



Des Moines River Watershed Comprehensive Watershed Management Plan 2023-2032





Plan Acknowledgements

Planning Partnership

Cottonwood County and SWCD

Jackson County and SWCD

Martin County and SWCD

Murray County and SWCD

Nobles County and SWCD

Lyon County and SWCD

Heron Lake Watershed District



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Advisory Committee Partners

Pipestone County and SWCD

Board of Water and Soil Resources

Minnesota Department of Agriculture

Minnesota Department of Health

Minnesota Department of Natural Resources

Minnesota Pollution Control Agency

United States Fish and Wildlife Service

Natural Resource Conservation Service

Minnesota Deer Hunters Association

Shetek Area Lakes Association

Corn / Soybean Producers

Minnesota Land Trust

Pheasants Forever

Ducks Unlimited

Minnesota Rural Water Association

Red Rock Rural Water

Lincoln-Pipestone Rural Water

Lake Shetek State Park

City of Jackson

City of Worthington

Minnesota Department of Transportation

Cottonwood Cattle Producers

Murray County Cattleman's Association

Public Citizens

Created in Collaboration With





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Acronyms

1W1P	One Watershed, One Plan
BMP	Best Management Practice
BWSR	Board of Water and Soil Resources
CEC	Contaminant of Emerging Concern
CIP	Capital Improvement Project
CRP	Conservation Reserve Program
CSP	Conservation Stewardship Program
CHF	Clean Water Fund
CWMP	Comprehensive Watershed Management Plan
DNR	Minnesota Department of Natural Resources
DO	Dissolved Oxygen
DWSMA	Drinking Water Supply Management Area
EPA	Environmental Protection Agency
EQIP	Environmental Quality Incentive Program
FSA	Farm Service Agency
FWS	Fish and Wildlife Service
GAM	Grants Administration Manual
HLWD	Heron Lake Watershed District
HUC	Hydrologic Unit Code
LGU	Local Government Unit
LSOHC	Lessard-Sams Outdoor Heritage Council
MBS	Minnesota Biological Survey
MDA	Minnesota Department of Agriculture
MDH	Minnesota Department of Health
MOA	Memorandum of Agreement





MPCA	Minnesota Pollution Control Agency
MRTWA	Minnesota Rural Water Association
NPDES	National Pollutant Discharge Elimination System
NRCS	Natural Resources Conservation Service
PFOA	Perfluorooctanoic acid
PTMApp	Prioritize, Target, and Measure Application
RCCP	Regional Conservation Partnership Program
RIM	Reinvest in Minnesota
SSTS	Subsurface Sewage Treatment System
SWCD	Soil and Water Conservation District
TMDL	Total Maximum Daily Load
TNC	The Nature Conservancy
TP	Total Phosphorus
USACE	United States Army Corps of Engineers
USDA	United States Department of Agriculture
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
WBIF	Watershed-based Implementation Funding
WCA	Wetland Conservation Act
WD	Watershed District
WMA	Wildlife Management Area
WPLMN	Watershed Pollutant Load Monitoring Network
WRAPS	Watershed Restoration and Protection Strategy
WWTF	Wastewater Treatment Facilities





Executive Summary



Executive Summary

The Des Moines River Watershed, located in southwestern Minnesota, is a primarily agricultural watershed rich with unique natural features and diverse water resources. The watershed drains 983,719 acres of land, spanning portions of seven counties, including Cottonwood, Jackson, Martin, Murray, Nobles, Lyon, and Pipestone (Figure ES.1). Two main river systems form the main arteries of this watershed: the West Fork Des Moines River and the East Fork Des Moines River. The West Fork Des Moines River starts in Lake Shetek in the headwaters of the watershed and flows southeast into Iowa, passing through the cities of Windom, Jackson, and others. The East Fork Des Moines River also drains southeast, flowing into the West Fork across the Iowa border.

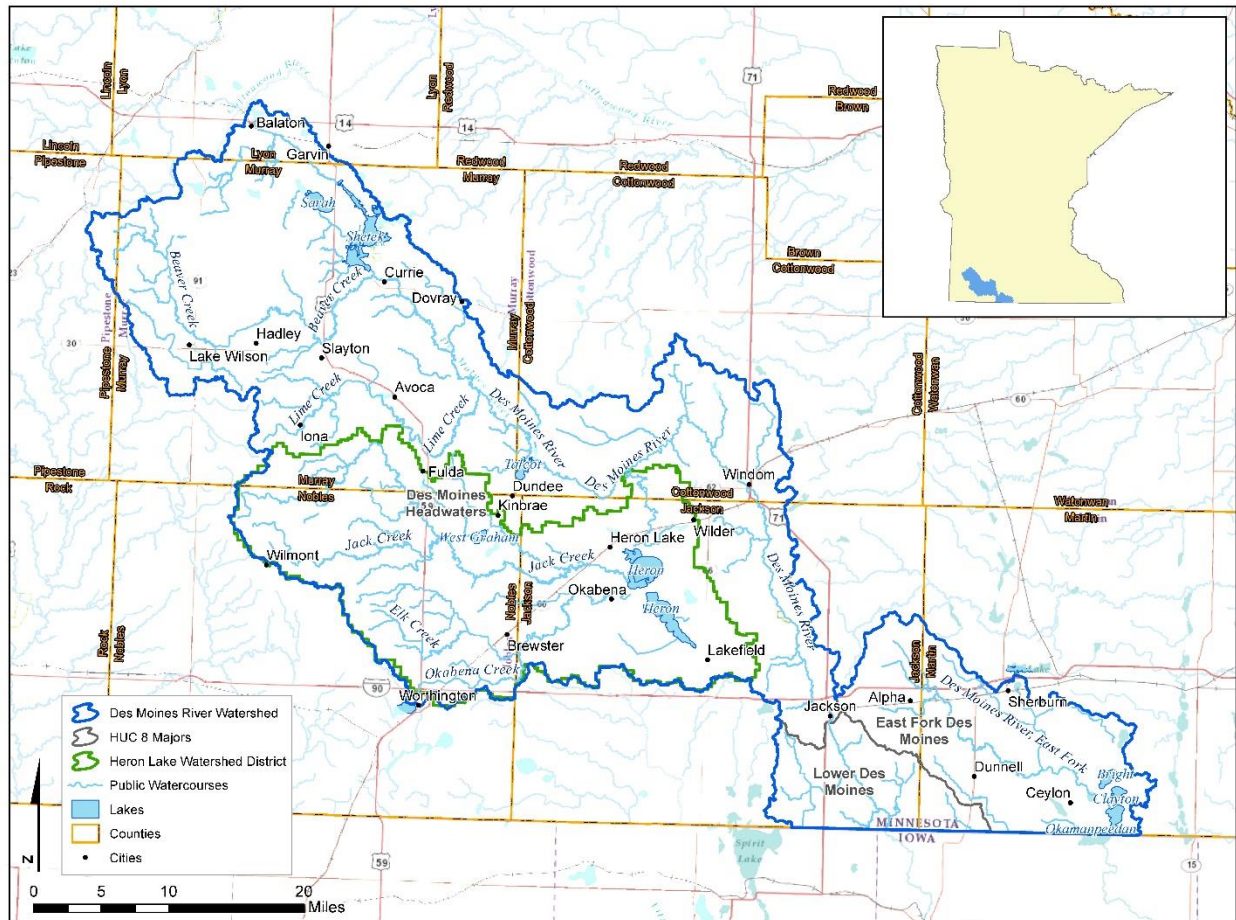
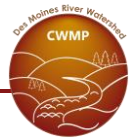


Figure ES.1. The Des Moines River Watershed.

The Des Moines River Watershed includes three major watersheds (USGS Hydrologic Unit Code [HUC]-08 size): the Headwaters of the Des Moines River (HUC 07100001), Lower Des Moines River (HUC 07100002), and the East Fork Des Moines River (HUC 07100003) (Figure ES.1). This Des Moines Comprehensive Water Management Plan (CWMP) was developed in 2021-2022 through the One Watershed, One Plan (1W1P) program administered by the Minnesota Board of Water and Soil Resources (BWSR), Minnesota Statutes §103B.801.

The 1W1P program was designed to align water planning along watershed boundaries, not county or other jurisdictional boundaries as was done in the past. Prior to this single plan, each of the seven counties within this



watershed, as well as the Heron Lake Watershed District, had water-related plans that covered portions of this watershed. Water is connected and ignores county boundaries, so to truly manage the resource holistically, a watershed scale is most efficient and effective. The purpose of this plan is to target management and projects to protect and restore the watershed’s most valuable resources.

The Des Moines River Watershed is diverse, with locations of natural resources and issues changing from north to south based on topography, land use, geology, and natural features (e.g., lakes, prairies, etc.). For purposes of this plan, the larger Des Moines River Watershed was divided into five “planning regions” shown in Figure ES.2 and described in Section 1. Introduction. These planning regions are referenced throughout the plan to better prioritize, target, and measure management efforts in the watershed over the next ten years.

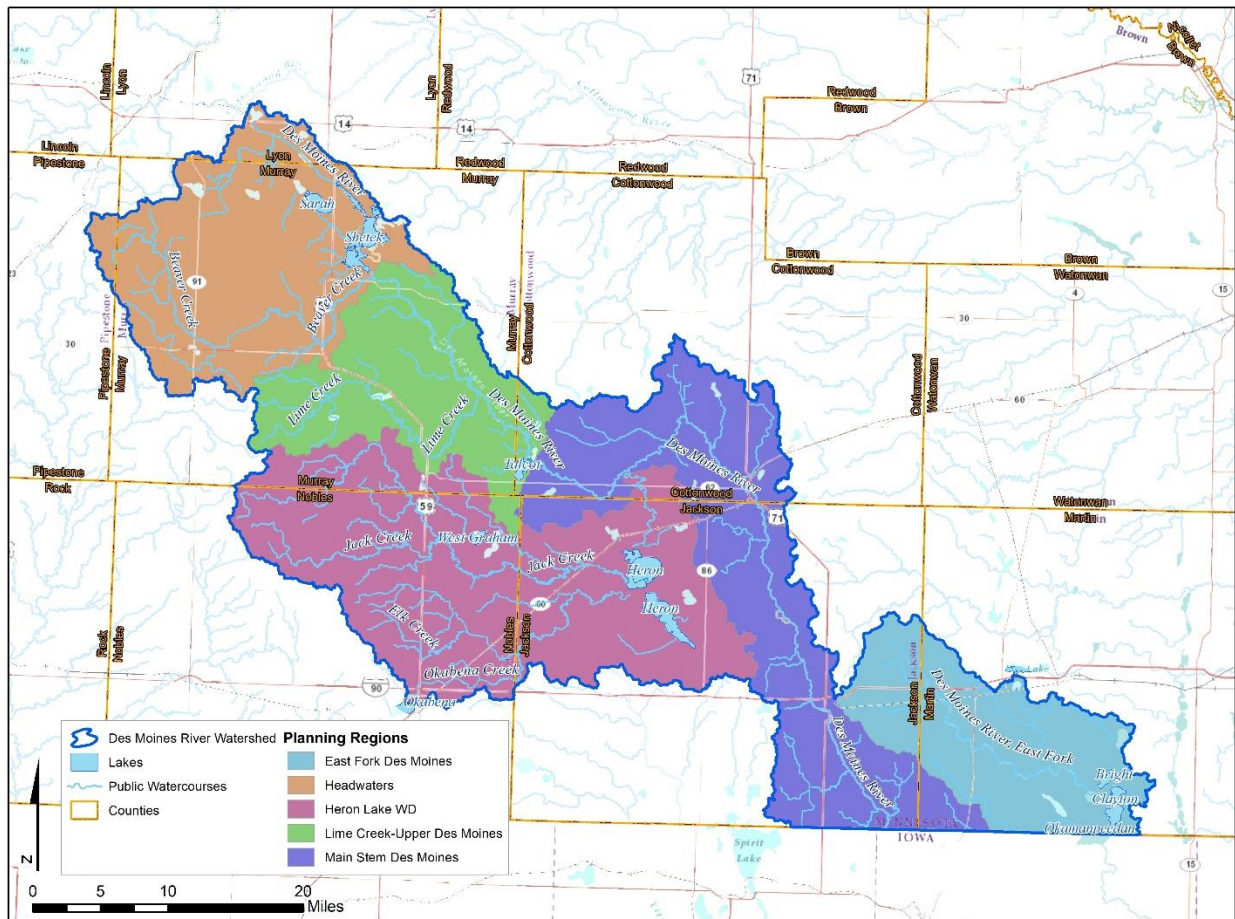


Figure ES.2. Planning regions in the Des Moines River Watershed.

