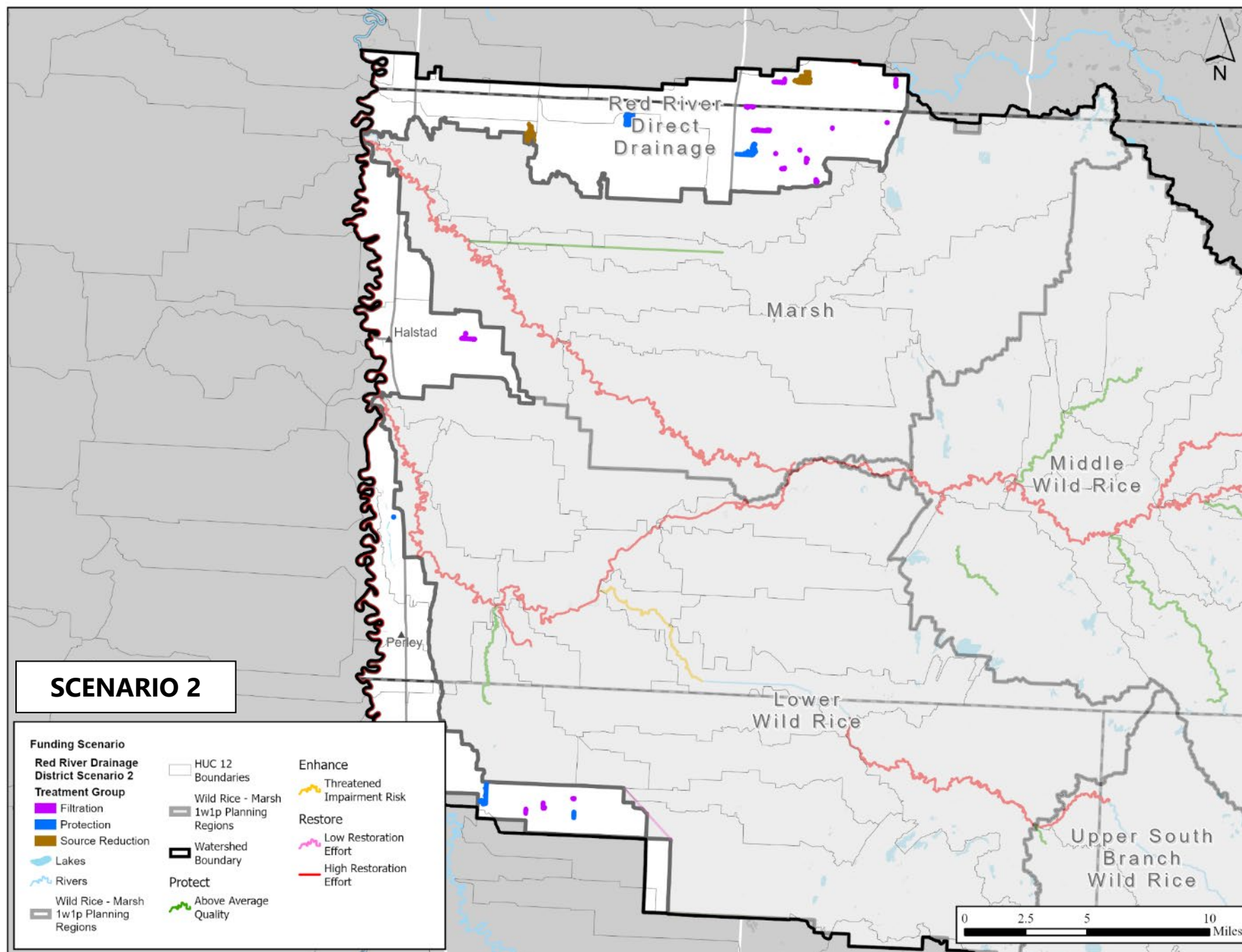
Funding Scenario 2: Current local baseline funding + new Watershed-Based Implementation Funding

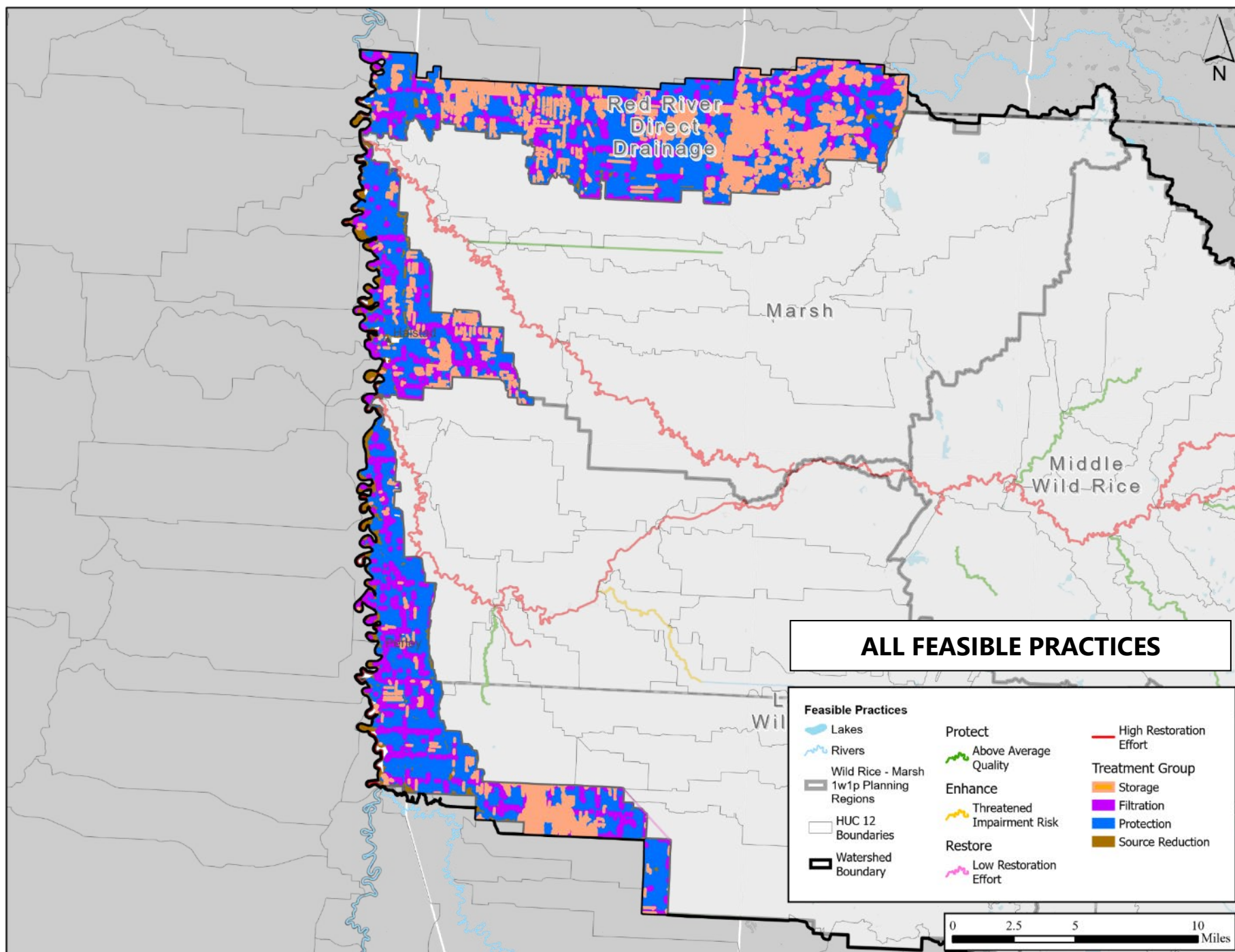
The Wild Rice - Marsh Watershed Partnership will operate at Scenario 2 Funding for the period of the 10-year plan.

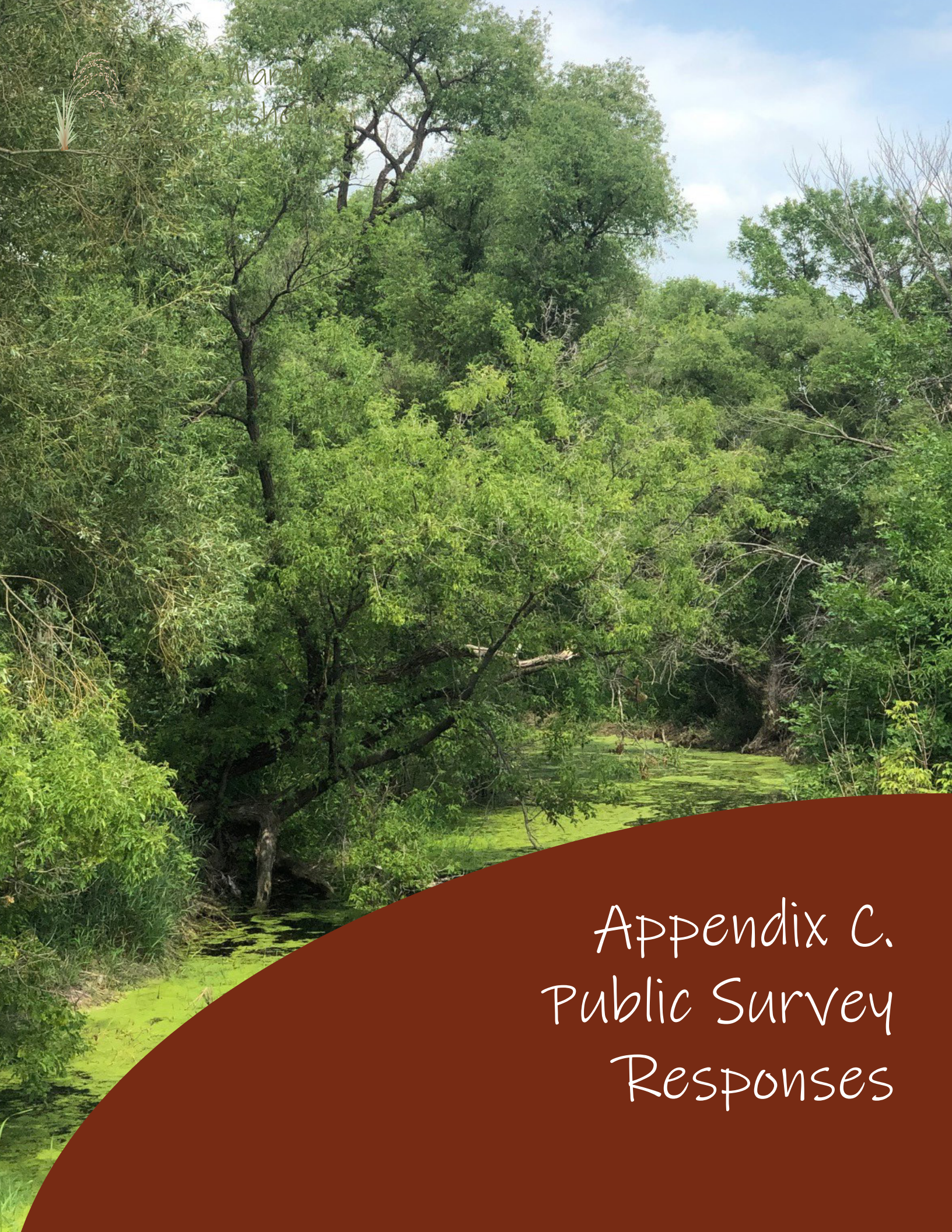
BMP Treatment Group	Funding Scenario	Number of Practices	Total 10-Year Cost (\$)	Values at Catchment Outlet		Values at Planning Region Outlet		Additional water storage (ac-ft)	Cumulative Surface area (acres)
				Sediment Reduction (tons/yr.)	TP Reduction (lbs./yr.)	Sediment Reduction (tons/yr.)	TP Reduction (lbs./yr.)		
Filtration	1	8	\$24,834	73	25	7	13	0	13
Protection		2	\$174,860	20	8	4	5	0	20
Source Reduction		1	\$45,000	35	17	5	10	0	123
Scenario 1 Total		11	\$244,694	128	50	17	28	0	156
Filtration	2	15	\$60,468	126	46	15	25	0	32
Protection		5	\$453,994	50	21	8	11	0	53
Source Reduction		1	\$117,000	35	17	5	10	0	123
Scenario 2 Total		21	\$631,462	210	84	28	47	0	208
Total Load						7,704	19,483		

*See Table 3 for a description of the NRCS practices included in each BMP Treatment Group.









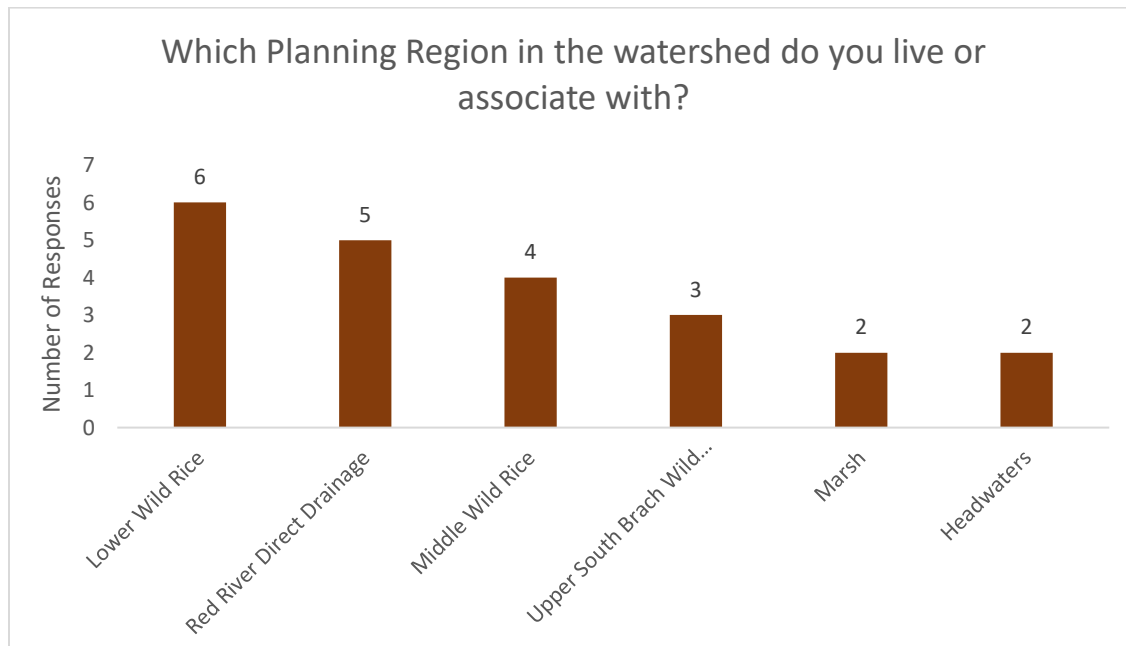
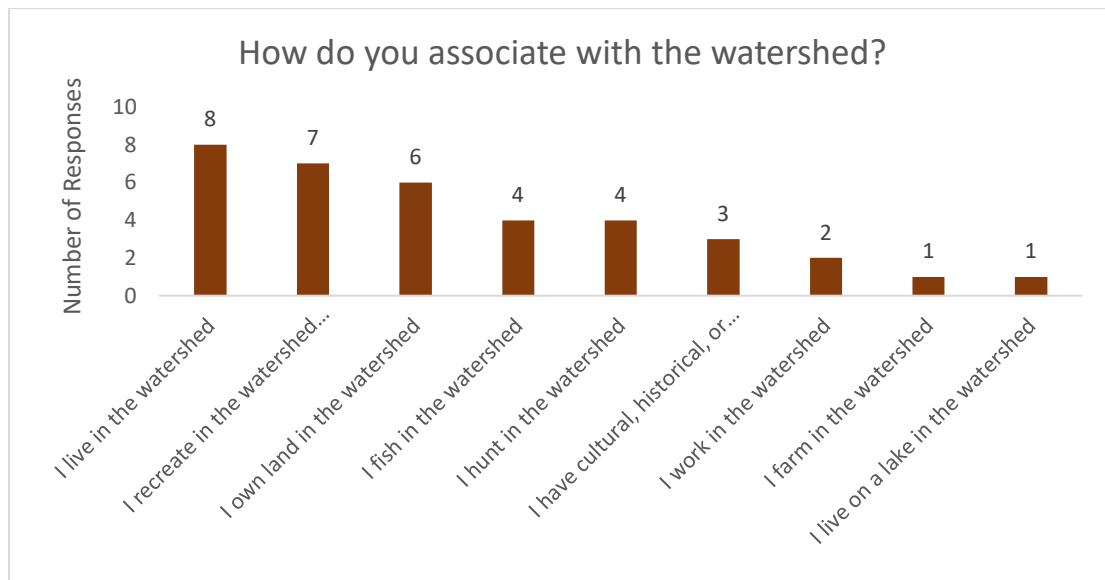
Appendix C. Public Survey Responses

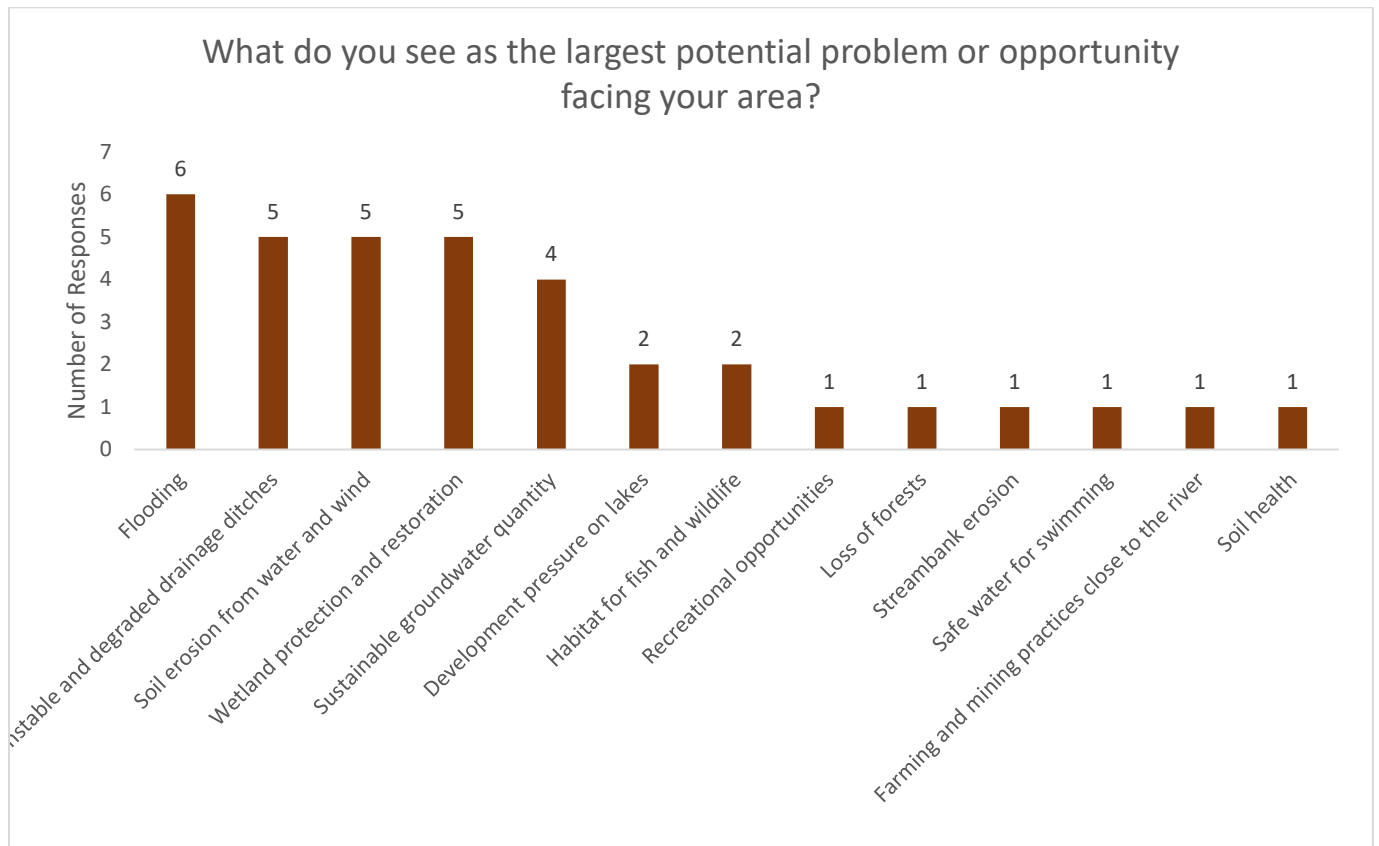
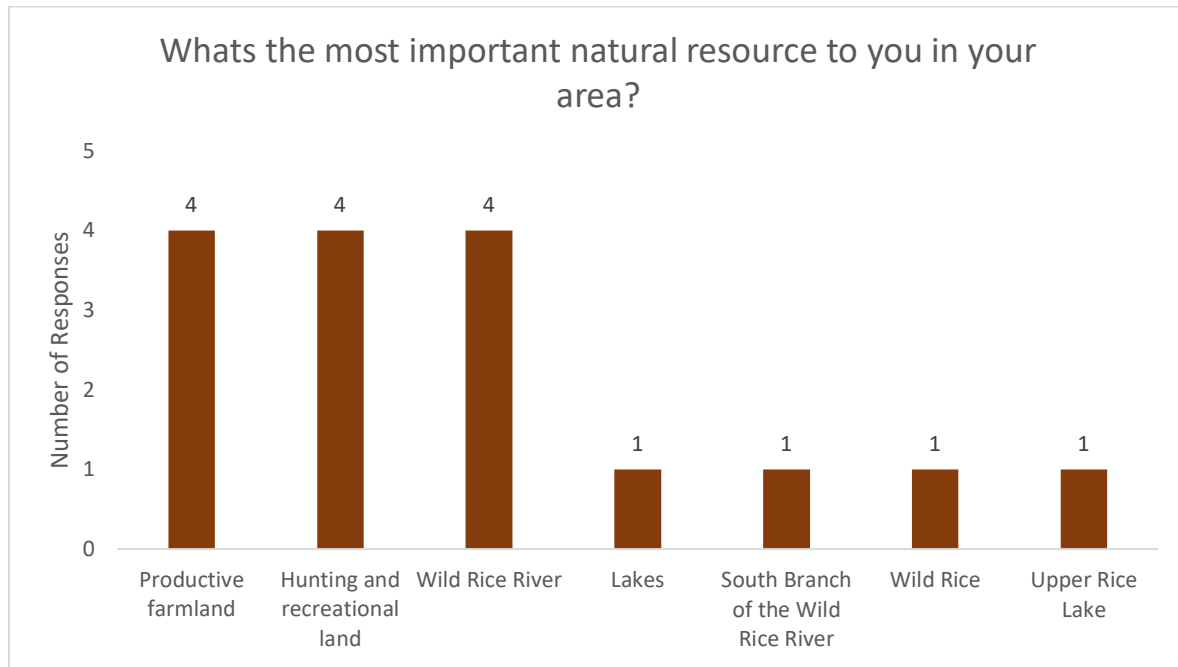
Appendix C. Public Survey Responses

On July 22, the Wild Rice – Marsh One Watershed One Plan (1W1P) partnership held their public kick-off open house. The purpose of this open house was to gather information to incorporate into the 1W1P including:

- What are their top-rated issues and opportunities they would like included in the plan?
- What resources would they like prioritized for protection and restoration?