Plan Partners

The Des Moines River Watershed 1W1P began with a memorandum of agreement (MOA) between all local planning entities in the watershed involved in the planning process. This included:

- The counties of Cottonwood, Jackson, Martin, Murray, Nobles, and Lyon,
- The Cottonwood, Jackson, Martin, Murray, Nobles, and Lyon Soil and Water Conservation Districts (SWCDs), and
- The Heron Lake Watershed District.



As the jurisdictional area of Pipestone County and SWCD within the watershed planning area is so small, Pipestone elected to serve the planning process from an advisory capacity.

The planning effort was guided by three committees: the Steering Committee, Advisory Committee, and Policy Committee (Figure ES.3). The Policy Committee, made up of one representative from each entity in the MOA, formed the decision-making body for this plan. The Steering Committee consisted of local staff from each of the entities in the MOA and state agencies and generated the content in this plan. The Advisory Committee consisted of additional agencies and local stakeholders and contributed to plan content in an advisory role.

The entities implementing this CWMP are collectively known as the Des Moines River Watershed Partnership (Partnership). The Steering and Advisory Committees of the planning process were consolidated for purposes of plan implementation. The Policy Committee continues to function as the decision-making body of plan implementation, with roles summarized in Figure ES.3 and expanded on in Section 7. Plan Administration and Coordination.

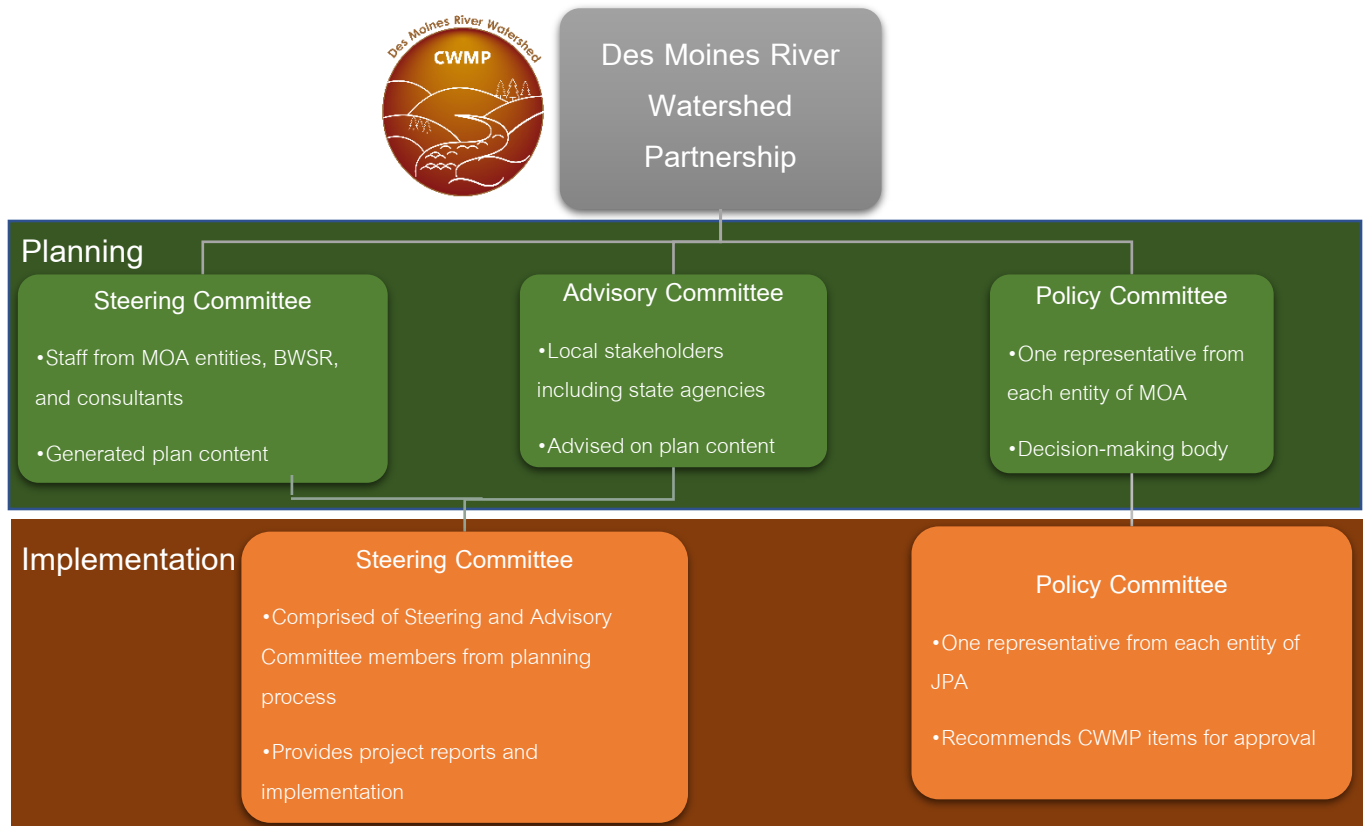


Figure ES.3. Local committee roles for planning and implementing the Des Moines River Watershed CWMP

Priority Issues

This plan identifies and prioritizes issues that planning partners will focus on for the next ten years. To begin the planning effort, natural resource issues present in existing plans, studies, and data were aggregated. These issues were then expanded to include natural resource issues identified in comment letters and responses from the public. In total, a list of 32 issues was generated, organized by resource category below (Figure ES.4):



Figure ES.4. Resource categories used to organize issues in the Des Moines River Watershed CWMP

Due to realistic staff time and funding limitations, this plan prioritizes issues to focus on during a 10-year effort. Issues were prioritized as Priority A, Priority B, or Priority C based on input from two public meetings and feedback from planning committees. The three priority levels are summarized below (Table ES.1).

Table ES.1: Definitions for Priority A, B, and C issues.

Priority A	We intend to address these issues first within the lifespan of this plan. These are the most important!
Priority B	We intend to address some of these issues throughout the lifespan of this plan. Still important, but less of a priority.
Priority C	We may address some of these issues through collecting additional data or funding throughout the lifespan of the plan. This issue may also be addressed through partner groups. Once again, still important, but the lowest local priority issues.



Priority A and B issues are the focus of this plan. They have goals set for them in Section 4. Measurable Goals, and actions assigned to address them in Section 5. Targeted Implementation. They are summarized below.

Priority A Issues




Category	Resource	Issue Statement
	Aquifer	Protection of existing groundwater recharge areas and promotion of additional recharge and infiltration to augment limited groundwater supplies.
	Drinking Water	Protection of drinking water quality from contaminants, including nitrates and pesticides, especially in areas with groundwater and surface water interaction.
	Drinking Water	Protection of drinking water quality from contamination from unused wells and noncompliant septic systems.
	Streams, Ditches	Peak flow from altered hydrology (tile and drainage ditches) and its impact on channel stability, infiltration rates, and water quality degradation.
	Streams	Excess nitrates and ammonia in streams impacting aquatic life.
	Lakes & Streams	Excess delivery of sediment from upland wind and water erosion to lakes and streams impacting aquatic life and recreation.





Category	Resource	Issue Statement
	Lakes & Streams	Excess phosphorus loading from runoff and resuspension in lakes causing nuisance algal blooms, impacting aquatic life and recreation.
	Rural and Urban Communities	Insufficient storage on the landscape, especially in upland areas, and its impact on flooding.
	Agriculture	Low crop diversity and lack of conservation tillage or residue management on fields, leaving soil exposed and impacting soil health.

Priority B Issues

Category	Resource	Issue Statement
	Streams	Need for continued enhancement of buffers along ditches, stream systems, and non-protected waters, impacting water quality and habitat.
	Streams	Streambank and in-channel erosion contributing sediment to water, impacting water quality, and habitat.
	Streams	Livestock access to streams causing degradation in water quality and instability to streambanks.
	Lakes & Streams	Urban/impervious runoff, stormwater runoff, and other urban point sources impacting downstream water quality conditions.
	Lakes	Inadequate lake shoreline habitat to provide habitat and protect against shoreline erosion.
	Drainage Ditches	Uncoordinated and inadequate drainage management to meet drainage network needs and promote water quality.
	Rural and Urban Communities	Increasing extremes from a changing climate (drought and increasing precipitation patterns), and the need to plan for resiliency.
	Wetlands	Loss and degradation of wetlands and its impact on wildlife habitat and water storage.
	Upland Habitat	Degradation and fragmentation of wildlife habitat, including native prairie, woodlands, grasslands, and other areas





Measurable Goals

Good resource management – and the ability to demonstrate progress – relies on setting measurable goals for locally important issues and resources. As such, measurable goals are set for every Priority A and Priority B issue in the Des Moines River Watershed. Goals were established for two different time scales:

- Desired future condition goals describe the resource condition (water quality, water availability, habitat quality) planning partners are striving to attain, regardless of timeframe.
- Ten-year goals describe the quantifiable change in resource condition that planning partners expect to achieve during implementation of this plan.

This plan includes 14 measurable goals that collectively address priority issues. The measurable goals are presented as a series of 2-page summaries for each goal, each detailing:

- The priority issue(s) the goal addresses;
- Background information about the issue and goal;
- The desired future condition and ten-year goals; and
- A map of specific resources and/or subwatersheds that are the geographic focus of initial implementation efforts for that goal.

An example goal is presented in **Figure ES-5**. Goals are set at a watershed-wide scale. However, the prominence of priority issues changes by planning region (and even by subwatershed). To reflect this, planning region milestones were established for each goal so each planning region has a target to make progress toward the watershed-wide goal (**Figure ES.6**). Issues that are more important in one planning region will have a larger milestone goal.

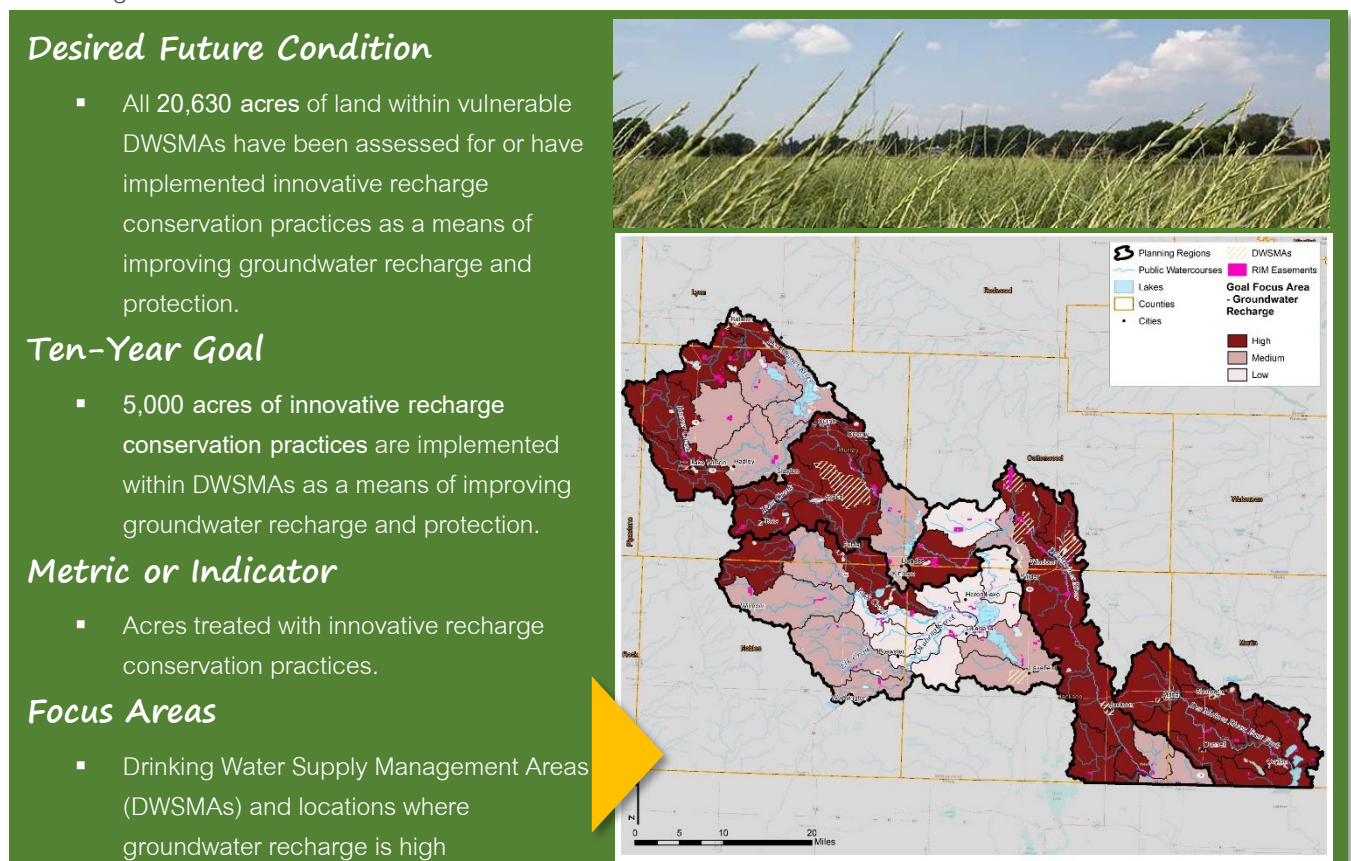
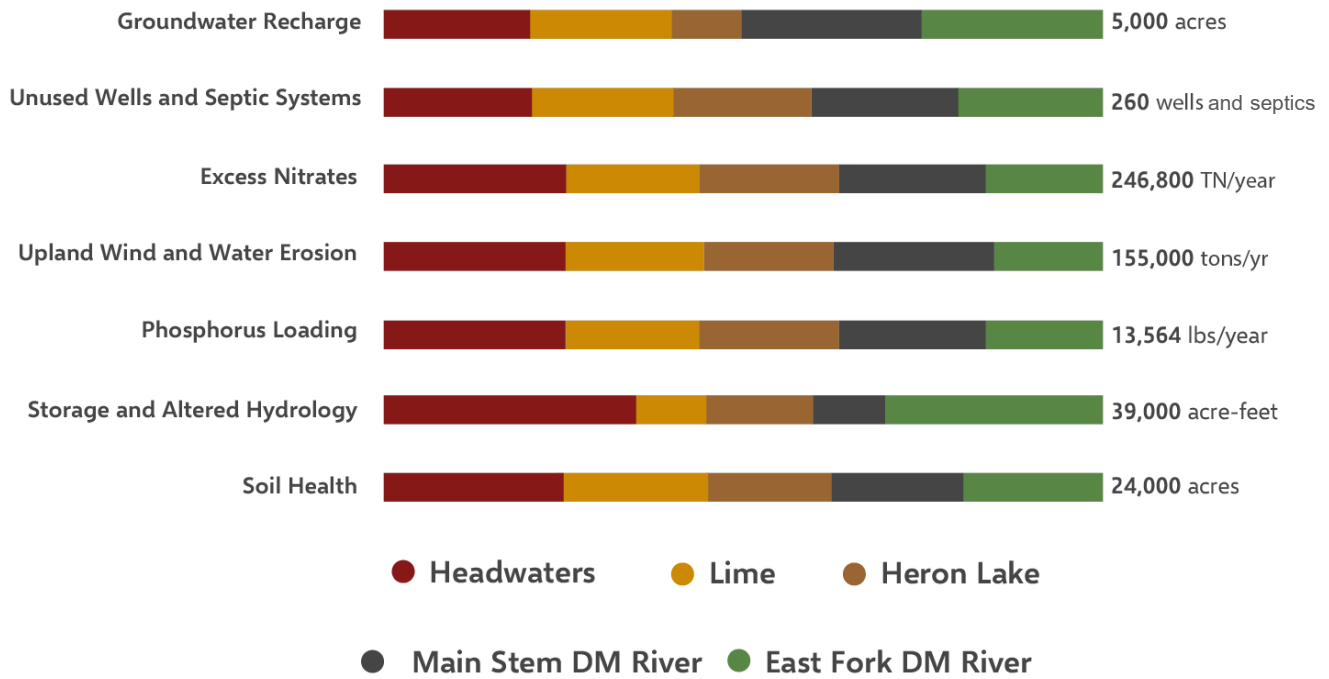


Figure ES.5. Example goal summary for the Des Moines River Watershed



Priority A Goals Overview



Priority B Goals Overview

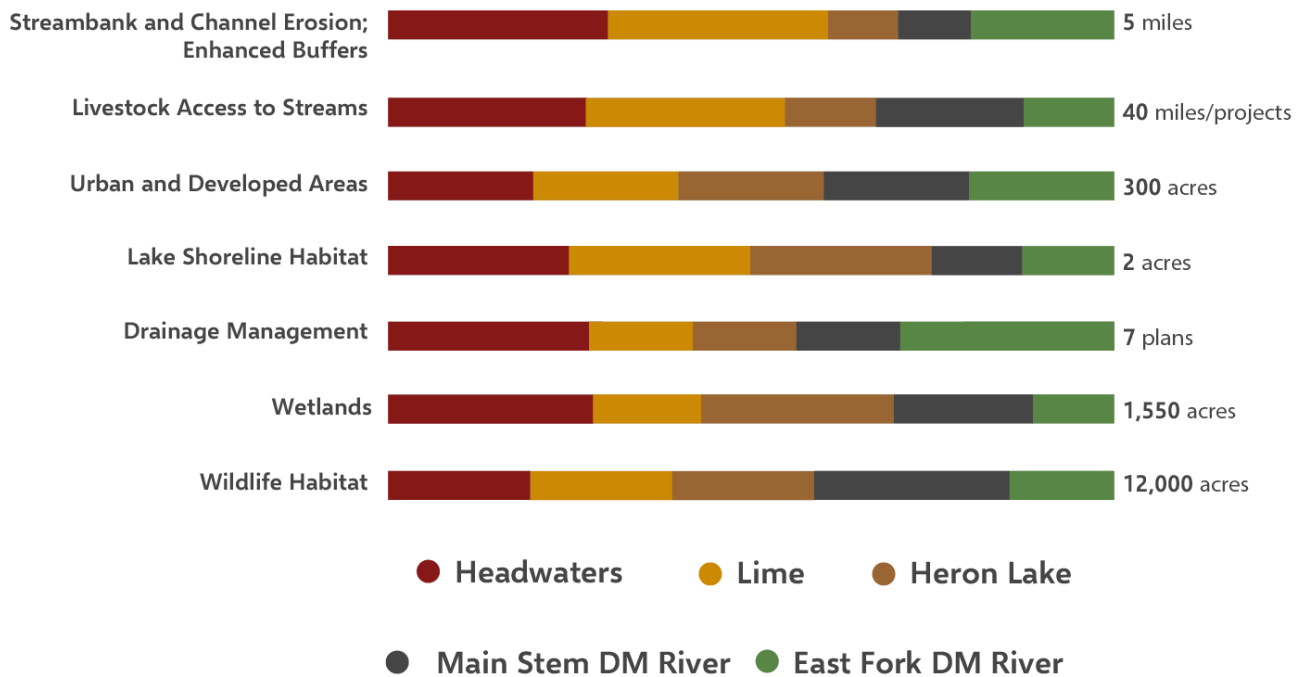


Figure ES.6. Watershed Priority A and B measurable 10-year goals with planning region milestones



Targeted Implementation

This plan includes a series of Action Tables that detail the actions that will be taken to make progress toward planning region milestones and measurable goals. These tables also include information about where and when actions will be targeted, how those actions will be measured, and how much it will cost, and what actions need to be tracked for reporting progress back toward goals. Action Tables can be found in **Section 5. Targeted Implementation**. Similar types of actions are grouped into one of five implementation programs, as shown in **Figure ES.7**, and described in **Section 6. Implementation Programs**.



Figure ES.7: Implementation programs in the Des Moines River Watershed with example actions that are summarized in Action Tables



Table ES.2 shows the estimated costs for implementing actions in the plan. Costs are also included for the operations and maintenance of waterways and waterway infrastructure at or near their current levels, for regulatory actions, and for plan administration and administrative costs related to implementation. This plan assumes local, state, and/or federal fiscal support remains unchanged.

Table ES.2. Estimated cost of implementing the Des Moines River CWMP (assumes Current Funding + Watershed Based Implementation Funding [WBIF])

	Assumes Current Funding + WBIF	
	Est. Annual Cost	Est. 10-Year Cost
Implementation Programs		
Projects and Practices	\$1,217,700	\$12,176,000
Capital Improvement Projects	\$35,900	\$359,000
Education and Outreach	\$260,900	\$2,609,000
Research and Assessments	\$103,100	\$1,031,000
Regulatory Administration	\$242,800	\$2,428,000
Additional Expenses		
Operations and Maintenance	\$186,600	\$1,866,000
Administration	\$70,000	\$700,000
Total	\$2,117,000	\$21,169,000

Lastly, Figure ES.8 summarizes the estimated benefits from implementing the Des Moines River Watershed CWMP. All benefits summarized are related to attaining the ten-year measurable goals.