Below is a summary of the public survey responses.

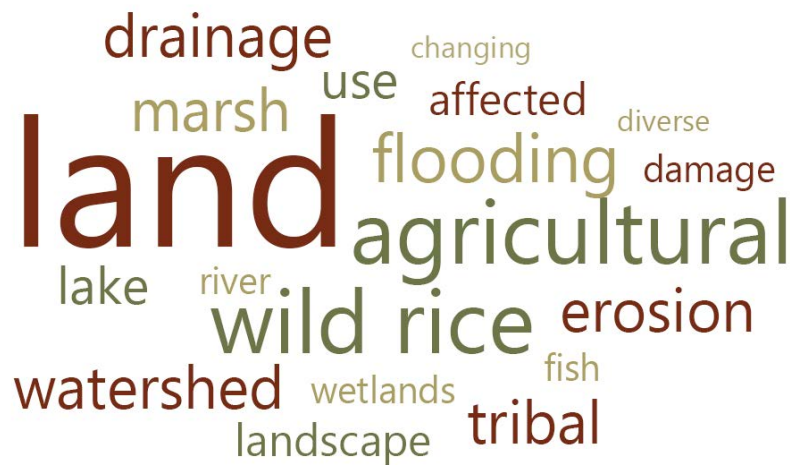




Are there any topics, resources, problems or opportunities that we didn't cover during this survey?

- Can we take monies from this 1W1P and try to maximize them by signing up for RCPP, or other matching funds or partners (DU, PF, TNC, etc...)
- Gravel mining to close to the river. Chemical run off.
- The mixture of different chemicals, etc. combined together leaching from runoff into the river could possibly cause health issues in the long term for fish, wildlife and even people.
- Tribal presence in watershed.

Using just 4-5 words, when you think of the Wild Rice - Marsh Watershed, what comes to mind?



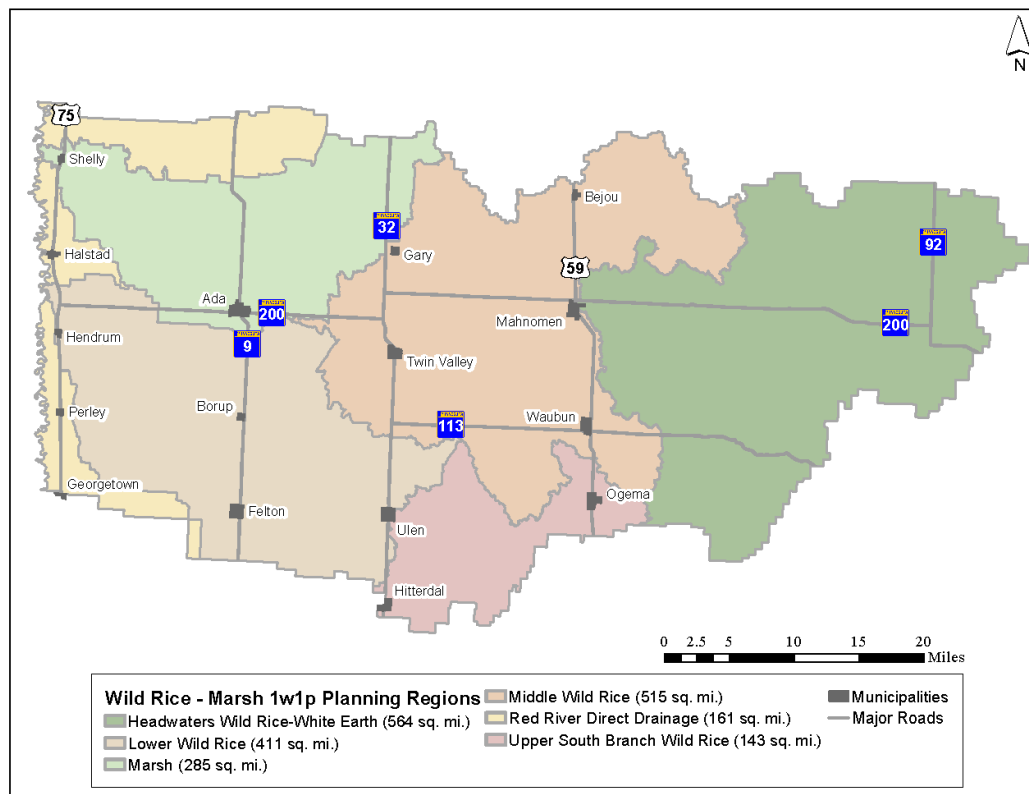
Considering the rate of land use change in the watershed, what do you think the Wild Rice - Marsh Watershed will look like in 50 years?

- I fear it will be mostly cleared, drained ag land.
- I worry about the loss of trees we are seeing and the impact that artificial drainage systems are having on the watershed.
- More agricultural.
- More developed, hopefully less run off.
- Much the same with the exception of more development around lakes.
- That depends on what is done along the watershed. I have seen water quality degrade over the past years.
- I think the wetland areas will be the most affected.

What would you like the Wild Rice - Marsh Watershed to look like in 50 years?

- Cleaner. As a small boy I use to swim in it. Today I really do not care to. The more polluted, the more apt waterborne illness type situations could possibly arise. Not to mention the fish and wildlife be affected as well.
- I would love to see an increase in trees planted, especially in the agricultural areas. We are losing tree rows by the minute it seems.
- I'd like the river system to be natural, clean and used for recreation and as a natural resource.
- More diverse land use.
- More natural areas, less channelization of streams and ditches, productive and sustainable agricultural land.
- Similar to what it is now, more public land in sensitive areas, less erosion, maintain forest connectivity.
- Buffers, restored wetlands, restore meanders.
- In the headwaters where I live I hope it will be the way it is now.

Below is a summary of suggested areas and resources for protection and restoration by Planning Region.



Headwaters

- Protect surface water by preserving trees and forests.

- Protect forest area. Focus on “lower value” land due to reduced crop output. Offer financial incentive to leave forests natural.
- Protect soil with cover crops. It will help store water. Provide financial incentives.
- Protect the streams and lakes identified by the MPCA and DNR.
- Fix ag land with steep fields. Protect them from water erosion.
- Fix unused wells. A large number of unused wells need sealing.

Middle Wild Rice

- Protect calcareous fens.
- Protect drinking water.
- Protect the 59 corridor for visitor movement.
- Fix streams and ditches. On crop land we need more buffers, side inlets, and water & sediment control structures.
- Fix cropland with slopes. Use cover crops, perennial cover and hay. We need more funding for these practices.

Lower Wild Rice

- Protect the Wild Rice – Marsh River confluence with the Red River. Grand Forks and Winnipeg reliance on drinking water supply.
- Protect Felton Prairie SNA/WMA. Protect from aggregate development. See Felton Prairie Stewardship Plan.
- Protect Felton Creek. It is a designated trout stream. Promote groundwater recharge and provide recreational access.
- Fix ditch in section 9 Lee Township. It needs outlet repair.
- Fix the upper reach of Felton Creek. There is a potential water storage site in a large cattail slough with very little open water. It would benefit wildlife and provide storage.

Upper South Branch Wild Rice

- Protect calcareous fens.
- Protect the diversity of land in the area.
- Protect groundwater supply and promote recharge near fens.

Marsh Creek

- Protect Shelly and Ada public water supplies. Groundwater used for consumption is over 10,000 years old and unique. Involve city utility staff in protection.

Red River Direct Drainage

- Fix degraded streams.
- Protect Halstad public water supply. 10,000 year old water is drawn for customers in this community. Involve the city utility staff for protection.
- Concerns that increasingly extreme weather events have the potential to impact the Red River.

Appendix D.
Altered Hydrology
Technical
Memorandum

Technical Memorandum

To: Wild Rice Planning Partnership
From: Jeremiah Jazdzewski, PE
Timothy Erickson, PE
Houston Engineering, Inc.
Subject: Wild Rice River Watershed Altered Hydrology Analysis
Date: November 27, 2019
Project: 1432-369

1. 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 (or decreases) 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 to define and quantify altered hydrology using records from 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. When addressing altered hydrology there 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 represents the likelihood of exceeding a specific daily mean discharge in the Sand Hill River. For the same likelihood of exceedance, the daily mean discharge is greater for the more recent time period (solid line is above the dashed line) indicating an increase in the daily mean discharge through most of the flow range. 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.

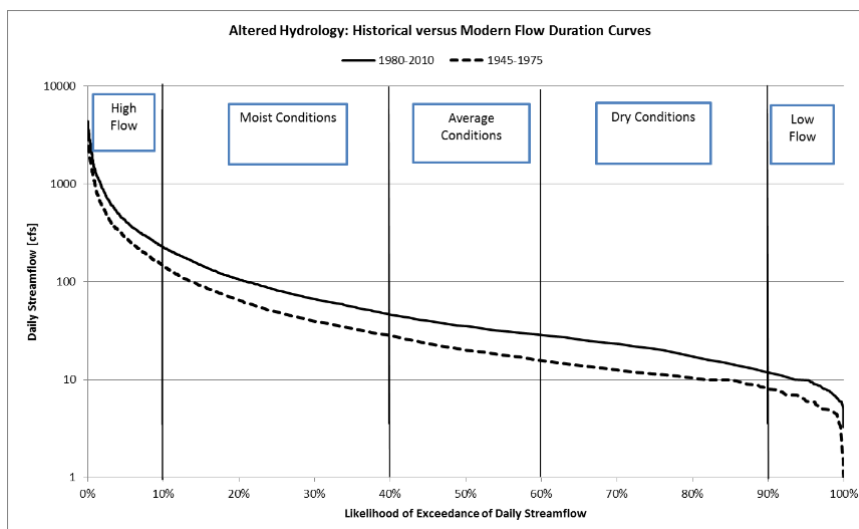


Figure 1. Flow duration curve for the Sand Hill River at Climax, Minnesota. The solid black line shows an increase in daily mean discharge for the 1980 – 2010 period, compared to the early 1945 – 1975 period.

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 has been completed and technical information developed relative to describing altered hydrology. The recently 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), 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 to 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 thorough definition of altered hydrology. Specific quantitative metrics to assess the benchmark conditions and the extent of hydrologic change 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. Actual indices of ecological diversity between the two time periods is needed. 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. A METHODOLOGY TO DEFINE ALTERED HYDROLOGY

2.1. *A Brief History of Changing Hydrology*

Streamflow in Minnesota (Novotny & Stefan, 2007) and across the contiguous United States (Lins and Slack 1999, McCabe and Wolock, 2002) have 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 the 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 two primary groups: climatic changes and landscape changes. Examples of climatic changes include changes in annual precipitation volumes, 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), subsurface (tile) and surface drainage, wetland removal/restoration, groundwater pumping, 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, implementing 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 streamflow between two time periods, as measured by a set of stream discharge metrics. The discernable change must occur through an entire annual hydrologic cycle and must exceed the discharge measurement error (i.e., 10%), 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 a 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 minimum timespan necessary to establish “normal” climate statistics in the United States. To the extent 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 the Wild Rice River at Hendrum, MN (USGS Station 05064000). 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.

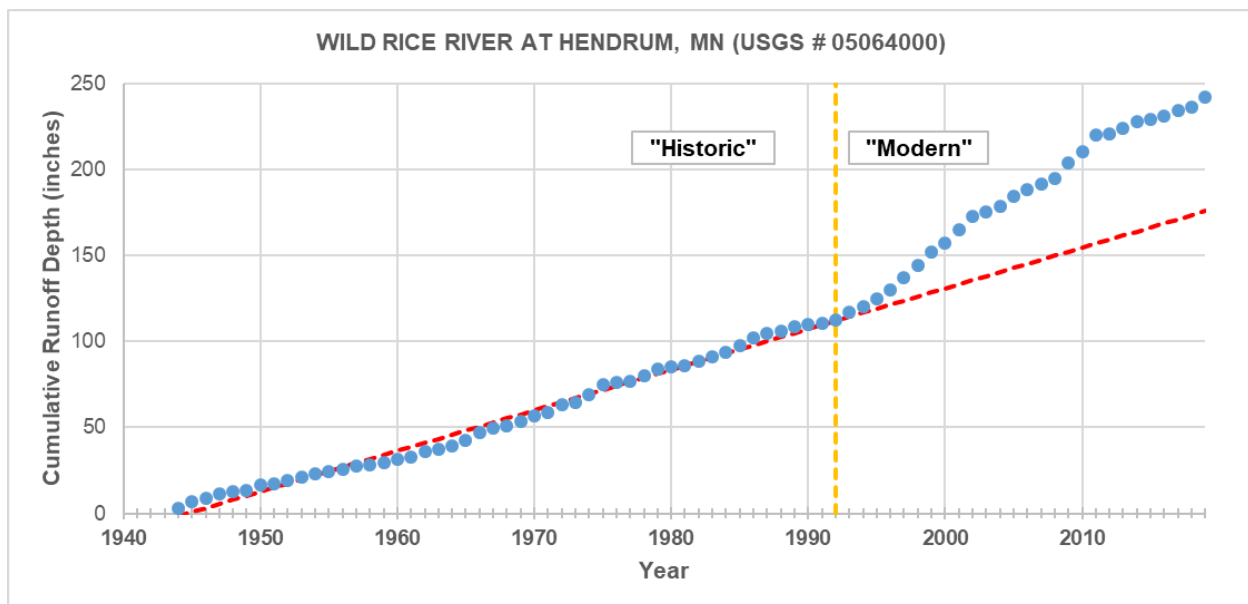


Figure 2. Cumulative streamflow for the Wild Rice River at Hendrum, MN (USGS Station 05064000).

Results from these analyses were used to determine the breakpoint 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 indicators can be problematic as many metrics often lack ecological or geomorphological meaning. Many of the metrics may also be correlated and are therefore interdependent.

The structure and therefore function of ecological systems are often “driven” by “non-normal” events; e.g., low flows associated with drought or 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	7 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.
			and		
		30 day			
		Annual	30-day median (November)		
Aquatic Organism Life Cycle	Shape (volume of flow)	Mean	Monthly average of daily means	Use the “historic” period of record to define “normal variability.” Develop a 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.
	Distribution of Flow				
	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	Days with a daily mean discharge exceeding the 10, 50, or 100-year, 24-hour discharge		
		50-year			
		100-year			
Geomorphic Stability and Capacity to Transport Sediment	Peak Discharge	1.5 year and 2 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 and 2 year	Days 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 the two separate time periods. A “+” is assigned to a metric if it shows a discernable increase in hydrologic response between the historic and modern time periods, as defined by the metric. A “-” is assigned to a metric if it shows a discernable decrease in hydrologic response between the historic and modern time periods, as defined by the metric. An “o” is assigned to a metric if it lacks a discernable increase or decrease between the historic and modern time periods, as defined by the metric.

Metrics were then placed into one of four groups based on the primary effects that altered hydrology can have on the ecological and geomorphological aspects of a river. Each metric was placed into one of the groups based on the effect that the metric measures, as a response to altered hydrology. For instance, the group relating to the condition of the aquatic habitat includes metrics that primarily reflect the flow characteristics of the annual hydrograph and represent conditions needed to maintain adequate habitat for fish and aquatic life. Each group was composed of multiple metrics. If the number of “+” values in a group of metrics 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. On the other hand, if the number of “-” values exceeds the number of “+” values, a decrease in the watershed response to precipitation is implied and the hydrology is considered altered between the two time periods.

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 in **Table 1**. It is presumed the historic period is “better” from an ecological and geomorphological perspective.

The second type of goal is a quantitative volume reduction goal. Several of the metrics within **Table 1** can be used to establish a volume reduction goal. The reduction volume is represented by the amount of storage required on the landscape to return to hydrologic response to historic conditions. Water storage on the landscape may be accomplished by a variety of structural or management projects. Projects include not only traditional storage projects, but also management strategies that increase the organic matter content (and thus water holding capacity) of soils.

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 (HSPF) and the event-based hydrology approaches like those within the Prioritize, Target and Measure Application (PTMApp).

3. ALTERED HYDROLOGY IN THE WILD RICE AND MARSH RIVERS

There are four long term USGS gaging stations within the Wild Rice River and Marsh River drainage areas (see **Table 2**).

Table 2. Available long-term USGS gage sites covering the Wild Rice and Marsh Rivers.

Stream	USGS ID	Drainage Area (sq mi)	Start Date	End Date	Observation Count ¹
Wild Rice River at Twin Valley, MN	05062500	934	7/1/1909	Present	33,437
South Branch Wild Rice River at Co. Rd. 27 near Felton, MN	05063398	190	8/16/2004	Present	5,532
Wild Rice River at Hendrum, MN	05064000	1,560	4/1/1944	Present	27,377
Marsh River near Shelly, MN	05067500	236	3/1/1944	Present	23,788

¹ As of October 13, 2019

The gage at the South Branch Wild Rice River at Co. Rd. 27 near Felton, MN (USGS #05063398) was installed in 2004 and does not have enough data to perform the altered hydrology analysis. Similarly, there are large gaps in the flow data record at the Marsh River near Shelby, MN (USGS #05067500). Therefore, results of the altered hydrology analysis can only be conducted on the remaining two sites.

The following are summaries of results from the altered hydrology analysis conducted on long-term gaging station with enough available data (USGS sites 05062500 and 05064000).

3.1. *Wild Rice River at Twin Valley, MN (USGS# 05062500)*

The USGS long-term continuous flow gaging station on the Wild Rice River at Twin Valley, MN (USGS# 05062500) monitors discharge from a drainage of approximately 934 square miles. The data record starts in 1909 and continues to operate at present day. The flow record used in this analysis was downloaded on October 10, 2019. 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**).

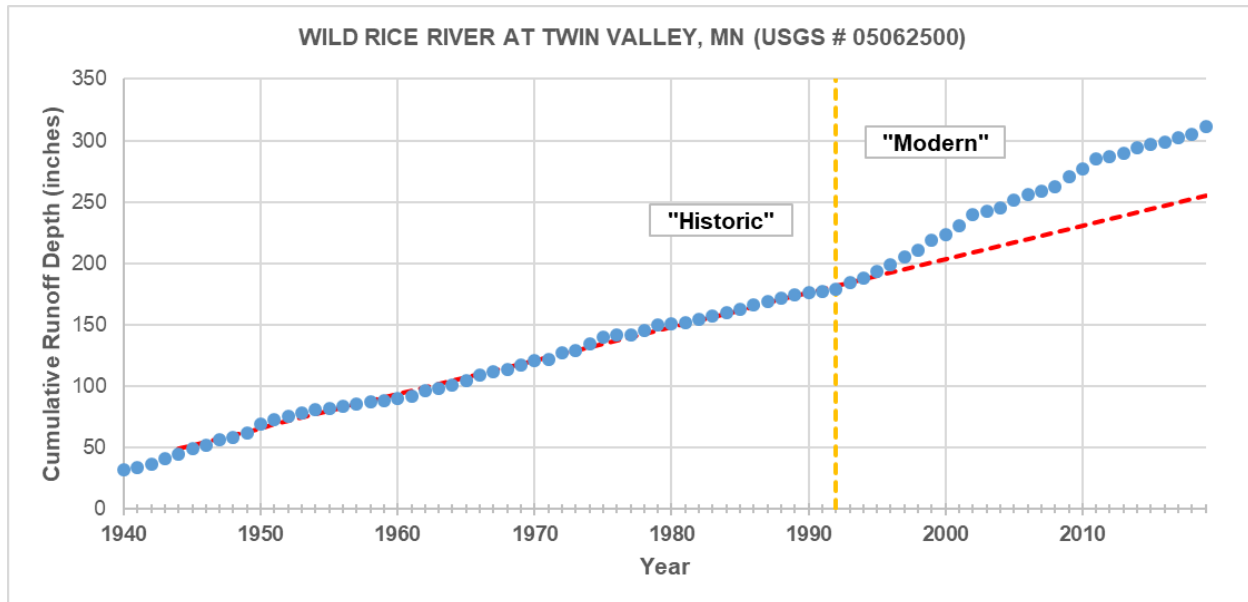


Figure 3. Cumulative streamflow for the Wild Rice River at Twin Valley, MN (USGS Station 05062500).

Additionally, the runoff (using non-cumulative annual depth values) is plotted in Figure 4.

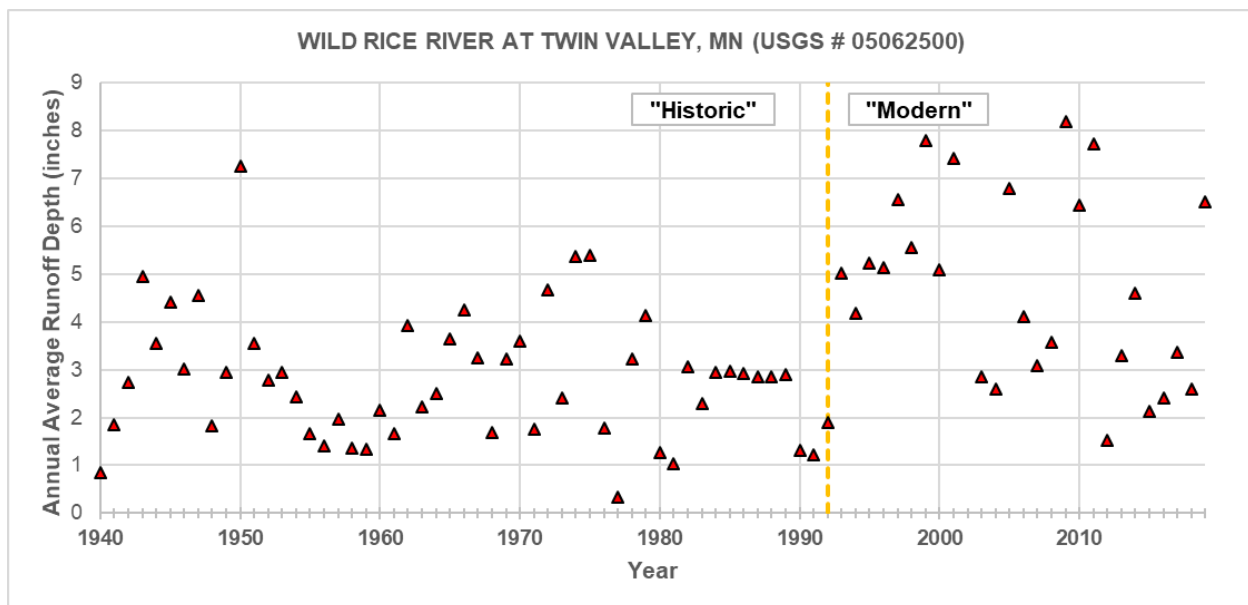


Figure 4. Average annual runoff depth for the Wild Rice River at Twin Valley, MN (USGS Station 05062500).