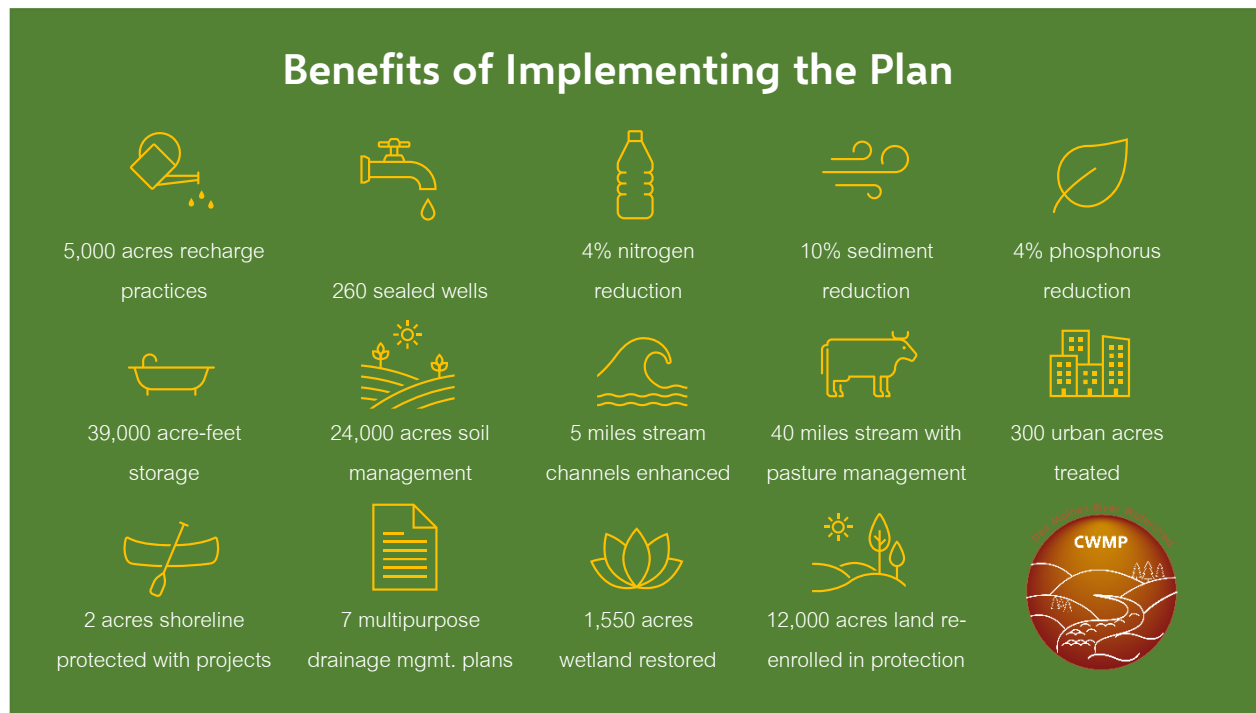



Figure ES.8. Estimated benefits from implementing the Des Moines River Watershed CWMP



Section 1. Introduction



Section 1. Introduction



This Plan Section provides a brief introduction to the Des Moines River Watershed and the partners involved in the One Watershed, One Plan planning process which resulted in this plan.

Introduction

Overview

The Des Moines River Watershed planning area includes three major watersheds (USGS Hydrologic Unit Code (HUC)-08 size): the Headwaters of the Des Moines River, Lower Des Moines River, and the East Fork Des Moines River. This Des Moines Comprehensive Water Management Plan was developed in 2020-2021 through the One Watershed, One Plan (1W1P) program administered by the Minnesota Board of Water and Soil Resources (BWSR), Minnesota Statutes §103B.801.

The 1W1P program was designed to align water planning along watershed boundaries, not county or other jurisdictional boundaries as was done in the past. Prior to this single plan, each of the seven counties within this watershed, as well as the Heron Lake Watershed District, had water-related plans that covered portions of this watershed. Water is connected and ignores county boundaries, so to truly manage the resource holistically, a watershed scale is most efficient and effective. The purpose of this plan is to target management and projects to protect and restore the watershed’s most valuable resources.

The Des Moines River Watershed and Planning Regions

The Des Moines River Watershed drains 983,719 acres of land, spanning portions of seven counties, including Cottonwood, Jackson, Martin, Murray, Nobles, Lyon, and Pipestone (Figure 1.1). A detailed overview about the watershed and its resources is provided in [Section 2: Land and Water Resources Narrative](#).

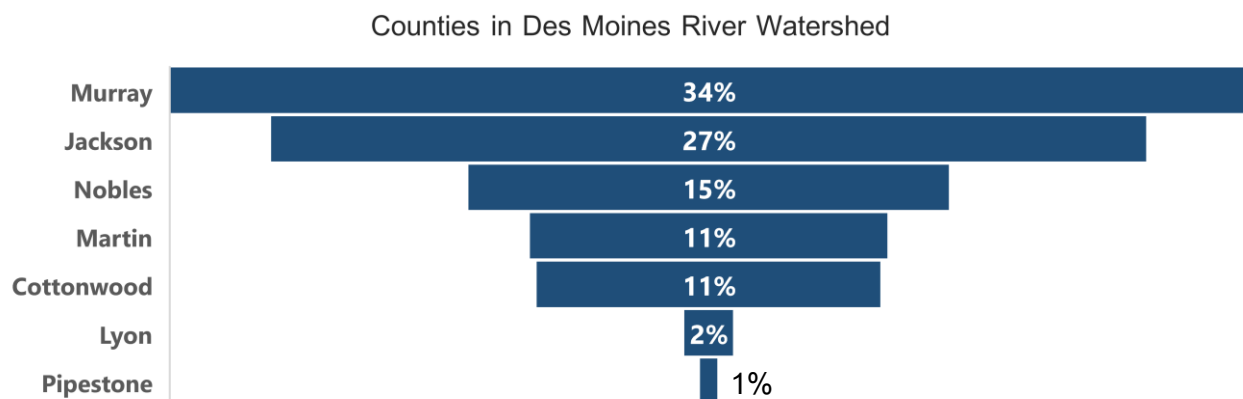


Figure 1.1: The percentage of the watershed occupied by each county.



The Des Moines River Watershed is diverse, with locations of natural resources and issues changing based on topography, land use, geology, and natural features (e.g., lakes, prairies, etc.). In recognition of this, planning partners separated the larger Des Moines River Watershed into five “planning regions” shown in Figure 1.2 and described in Table 1.1. These planning regions will be referenced throughout the plan to better prioritize, target, and measure management efforts in the watershed over the next ten years.

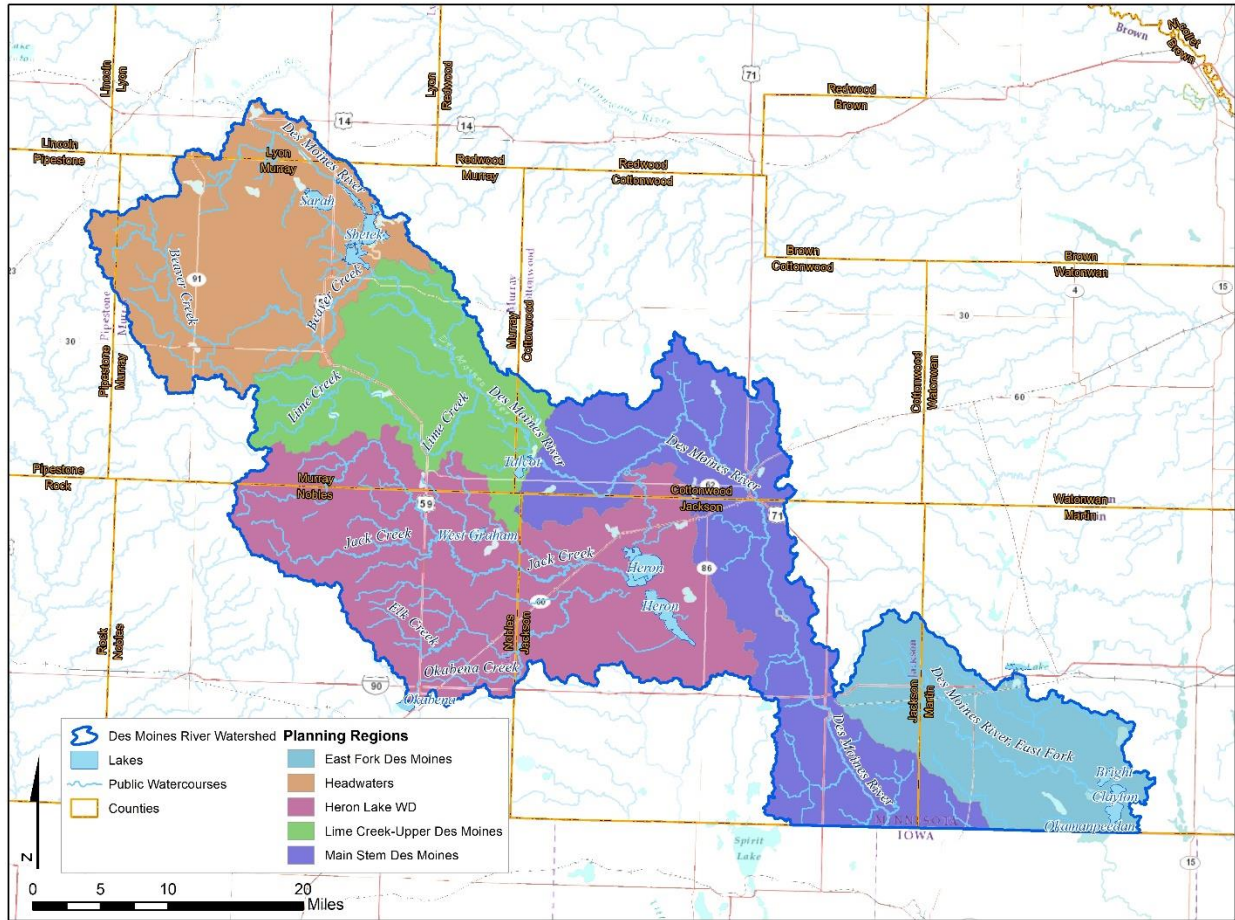


Figure 1.2. Planning regions in the Des Moines River Watershed.

Table 1.1: Planning region descriptions.