According to the cumulative streamflow analysis, a breakpoint exists around 1992. Therefore, the benchmark “historic” conditions include data from 1967 through 1991 and the altered “modern” conditions include data from 1992 through 2018. This results in a comparison period of 26 years.

A summary of the results from the altered hydrology analysis is provided in **Table 3**. 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 3. Altered Hydrology Summary for the Wild Rice River at Twin Valley, MN (USGS Station 05062500).

Group	Metric	% Difference	Altered Hydrology Metric	Evidence of Altered Hydrology for Group
Aquatic Habitat	10-year, Annual Minimum 30-day Mean Daily Discharge	141.3%	+	Yes, Increasing
	10-year, Annual Minimum 7-day Mean Daily Discharge	159.2%	+	
	Median November (Winter Base) Flow	134.3%	+	
Aquatic Organism Life Cycle	Magnitude of Monthly Runoff Volumes	6.1% - 221.0%	o	No Trend
	Distribution of Monthly Runoff Volumes	-35.9% - 93.9%	o	
	Timing of Annual Peak Discharge	19.63%	+	
	Timing of Annual Minimum Discharge	2.44%	o	
Riparian Floodplain (Lateral) Connectivity	10-year Peak Discharge Rate	51.09%	+	Yes, Increasing
	50-year Peak Discharge Rate	42.21%	+	
	100-year Peak Discharge Rate	40.75%	+	
	Average Cumulative Volume above the Historic 10-year Peak Discharge	187.80%	+	
	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	107.71%	+	Yes, Increasing
	2-year Peak Discharge Rate	86.88%	+	
	Average Cumulative Volume above the Historic 1.5-year Peak Discharge	67.22%	+	
	Average Cumulative Volume above the Historic 2-year Peak Discharge	81.59%	+	
	Duration above the Historic 1.5-year Peak Discharge	24.62%	+	
	Duration above the Historic 2-year Peak Discharge	39.39%	+	
	Flow Duration Curve	40.0% - 303.0%	+	

+ 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

3.2. Wild Rice River at Hendrum, MN (USGS# 05064000)

The USGS long-term continuous flow gaging station on the Wild Rice River at Hendrum, MN (USGS# 05064000) monitors discharge from a drainage of approximately 1,560 square miles. The data record starts in 1944 and continues to operate at present day. The flow record used in this analysis was downloaded on October 10, 2019. The site includes both daily average streamflow records and peak flow measurements.

Figure 5 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**).

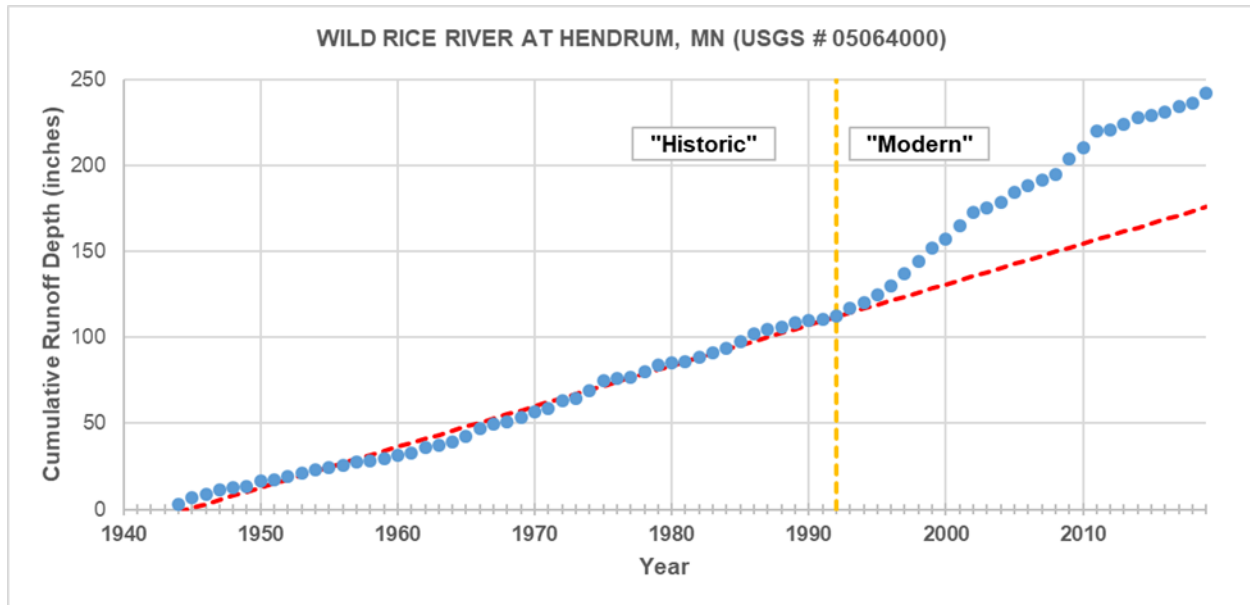


Figure 5. Cumulative streamflow for the Wild Rice River at Hendrum, MN (USGS# 05064000).

Additionally, the runoff (using non-cumulative annual depth values) is plotted in **Figure 4**.

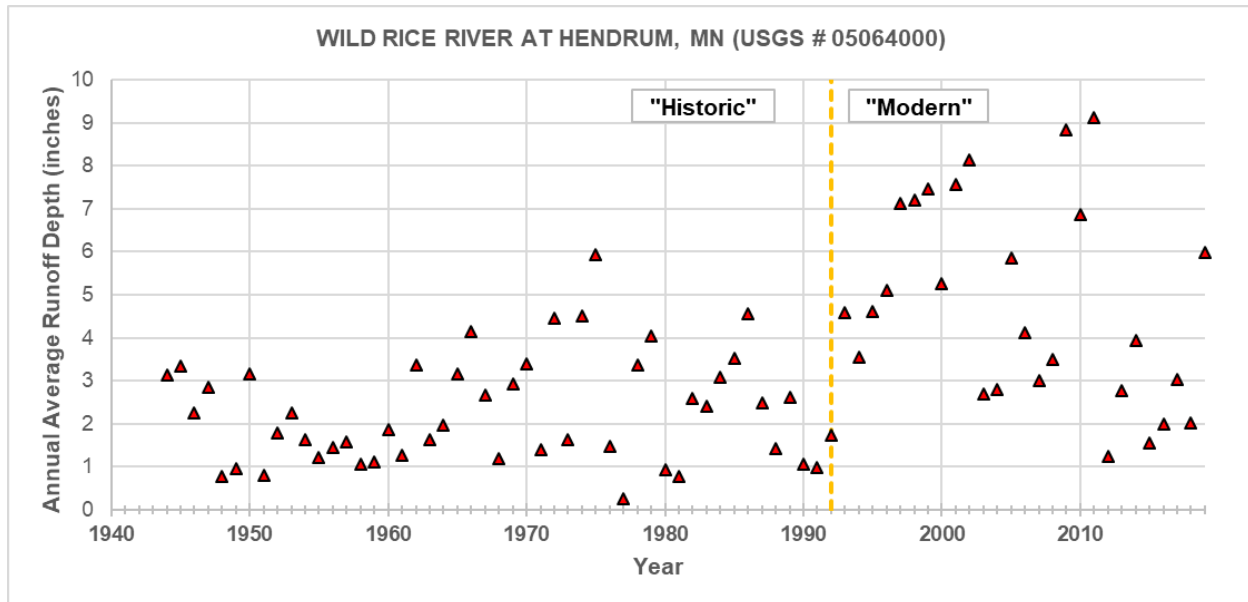


Figure 6. Average annual runoff depth for the Wild Rice River at Hendrum, MN (USGS Station 05064000).

According to the cumulative streamflow analysis, a breakpoint exists around 1992. Therefore, the benchmark “historic” conditions include data from 1967 through 1991 and the altered “modern” conditions include data from 1992 through 2018. This results in a comparison period of 26 years.

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

Table 4. Altered Hydrology Summary for the Wild Rice River at Hendrum, MN (USGS# 05064000).

Group	Metric	% Difference	Altered Hydrology Metric	Evidence of Altered Hydrology for Group
Aquatic Habitat	10-year, Annual Minimum 30-day Mean Daily Discharge	740.9%	+	Yes, Increasing
	10-year, Annual Minimum 7-day Mean Daily Discharge	1,317.9%	+	
	Median November (Winter Base) Flow	108.0%	+	
Aquatic Organism Life Cycle	Magnitude of Monthly Runoff Volumes	12.7% - 211.8%	+	Yes, Increasing
	Distribution of Monthly Runoff Volumes	-34.9% - 80.1%	o	
	Timing of Annual Peak Discharge	14.29%	+	
	Timing of Annual Minimum Discharge	9.57%	o	
Riparian Floodplain (Lateral) Connectivity	10-year Peak Discharge Rate	21.97%	+	Yes, Increasing
	50-year Peak Discharge Rate	16.54%	+	
	100-year Peak Discharge Rate	15.87%	+	
	Average Cumulative Volume above the Historic 10-year Peak Discharge	84.96%	+	
	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	62.26%	+	Yes, Increasing
	2-year Peak Discharge Rate	47.07%	+	
	Average Cumulative Volume above the Historic 1.5-year Peak Discharge	68.04%	+	
	Average Cumulative Volume above the Historic 2-year Peak Discharge	74.62%	+	
	Duration above the Historic 1.5-year Peak Discharge	40.47%	+	
	Duration above the Historic 2-year Peak Discharge	58.45%	+	
	Flow Duration Curve	17.5% - 10,562.5%	+	

+ 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

4. STORAGE GOALS

Goals for addressing the change in hydrology were estimated using four methods. Each method is based on different assumptions and a different set of metrics for a specific “altered hydrology” group. The first method is focused on the aquatic habitat metric group and the geomorphic stability and capacity to transport sediment metric group. This method 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, and the associated storage goal, 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 time 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 (1.5-year, 2-year, 5-year, 10-year, 25-year, 50-year, and 100-year return period events) between the modern and historic period, finding a probability-weighted representative change in flow rate for each return period event. A storage goal 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 two. Method three 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 multiplies the flow rates by the change in the number of days exceeding the return period flow for each return period. Method four estimates a storage goal based on changes in the flow duration curve (FDC) (see **Figures A-6 and B-6**). Method four integrates the changes in the FDC between the two periods and applies the probability of each flow to occur.

This analysis presents a preliminary framework for defining altered hydrology, applying a method to determine whether altered hydrology has occurred, and establishes a goal for relating to proposed projects. The storage goals are provided in **Table 5** 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. The average storage goals are 0.43 inches for areas upstream of the Wild Rice River at Twin Valley, MN and 0.38 inches for areas upstream of the Wild Rice River at Hendrum, MN. 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 the peak of the hydrograph. The means 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 5. Storage goals for the Wild Rice watershed.

Stream	USGS ID	Storage Targets			
		Method 1	Method 2	Method 3	Method 4
Wild Rice River at Twin Valley, MN	05062500	0.39 in.	0.50 in.	0.33 in.	0.51 in.
Wild Rice River at Hendrum, MN	05064000	0.45 in.	0.36 in.	0.27 in.	0.43 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 WILD RICE RIVER AT TWIN VALLEY, MN (USGS# 05062500)

The following provides the summary statistics used to determine the altered hydrology metrics and develop the volume reduction goals. A summary of these statistic is shown in **Table 3** 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 30-day low flow, the 7-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**.

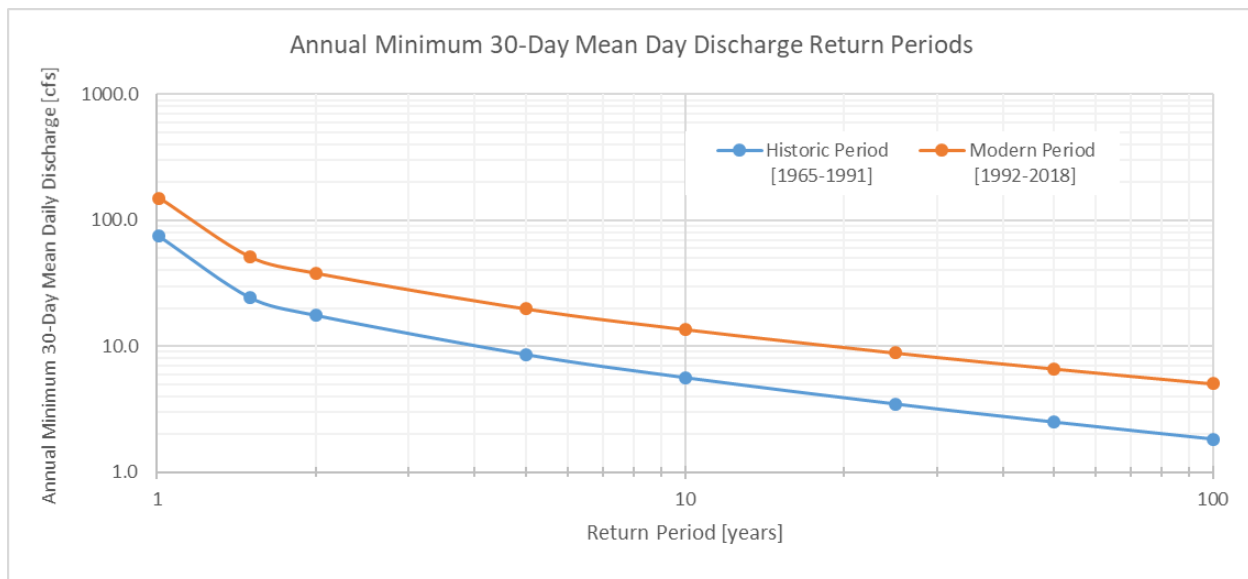


Figure A-1. Historical versus modern annual minimum 30-day mean daily discharge versus return period for the Wild Rice River at Twin Valley, MN (USGS Station 05062500).

Table A-1. Summary of annual minimum 30-day mean daily discharge by return periods for Wild Rice River at Twin Valley, MN (USGS Station 05062500).

Return Period	Historic Period [1965-1991]	Modern Period [1992-2018]	% Diff	Altered Hydrology Criterion
1.01	74.4	149.7	101.1%	+
1.5	24.3	51.2	110.8%	+
2	17.5	37.9	116.1%	+
5	8.6	19.8	130.9%	+
10	5.6	13.6	141.3%	+
25	3.5	8.8	155.0%	+
50	2.5	6.6	165.4%	+
100	1.8	5.0	175.9%	+

+ 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.1.2 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**.

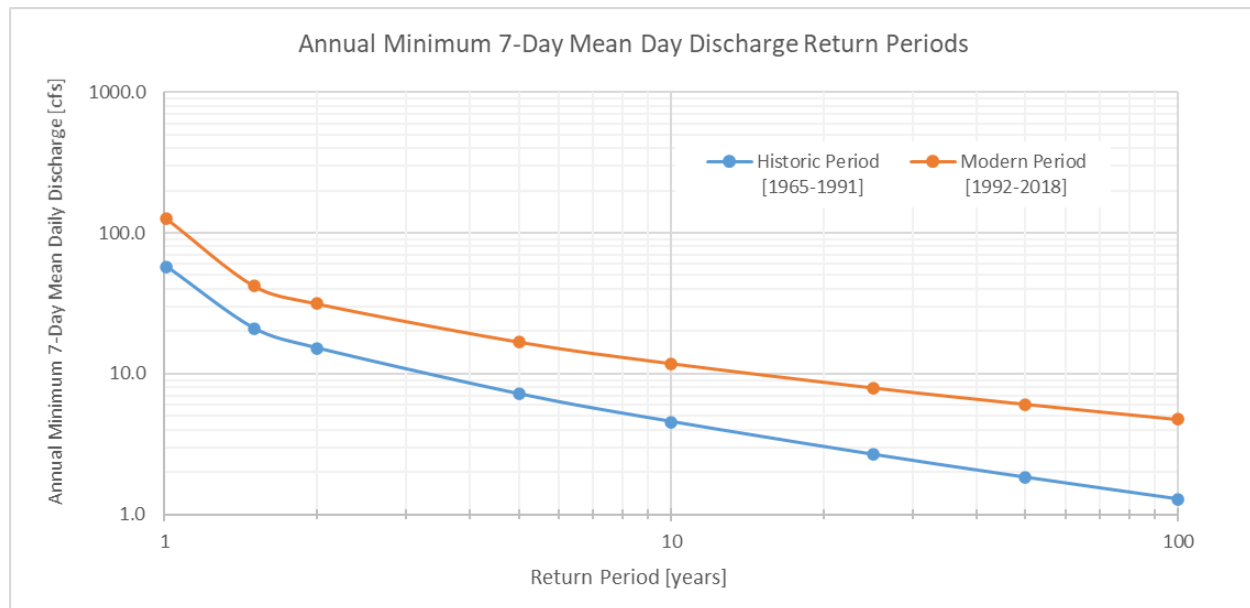


Figure A-2. Historical versus modern annual minimum 7-day mean daily discharge return periods for the Wild Rice River at Twin Valley, MN (USGS Station 05062500).

Table A-2. Summary of annual minimum 7-day mean daily discharge return periods for the Wild Rice River at Twin Valley, MN (USGS Station 05062500).

Return Period	Historic Period [1965-1991]	Modern Period [1992-2018]	% Diff	Altered Hydrology Criterion
1.0101	57.2	125.5	119.3%	+
1.5	21.0	42.0	100.3%	+
2	15.2	31.3	106.5%	+
5	7.2	16.8	134.0%	+
10	4.6	11.8	159.2%	+
25	2.7	7.9	197.7%	+
50	1.8	6.1	231.0%	+
100	1.3	4.7	268.5%	+

+ 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 Wild Rice River at Twin Valley, MN (USGS Station 05062500).

Return Period	Historic Period [1965-1991]	Modern Period [1992-2018]	% Diff.	Altered Hydrology Criterion
Period median November flow [cfs]	70.0	164.0	134.3%	+

+ 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**.

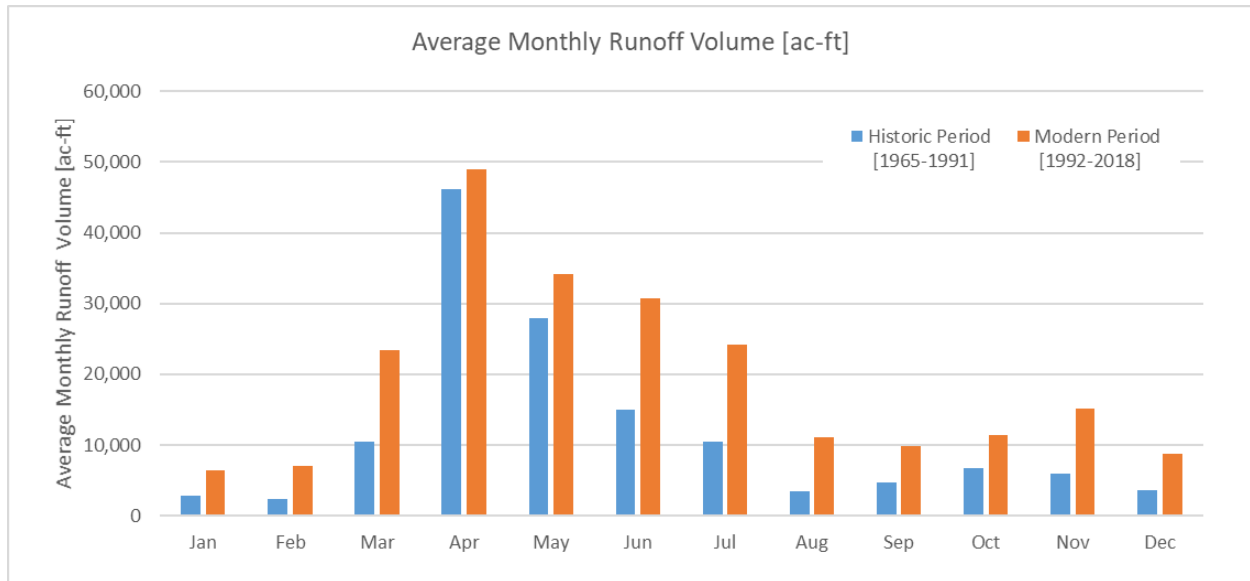


Figure A-3. Average monthly runoff volume [ac-ft] in the Wild Rice River at Twin Valley, MN (USGS Station 05062500).

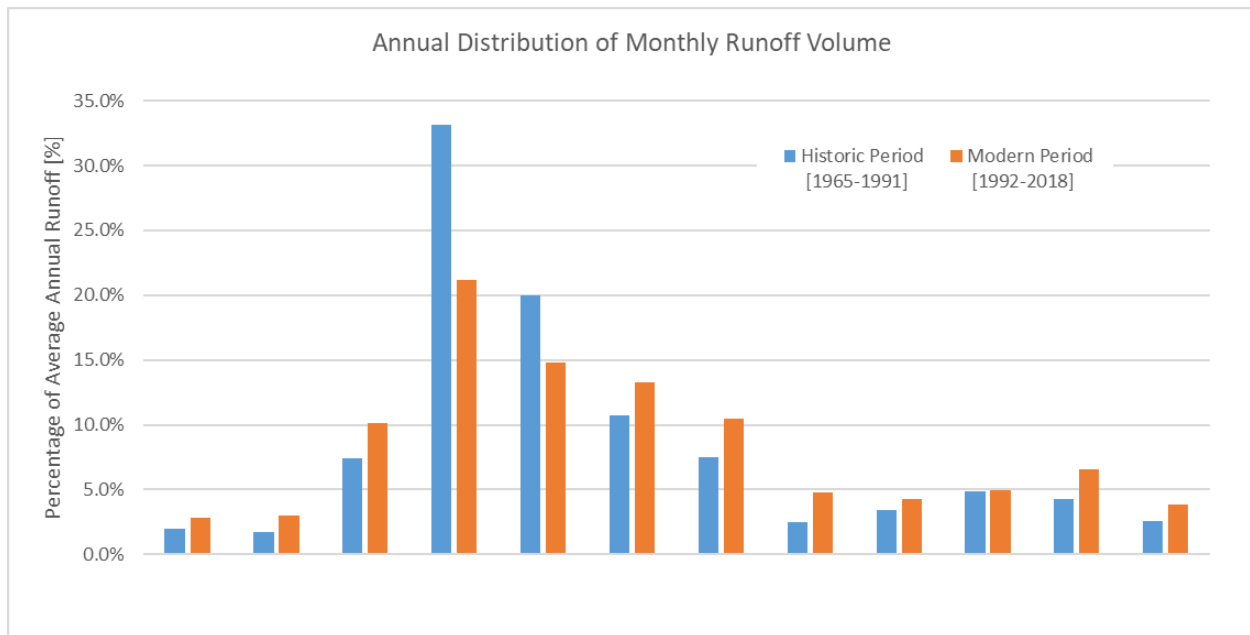


Figure A-4. Annual distribution of average monthly runoff volume as a percentage of annual total volume in the Wild Rice River at Twin Valley, MN (USGS Station 05062500).

Table A-4. Average monthly runoff volume and annual distribution of monthly runoff volumes in the Wild Rice River at Twin Valley, MN (USGS Station 05062500).

Month	Average Monthly Volumes [ac-ft]				Distribution of Annual Volume			
	Historic Period [1965-1991]	Modern Period [1992-2018]	% diff.	AH	Historic Period [1965-1991]	Modern Period [1992-2018]	% diff.	AH
Jan	2,765	6,455	133.5%	+	2.0%	2.8%	41.0%	+
Feb	2,387	7,012	193.8%	+	1.7%	3.0%	77.4%	+
Mar	10,387	23,332	124.6%	+	7.4%	10.1%	35.6%	+
Apr	46,227	49,048	6.1%	o	33.1%	21.2%	-35.9%	-
May	27,949	34,194	22.3%	+	20.0%	14.8%	-26.1%	-
Jun	14,952	30,695	105.3%	+	10.7%	13.3%	24.0%	+
Jul	10,459	24,161	131.0%	+	7.5%	10.4%	39.5%	+
Aug	3,474	11,152	221.0%	+	2.5%	4.8%	93.9%	+
Sep	4,762	9,839	106.6%	+	3.4%	4.3%	24.8%	+
Oct	6,739	11,414	69.4%	+	4.8%	4.9%	2.3%	o
Nov	5,995	15,164	153.0%	+	4.3%	6.6%	52.7%	+
Dec	3,561	8,819	147.6%	+	2.5%	3.8%	49.5%	+

+ 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 typically 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 (mean), 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 Wild Rice River at Twin Valley, MN (USGS Station 05062500).

Statistic	Historic Period [1965-1991]	Modern Period [1992-2018]	% diff.	AH
Average	27-Apr	20-May	19.63%	+
Median	12-Apr	14-May	31.37%	+
Standard Deviation	48 days	64 days	32.09%	+

+ 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

Based on 365-day year

Table A-6. Julian Day of annual minimum flow in the Wild Rice River at Twin Valley, MN (USGS Station 05062500).

Statistic	Historic Period [1965-1991]	Modern Period [1992-2018]	% diff.	AH
Average	4-Sep	10-Sep	2.44%	o
Median	15-Sep	29-Sep	5.43%	o
Standard Deviation	55 days	60 days	8.26%	o

+ 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

Based on 365-day year

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**.

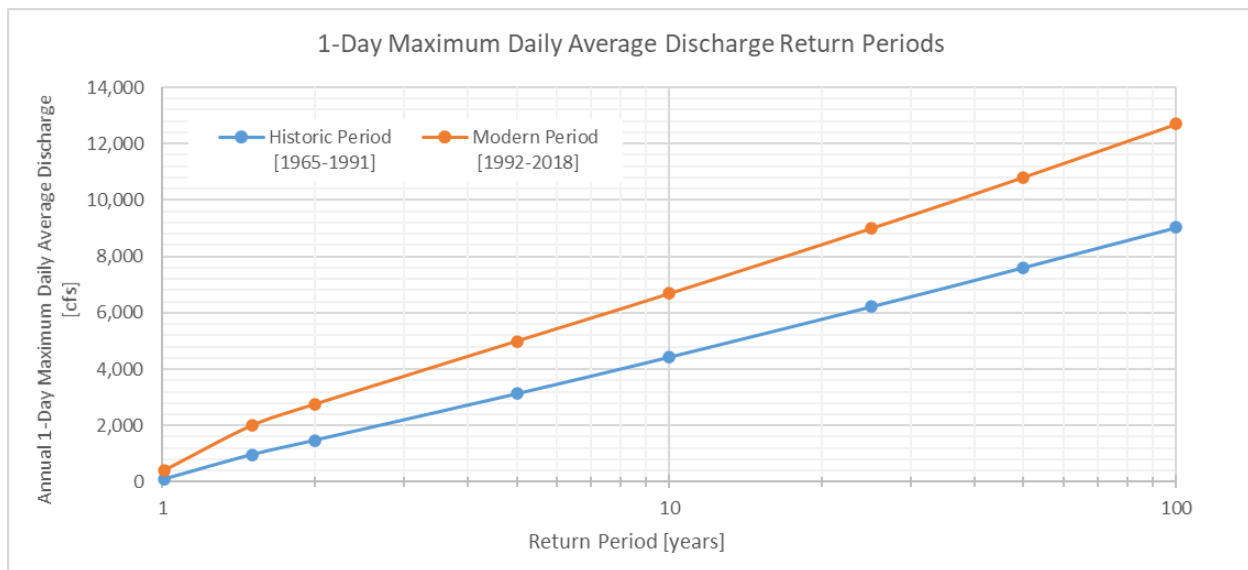


Figure A-5. Historical (1963-1990) versus modern (1991-2018) peak discharge return periods for the Wild Rice River at Twin Valley, MN (USGS Station 05062500).

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 Wild Rice River at Twin Valley, MN (USGS Station 05062500).

Flow Metric	Historic Period [1965-1991]	Modern Period [1992-2018]	% Diff. ¹	Altered Hydrology
5-Year Peak Discharge, Q(5) [cfs]	3,122	4,992	59.9%	+
Number of years with Discharge (Q) > Q _H (5)	5	11	120.0%	+
Average number of days per year Q > Q _H (5)	2	5	100.8%	+
Average annual cumulative volume > Q _H (5) [ac-ft]	4,764	13,460	182.5%	+
10-Year Peak Discharge, Q(10) [cfs]	4,422	6,682	51.1%	+
Number of years with Discharge (Q) > Q _H (10)	2	7	250.0%	+
Average number of days per year Q > Q _H (10)	2	3	100.0%	+
Average annual cumulative volume > Q _H (10) [ac-ft]	3,018	8,685	187.8%	+
25-Year Peak Discharge, Q(25) [cfs]	6,209	8,992	44.8%	+
Number of years with Discharge (Q) > Q _H (25)	0	3	NA	o
Average number of days per year Q > Q _H (25)	0	2	NA	o
Average annual cumulative volume > Q _H (25) [ac-ft]	0	7,103	NA	o
50-Year Peak Discharge, Q(50) [cfs]	7,602	10,811	42.2%	+
Number of years with Discharge (Q) > Q _H (50)	0	2	NA	o
Average number of days per year Q > Q _H (50)	0	2	NA	o
Average annual cumulative volume > Q _H (50) [ac-ft]	0	4,644	NA	o
100-Year Peak Discharge, Q(100) [cfs]	9,020	12,696	40.7%	+
Number of years with Discharge (Q) > Q _H (100)	0	1	NA	o
Average number of days per year Q > Q _H (100)	0	1	NA	o
Average annual cumulative volume > Q _H (100) [ac-ft]	0	3,530	NA	o

+ 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

¹NA = No events occurred above return period discharge.

A.4 Geomorphic Stability and Capacity to Transport Sediment

The metrics pertaining to geomorphic stability and capacity to transport sediment 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** has 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.

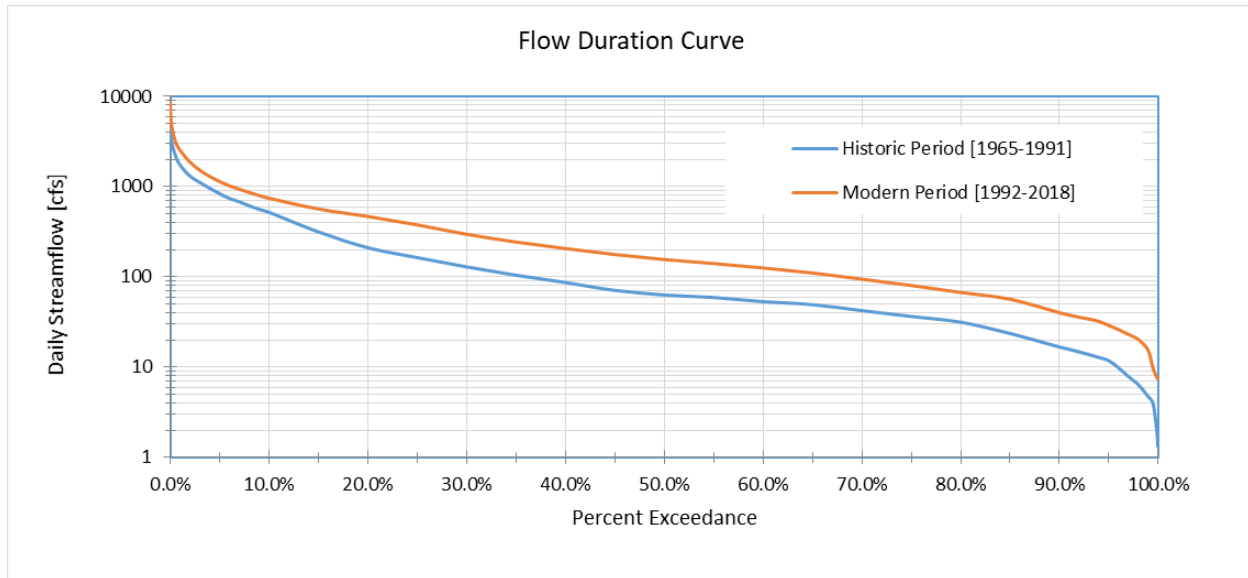


Figure A-6. Historical (1963-1990) versus modern (1991-2018) flow duration for the Wild Rice River at Twin Valley, MN (USGS Station 05062500).

Table A-8. Select summary of stream flows for various percent exceedance values from the flow duration curves for the Wild Rice River at Twin Valley, MN (USGS Station 05062500).

Percent Exceedance	Historic Period [1965-1991]	Modern Period [1992-2018]	% Diff.	Altered Hydrology
0.10%	3,426	5,151	50.4%	+
1.0%	1,760	2,510	42.7%	+
10.0%	528	739	40.0%	+
25.0%	166	375	125.9%	+
50.0%	64	155	142.2%	+
75.0%	43	94	118.6%	+
90.0%	17	40	135.3%	+
99.0%	5	15	219.5%	+
99.9%	2	8	303.0%	+

+ 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

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 Wild Rice River at Twin Valley, MN (USGS Station 05062500).

Flow Metric	Historic Period [1965-1991]	Modern Period [1992-2018]	% Diff.	Altered Hydrology
1.5-Year Peak Discharge, $Q(1.5)$ [cfs]	961	1,995	107.7%	+
Number of years with Discharge (Q) > $Q_H(1.5)$	13	22	69.2%	+
Average number of days per year $Q > Q_H(1.5)$	24	30	24.6%	+
Average annual cumulative volume > $Q_H(1.5)$ [ac-ft]	29,093	48,650	67.2%	+
2-Year Peak Discharge, $Q(2)$ [cfs]	1,475	2,756	86.9%	+
Number of years with Discharge (Q) > $Q_H(2)$	11	21	90.9%	+
Average number of days per year $Q > Q_H(2)$	11	15	39.4%	+
Average annual cumulative volume > $Q_H(2)$ [ac-ft]	16,044	29,134	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

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 a different set of metrics for a specific “altered hydrology” group. The first method is focused on the metric groups focused on aquatic habitat and also the geomorphic stability and ability to transport sediment, 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 storage goal based on observed flows is **19,557 AF or 0.39 inches** across the watershed.

The second method is based on the changes in hydrology across the entire annual hydrograph. This method 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 Wild Rice River at Twin Valley, MN (USGS Station 05062500) using Method 2.

Return Period	Historic Period Discharges (cfs)	Modern Period Discharges (cfs)	Difference (cfs)	Probability of Occurrence	Difference*Probability (cfs)
1.5	961	1,995	1035	0.67	689.8
2	1,475	2,756	1281	0.50	640.6
5	3,122	4,992	1869	0.20	373.9
10	4,422	6,682	2259	0.10	225.9
25	6,209	8,992	2783	0.04	111.3
50	7,602	10,811	3209	0.02	64.2
100	9,020	12,696	3676	0.01	36.8
				Sum (cfs):	2,143
				Sum (ac-ft/day):	4,251
Number of days:			6	Total Volume Goal:	25,118 AF (0.50 in.)

The third method is also based on addressing the effects through the entire flow range and is a revision to Method two. Method three 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 multiplies 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 Wild Rice River at Twin Valley, MN (USGS Station 05062500) 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	1,035	0.67	1,368.6	6	8,087
2	1,281	0.50	1,271.0	4	5,370
5	1,869	0.20	741.8	2	1,794
10	2,259	0.10	448.3	2	672
25	2,783	0.04	220.8	2	368
50	3,209	0.02	127.3	2	255
100	3,676	0.01	72.9	1	73
				Total Volume Goal:	16,619 AF (0.33 in.)

The fourth method integrates the changes in the FDC (see **Figure A-6**) and the probability of occurrence of each flow. The fourth method estimated a storage goal of **25,475 AF, or 0.51 inches**, across the watershed.

APPENDIX B: METRICS OF ALTERED HYDROLOGY FOR THE WILD RICE RIVER AT HENDRUM, MN (USGS# 05064000)

The following provides the summary statistics used to determine the altered hydrology metrics and develop the volume reduction goals. A summary of these statistic is shown in **Table 3** in **Section 3.2**.

B.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 30-day low flow, the 7-day low flow, and the median November mean daily discharge are metrics used to represent changes in the availability of flow for aquatic habitat.

B.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 B-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 B-1** summarizes the data shown in **Figure B-1**.

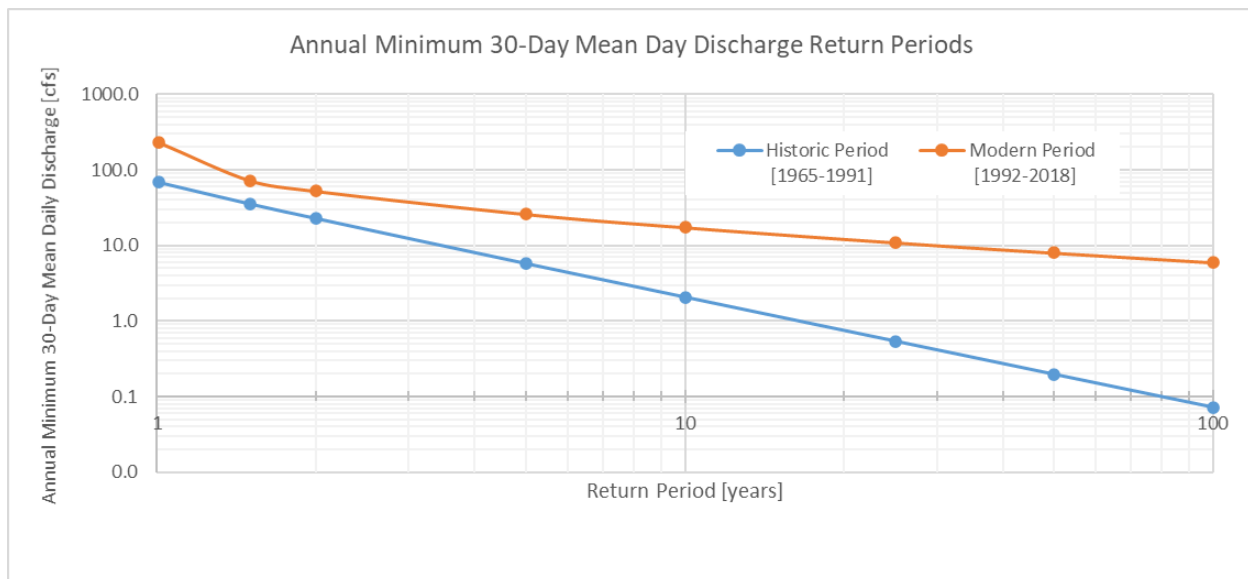


Figure B-1. Historical versus modern annual minimum 30-day mean daily discharge versus return period for the Wild Rice River at Hendrum, MN (USGS Station 05064000).

Table B-1. Summary of annual minimum 30-day mean daily discharge by return periods for Wild Rice River at Twin Valley, MN (USGS Station 05062500).

Return Period	Historic Period [1965-1991]	Modern Period [1992-2018]	% Diff	Altered Hydrology Criterion
1.01	68.2	231.3	239.3%	+
1.5	35.5	72.7	104.9%	+
2	22.8	52.6	131.0%	+
5	5.8	26.1	352.9%	+
10	2.1	17.4	740.9%	+
25	0.5	11.0	1930.8%	+
50	0.2	8.0	3975.8%	+
100	0.1	6.0	8225.0%	+

+ 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

B.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 B-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 B-2** summarizes the data shown in **Figure B-2**.

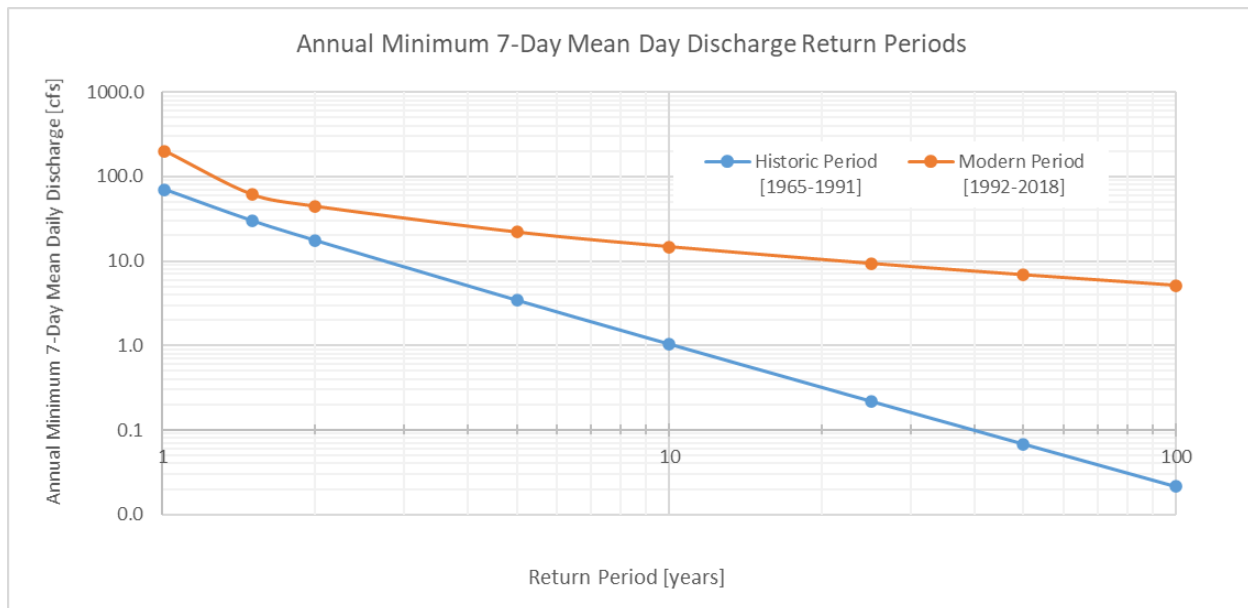


Figure B-2. Historical versus modern annual minimum 7-day mean daily discharge return periods for the Wild Rice River at Hendrum, MN (USGS Station 05064000).

Table B-2. Summary of annual minimum 7-day mean daily discharge return periods for the Wild Rice River at Hendrum, MN (USGS Station 05064000).

Return Period	Historic Period [1965-1991]	Modern Period [1992-2018]	% Diff	Altered Hydrology Criterion
1.0101	70.2	199.1	183.7%	+
1.5	30.1	61.2	103.3%	+
2	17.5	44.2	152.1%	+
5	3.4	22.0	540.2%	+
10	1.0	14.8	1317.9%	+
25	0.2	9.4	4171.8%	+
50	0.1	6.9	9977.8%	+
100	0.0	5.2	24016.1%	+

+ 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

B.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 B-3** provides the median November flow for each period.

Table B-3. Historical and modern median November flow for the Wild Rice River at Hendrum, MN (USGS Station 05064000).

Return Period	Historic Period [1965-1991]	Modern Period [1992-2018]	% Diff.	Altered Hydrology Criterion
Period median November flow [cfs]	100.0	208.0	108.0%	+

+ 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

B.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.

B.1.4 Annual Distribution of Discharges

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

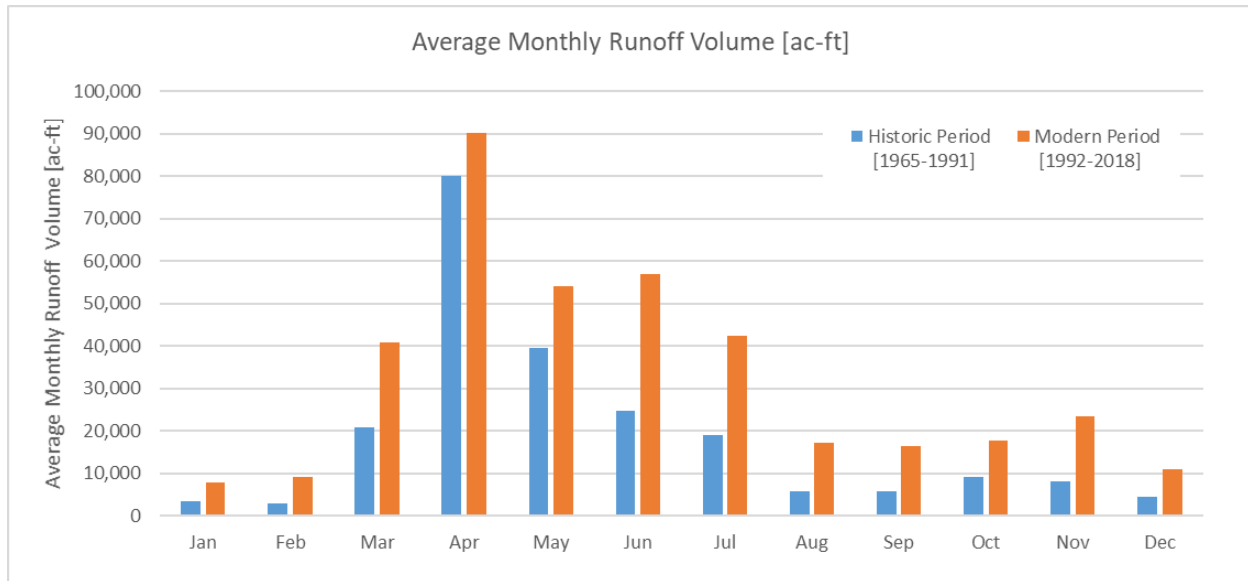


Figure B-3. Average monthly runoff volume [ac-ft] in the Wild Rice River at Hendrum, MN (USGS Station 05064000).