Planning Region	Description
Headwaters	The Headwaters planning region is characterized by its relative abundance of lakes, higher elevation, and unique topography. Artificial drainage is less prevalent in this planning region than in other areas.
Lime Creek-Upper Des Moines River	Lime Creek-Upper Des Moines River retains some of the characteristics of the Headwaters area in geology and soils but lacks the prevalence of lakes. Red Rock Rural Water Lindstrom wellfield is highly vulnerable to contamination and directly connected to the surface water resources.
Heron Lake Watershed District	The Heron Lake Watershed District planning region follows the watershed district’s jurisdictional boundary. It is a unique area for its lakes and preexisting governance structure for water management planning.
Main Stem Des Moines River	The Main Stem of the Des Moines River flows past Windom and Jackson, the two largest population centers in the area. The planning region contains several calcareous fens and the only trout stream in the



Planning Region	Description
	watershed (Scheldorf Creek). There is a relatively high level of native prairie habitat in this region compared to the rest of the watershed. Windom, Red Rock Rural Water Great Bend, and Red Rock Rural Water Lake Augusta wellfields are highly vulnerable to contamination and directly connected to the surface water resources.
East Fork Des Moines River	The East Fork Des Moines River planning region is unique, as it does not drain into the main stem Des Moines until it crosses out of the planning area in Iowa. This region has high recreation value lakes and intensive artificial drainage.

Planning Partners

The Des Moines River Watershed 1W1P began with a memorandum of agreement (MOA) between all local planning entities in the watershed involved in the planning process (**Appendix A**). This included:

- The counties of Cottonwood, Jackson, Martin, Murray, Nobles, and Lyon,
- The Cottonwood, Jackson, Martin, Murray, Nobles, and Lyon Soil and Water Conservation Districts (SWCDs), and
- The Heron Lake Watershed District.

As the jurisdictional area of Pipestone County and SWCD within the watershed planning area is so small, Pipestone elected to serve the planning process from an advisory capacity.

The planning effort was led by the Steering Committee made up of local government and State agency staff. The Policy Committee, made up of elected officials from the County Boards, SWCD Boards, and the Watershed District Board, approved the content of the plan, served as a liaison to their representative governing entities, and acted on behalf of their constituents. The Advisory Committee provided input to the Policy Committee to ensure a technically robust and socially viable plan was developed. The relationships between the committees is shown in **Figure 1.3**. Additional information about committee members and responsibilities is found in the Participation Plan created specifically for this planning effort (**Appendix B**).

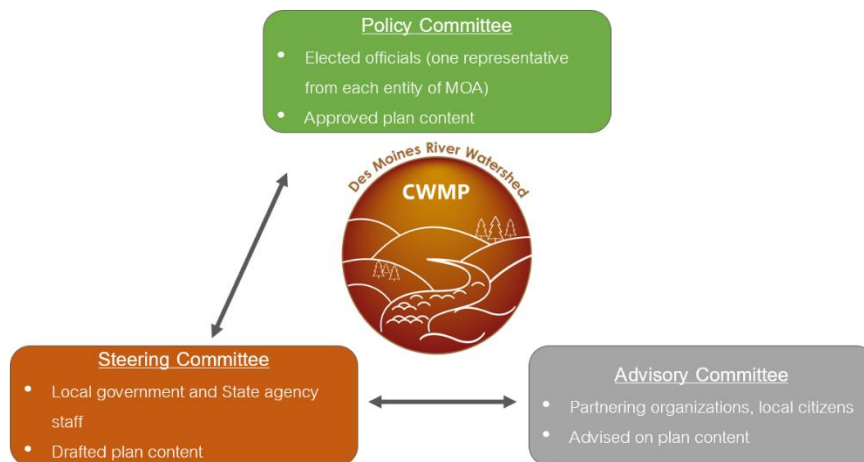
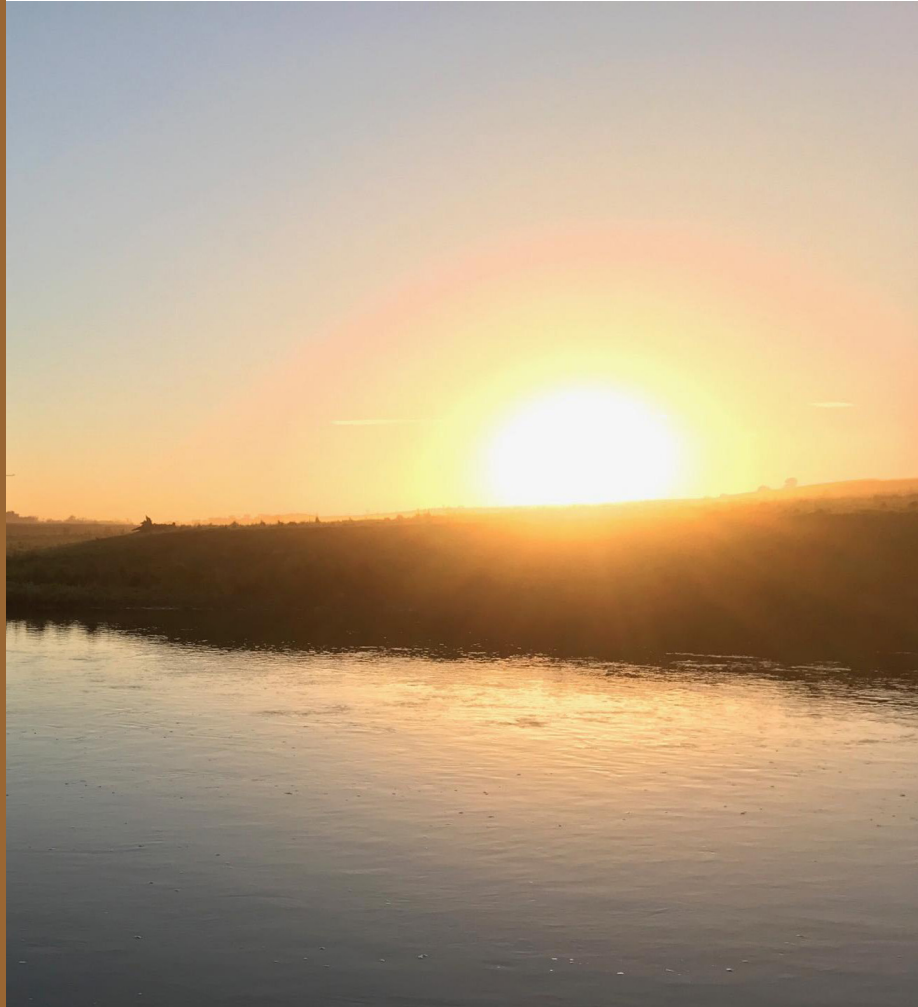



Figure 1.3: Planning committees involved with the Des Moines River Watershed 1W1P process.



Section 2. Land and Water Resources Narrative



Section 2. Land and Water Resources Narrative



This Plan Section introduces the natural resources within the Des Moines River Watershed and briefly summarizes their conditions.

Land and Water Resources Narrative

Introduction and History

The Des Moines River Watershed, located in southwestern Minnesota, is a primarily agricultural watershed rich with unique natural features and diverse water resources. Two main river systems form the main arteries of this watershed: the West Fork Des Moines River and the East Fork Des Moines River. The West Fork Des Moines River starts in Lake Shetek in the headwaters of the watershed and flows southeast into Iowa, passing through the cities of Windom, Jackson, and others. The East Fork Des Moines River also drains southeast, flowing into the West Fork across the Iowa border. From there, the Des Moines River flows into the Mississippi at Keokuk, Iowa, and supplies the city of Des Moines with drinking water (Figure 2.1).

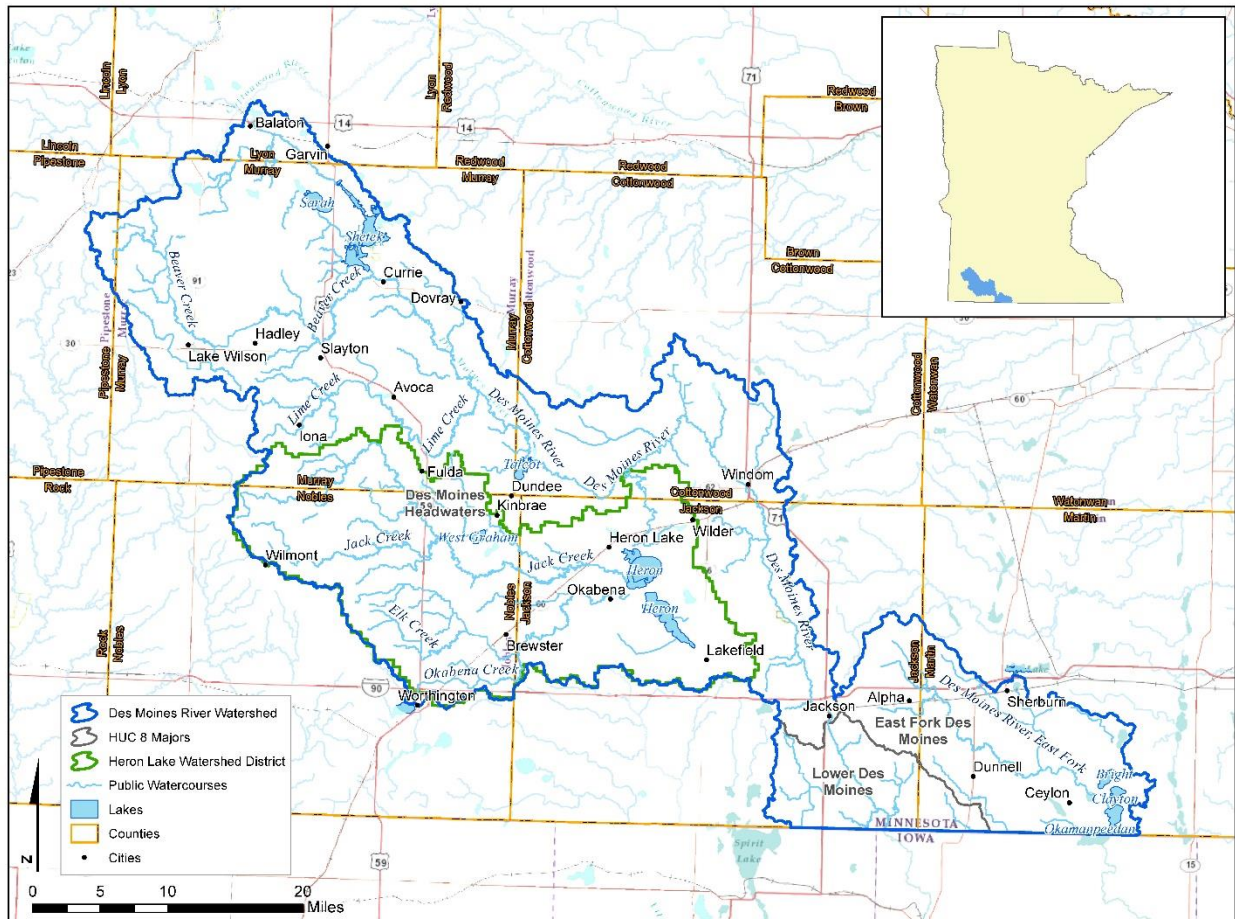


Figure 2.1: General location of the Des Moines River Watershed.



The Des Moines River Watershed was formed in glacial material deposited by the Des Moines Lobe glacier approximately 12,000 years ago. The eastern part of the watershed was largely under the Des Moines Lobe, but as one travels west, hilly morainal features start to appear where the edge of the glacier formed a patchwork of hills and wetland-filled valleys. Finally, the westernmost border of the watershed is the Buffalo Ridge, a high ridge towering 100-200 feet over the surrounding plains landscape that is part of the larger Coteau des Prairies feature. The Coteau des Prairies, or hill of the prairie, is a flatiron shaped plateau on the plains that was missed by the most recent glaciation. Lewis and Clark described the Coteau des Prairies as *High Land covered with Wood called Mountain of the Prairie* on their ca. 1814 map of the area, indicating its regional significance. The Buffalo Ridge forms the western border of the Des Moines River Watershed and separates the Mississippi and Missouri River drainages, with anything west of the Buffalo Ridge draining into the Missouri River.