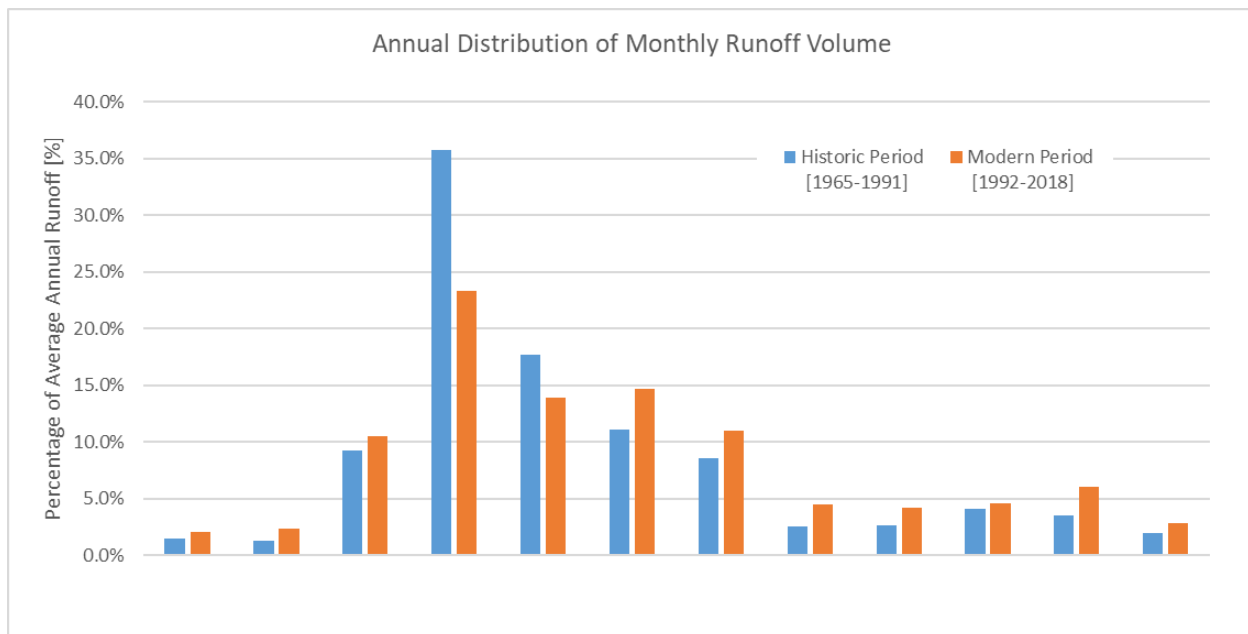


Figure B-4. Annual distribution of average monthly runoff volume as a percentage of annual total volume in the Wild Rice River at Hendrum, MN (USGS Station 05064000).

Table B-4. Average monthly runoff volume and annual distribution of monthly runoff volumes in the Wild Rice River at Hendrum, MN (USGS Station 05064000).

Month	Average Monthly Volumes [ac-ft]				Distribution of Annual Volume			
	Historic Period [1965-1991]	Modern Period [1992-2018]	% diff.	AH	Historic Period [1965-1991]	Modern Period [1992-2018]	% diff.	AH
Jan	3,305	7,868	138.1%	+	1.5%	2.0%	37.5%	+
Feb	2,965	9,245	211.8%	+	1.3%	2.4%	80.1%	+
Mar	20,769	40,793	96.4%	+	9.3%	10.5%	13.4%	+
Apr	80,002	90,193	12.7%	+	35.8%	23.3%	-34.9%	-
May	39,627	54,008	36.3%	+	17.7%	13.9%	-21.3%	-
Jun	24,817	56,924	129.4%	+	11.1%	14.7%	32.5%	+
Jul	19,079	42,418	122.3%	+	8.5%	11.0%	28.4%	+
Aug	5,678	17,283	204.4%	+	2.5%	4.5%	75.8%	+
Sep	5,857	16,443	180.7%	+	2.6%	4.2%	62.1%	+
Oct	9,137	17,800	94.8%	+	4.1%	4.6%	12.5%	+
Nov	7,981	23,329	192.3%	+	3.6%	6.0%	68.8%	+
Dec	4,487	11,034	145.9%	+	2.0%	2.8%	42.0%	+

+ 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

AH means altered hydrology criterion

B.1.5 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 typically occurs during the spring flood and the timing of the annual minimum usually occurs during the winter months. **Table B-5** provides statistics on the Julian day of the annual maximum flow and **Table B-6** provides the Julian day for the annual minimum flow. The statistics include the average (mean), the median, and the standard deviation of the Julian days when the maximum or minimum flow occur.

Table B-5. Julian Day of annual maximum in the Wild Rice River at Hendrum, MN (USGS Station 05064000).

Statistic	Historic Period [1965-1991]	Modern Period [1992-2018]	% diff.	AH
Average	2-May	20-May	14.29%	+
Median	12-Apr	30-Apr	17.07%	+
Standard Deviation	44 days	63 days	43.85%	+

+ 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

Based on 365-day year

Table B-6. Julian Day of annual minimum flow in the Wild Rice River at Hendrum, MN (USGS Station 05064000).

Statistic	Historic Period [1965-1991]	Modern Period [1992-2018]	% diff.	AH
Average	22-Aug	13-Sep	9.57%	o
Median	21-Sep	27-Sep	2.08%	o
Standard Deviation	75 days	67 days	-10.92%	-

+ 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
Based on 365-day year

B.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 B-5**.

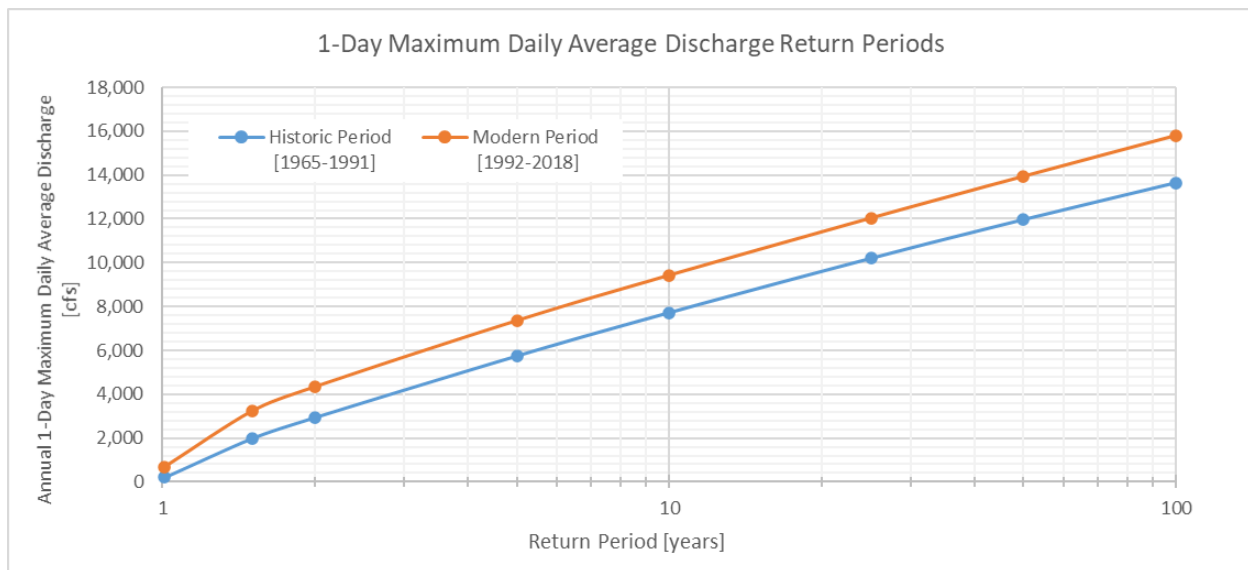


Figure B-5. Historical (1963-1990) versus modern (1991-2018) peak discharge return periods for the Wild Rice River at Hendrum, MN (USGS Station 05064000).

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 B-7**).

Table B-7. Riparian floodplain connectivity metrics for the Wild Rice River at Hendrum, MN (USGS Station 05064000).

Flow Metric	Historic Period [1965-1991]	Modern Period [1992-2018]	% Diff. ¹	Altered Hydrology
5-Year Peak Discharge, Q(5) [cfs]	5,750	7,355	27.9%	+
Number of years with Discharge (Q) > Q _H (5)	5	9	80.0%	+
Average number of days per year Q > Q _H (5)	6	9	41.6%	+
Average annual cumulative volume > Q _H (5) [ac-ft]	17,697	32,081	81.3%	+
10-Year Peak Discharge, Q(10) [cfs]	7,729	9,427	22.0%	+
Number of years with Discharge (Q) > Q _H (10)	3	7	133.3%	+
Average number of days per year Q > Q _H (10)	3	5	66.7%	+
Average annual cumulative volume > Q _H (10) [ac-ft]	4,710	8,711	85.0%	+
25-Year Peak Discharge, Q(25) [cfs]	10,201	12,037	18.0%	+
Number of years with Discharge (Q) > Q _H (25)	0	1	NA	o
Average number of days per year Q > Q _H (25)	0	1	NA	o
Average annual cumulative volume > Q _H (25) [ac-ft]	0	197	NA	o
50-Year Peak Discharge, Q(50) [cfs]	11,967	13,946	16.5%	+
Number of years with Discharge (Q) > Q _H (50)	0	0	NA	o
Average number of days per year Q > Q _H (50)	0	0	NA	o
Average annual cumulative volume > Q _H (50) [ac-ft]	0	0	NA	o
100-Year Peak Discharge, Q(100) [cfs]	13,643	15,808	15.9%	+
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

+ 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

¹NA = No events occurred above return period discharge.

B.4 Geomorphic Stability and Capacity to Transport Sediment

The metrics pertaining to geomorphic stability and capacity to transport sediment 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 B-8**). **Figure B-6** has the flow duration curves for the historic and modern periods and **Table B-8** provides a summary of flows for select percent exceedances. Both show that discharges across the flow spectrum have increased substantially.

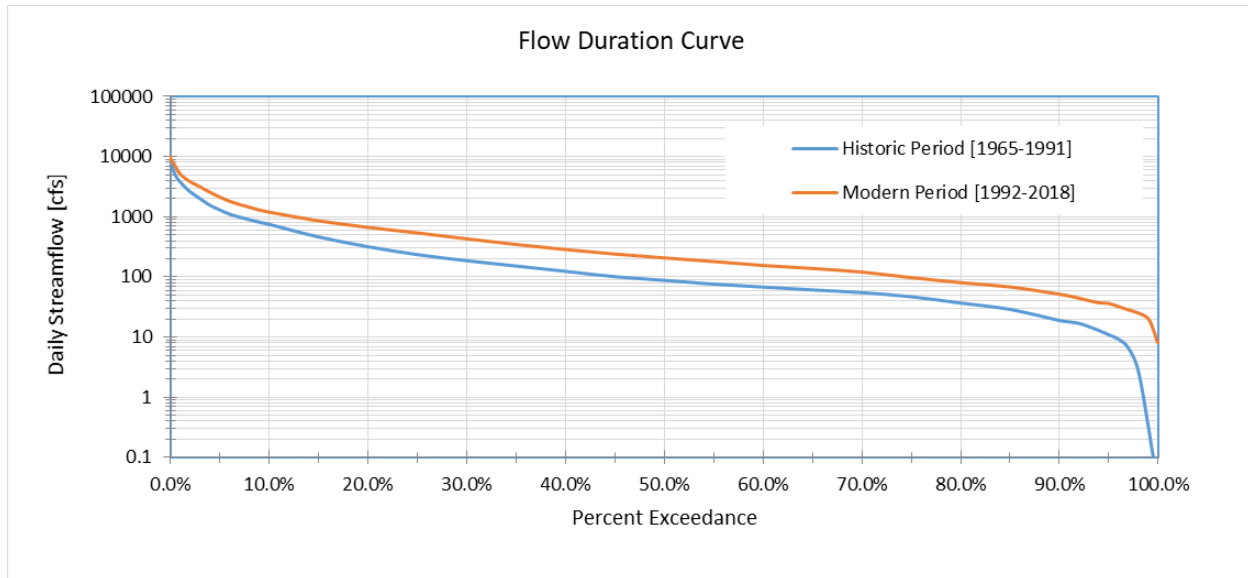


Figure B-6. Historical (1963-1990) versus modern (1991-2018) flow duration for the Wild Rice River at Hendrum, MN (USGS Station 05064000).

Table B-8. Select summary of stream flows for various percent exceedance values from the flow duration curves for the Wild Rice River at Hendrum, MN (USGS Station 05064000).

Percent Exceedance	Historic Period [1965-1991]	Modern Period [1992-2018]	% Diff.	Altered Hydrology
0.10%	7,634	8,971	17.5%	+
1.0%	3,775	5,188	37.4%	+
10.0%	746	1,200	60.9%	+
25.0%	235	540	129.8%	+
50.0%	88	207	135.2%	+
75.0%	55	120	118.2%	+
90.0%	19	51	170.0%	+
99.0%	0	20	5688.9%	+
99.9%	0	9	10562.5%	+

+ 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 B-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 B-9. Geomorphic stability and capacity to transport sediment metrics for the Wild Rice River at Hendrum, MN (USGS Station 05064000).

Flow Metric	Historic Period [1965-1991]	Modern Period [1992-2018]	% Diff.	Altered Hydrology
1.5-Year Peak Discharge, $Q(1.5)$ [cfs]	1,984	3,219	62.3%	+
Number of years with Discharge (Q) > Q_H (1.5)	16	22	37.5%	+
Average number of days per year $Q > Q_H$ (1.5)	17	24	40.5%	+
Average annual cumulative volume > Q_H (1.5) [ac-ft]	55,105	92,599	68.0%	+
2-Year Peak Discharge, $Q(2)$ [cfs]	2,949	4,337	47.1%	+
Number of years with Discharge (Q) > Q_H (2)	14	20	42.9%	+
Average number of days per year $Q > Q_H$ (2)	11	17	58.4%	+
Average annual cumulative volume > Q_H (2) [ac-ft]	35,230	61,519	74.6%	+

+ 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

B.5 Setting Goals

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 a different set of metrics for a specific “altered hydrology” group. The first method is focused on the metric groups focused on aquatic habitat and also the geomorphic stability and ability to transport sediment, 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 storage goal based on observed flows is **19,557 AF or 0.39 inches** across the watershed.

The second method is based on the changes in hydrology across the entire annual hydrograph. This method integrates the differences in return period discharges between the modern and historic period (see **Table B-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 B-9**).

Table B-10. Estimated goal for the drainage area of the Wild Rice River at Hendrum, MN (USGS Station 05064000) using Method 2.

Return Period	Historic Period Discharges (cfs)	Modern Period Discharges (cfs)	Difference (cfs)	Probability of Occurrence	Difference*Probability (cfs)
1.5	1,984	3,219	1235	0.67	823.3
2	2,949	4,337	1388	0.50	694.0
5	5,750	7,355	1604	0.20	320.9
10	7,729	9,427	1698	0.10	169.8
25	10,201	12,037	1836	0.04	73.5
50	11,967	13,946	1979	0.02	39.6
100	13,643	15,808	2165	0.01	21.7
			2,143	Sum (cfs):	2,143
			4,251	Sum (ac-ft/day):	4,251
Number of days:			7	Total Volume Goal:	29,782 AF (0.36 in.)

The third method is also based on addressing the effects through the entire flow range and is a revision to Method two. Method three 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 multiplies the flow rates by the change in the number of days exceeding the return period flow for each return period (see **Table B-11**).

Table B-11. Estimated goal for the drainage area of the Wild Rice River at Hendrum, MN (USGS Station 05064000) 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	1,235	0.67	1,633.4	7	11,443
2	1,388	0.50	1,377.0	6	8,508
5	1,604	0.20	636.6	3	1,641
10	1,698	0.10	336.9	2	674
25	1,836	0.04	145.7	1	146
50	1,979	0.02	78.5	0	0
100	2,165	0.01	43.0	0	0
				Total Volume Goal:	22,412 AF (0.27 in.)

The fourth method integrates the changes in the FDC (see **Figure B-6**) and the probability of occurrence of each flow. The fourth method estimated a storage goal of **36,095 AF, or 0.43 inches**, across the watershed.

Appendix E.
Memorandum of
Agreement

MEMORANDUM OF AGREEMENT

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

The Counties of Becker, Clay, Clearwater, Mahnomen, Norman, and Polk by and through their respective County Board of Commissioners, and
The Becker, Clay, Clearwater, Mahnomen, Norman, East Polk, and West Polk Soil and Water Conservation Districts, by and through their respective Soil and Water Conservation District Board of Supervisors, and
The Wild Rice Watershed District, by and through their respective Board of Managers;

Collectively referred to as the “parties.”

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

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

WHEREAS, the Watershed Districts of this Agreement are political subdivisions of the State of Minnesota, with statutory authority to carry out conservation of the natural resources of the state by land use controls, flood control, and other conservation projects for the protection of the public health and welfare and the provident use of the natural resources, pursuant to Minnesota Statutes Chapters 103B, 103D and as otherwise provided by law; and

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

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

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

NOW, THEREFORE, the Parties hereto agree as follows:

1. **Purpose:** The Parties to this Agreement recognize the importance of partnerships to plan and implement protection and restoration efforts for the Wild Rice – Marsh River Watershed (See **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 Wild Rice Planning 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 canceled 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 3/31/2019. 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 *Wild Rice Watershed District* 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.
- e. **Extension:** The Parties may extend the termination date of this Agreement upon agreement by all Parties.
- f. **Termination:** The Parties anticipate that this Agreement will remain in full force and effect through the term of the grant agreement with BWSR and until cancelled by all parties or until 12/31/2021 consistent with the term of the grant agreement, unless otherwise terminated in accordance with law or other provisions of the Agreement.

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 the execution of this document to describe the functions and operations of the committee(s).
 - iv. The Advisory Committee will meet monthly or as needed to assist and provide technical support and make recommendations to the Policy Committee on the development and content of the plan.
- 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:** *Wild Rice Watershed District* 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 agent's records retention schedule until termination of the agreement (at that time, records will be turned over to *Wild Rice Watershed District*).
8. **Grant Administration:** *Wild Rice Watershed District* 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.
9. **Authorized Representatives:** The following persons will be the primary contacts for all matters concerning this Agreement:

Clay County
Frank Gross
County Commissioner
Email: frank.gross@co.clay.mn.us
Telephone: 218-287-2152

Clay SWCD
Richard Menholt
District Supervisor
Email: menholtfarms@yahoo.com
Telephone: 218-790-4904

Clearwater County
Dean Newland
County Commissioner
Email: emily.mcdougall@co.clearwater.mn.us
Telephone: 218-657-2357

Clearwater SWCD
TBD
District Supervisor
Email: TBD
Telephone: TBD

Becker County
Barry Nelson
County Commissioner
Email: bknello@co.becker.mn.us
Telephone: 218-439-3250

Becker SWCD
Travis Schauer
District Supervisor
Email: travisschauer@yahoo.com
Telephone: 218-849-1925

Mahnomen County
David Geray
County Commissioner
Email: david.geray@co.mahnomen.mn.us
Telephone: 218-473-2425

Mahnomen SWCD
Pete Revier
District Supervisor
Email: Neubert@outlook.com
Telephone: 218-230-5385

Norman County
Steve Jacobson
County Commissioner
Email: steve.jacobson@co.norman.mn.us
Telephone: 218-861-6155

Norman SWCD
Erik Rockstad
District Supervisor
Email: gbgejr@loretel.net
Telephone: 218-784-8505

Polk County
Joan Lee
County Commissioner
Email: joan.lee@co.polk.mn.us
Telephone: 218- 563-2762

East Polk SWCD
Scott Balstad
District Supervisor
Email: mjb@gvtel.com
Telephone: 218-563-2173

West Polk SWCD
Chris Cournia
District Supervisor
Email: farmer_taz@hotmail.com
Telephone: 218-280-1332

Wild Rice Watershed District
Mark Harless
Manager
Email: mlharlessz@gmail.com
Telephone: 218-495-3330

IN TESTIMONY WHEREOF the Parties have duly executed this agreement by their duly authorized officers.
(Repeat this page for each participant)

PARTNER: Clay County

APPROVED:

BY: Frank Gross 2/19/19
Board Chair Vice-Chair Date

BY: Stephen Turner 2/19/19
District Manager/Administrator Date

APPROVED AS TO FORM (use if necessary)

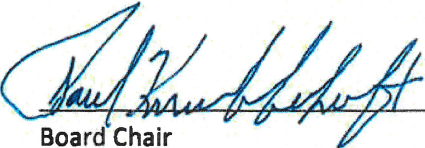
BY: Atty. Wrl 2/19/19
County Attorney Date

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

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

PARTNER: Clay SWCD

APPROVED:

BY:  1-10-19
Board Chair Date

BY:  2/14/19
District Manager/Administrator 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.
(Repeat this page for each participant)

PARTNER: **Clearwater County**

APPROVED:

BY: John A. Nelson 2-12-2019
Board Chair Date

BY: Allen J. Paulson 2/12/2019
District Manager/Administrator 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.
(Repeat this page for each participant)

PARTNER: **Clearwater SWCD**

APPROVED:

BY: Alay Lewis
Board Chair Date

BY: Lori Buell 3/4/19
District Manager/Administrator 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: Becker County

APPROVED:

BY: John C. Olson 3/5/19
Board Chair Date

BY: William B. St. 3/5/19
District Manager/Administrator 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: **Becker SWCD**

APPROVED:

BY: Tony Beck 2-20-19
Board Chair Date

BY: [Signature] 2-20-19
District Manager/Administrator 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: **Mahnomen County**

APPROVED:

BY: Karen Ahmann 2/20/19
Board Chair Date

BY: James See 2-21-19
District Manager/Administrator Date

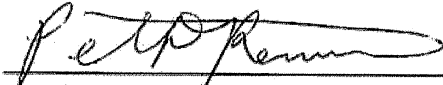
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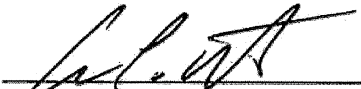
BY: Dorothy M. Palla 21 Feb 19
County Attorney Date

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

PARTNER: Mahnomens SWCD

APPROVED:

BY:  2-11-2019
Board Chair Date

BY:  2-11-19
District Manager/Administrator Date

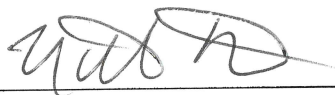
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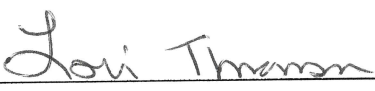
BY: _____
County Attorney Date

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

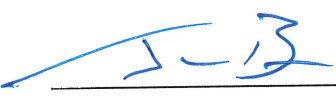
PARTNER: Norman County

APPROVED:

BY:  2-21-19
Board Chair Date

BY:  2-21-19
District Manager/Administrator Date

APPROVED AS TO FORM *(use if necessary)*

BY:  2/25/19
County Attorney Date

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

PARTNER: **Norman SWCD**

APPROVED:

BY: Ronald Thorsrud 2/21/19
Board Chair Date

BY: Lori Thorsrud 2-21-19
District Manager/Administrator Date

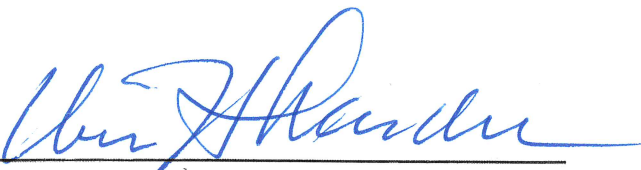
APPROVED AS TO FORM *(use if necessary)*

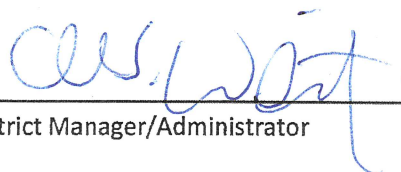
BY: _____
County Attorney Date

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

PARTNER: Polk County

APPROVED:

BY: 
Board Chair Date

BY:  3-6-19
District Manager/Administrator 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: East Polk SWCD

APPROVED:

BY: Al Bauer 2-19-19
Board Chair Date

BY: Rachel Klein 2/19/19
District Manager/Administrator 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: **West Polk SWCD**

APPROVED:

BY:  2-21-19
Board Chair Date

BY:  2/21/19
District Manager/Administrator Date

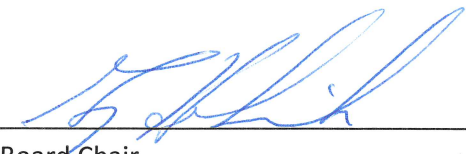
APPROVED AS TO FORM *(use if necessary)*

BY: _____
County Attorney Date

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

PARTNER: **Wild Rice Watershed District**

APPROVED:

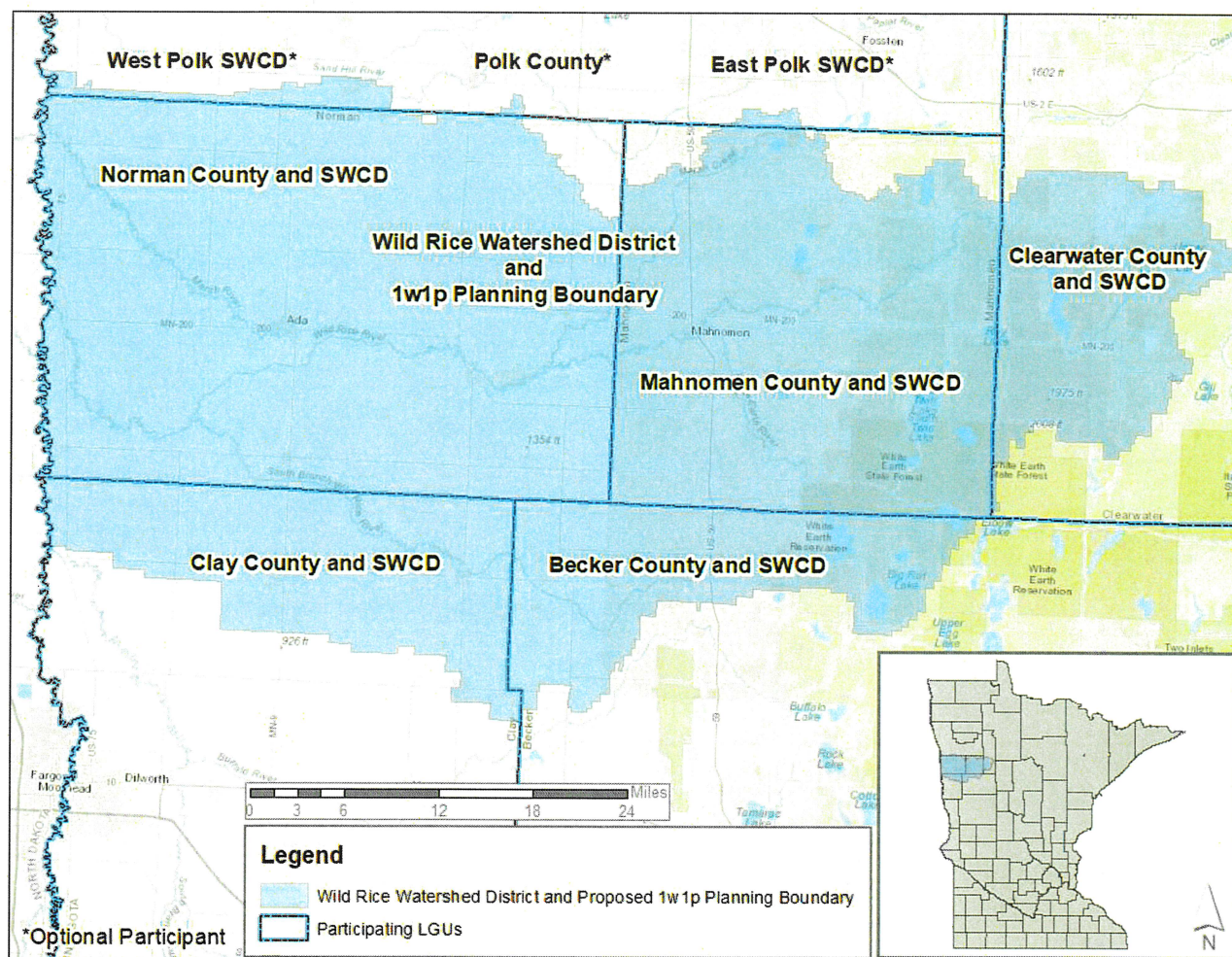
BY:  2-13-19
Board Chair Date

BY:  2-13-19
District Manager/Administrator Date

APPROVED AS TO FORM *(use if necessary)*

BY: _____
District Attorney Date

Attachment A



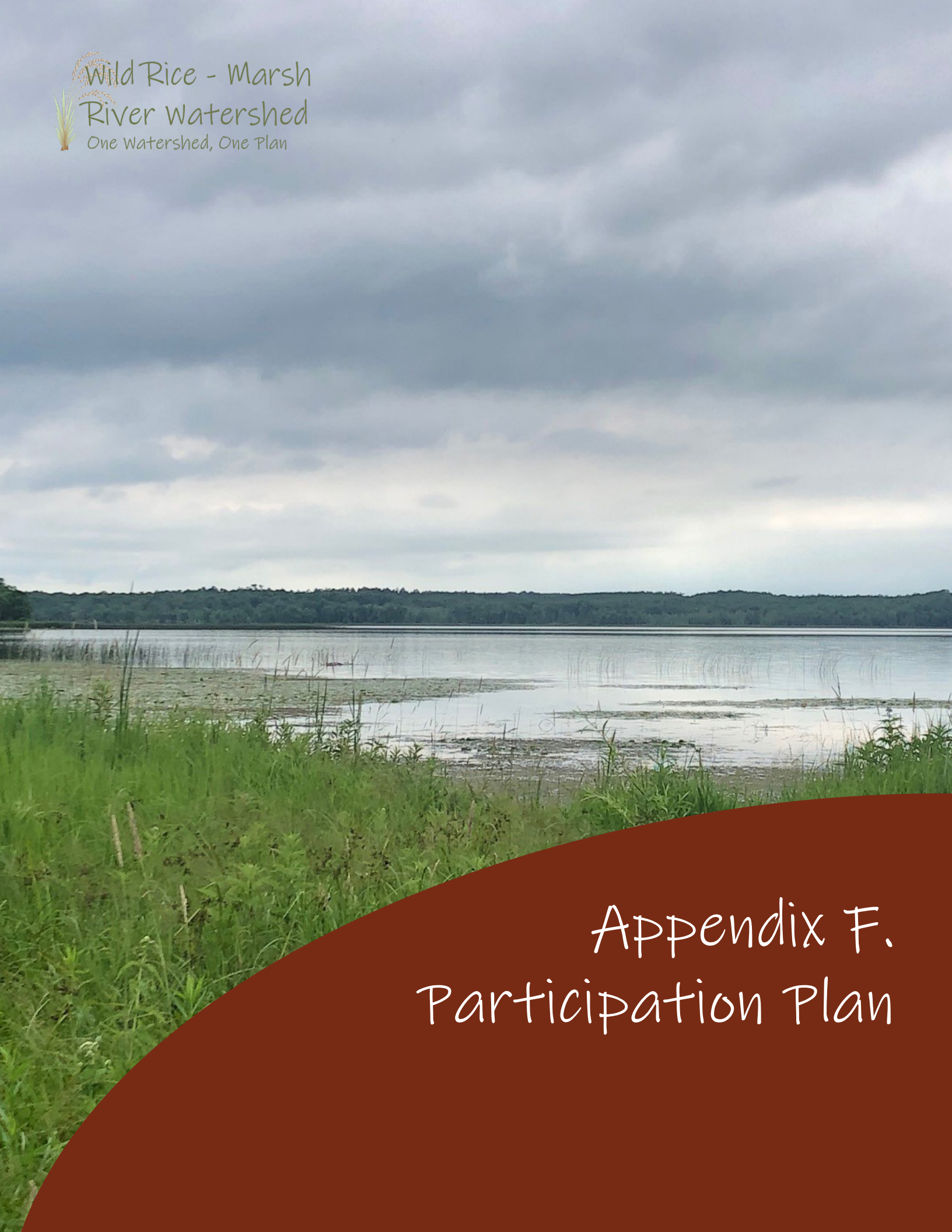
Attachment B

Scope of Services Provided by the

Wild Rice Watershed District

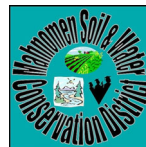
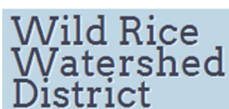
The **Wild Rice Watershed District** will have the following duties *(the following are examples and should be modified to meet local need, including additional attachments if services are split between multiple parties)*:

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 and watershed district for publication; and
 - f. Gather public comments from public hearing and prepare for submittal.
2. Coordination of Advisory Committee meetings, including the technical and citizen 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.
3. Administration of the grant with BWSR for the purposes of developing a watershed-based plan, including:
 - a. Submit this Agreement, work plan, and other documents as required;
 - b. Execute the grant agreement;
 - c. Account for grant funds and prompt payment of bills incurred;
 - d. Complete annual eLINK reporting;
 - e. Present an annual audit of grant funds and their usage; and
 - f. Maintain all financial records and accounting.
4. Contracting for services with the chosen consultant for plan preparation and writing of the watershed-based plan, including:
 - a. Execute the Contract for Services agreement;
 - b. Oversee expenditures incurred by the consultant;
 - c. Provide prompt payment for services rendered; and
 - d. Serve as primary contact person with the consultant.



Appendix F. Participation Plan

Wild Rice - Marsh River One Watershed, One Plan Participation Plan



East Polk Soil & Water Conservation District

WEST POLK Soil & Water Conservation District



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Acronyms and Abbreviations List

1W1P	One Watershed, One Plan
BWSR	Board of Water and Soil Resources
COE	Corps of Engineers
DNR	Department of Natural Resources
LGU	Local Government Unit
MDA	Minnesota Department of Agriculture
MDH	Minnesota Department of Health
MPCA	Minnesota Pollution Control Agency
NRCS	Natural Resource Conservation Service
SWCD	Soil & Water Conservation District
TNC	The Nature Conservancy
WD	Watershed District
WRMRW	Wild Rice – Marsh River Watershed

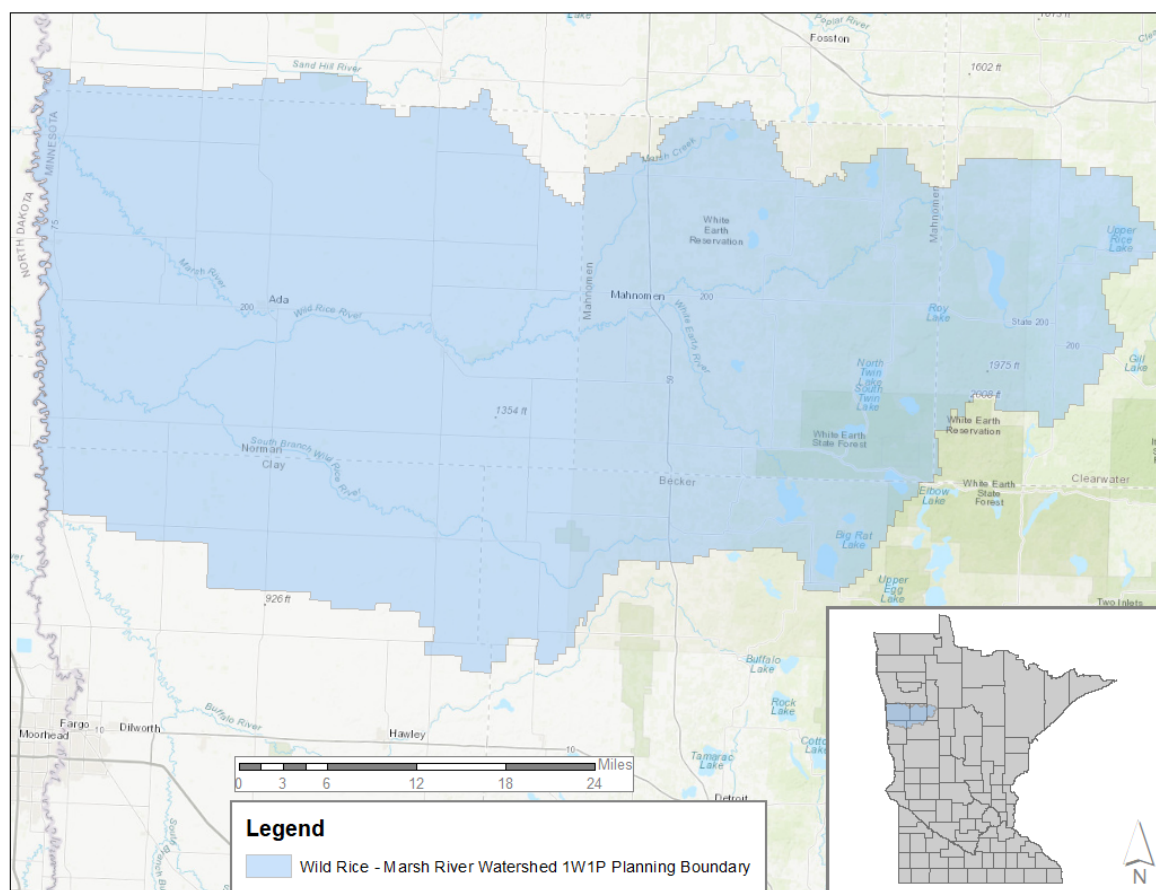
1 BACKGROUND

The Counties of Becker, Clay, Clearwater, Mahnomen, Norman and Polk (Counties), by and through their respective County Board of Commissioners, and the Becker, Clay, Clearwater, Mahnomen, Norman, East Polk and West Polk Soil and Water Conservation Districts (SWCDs), by and through their respective SWCD Board of Supervisors, and the Wild Rice Watershed District (WD), by and through its respective Board of Managers were selected in the 2018 planning year by the Minnesota Board of Water and Soil Resources (BWSR), to complete a One Watershed One Plan (1W1P). Collectively, the parties are called the “Wild Rice Planning Partnership” (hereafter referred to as the “Partnership”). The LGUs recognized the importance of partnerships to plan and implement protection and restoration efforts for the Wild Rice - Marsh River Watershed. The Wild Rice - Marsh River Watershed 1W1P planning area is shown in **Figure 1**.

The LGUs are responsible for preparing a Comprehensive Watershed Management Plan (Plan) under the 1W1P effort. The members of the LGUs share an interest in and the statutory authority to prepare, adopt, and assure implementation of a Plan for the Wild Rice – Marsh River Watershed.

This document describes the participation process for developing the Plan.

Figure 1. Wild Rice - Marsh River Watershed 1W1P Location.



2 AUDIENCE & ROLES

One of the Guiding Principles of 1W1P is that the process “must involve a broad range of Stakeholders to ensure an integrated approach to watershed management.” A Stakeholder is defined as a party (person or group) who holds a vested interest in the outcome of the planning process. The primary outcome resulting from the Plan will be a targeted implementation plan, focused on the implementation of specific best management practices, capital improvement projects, educational and outreach programs, monitoring activities, and regulatory controls. A variety of Stakeholders may be directly or indirectly affected.

Participants in the planning process are comprised of several potential target audiences or groups and collectively represent the Stakeholders. The groups and their respective planning roles are described in the following sections.

2.1 Policy Committee

The primary role of the Policy Committee is to collectively develop and adopt, as local government units, a coordinated watershed management plan pertaining to the area within the Wild Rice - Marsh River Watershed. Bylaws have been adopted to guide the decision-making process, leadership, and direction of process for the Policy Committee. Expectations are that the Policy Committee will review and approve a draft of the plan outline, review and approve information about the priority resources, concerns and issues affecting the plan area, and review and approve the Plan. An additional expectation is that members of the Policy Committee will engage in constructive discussion and debate about issues addressed by the Plan and provide consensus direction on plan development matters, to the Steering Committee. The Policy Committee will also review and approve membership on the Advisory Committee. Meeting commitments for the Policy Committee are expected to be every other month or as needed. The Policy Committee has additional obligations as described by The Memorandum of Agreement executed by the Partnership.

2.2 Advisory Committee

Membership on the Advisory Committee may consist of members from the Steering Committee, other local government staff, the state's main water agencies and/or plan review agencies, the general public, trade organizations, nonprofit organizations, and special interest groups. Leaders within the local community are valued members of the Advisory Committee. Membership to the Advisory Committee is reviewed and approved by the Policy Committee.

The purpose of an Advisory Committee is to make recommendations on the Plan and the targeted implementation schedule to the Policy Committee, including identification of priority resources, concerns, and issues affecting the plan area. Expectations are that members of the Advisory Committee will communicate Plan related activities to their respective organizations. Advisory Committee members are expected to communicate practical concerns during the plan development process and to assist the Policy Committee in ensuring a credible Plan development process. Meeting commitments for Advisory Committee members are expected to be every other month or when subject matter expertise is warranted.

Each state or federal agency or organization participating on the Advisory Committee shall designate one lead representative and one designated alternate. An agency's or organization's guidance, input, and decisions shall be communicated through the lead representative or designated alternative. The lead agency or organization representative is expected to coordinate information flow and communication within their agency or organization.

2.3 Steering Committee

The Steering Committee is comprised of local SWCD and Watershed District staff for the purposes of logistical and day-to-day decision-making in the planning process. The Steering Committee includes the consultant and BWSR Board Conservationist who are also responsible for assembling the draft and final Plan. Members of the Steering Committee are responsible for providing information needed for the planning process, reviewing and accepting draft plan related information, and assisting in Plan development. Identifying priority resources, concerns, and issues for their specific county or watershed district is also the responsibility of the Steering Committee. Meeting expectations for the Steering Committee are monthly and as needed to maintain pace of progress for plan development.

2.4 General Public

Various public meetings and hearings will be completed as part of the Plan development process. The general public is expected to be an important Stakeholder group. Input from the public meetings will be used to ensure a complete list of priority issues is developed. The role of the general public is expected to include identifying issues affecting resources. The public will be engaged to rank concerns establishing a “public priority” rank. An additional role for the general public is expected to include review of and discussion about the targeted implementation schedule and ability to achieve the measurable goals.

3 INTENT FOR STAKEHOLDER INVOLVEMENT

The principal intent of involving stakeholders during the planning process is to discover what's happening in the watershed, what is important to Stakeholders, and build acceptance of the Plan and the recommended solutions described by the targeted implementation schedule. Acceptance is critical because the Partnership is focused on actively utilizing their Plan to implement projects and programs within the Wild Rice - Marsh River Watershed. Successful implementation will depend highly on the degree to which the Stakeholders believe their concerns, issues, or expectations are addressed within the Plan.

The Partnership intends for the Stakeholder involvement process to be active, genuine, and credible. To that end, the Stakeholder groups will be involved early in the planning process and will remain engaged through plan completion. Input provided by Stakeholders is intended to help ensure the comprehensiveness of the Plan and validate the implementation priorities of the Partnership and Stakeholders.

4 TOOLS FOR STAKEHOLDER INVOLVEMENT

The Partnership expects to use several tools to involve Stakeholders. These tools include:

- Informing the stakeholders of status and progress by posting information on a website, including document drafts as they become available;
- Convening meetings and workshops with Stakeholders at key milestones to discuss relevant content and obtain input; and
- Use of existing “standing” committees within each county, including local water plan advisory committees. These committees tend to include broad representation.

BWSR has developed guidance for agency comments for the 1W1P planning process that is applicable to all stakeholder groups participating in plan development (See table below for BWSR guidance on providing comments). This guidance is available at

http://www.bwsr.state.mn.us/planning/1W1P/Best_Practices_for_Agency_Comments_on_Water_Plans.pdf

Figure 2: BWSR Guidance on Providing Comments during Plan Development.

Practical and Valuable Comments	Less Valuable Comments
The following types of comments can be very valuable to the planning effort: ■ Feedback on the legality or statutory authority of a proposed action or strategy in a plan, and/or consistency with an agency rule or policy ■ Identification of opportunities for agency collaboration, including when an agency might be willing to lead and/or funds are available through the agency to accomplish a strategy or action ■ Identification of alternative methods to identify or accomplish a goal ■ Identification of data not reviewed or properly considered, or data that may validate a potential concern or issue ■ Work that can or will be done in the future to improve the plan	The following types of comments are less valuable to the planning process: ■ Individual comments that have not been vetted or delivered as an agency perspective ■ Comments that question a method without suggestions for an alternative method ■ Editorial comments, especially in early working drafts of plans, unless the text is unclear

There are many methods for conveying information and communicating messages. This Stakeholder Participation Plan will utilize a variety of tools as appropriate and beneficial for sharing progress and soliciting input. Information about the planning process can be obtained from the Wild Rice - Marsh River Watershed 1W1P website at <http://www.wildricewatershed.org/>.

5 CONDUCT

The conduct of members of the various Stakeholder Groups —how the committees function and affect the process—will be based on the overall intent of building acceptance of the Plan through a credible yet timely process. Where appropriate, the Partnership will strive to achieve consensus on Plan related matters. However, because of the diversity of issues and range of resources, full agreement between or among all Stakeholders is not realistic or expected. Within the Policy Committee, bylaws specify voting (Article V). The ultimate responsibility for the content of the Plan rests with the Policy Committee. Participants are expected to act in a professional, constructive, and contributory manner. Members failing to act in good faith during the planning process can be removed from the Advisory Committee by consensus of the Policy Committee.

6 STAKEHOLDER LIST

6.1 Policy Committee Members

The Policy Committee Members, their affiliation, and contact information are listed in **Table 1**.