The Des Moines River Watershed has a long and storied human history. The watershed is the traditional homeland of the Dakota. Although there are no reservations currently within the watershed, the area is designated as an area of interest by the Lower Sioux Indian Community of Minnesota. Members of this community are part of the Mdewakanton Band of Dakota.

French fur traders and other European explorers mapped the area and used the rivers as local thoroughfares (Figure 2.2). Before Euro-American colonists and settlers came to the region in the late 1800's, the native vegetation was almost entirely tallgrass prairie, including wet and dry prairie. Forest vegetation was primarily Big Woods oak, maple, basswood, elm, and hickory assemblages along river corridors.



Figure 2.2: Joseph Nicollet’s 1842 map of the area.



Introduction



Land and Water Resources Narrative



Priority Issues



Measurable Goals



Targeted Implementation



Implementation Programs



Plan Administration and Coordination



Topography, Soils, and General Geology

Areas within the Des Moines River Watershed have significant topography due to its moraine border to the west, compared to similar agricultural watersheds in the area. However, slope is still slight relative to areas of eastern Minnesota. The headwaters area in the northwest of the watershed is characterized by gently sloping to steep, loamy glacial till soils with scattered sandy outwash soils and silty alluvial flood plains soils. This area is part of the Prairie Pothole region of the Upper Midwest. In the southwestern part of the watershed, Loess Mantled Prairie Till Plain can be found on the watershed border. This region is characterized by gently undulating to steep and long smooth slopes and well-defined drainage ways formed in loess mantled uplands. Soils are commonly well-drained with some poorly drained upland waterways. The eastern part of the watershed is characterized by loamy glacial till soils with scattered lacustrine areas, potholes, outwash, and floodplains, and is nearly level to gently undulating with relatively short slopes. Most of the wet soils have been artificially drained to maximize crop production.

Soils in the Des Moines River Watershed are primarily loamy glacial till with scattered lacustrine areas, potholes, outwash, and floodplains. However, the northwestern part of the watershed in southern Lyon and northwest Murray counties contains loamy glacial till with scattered sandy outwash soils and silty alluvial flood plain soils.

As previously mentioned, the Des Moines River Watershed was shaped by the Des Moines Lobe glacier. The western border of the watershed is the Bemis Moraine, the oldest and westernmost extent of the Des Moines Lobe glacier (Gilbertson, 1990). The eastern border is formed by the Altamont Moraine, a stagnation moraine associated with a later advance of the Des Moines Lobe. In between, in the Heron Lake area, lacustrine deposits dominate, indicating the presence of a glacial lake in the Heron Lake area. Outwash deposits are common in the actual Des Moines valley, indicating the current drainageway was once also an ancient glacial meltwater drainageway.

Climate and Precipitation

The Des Moines River Watershed has a continental climate, with warm, wet summers and dry, cold winters. The largest streamflow of the year can occur due to snow or rain but is often associated with melting of the spring snowpack and spring rains on a saturated catchment.

The annual average temperature 1895-2020 is 43.7 °F. The annual average temperature is increasing at a rate of 0.16 °F per decade. Since the start of the climate record in 1895, this is an increase of ~2 °F. How the increase in temperature is distributed throughout the year determines the effect. The winter temperature is increasing faster than the annual average, driving much of the change (for the months of December-February, average temperatures are increasing 0.24 °F per decade) (DNR, 2021). Snowpack will start to accumulate later in the year, with what was once an early-winter snow occurring as rain, causing larger flooding peaks in the fall.

Annual average precipitation for the watershed 1895-2020 is 27.1 inches. However, annual precipitation, like temperature, is increasing, and at a rate of 0.32 inches per decade. This is a total increase of 4 inches of additional precipitation since 1895 (DNR, 2021). Increasing precipitation can also cause increased streamflow.





Surface Water Resources

Streams

The Des Moines River Watershed is composed of two primary river systems, the West Fork Des Moines River (main branch), and the East Fork Des Moines River. There are 10 primary tributaries to these two river systems: nine are in the main stem of Des Moines River system and one in the East Fork Des Moines River. The nine main stem tributaries are Beaver, Division, Elk, Jack, Lime, Okabena, Scheldorf Creeks, and the Heron Lake Watershed. The lone tributary for the East Fork Des Moines River is Fourmile Creek. In total, there are 10 minor (HUC-10) watersheds located within the three major (HUC-8) Des Moines River Basin Watersheds.

The Des Moines River has seen increasing streamflow (at the Jackson Gauge) in the record 1936-2012 (DNR, 2016). This is due to both increased artificial drainage that routes water to streams quickly, and increased precipitation. This may cause increased in-channel erosion, which contributes to impairments, in addition to the overland flow delivery of sediment and nutrients off agricultural fields, lawns, and out of urban drainage networks. The Des Moines River spends more time in a year at flood flow conditions than it used to, indicating high flows are increasing also. New drainage improvement projects continue to be proposed and constructed within the watershed as well. For more information about increasing streamflow and altered hydrology, see **Section 4**.

Measurable Goals. Updated floodplain maps are still under development by the DNR.



Photo credit: MPCA

Lakes

Several high-value surface water resources exist in the watershed, including multiple calcareous fens and one trout stream, a rare feature for Southwest Minnesota (Scheldorf Creek near Windom). The watershed also hosts several unique lakes, including Heron, Okamanpeedan, Shetek, Talcot, and more. The lakes in the region are a valuable cultural and recreational resource that is unique for southern Minnesota.

At one time, the shallow lakes in the Heron Lake chain were the nesting grounds for clouds of waterfowl. At the turn of the 19th century into the 20th century, the wild celery growing in the lake attracted diverse groups of waterfowl on a major flyway. Market hunters hunted the waterfowl in the area. Because of this and degradation of water quality due to land use changes, lake level regulation, artificial landscape drainage, and introduction of invasive species, Heron Lake does not support the clouds of wildlife that darkened the skies as it once did. Other lakes in the area followed similar paths: the shallow lakes in the watershed supported wildlife through diverse and emergent vegetation and good water quality, but that water quality has declined since European colonization and settlement. However, the lakes do remain considerable waterfowling destinations, and support duck and goose populations; further improvement may increase opportunities for restoration even more.



Introduction



Land and Water Resources
Narrative



Priority Issues



Measurable
Goals



Targeted
Implementation



Implementation
Programs



Plan Administration and
Coordination



Surface Water Quality

Throughout the watershed, many surface water resources are monitored to assess their water quality condition. Water bodies that do not meet water quality standards for their designated use (e.g. supporting aquatic life or recreation) are deemed “impaired.” The majority of monitored stream reaches and lakes in the Des Moines River Watershed are not meeting water quality standards for aquatic life and aquatic recreation (MPCA, 2021). Impairments in the watershed include (but are not limited to) bacteria, nutrients, pH, and turbidity (Figure 2.3).

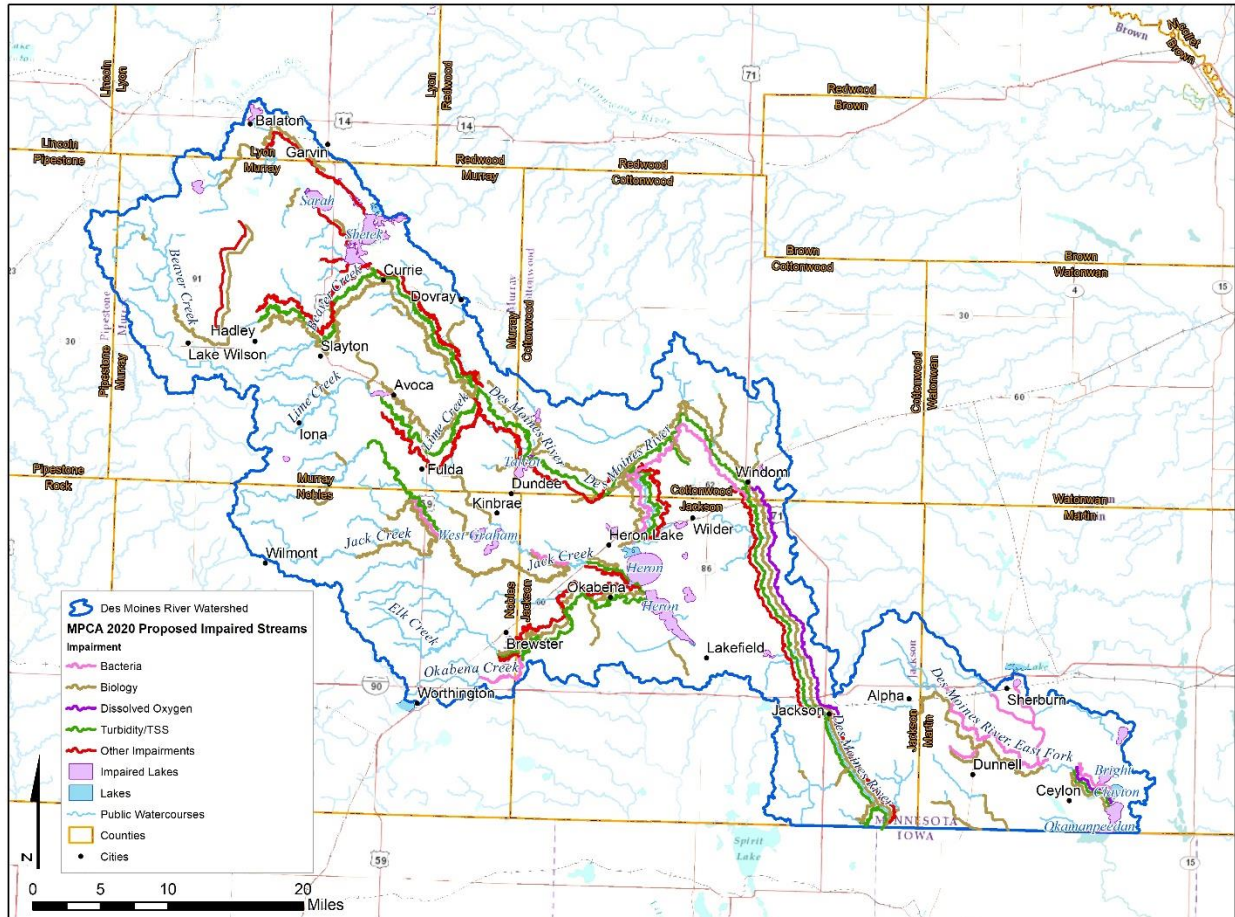


Figure 2.3: Impaired waters within the Des Moines River Watershed (MPCA, 2020). Parallel stream lines indicate multiple impairments for the same stream.