Table 1. Policy Committee Members

Name	Organization	Role	Address	City/State/Zip	Phone	e-mail
Barry Nelson	Becker County				218-439-3250	bknelso@co.becker.mn.us
Vacant - TBD	Becker County	Alternate				
Travis Schauer	Becker SWCD					travisschauer@yahoo.com
Jerome Flottesch	Becker SWCD	Alternate	20235 Co Hwy 11	Callaway, MN 56521	218-375-2141	fmesch@tvutel.com
Frank Gross	Clay County				218-287-2152	frank.gross@co.clay.mn.us
Jenny Mongeau	Clay County	Alternate				jenny.mongeau@co.clay.mn.us
Richard Menholt	Clay SWCD				218-790-4904	menholtfarms@yahoo.com
Joel Hildenbrandt	Clay SWCD	Alternate				joel.hildebrandt@gmail.com
Dean Newland	Clearwater County				218-657-2357	emily.mcdougall@co.clearwater.mn.us
Mark Titera	Clearwater County	Alternate				mark.titera@co.clearwater.mn.us
Vacant - TBD	Clearwater SWCD				218-308-1184	chester.powell@mn.nacdnet.net
Alroy Lewis	Clearwater SWCD				218-694-6845 ext 4	chester.powell@mn.nacdnet.net
David Geray	Mahnomen County				218-473-2425	david.geray@co.mahnomen.mn.us

Name	Organization	Role	Address	City/State/Zip	Phone	e-mail
Scott McCollum	Mahnomen County	Alternate				scott.mccollum@co.mahnomen.mn.us
Pete Revier	Mahnomen SWCD					Neubert@outlook.com
Vacant - TBD	Mahnomen SWCD	Alternate				
Steve Jacobson	Norman County				218-861-6155	steve.jacobson@co.norman.mn.us
Nathan Redland	Norman County	Alternate				nathan.redland@co.norman.mn.us
Erik Rockstad	Norman SWCD				218-784-8505	gbgejr@loretel.net
Kelly Skaurud	Norman SWCD	Alternate				Kelly@skaurud.com
Joan Lee	Polk County	Chair			218- 563-2762	joan.lee@co.polk.mn.us
Vacant - TBD	Polk County	Alternate				
Scott Balstad	East Polk SWCD				218-563-2173	mjb@gvtel.com
Vacant - TBD	East Polk SWCD	Alternate				
Chris Cournia	West Polk SWCD		28403 250th Ave SW	Crookston MN 56716	218-280-1332	farmer_taz@hotmail.com
John Sorenson	West Polk SWCD	Alternate	1320 Albert St	Crookston MN 56716	701-741-4282	soren716@gmail.com
Mark Harless	Wild Rice Watershed District		P.O. Box 37	Borup, MN 56519	701-261-6374	mlharlessz4@gmail.com
Dean Spaeth	Wild Rice Watershed District	Alternate				

6.2 Advisory Committee Members

The Advisory Committee Members, their affiliation, and contact information are listed in **Table 2**. The Advisory Committee is comprised of technical representatives from local, federal and state agencies, non-governmental organizations, industry and citizens who reside in the watershed. Members of the Policy Committee and Steering Committee can participate in the Advisory Committee process.

Table 2. Advisory Committee Members

Name	Affiliation	Address	City/State/Zip	Phone	E-mail
Annette Drewes	DNR	2532 Hannah Ave	Bemidji, MN 56601	218-308-2468	annette.drewes@state.mn.us
Elizabeth Negben	MPCA	714 Lake Ave Suite 220	Detroit Lakes, MN 56501	218-846-8103	elizabeth.nebgen@state.mn.us
Ryan Lemickson	MDA	23070 North Lake Shore Drive	Glenwood, MN 56334	612-209-9181	ryan.lemickson@state.mn.us
Aicam Laacouri (alt.)	MDA	625 Robert Street N	St. Paul, MN 55155	651-201-6487	aicam.laacouri@state.mn.us
Dan Disrud Jenilynn Marchand (alt.)	MDH	705 5 th St. NW, Ste. A	Bemidji, MN 56601	218-308-2153	dan.disrud@state.mn.us jenilynn.marchand@state.mn.us
Henry Van Offelen	BWSR	1732 North Tower Rd.	Detroit Lakes, MN 56501	218-846-8406	henry.van.offelen@state.mn.us
Bob Guetter	NRCS	528 Strander Ave.	Crookston, MN 56716	218-935-2809	robert.guetter@usda.gov
Lynn Foss	Clay SWCD	1615 30 th Ave S	Moorhead, MN 56560	218-287-2255 ext. 3485	lynn.foss@clay.mnswcd.org
Tony Nelson	Pheasants Forever	1615 30 th Ave S	Moorhead, MN 56560	218-287-2255 ext.3475	tnelson@pheasantsforever.org
Brian Winter	TNC	15336 28 th Ave S	Glyndon, MN 56547-9561	218-498-2679	bwinter@tnc.org
Phil Doll	Private Lands Biologist, Becker SWCD	809 8 th ST SE	Detroit Lakes, MN 56501	218-846-7360	Phil.doll@mn.nacdnet.net

Curt Johannsen	Wild Rice Watershed District	PO Box 111	Hendrum, MN 56550		chj74@outlook.com
Garry Johanson	Norman County Environmental Services	816 East Main Street	Ada, MN 56510	218-784-5493	garry.johanson@co.norman.mn.us
Mark Christianson	Norman County SWCD	100 Main Ave E	Twin Valley, MN 56584	218-584-5169	markc@arvig.net
Jake Snyder	Polk County	320 Ingersoll Ave.	Crookston, MN 56716	218-281-5700	jacob.snyder@co.polk.mn.us
Mark Diekman	Mahnomen County Planning & Zoning	1440 Hwy 200	Mahnomen, MN 56557	218-935-5639	mark.diekman@co.mahnomen.mn.us
Monica Hedstrom	White Earth Tribe	102 3 rd St. NE	Mahnomen, MN 56557	218-935-2488	monica.hedstrom@whiteearth-nsn.gov
Dan McLaughlin	Becker County	200 State St E	Detroit Lakes, MN 56501	218-847-0099	dan.mclaughlin@co.becker.mn.us
Kyle Vareberg	Becker County	200 State St E	Detroit Lakes, MN 56501	218-846-7314	zoning@co.becker.mn.us
Dan Hecht	Clearwater County	213 Main Ave N Dept. 206	Bagley, MN 56621	218-694-6183	dan.hecht@co.clearwater.mn.us
Mike Stenseng	Clearwater County	213 Main Ave N Dept. 206	Bagley, MN 56621	218-694-6183	michael.stenseng@co.clearwater.mn.us
Bruce Cox	Clearwater County	213 Main Ave N Dept. 107	Bagley, MN 56621	218-694-6227	Bruce.cox@co.clearwater.mn.us
Matt Jacobson	Clay County Planning and Zoning	807 11th Street N. 2nd Floor	Moorhead, MN 56560	218-299-5005	matthew.jacobson@co.clay.mn.us

6.3 Steering Committee Members

The Steering Committee Members, their affiliation, and contact information are listed in **Table 3**.

Table 3. Planning Team Members.

Name	Affiliation	Address	City/State/Zip	Phone	e-mail
Peter Mead	Becker SWCD	809 8 th St SE	Detroit Lakes, MN 56501	218-846-7360	pemead@co.becker.mn.us
Kevin Kassenborg	Clay SWCD	1615 30 th Ave S	Moorhead, MN 56560	218-287-2255	kevin.kassenborg@clay.mnswcd.org
Chester Powell	Clearwater SWCD	312 Main Avenue North, Suite 3	Bagley, Minnesota 56621	218-694-6845	chester.powell@mn.nacdnet.net
Aaron Neubert	Mahnomen SWCD	PO Box 381, 200 US Hwy 59	Mahnomen, MN 56557	218-935-2987	aaron.neubert@mn.nacdnet.net
Lori Thronson	Norman SWCD	100 Main Ave E	Twin Valley, MN 56584	218-584-5169	lorit@arvig.net
Kelsey Hedlund	East Polk SWCD	PO Box 57, 240 Cleveland Ave SW	McIntosh, MN 56556	218-563-2777	hedlund.eastpolk@gmail.com
Nicole Bernd	West Polk SWCD	528 Strander Ave	Crookston, MN 56716	218-281-6070	nicole.bernd@wpolk.mnswcd.org
Kevin Ruud	Wild Rice Watershed District	11 East 5 th Ave	Ada, MN 56510	218-784-5501	kevin@wildricewatershed.org
Brett Arne	BWSR	26624 N Tower Rd	Detroit Lakes, MN 56501	218-846-8424	brett.arne@state.mn.us

7 SCHEDULE

Wild Rice - Marsh River One Watershed, One Plan Partnership																														
Plan Development Timeline																														
					2018	2019												2020												
Start Date	Duration	End Date	Task		Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
			Pre-Planning				SC	SC/PC	SC/AC/PC	SC/AC/PC	SC/AC	SC/PC	SC/AC	SC/PC	SC/AC	SC/PC	SC/AC	SC/PC	SC/AC	SC/PC	SC/AC	SC/AC/PC	SC/PC	SC/PC	SC/PC					
12/17/2018	45	1/31/2019	Establish Memorandum of Agreement*																											
12/17/2018	60	2/15/2019	Develop Grant Work Plan, Budget, and Timeline*																											
12/17/2018	30	1/16/2019	1.1 Process Request(s) for qualifications for plan development consultants*																											
12/17/2018	615	8/23/2020	2.1 Establish and Maintain Committees, Team & Workgroups*																											
2/1/2016		2/1/2016	Sign Grant Agreement																											
2/10/2019	60	4/11/2019	2.2 Notify Plan Review Authorities & Stakeholders (includes 60-day comment period)																											
1/2/2019	120	5/2/2019	2.3 Gather Watershed Information & Review for Commonalities, Conflicts and Gaps*																											
3/1/2019	45	4/15/2019	Plan and Notice Public Information/Kickoff Meeting																											
4/15/2019		4/15/2019	2.4 Hold Public Information/Kickoff Meeting																											
			Planning																											
4/15/2019	60	6/14/2019	3.1 Continue to Gather Watershed Information																											
4/16/2019	90	7/15/2019	3.2 Analyze and Prioritize Issues																											
6/5/2019	150	11/2/2019	3.3 Establish Measurable Goals																											
8/1/2019	180	1/28/2020	3.4 Develop a Targeted & Measurable Implementation Schedule and Programs																											
9/1/2019	150	1/29/2020	3.5 Determine Organizational Arrangement for Plan Implementation																											
2/1/2020	60	4/1/2020	3.6 Write Final Plan Review Draft																											
			Plan review																											
4/5/2020	60	6/4/2020	4.1 Formal Review																											
6/20/2020		6/20/2020	4.2 Public Hearing																											
6/24/2020	60	8/23/2020	4.3 Write Final Plan																											
8/30/2020	90	11/28/2020	5.1 Plan Approval by BWSR																											
1/1/2020		1/1/2020	6.1 Local Adoption																											
			7.1 Annual Grant Reporting (deadline = February 1)																											
12/31/2019		12/31/2019	7.2 Final Grant Reporting																											
			*work that occurs before the 1W1P grant agreement is signed is not reimbursable with grant dollars.																											
			dark boxes indicate the start and end of the main planning process.																											
			Committee Meetings (Estimates) SC - Steering Committee; AC - Advisory Committee; PC - Policy Committee																											

Appendix G.
Wild Rice Watershed
District Rules

Wild Rice Watershed District Rules

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Wild Rice Watershed District Rules

SECTION 1 - INTRODUCTION AND GENERAL POLICY

Adopted: June 14, 2017

Effective: June 14, 2017

- A. The rules of the Wild Rice Watershed District are to effectuate the purposes of Minnesota Statutes, Chapter 103D and the authority of the Managers therein described. These rules are deemed necessary to implement and make more specific the law administered by them.
- B. If any part of these rules is for any reason held to be invalid, such decision shall not affect the validity of the remaining portion of these rules.
- C. Changes to these rules may be made by the Managers. Any interested person may petition the Managers for a change in these rules.
- D. If any rule is inconsistent with the provisions of Minnesota Statutes, Chapter 103D, or other applicable law, the provisions of said Chapter 103D or other applicable law shall govern.
- E. The Managers accept the responsibility with which they are charged as a governing body. While the Managers have no intention to usurp the authority or responsibilities of other agencies or governing bodies, neither will they shirk their responsibilities. The Managers will cooperate to the fullest extent feasible with persons, groups, state and federal agencies and other governing bodies.
- F. It is the intention of the Managers that no person shall be deprived or divested of any previously established beneficial use or right, by any rule of the District, without due process of law, and that all rules of the District shall be construed according to said intention.
- G. It is the intention of the Managers to promote the use of the waters and related resources within the District in a provident and orderly manner so as to improve general welfare and public health for the benefit of its present and future residents.

Wild Rice Watershed District Rules

SECTION 2 - ADOPTION OF RULES

Adopted: June 14, 2017

Effective: June 14, 2017

The Managers shall comply with the following steps in adopting rules.

- A. A copy of the proposed rules shall be submitted to each Manager at least thirty (30) days before its adoption by the Managers.
- B. The proposed rules shall be adopted by a majority vote of the Managers, after public notice and hearing.
- C. The original copy of the rules shall be kept in the files of the District and in addition, copies shall be prepared for distribution to the County Auditors, County Commissioners, Town Board Chairpersons in the District, City Council Chairpersons, and other interested persons as requested.
- D. Every rule adopted by the Managers shall have the force and effect of law.

Wild Rice Watershed District Rules

SECTION 3 - DEFINITIONS

Adopted: June 14, 2017

Effective: June 14, 2017

For the purposes of these rules certain words and terms are herein defined as follows:

- A. **Dike** means an embankment for controlling or holding back water.
- B. **District** means the Wild Rice Watershed District.
- C. **Managers** means the District Board of Managers.
- D. **Person** means an individual, firm, partnership, association or corporation, but does not include public or political subdivisions.
- E. **Private drainage way** means a drainage way other than a legal drainage way.
- F. **Political Subdivision** means a county, town, school district or a political division or subdivision of the State.
- G. **Public Health** includes any act or thing tending to improve the general sanitary conditions of the District.
- H. **General Welfare** includes any act or thing tending to improve, benefit or contribute to the safety or wellbeing of the general public or benefit the inhabitants of the District.
- I. **Work or Works** means any construction, maintenance, repairs or improvements.
- J. **Shall** is mandatory, not permissive.
- K. **Drainage way** means any artificial or natural channel which provides a course for water flowing continuously or intermittently. A drainage way includes incidental tiled sections.
- L. **Legal Drainage System** means a drainage way under the jurisdiction of the drainage authority pursuant to Minnesota Statutes chapter 103D or 103E.
- M. **Private Drainage System** means an individual or mutual drainage system.
- N. **Plan** is a map or drawing with supporting data for proposed work.
- O. **Normal High Water Mark** means a mark delineating the highest water level which has been maintained for a sufficient period of time to leave evidence on the landscape. Commonly it is that point where the natural vegetation changes from predominantly aquatic to predominantly terrestrial.
- P. **Wetlands** means lands transitional between terrestrial and aquatic systems where the water table is usually at or near the surface of the land or is covered by shallow water. For the purposes of definition, wetlands must have the following three attributes: 1. Have a predominance of hydric soils; 2. Are inundated or saturated by surface or ground water at a frequency and duration sufficient to support a prevalence of hydroponic vegetation typically adapted for life in saturated soil conditions; and 3. Under normal circumstances support a prevalence of such vegetation.

Wild Rice Watershed District Rules

SECTION 4 - PERMITTING PROCEDURES, FEES AND FINANCIAL ASSURANCES RULE

Adopted: June 14, 2017

Effective: June 14, 2017

1. **POLICY.** The District permit requirement is not intended to delay or inhibit development. Rather permits are needed so that the managers are kept informed of planned projects, can advise and in some cases, provide assistance, and can ensure that land disturbing activity and development occurs in an orderly manner and in accordance with the overall plan for the District. All interpretations of these rules and permit decisions under these rules will incorporate and be consistent with District purposes set forth in Minnesota Statutes section 103D.201.
2. **PERMIT REQUIREMENT.** Any person or agency of the State of Minnesota or political subdivision undertaking an activity for which a permit is required by the District rules must first submit a permit application. The application must be submitted on the form provided by the District or the substantial equivalent, and must include all exhibits required by the applicable District rule(s). Application forms are available on the District web site at www.wildricewatershed.org.
 - A. All permits when issued shall be signed by the Chair and Secretary of the Board of Managers or designates.
 - B. No land disturbing activity, use, or other work requiring a permit shall be commenced prior to the issuance of a permit.
 - C. Permit application forms may be completed and filed at the District's office, mailed, or electronically communicated to: Wild Rice Watershed District, 11 East 5th Avenue, Ada, MN 56510.
 - D. Permits must be on file at the district's office at least ten (10) days prior to the regular monthly meeting to be considered at that meeting.
 - E. The Managers further require as a condition of all permits, that they be notified when said permitted activity is completed.
 - F. Application for a permit will be acted upon within sixty (60) days from the date the Managers receive the application and/or required data.
 - G. A plat or drawing shall accompany the application. Additional information, as deemed necessary by the Managers, may be required before processing the application for permitting.

- H. Permit decisions will be made by the Board of Managers, except as may be delegated to staff or the District engineer by written resolution. The Board will review a staff permit decision on the applicant's request. The District may approve or deny an application and may impose reasonable conditions on approval. Conditions may include, consistent with the rules, requirements for financial assurances and maintenance agreements or declarations, and may require that these documents be properly executed or recorded before permit issuance.
- I. A permit is valid for two years from the date the permit is approved, with or without conditions, unless specified otherwise or the permit is suspended or revoked.
- J. To renew or transfer a permit, the permittee must notify the District in writing prior to the permit expiration date and provide an explanation for the renewal or transfer request. The District may impose different or additional conditions on a renewal or deny the renewal in the event of a material change in circumstances, except that on the first renewal, a permit will not be subject to additional or different requirements solely because of a change in District rules. New or revised rule requirements will not be imposed on renewal of a permit where the permittee has made substantial progress toward completion of the permitted work. If the activities subject to the permit have not substantially commenced, no more than one renewal may be granted. An applicant wishing to continue to pursue a project for which permit approval has expired must reapply for a permit from the District and pay applicable fees.
- K. A permittee may assign a permit to another party only upon approval of the District, which will be granted if:
 - i. the proposed assignee agrees in writing to assume responsibility for compliance with all terms, conditions and obligations of the permit as issued;
 - ii. there are no pending violations of the permit or conditions of approval; and
 - iii. the proposed assignee has provided any required financial assurance necessary to secure performance of the permit.

The District may impose different or additional conditions on the transfer of a permit or deny the transfer if it finds that the proposed transferee has not demonstrated the ability to perform the work under the terms of the permit as issued. Permit transfer does not extend the permit term. The District may suspend or revoke a permit issued under these rules wherever the permit is issued based on incorrect information supplied to the District by the applicant,

- L. A permit applicant consents to entry and inspection of the subject property by the District and its authorized agents at reasonable times as necessary to evaluate the permit application or determine compliance with the requirements of a District permit or rule(s).
 - M. A District permit is permissive. Obtaining a permit from the District does not relieve the applicant from responsibility to comply with any procedures or approvals that may be required by Minnesota Statutes chapter 103E or other ditch law, nor does it relieve the applicant from responsibility for obtaining authorizations required, if any, by other regulatory bodies or property owners where the activity occurs.
3. **GENERAL PERMITS.** The District may issue district-wide general permits, approving certain routine activities or specific classes of projects where a standard design has been approved by the District, as long as the work is conducted in compliance with applicable District rule requirements.
- A. Each District-wide permit will be subject to such specific requirements as the Board may establish.
 - B. A hearing will be held before any District-wide permit is issued or renewed.
4. **RECONSIDERATION.**
- A. Before a permit decision is final for the purpose of appeal under Minnesota Statutes §103D.537, an applicant may request that the Board of Managers reconsider its decision. To request reconsideration, the applicant must file at the District's office a Notice of Reconsideration on a form provided by the District that includes concurrence in an extension of the time for District permit action under Minnesota Statutes §15.99, together with the specific findings or consideration for which reconsideration is requested, along with any additional submittals or argument supporting applicant's request.
 - B. The District will give the applicant due notice of when the Board of Managers will reconsider the permit decision. The District will not take longer than 60 days from its receipt of the Notice of Reconsideration to issue a final decision including reconsideration, unless a further extension is approved by the applicant, or is permissible under Minnesota Statutes §15.99, i.e., if more information is timely requested by the District on the reconsideration, then the 60 days starts over per Minn. Stat. §15.99 upon receipt of such information.
 - C. District costs incurred for reconsideration are permit administration costs for which an applicant may be responsible under Section 5 of this rule.

5. **PERMIT FEE.** The District may charge applicants a permit fee in accordance with state law and a schedule maintained by the Board of Managers to ensure that permit fees cover the District's actual costs of administering and enforcing permits. Fees also will cover actual costs related to field inspections of permitted projects, such as investigation of the area affected by the proposed activity, analysis of the proposed activity, services of consultants and any required monitoring of the proposed activity. Costs of monitoring an activity authorized by permit may be charged and collected as necessary after issuance of the permit. The fee provided for in this rule will not be charged to any agency of the United States or of any governmental unit or political subdivision of the State of Minnesota.
6. **FINANCIAL ASSURANCE.** The managers, at their discretion, may require an applicant to file a bond, letter of credit or other escrow deposit in a form approved by the District as a condition of permit issuance. The amount of the financial assurance required will be set in accordance with a schedule established and maintained the Board of Managers by resolution. When the permitted activities are certified as having been completed in compliance with the District permit and rules, the financial assurance will be released.
 - A. If the District determines that the permitted activities have not been completed in compliance with the permit and District rules, the Board of Managers may determine that the assurance is forfeited and the District may use the funds to take such actions the District deems necessary to bring the subject property into compliance with the permit and District rules, to prevent or mitigate harm to protected resources or other property, to abate or restore damages, or otherwise to ensure conditions in compliance with an applicable District permit and/or the District rules.
 - i. If financial assurance funds prove insufficient to complete necessary work, the District may complete the work and assess the permit holder and/or property owner for any excess costs.
 - B. No financial assurance will be required of any agency of the United States or of any governmental unit or political subdivision of the State of Minnesota. The District may require that the District be named as a beneficiary in the financial assurance of the agency's contractor.

Wild Rice Watershed District Rules

SECTION 5 - DRAINAGE AND FLOOD MITIGATION

Adopted: June 14, 2017

Effective: June 14, 2017

1. **POLICY.** It is the policy of the Board of Managers to promote the use of the waters and related resources within the District in a provident and orderly manner to improve the general welfare and public health for the benefit of the District's present and future residents.

Every person shall use their land in a reasonable manner in disposing of excess surface water and may turn into a natural drainageway all surface water that would naturally drain there, but may not burden a lower landowner with more water than is reasonable under the circumstances.

Surface water shall not be artificially removed from upper lands to and across lower land without adequate provisions being made on the lower land for its passage, nor shall the natural flow of surface water be obstructed so as to cause an overflow onto the property of other.

. It is the policy of the Board of Managers to promote the sound construction and management of subsurface tile drainage systems in order to minimize downstream flooding and maximize soil storage and agricultural productivity.

Further, it is the policy of the Board of Managers to regulate new construction, improvement, repair and maintenance of legal and private drainage ways for the following purposes:

- A. To preserve the capacities of drainage systems to accommodate future needs.
- B. To improve water quality and prevent localized flooding.
- C. To prevent the loss of drainage capacity.
- D. To avoid drainage conditions that cause or aggravate erosion or sedimentation of downstream drainage ways or water bodies.
- E. To ensure that parties responsible for accumulation of debris, soil and sediment in drainage ways maintain those drainage ways.

2. **REGULATION.**

- A. No person or public corporation shall allow an artificially or naturally created obstruction on their property to impede the flowage within a waterway or cause an impoundment to be created on adjoining property.
- B. No person or public corporation shall cut an artificial drainageway across a subwatershed without a permit from the Managers.
- C. No person or public corporation shall divert or case water by any artificial means into any legal drainage system from lands not assessed to said drainage system without complying with the proper statutory procedure therefore and securing a permit from the Managers.