Groundwater Resources

There is significant surface water/groundwater interaction within the Des Moines River Watershed (DNR, 2016). Groundwater is an important resource in the watershed as it accounts for about 85 percent of the reported water use. Aquifers and wells used for public water supplies vary widely. Some are very shallow and unprotected and can be easily contaminated by activities at the ground surface. Others are deeper or more protected by geologic materials; these tend to exhibit a low vulnerability to overlying land uses.

The Des Moines River Watershed resides within Minnesota’s Western Groundwater Province (Figure 2.4). This region is characterized by clayey glacial drift overlying Cretaceous and Precambrian bedrock. Glacial drift and Cretaceous bedrock contain sand and sandstone aquifers. Quaternary deposits cover nearly the entire watershed



and serve as the primary source of groundwater for the watershed. Recharge of these aquifers occurs at topographic highs, areas with coarse surficial deposits, and along the bedrock/surficial deposit interface (MPCA, 2017). Groundwater issues include limited supply in some areas, poor quality of groundwater outside of glacial drift aquifers, contamination via septic system leakage, and nitrate contamination. Well water in many areas is undrinkable because of contamination, so wellhead protection and planning are important in the region.

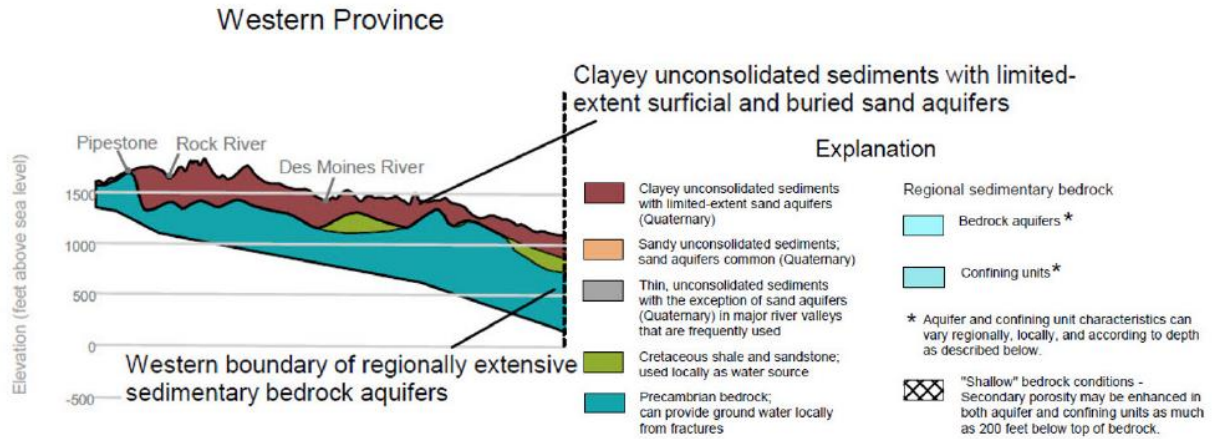


Figure 2.4: Western Province within the Des Moines River Watershed.

Groundwater Withdrawals

A Water Appropriation Permit (WAP) program is implemented by the Department of Natural Resources (DNR) and is required for all water appropriators (surface or groundwater) withdrawing more than 10,000 gallons of water per day or one million gallons per year. This provides the DNR with the ability to assess which aquifers are being used and for what purpose. The WAP exists to balance competing groundwater management objectives that include both development and protection of Minnesota’s water resources. Most groundwater used in the Des Moines River Watershed is for water supply. Agricultural irrigation and ethanol production are the largest water uses, followed by industrial processing and livestock watering. Over 20 years (1995-2015) the groundwater withdrawals within the Des Moines River Watershed have increased at a statistically significant rate (MPCA, 2017) (Figure 2.5).

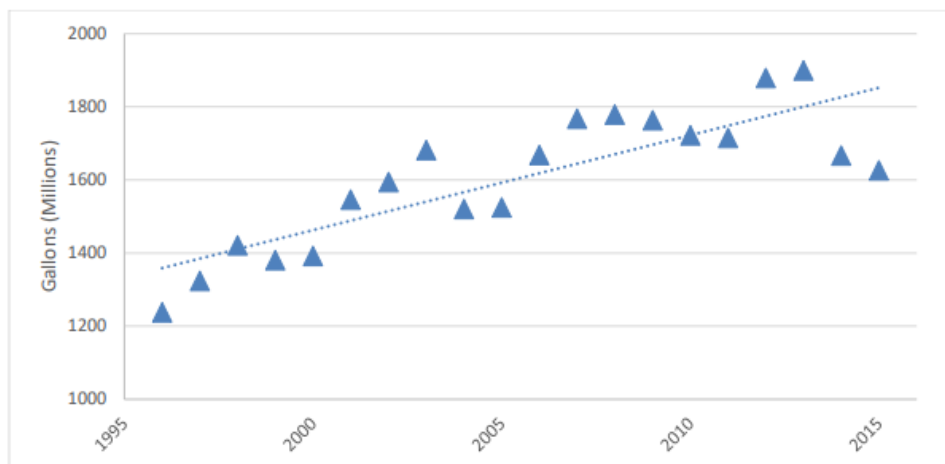
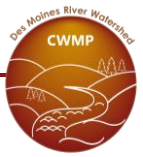


Figure 2.5: Total annual permitted groundwater withdrawals, Des Moines River Watershed (1996-2015). Source: MPCA, 2017.



Pollution Sensitivity

Understanding pollution sensitivity is important for prioritizing and targeting implementation efforts related to groundwater management. Pollution sensitivity (also known as aquifer vulnerability or geologic sensitivity) refers to the time it takes recharge and contaminants at the ground surface to reach the underlying aquifer. It is important to understand the target aquifer when assessing pollution sensitivity. Certain aquifers may be deeper and more geologically protected than water table aquifers, or surficial sand aquifers, in each area. **Figure 2.6** depicts the pollution sensitivity of near-surface materials dataset developed by the DNR. This dataset only considers the top ten feet of soil and geologic material when assigning a sensitivity rating.

Public water supplies establish protection areas also known as Drinking Water Supply Management Areas (DWSMAs). This is done through an extensive evaluation that determines the contribution area of a public water supply well with aquifer vulnerability and provides an opportunity to prioritize specific geographic areas for drinking water protection. DWSMA vulnerability determines the level of management required to protect a drinking water supply and provides an opportunity to target implementation practices in accordance with the level of risk different land uses pose (**Figure 2.6**).

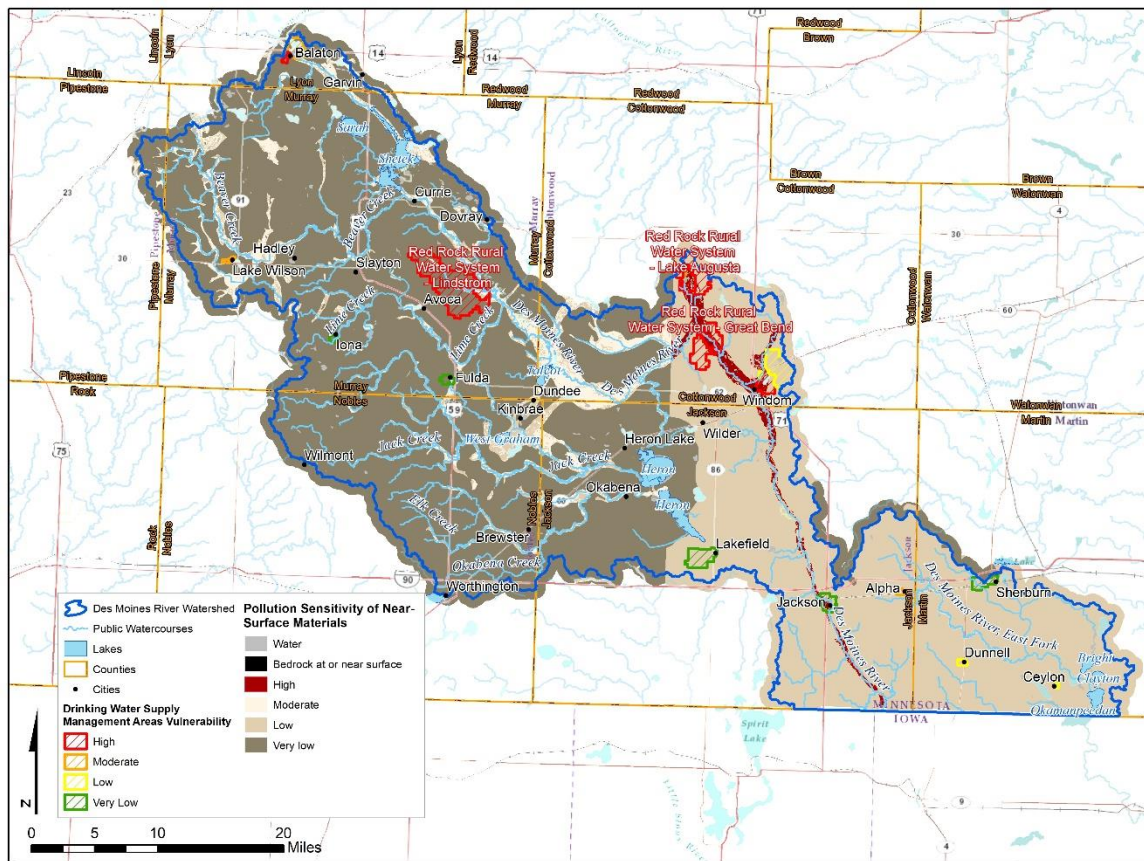


Figure 2.6: Pollution Sensitivity of Near-Surface Materials for the Des Moines River Watershed.

Figure 2.6 shows that the watershed has a mix of pollution sensitivity ratings based on surficial materials. The watershed is predominately split into two halves: a very low sensitivity portion in the western part of the watershed, and a low sensitivity portion on the eastern part of the watershed. There are also pockets of high pollution sensitivity in the Cottonwood County and Jackson County portions of the watershed as well as pockets of moderate pollution sensitivity throughout the western half of the watershed.



Stormwater Systems, Drainage Systems, and Control Structures

Like most areas across the Midwest, the Des Moines River Watershed has been converted from mostly tallgrass prairie and a small amount of wet prairies to a matrix of agricultural uses. This conversion has resulted in significant alterations in the watershed, including an increase in overland flow of water and pollutants resulting from a decrease in groundwater infiltration/subsurface recharge. An increase in surface runoff has been associated with increases in the nonpoint source transport of sediment, nutrients, agricultural and residential chemicals, and feedlot runoff. Developed urban land accounts for 5.6% of the land cover in the watershed (DNR, 2016). In these urban areas, subsurface storm sewers can also deliver pollutants to waterbodies. In drained agricultural areas of the watershed, subsurface tile drainage pathways can also rapidly deliver pollutants to waterbodies. Artificial drainage has been identified as a primary cause of stream flow changes in extensively drained landscapes (MPCA, 2021). There are 254 miles of public ditch in the watershed, which is about 27% of the surface water stream length in the basin (DNR, 2019). This includes county and judicial ditches. Many watercourses have been altered, with altered watercourse scores for the major watersheds in the Des Moines ranging from 20-43 out of 100 (higher numbers mean better watershed conditions) (DNR WHAF, 2021).