- D. No landowner or occupant nor any contractor or equipment operator shall undertake to construct or improve any private or legal drainage system without obtaining a permit from the Managers.
- E. No landowner, occupant, nor any contractor or equipment operator shall undertake the construction, alteration or removal of any dike without a permit from the Managers.
- F. No landowner, occupant nor any contract or equipment operator shall undertake the construction, removal or abandonment of any reservoir for the impoundment of water; nor shall any works be done that would alter the effectiveness of a reservoir without a permit from the Manager.
- G. Any plat that includes land abutting upon any project, river or stream within the District shall be submitted to the Managers for their approval to insure the protection of the bed, banks and shore of said project, river or stream from improper encroachment for the purpose of preventing erosion, pollution and alleviating damage by flooding.
- H. To control and alleviate soil erosion and the siltation of the watercourses of the District.
 - a. All watercourses therein shall be constructed with a side slope as determined by proper engineering practice, so as to reasonably minimize soil erosion, giving due consideration to the intended capacity of the watercourses, its depth, width and elevation, and the character of the soils through which the drain passes.
 - b. Water inlets, culvert openings and bridge approaches shall have adequate shoulder and bank protection in order to minimize soil erosion. Plans and specifications relating to matters covered in this section shall be submitted to the Managers for their consideration and approval prior to construction and installation of any of the foregoing works.
- I. No landowner or occupant shall destroy all or any portion of the required sixteen and one-half foot (16.5') grass strip on ditch systems where they have previously been established. Where grass strips have been partially or completely destroyed, landowners will be required to restore the destroyed area to the original specifications at their own expense. If not restored, after receiving proper notice with a reasonable, attainable restoration date, the necessary work will be performed by the District and the costs subsequently collected with the landowner's real estate taxes in the following year.
- J. In the interest of sanitation and public health and to prevent the pollution of waters of the district, all septic tanks and drainfields which outlet directly or indirectly into the waters of the District shall be constructed and maintained in accordance with the rules and recommendations of the State Board of Health and the Minnesota Pollution Control Agency. No septic tank or other waste disposal facility shall outlet into any project, river, stream or public or private drainage system. No refuse, garbage or obnoxious materials may be dumped in or within fifty feet (50') of any project, river, stream or public or private drainage system within the District, or be placed in such a

manner as to be potentially cast into these same systems by flowing water.

- K. To preserve the same for beneficial use, no wetland may be filled or drained without a permit from the Managers.
- L. No repair or alteration of any legal drainage system shall be done without a permit from the Managers. Copies of plans and specifications for the repair or alteration of any legal drainage system, shall be submitted and approved by the Managers before construction may begin. Repairs of an emergency nature on a legal drainage system by a political subdivision may be undertaken without a permit, however, the District must be notified of the proposed work and a reason given for the emergency nature of the action.
- M. No construction of new or improvements to existing private drainage systems shall be undertaken without first filing plans and specifications with a permit application and being authorized by the receipt of an approved permit for the intended work from the Managers.
- N. No irrigation project, public or private, serving an area in excess of five (5) acres, shall be constructed without a permit from the Managers.
- O. The requirements of this rule are in addition to other applicable laws and procedures, including those of Minnesota Statutes chapter 103E. This rule is to provide for management of waters in the public interest and does not displace in whole or part any private legal rights a property owner or other person may have with respect to the use and drainage of waters.
- P. A contractor or equipment operator is responsible to ascertain whether a permit is required by this rule and, if so, that it has been obtained.
- Q. No person shall install, alter, or construct any subsurface tile drainage system without obtaining a permit from the Watershed District
- R. The Sections above notwithstanding, no permit from the District is required:
 - i. To perform maintenance on an existing drainage way or field drain, so long as the work does not remove clay or virgin soils or alter the original alignment, depth or cross-section of the drainage way;
 - ii. To repair or replace up to 500 lineal feet of tile within a private drainage way without altering the system invert;
 - iii. To disturb surface soils in the course of ordinary cultivation or other agricultural activity.

Wild Rice Watershed District Rules

SECTION 6 - RELATED ORDINANCES

Adopted: June 14, 2017

Effective: June 14, 2017

- 1. POLICY.** The Managers will cooperate with public corporations and state and federal agencies in the application of ordinances and/or rules concerning water and related resources within the District.
 - A. In the interest of public health and to prevent pollution of the waters of the District, the applicable county ordinances and rules of the appropriate state agencies regarding the disposal of wastes, are by references hereby adopted as rules of the District within the limits of statutory authority granted to the watershed districts.
 - B. Copies of proposed county, municipal, and/or town ordinances relating to surface water drainage, land use zoning, shoreland regulations and flood plain zoning, as applied to changes within the flood plain shall be submitted to the Managers thirty (30) days prior to the first public hearing date for review and comment.
 - C. Ordinances relating to surface water drainage, land use zoning, shoreland regulation and flood plain zoning shall be submitted to the Managers within forty-five (45) days after passage.
 - D. The adoption of "Rules" by the Board of Water and Soil Resources governing the implementation of the 1991 Minnesota "Wetland" law are hereby adopted by reference for the purposes of carrying out duties as may be directed by cooperating county boards.

Wild Rice Watershed District Rules

SECTION 7 – ALTERATION OF NATURAL DRAINAGEWAYS AND WETLANDS

Adopted: June 14, 2017

Effective: June 14, 2017

1. POLICY. Management of natural drainageways and wetlands and their abutting lands should be done in such a manner so as to reduce their deterioration and to maximize their value for the general welfare of the District.

- A. No artificial change may be made in the beds, banks, or shores of natural drainageways or wetlands without a permit from the Managers.
- B. To prevent obstructions in the natural drainageways, landowners shall remove any trees cut along the banks. No wastes shall be disposed of directly or indirectly into the drainageways.
- C. No excavations, grading, or filling near any drainageway shall be done in such a manner so as to minimize any detrimental effect to them. A permit is required from the Managers for construction activity within any drainageway.

Wild Rice Watershed District Rules

Pursuant to authority granted by Minnesota Statutes section 103D.341

SECTION 8 – ENFORCEMENT RULE

Adopted: June 14, 2017

Effective: June 14, 2017

1. MANNER OF ENFORCEMENT. In the event of a violation or threatened violation of a District rule, permit, order or stipulation, or a provision of Minnesota Statutes chapter 103D, the District may take action to prevent, correct or remedy the violation or any harm to water resources resulting from it. Enforcement action includes but is not limited to injunction; action to compel performance, abatement or restoration; and prosecution as a criminal misdemeanor in accordance with Minnesota Statutes sections 103D.545 and 103D.551.

2. INVESTIGATION OF NONCOMPLIANCE. The District's authorized representatives may enter and inspect a property in the watershed to determine the existence of a violation or threatened violation as described in section 1, above.

3. ADMINISTRATIVE COMPLIANCE ORDER. The District may issue a preliminary compliance order without notice or hearing when it finds a violation or threatened violation as described in section 1, above, and that the violation or threatened violation presents a serious threat of adverse effect on water resources. A preliminary compliance order may require that the property owner or responsible contractor cease the land-disturbing activity; apply for an after-the-fact permit; and take corrective or restorative action. A preliminary compliance order is not effective for more than ten days. The Board of Managers by resolution may delegate to District staff the authority to issue preliminary compliance orders.

4. BOARD HEARING. After due notice and a hearing at which evidence may be presented, the Board of Managers shall make findings. If the Board finds a violation as described in section 1, above, it may issue a compliance order of indefinite duration that may require the property owner or responsible contractor to cease land-disturbing activity; apply for an after-the-fact permit; take corrective or restorative action; reimburse the District for costs under Minnesota Statutes section 103D.345, subdivision 2; and/or be subject to any other remedy within the District's authority. A compliance order may supersede a preliminary order or may be issued without a prior preliminary order.

5. LIABILITY FOR ENFORCEMENT COSTS. To the extent provided for by Minnesota Statutes section 103D.345, subdivision 2, a property owner or responsible contractor is liable for investigation and response costs incurred by the District under this rule, including but not limited to the costs to inspect and monitor compliance, engineering and other technical analysis costs, legal fees and costs, and administrative expenses.

6. CONTRACTOR LIABILITY. Any individual, firm, corporation, partnership, association or other legal entity contracting to perform work subject to one or more District rules will be responsible to ascertain that the necessary permit has been obtained and that the work complies with the permit, rules and statutes and any applicable District orders or stipulations. A contractor that, itself or through a subcontractor, engages in an activity constituting a violation or threatened violation under section 1, above, is a responsible contractor for purposes of this rule.

Mashaug
Creek

BRIDGE NO.
54007

Appendix H. Ordinances and Standards

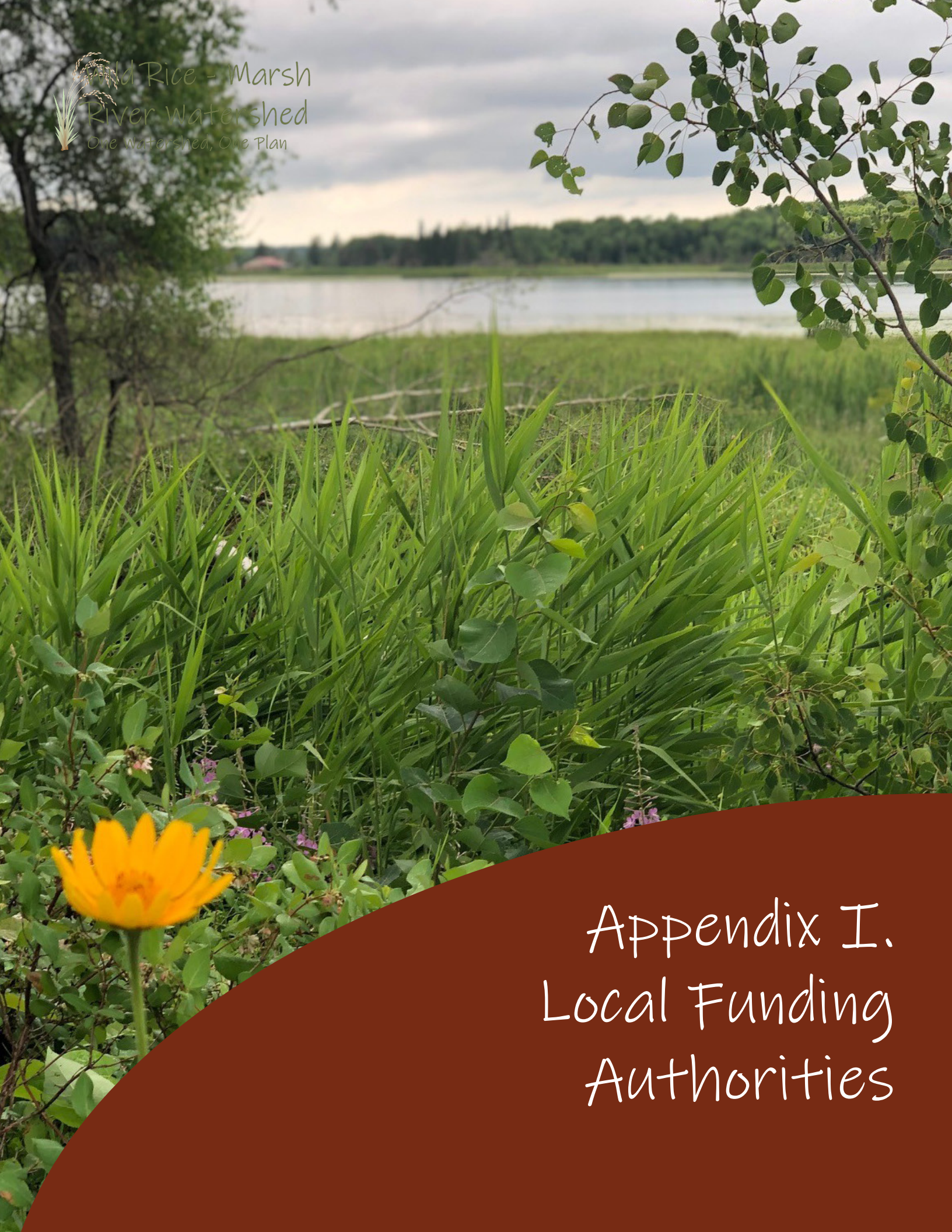
Appendix H. Local Rules, Ordinances, and Statutes

Many of the issues affecting priority issues can be addressed in part through administration of statutory responsibilities and ordinances. This document is intended to be used to summarize the existing local rules, ordinances and statutes that are currently being administered by planning entity, to understand areas of duplication, gaps, and opportunities.

	Rule, Ordinance or Statute Name	Becker	Clearwater	Clay	Mahnomen	Norman	Polk	WRWD
Statutory Responsibilities	Shoreland Management <i>MN Rules 6120.3300</i>	County Zoning Ordinance Chapters 3,4,5,6,8;	County Ordinance	Land Development Code 8-5B	County Shoreland Management Ordinance	County Zoning Ordinance No. 4	County Zoning Ordinance Section 18	WRWD Watershed Rules
	Floodplain Management <i>MN Statutes 103F, 104, 394</i>	County Zoning Ordinance Chapter 6	N/A	Land Development Code 8-5A; County Ordinance No. 2015-2	County Floodplain Management Ordinance Chapter 152	County Zoning Ordinance No. 4;	County Zoning Ordinance Section 17	WRWD Watershed Rules
	Individual Sewage Treatment Systems (ISTS) <i>MN Rules 7080-7083</i>	County Zoning Ordinance Chapter 4	County Zoning Ordinance	County Ordinance No. 2014-1	County Sewage and Wastewater Treatment Ordinance Chapter 51	County Ordinance No. 3; MN Rules 2006 with MN Rules 2011 Elements	County Zoning Ordinance Section 21	N/A
	Solid Waste Management <i>MN Statute 115A, 400</i>	County Solid Waste Management Ordinance	County Solid Waste Management Ordinance	County Code 5-2	County Solid Waste Ordinance	Land Use Ordinance No. 5;	County Zoning Ordinance Section 21	N/A
	Hazard Management <i>Minnesota Statute, Chapter 12</i>	N/A	Emergency Management, County Sheriff's Office	Emergency Management, County Sheriff's Office	County Emergency Operations Plan Chapter 32	N/A	County Emergency Management	WRWD Watershed Rules
	Feedlots <i>MN Rules 7020</i>	County Zoning Ordinance Chapter 8	MPCA Administers the CFO Program	Land Development Code 8-6-3	MPCA Administers the CFO Program	County Zoning Ordinance Section 4	County Zoning Ordinance Section 19	N/A

	Rule, Ordinance or Statute Name	Becker	Clearwater	Clay	Mahnomen	Norman	Polk	WRWD
	Buffers <i>MN Statute 103F.48</i>	County Zoning Ordinance Chapter 10	County Ordinance	County Ordinance No. 2017-04	County Buffer Ordinance 2/13/18	County Ordinance	County Zoning Ordinance Section 25	WRWD Watershed Rules
	Aggregate Management	N/A	N/A	Land Development Code 8-6-16	N/A	N/A	County Zoning Ordinance Section 13	N/A
	Construction Erosion Control	County Zoning Ordinance Chapter 6	County Shoreline Ordinance	County Ordinance No. 2015-1	N/A	N/A	County Ordinance Section 12	WRWD Watershed Rules
	Bluffland Protection	County Zoning Ordinance Chapter 7	County Shoreland Ordinance	Land Development Code 8-5B	N/A	N/A	County Shoreland Ordinance	N/A
	Forestland Management	County Zoning Ordinance Chapter 6 Section 13	N/A	N/A	N/A	N/A	County Ordinance Section 18	N/A
	Preservation of Natural Drainage Ways	N/A	N/A	N/A	N/A	N/A	N/A	WRWD Watershed Rules
	Tile Drainage	N/A	N/A	N/A	N/A	N/A	Sand Hill Watershed District Rules	WRWD Watershed Rules
	Land Use	County Zoning Ordinance	County Zoning Ordinance	Clay County Land Development Code	County Zoning Ordinance Title XV	County Zoning Ordinance	County Zoning Ordinance	WRWD Watershed Rules

	Rule, Ordinance or Statute Name	Becker	Clearwater	Clay	Mahnomen	Norman	Polk	WRWD
Local Regulations, Rules, and Ordinances	Public Drainage Systems <i>MN Statute 103E</i>	County is Drainage Authority	N/A	WRWD is Drainage Authority	County is Drainage Authority	WRWD is Drainage Authority	County is Drainage Authority	103E Drainage Authority WRWD Watershed Rules
	Stream Hydraulic Capacity	N/A	N/A	N/A	N/A	N/A	N/A	WRWD Watershed Rules
	Stormwater Runoff	County Zoning Ordinance Chapter 6	County Shoreland Ordinance	County Ordinance No. 2015-1; Land Development Code 8-5B-13	N/A	N/A	County Comp. Local Water Plan	WRWD Watershed Rules
	Wellhead Protection <i>MN Rules, 4720.5100 – 4720.5590</i>	N/A	Bagley has a WHP Plan	Clay County Land Development Code 8-5C-5	Bejou, Mahnomen & Waubun have WHP Plans	N/A	Beltrami and Climax have a WHP Plans	N/A
	Wetland Conservation Act <i>MN Rule 8420</i>	Delegated to SWCD 1999	County Environmental Services	Clay County transfers to SWCD 2000	Delegated to SWCD 1993	Delegated to SWCD	Delegated to SWCD	WRWD Watershed Rules
	County Agriculture Inspector	SWCD	County	Clay County transfers to SWCD 2012	County	County transfer to Mn Extension	County	N/A
	Aquatic Invasive Species	SWCD	SWCD	SWCD	SWCD does AIS Outreach for the County	SWCD	County	WRWD Watershed Rules



Appendix I. Local Funding Authorities



APPENDIX L

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 <i>(please see details in the full text of each provision)</i>
§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 <i>(please see details in the full text of each provision)</i>
§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 <i>(please see details in the full text of each provision)</i>
		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 J. Glossary of Terms

Appendix J. Glossary of Terms

Enhance: Used to describe the management strategy of a water body that is nearly impaired.

Impairment: Waterbodies are listed as impaired if they do not meet the state water quality standard for designated uses including aquatic life, aquatic recreation, and aquatic consumption.

Index of Biological Integrity (IBI): A way of measuring the biological community (fish and aquatic macroinvertebrates) in the water body. The index is a scale of 0 to 100 with 0 being the lowest quality and 100 being the highest quality.

Judicial Ditch: A ditch that crosses county lines.

Implementation Scenario. An estimated way to implement the plan that shows both placement of best management practices and costs. It can be used to determine how to achieve plan goals.

Phosphorus Sensitivity: The lake's sensitivity to phosphorus as determined by the DNR. Sensitivity means that added phosphorus would affect the clarity in these lakes the most (Radomski 2018).

PTMApp: The Prioritize, Target, Measure Application is a tool that 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.

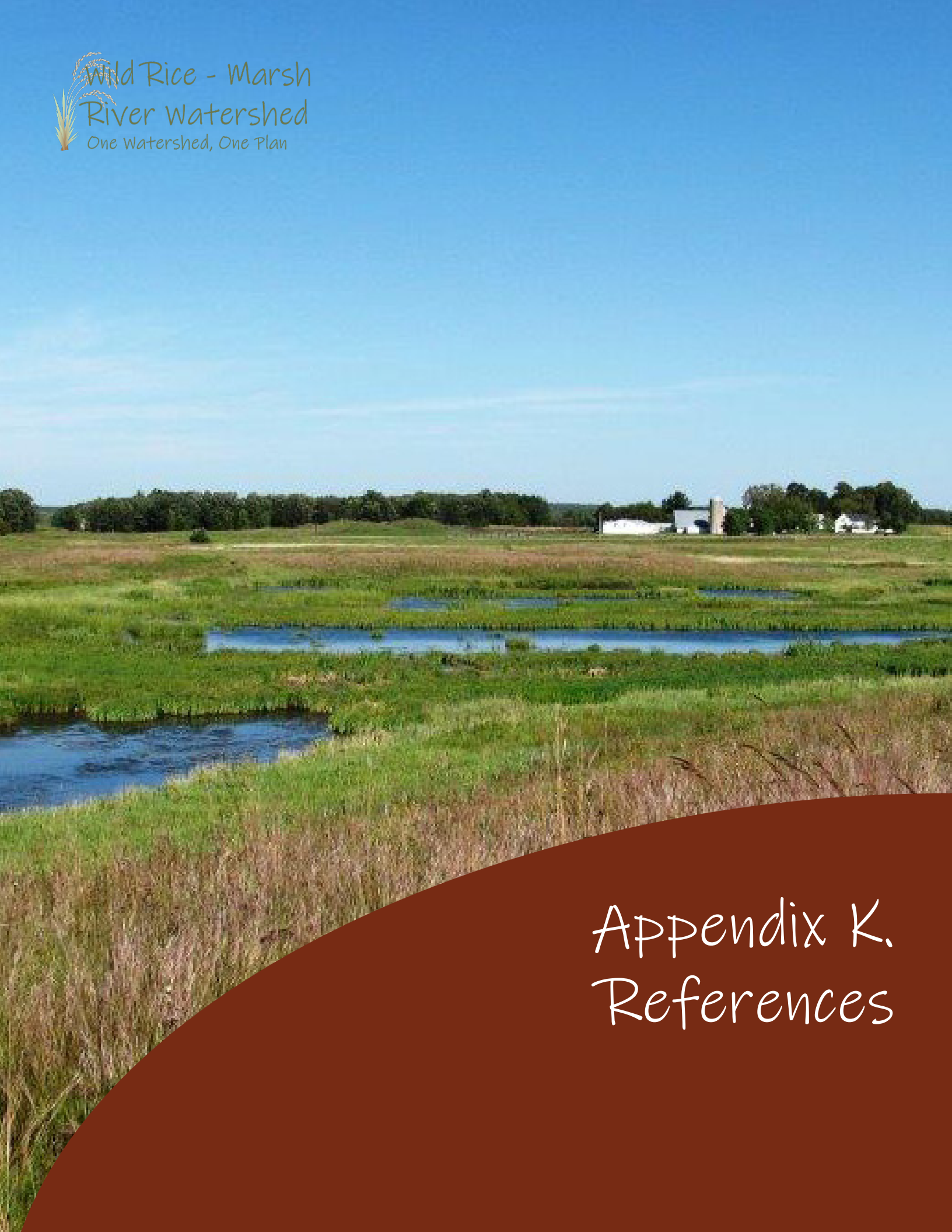
Protect: Used to describe the management strategy of a water body that is above average water quality.

Restore: Used to describe the management strategy of a water body that is impaired.

TMDL (Total Maximum Daily Load): The amount of a particular pollutant that a body of water can handle without violating state water quality standards.

Watershed: A land area that channels rainfall and snowmelt to creeks, streams, and rivers, and eventually to outflow points such as reservoirs, bays, and the ocean.

WRAPS: (Watershed Restoration and Protection Strategy): A watershed approach to restoring and protecting Minnesota's rivers, lakes, and wetlands implemented by the Minnesota Pollution Control Agency on a 10-year cycle (<https://www.pca.state.mn.us/water/watershed-approach-restoring-and-protecting-water-quality>).



Appendix K. References

Appendix K. References

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