Multiple control structures exist in the watershed, including several structures that prevent fish passage. However, work has been completed to alter existing dams for fish passage. For example, the low-head dam on the Des Moines River in Windom was recently replaced with a rock riffle structure that allows fish passage. Many local lakes are regulated via dams – Heron Lake, Talcot Lake, and Lake Shetek are all regulated via dams. Connectivity scores from the DNR Watershed Health Assessment Framework indicate low connectivity in the watershed, with the Headwaters HUC-08 having a score of 25/100, the Lower Des Moines having a connectivity score of 51/100, and the East Fork Des Moines having a connectivity score of 0/100.

Lastly, there are several cities in the watershed that may manage stormwater (Figure 2.7). The total combined population of the three major Des Moines watersheds is approximately 34,000 people, with the largest cities being Fulda, Jackson, Slayton, Windom, and the eastern side of Worthington.



Figure 2.7: Unincorporated and incorporated communities of the Des Moines River Watershed.

Water-based Recreation Areas

According to the DNR Recreation Compass, there are many lakes with public boat access, waterfowl production areas (WPAs), and wildlife management areas (WMAs) that provide access to water related recreation. Waterfowl and pheasant hunting are particularly popular in the area. More information on specific resources can be found on the DNR's websites:

- DNR, Recreation Compass:
<https://www.dnr.state.mn.us/maps/compass/index.html>
- DNR, LakeFinder:
<https://www.dnr.state.mn.us/lakefind/index.html>
- DNR, Water Access Sites:
<https://www.dnr.state.mn.us/lakefind/was/report.html>

The DNR lists part of the Des Moines River as a State Water Trail with 68 miles of river for kayakers and canoers to explore from Talcot Lake to the Minnesota Iowa border. The canoe journey begins in open farmland and gently rolling prairies, becoming more wooded farther south. Steep oak-covered bluffs are encountered at Kilen Woods State Park, which also boasts canoe-access campsites.



Photo credit: HLWD

There are many cultural resources centered on the water in the area. Indigenous peoples used the waterways extensively, as did early trappers and colonist-settlers. Old settler cemeteries with 150-year-old headstones can be found on section lines as one drives through the country. Many county parks are tucked away and less well-known, but also offer water-based recreation and cultural resources. For example, Pat's Grove County Park in Windom includes a stone house build by one of the first colonist-settlers in the township. The stone house was recently renovated with historical context and is now accompanied by a canoe launch on the Heron Lake outlet and picnic areas.

Fish, Wildlife, and Endangered Species

The Des Moines River Watershed is primarily located within the Coteau Moraines Prairie Subsection of the North Central Glaciated Plains Section of the Prairie Parkland Province. Pre-settlement vegetation was virtually all tallgrass prairie except for wet prairies, which were restricted to ravines along streams. Remnant stands of tallgrass prairie are now rare in the subsection. Fire and drought were the most common natural disturbances before settlement. Other causes of disturbance in this region of southwestern Minnesota are floods and tornadoes.

According to the DNR, Coteau Moraines Prairie Subsection Profile, there are 78 species in Greatest Conservation Need within the Coteau Moraines Prairie ecological subsection. Of these species, 30 species are federal or state-listed endangered, threatened, or of special concern. Species' habitat degradation and loss are generally the problem for these listed species followed by invasive



Introduction



Land and Water Resources
Narrative



Priority Issues



Measurable
Goals



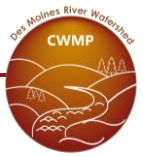
Targeted
Implementation



Implementation
Programs



Plan Administration and
Coordination



species and competition, pollution, social tolerance/persecution/exploitation, and other reasons. Prairie and wetland-non forest habitats are key habitats that support the species that naturally reside in this region. Managing invasive species, use of prescribed fire, grassland management, prairie protection and restoration, and wetland protection/enhancement/restoration would assist native prairie habitats and the species they support. Rare and endangered species in this subsection include the Poweshiek skipper, Prairie Bush Clover, Prairie vole, and Spike Mussel.

Existing Land Uses and Anticipated Land Use Changes

Agricultural production is the primary economic driver in the watershed, followed by agricultural products processing including ethanol production. Current land use reflects this: the Des Moines River Watershed is predominantly covered in agricultural lands (Figure 2.8). Corn and soybean production makes up approximately 77.2% of the land cover in the watershed. Small grain accounts for 0.10%, and other agriculture accounts for 7.7% in the Des Moines River Watershed. The remaining land is made up of 8.1% water, 5.6% development, and 1.4% perennial vegetation. The remaining portion of the land is undeveloped forest, open water, and wetlands (DNR, 2016). For more information on how this plan aims to protect existing and increase land use for wetlands, please see Section 4. Measurable Goals.

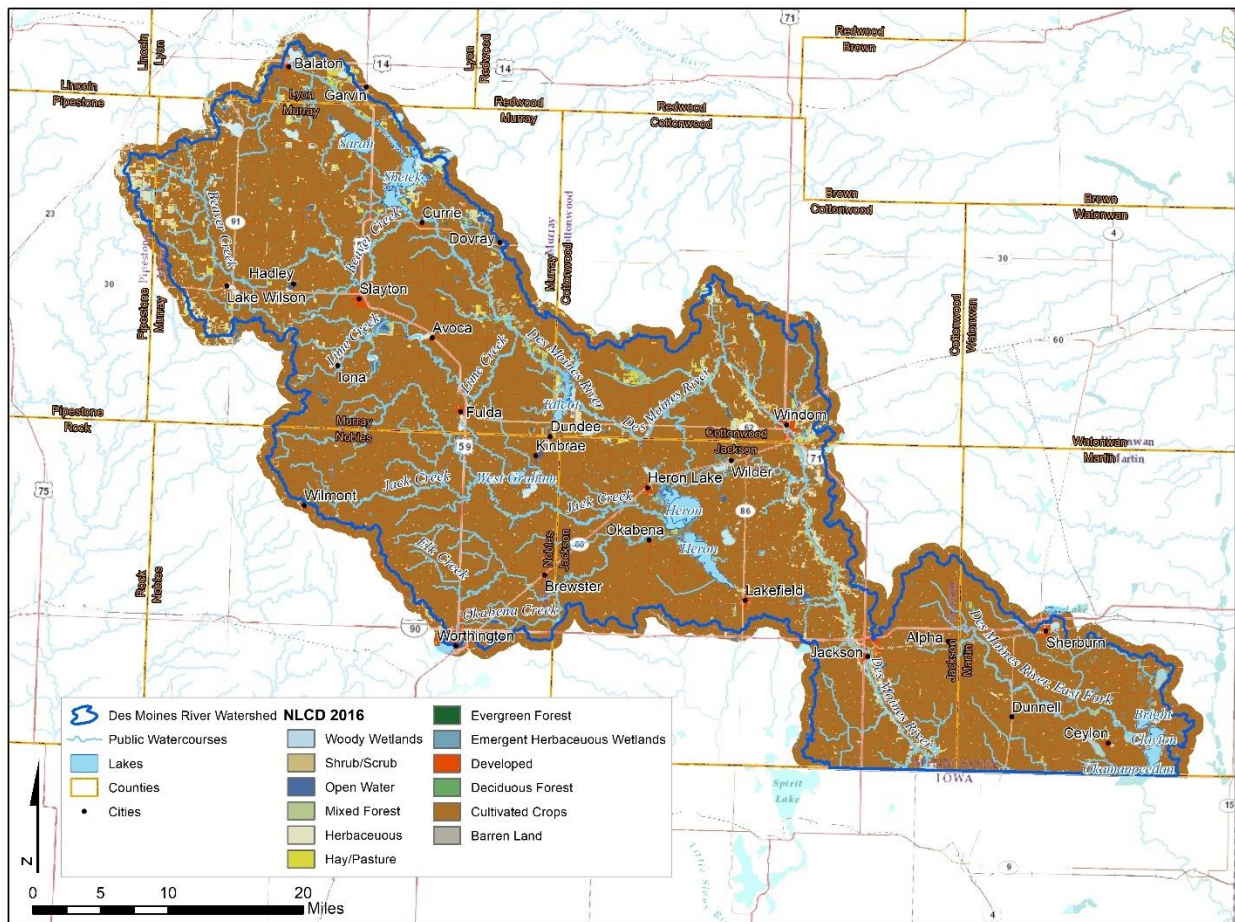


Figure 2.8: Current (NLCD 2016) land use in the Des Moines River Watershed.





Land ownership is comprised of approximately 96% private ownership and 4% non-private lands. It is expected in the Des Moines River Watershed that land use will remain relatively consistent with current use during the implementation of the plan.

New artificial drainage systems, via both new drainage improvement projects and the continual addition of private tile, continue to be installed in the watershed. Previous agricultural drainage in the area focused on draining prairie potholes, while a renewed interest in drainage in recent years (since approximately year 2000) has seen increased use of pattern tiling fields to ensure dry conditions for farming operations (MGA, 2018). Ongoing drainage that adds more water to streams as time goes on illustrates how watershed management in the area is not only addressing previous issues but managing ongoing resource concerns.






Section 3. Priority Issues



Section 3. Priority Issues



Priority Issues

This Plan Section summarizes the process planning partners used to identify and prioritize resource issues that will be addressed in this plan. Prioritizing is needed because not all issues can be addressed in the timeframe of a ten-year plan.




Identifying Issues

To prioritize resource issues, the planning partners first needed to develop a comprehensive list of issues that impacted resources in the watershed. Planning partners identified and catalogued the issues impacting resources in the watershed through review of existing plans, studies, data, and information available at the time (Summer 2021). Materials reviewed included:

- Existing county water plans, multipurpose drainage management plans (Martin County), and the Heron Lake Watershed District Watershed Management Plan
- Des Moines River Basin watershed reports, including:
 - Watershed Restoration and Protection Strategies (WRAPS) report,
 - Total Maximum Daily Load (TMDL) studies and supporting data (Stressor Identification Report and Monitoring and Assessment Reports),
 - Des Moines River Basin Civic Engagement Project Summary,
 - Watershed Model Development Report,
- Des Moines River Watershed Characterization Report,
- Comment letters and supporting materials provided by state agencies (**Appendix C**) and,
- The knowledge of local and partnering entities managing natural and water resources in the watershed.

During issue identification, issues were grouped according to emergent categories in the resources they impact. These “resource categories” include Groundwater, Habitat, Land Stewardship, and Surface Water, as described below (**Table 3.1**).

Table 3.1: Resource categories used to group issues in the Des Moines River Watershed.

 <p>Groundwater</p>	Groundwater	Includes issues affecting groundwater resources: aquifers, groundwater flow, and drinking water reserves.
 <p>Habitat</p>	Habitat	These issues impact habitat for fish, wildlife, game, and birds.
 <p>Land Stewardship</p>	Land Stewardship	These issues affect multiple benefits of managing the land for healthy soils, groundwater, surface water, and habitat quality. In general, it refers to how people actively manage the land for these benefits.



Surface Water

Surface water issues include those affecting surface water such as lakes, streams, and wetlands.

Prioritizing Issues – Engaging the Public

Relevant issues that were identified needed to be prioritized. This is a local plan which requires voluntary implementation to be successful. Considering this, planning committees wanted to be sure they were getting feedback from the public on what issues were most important to them. Two public meetings were held:

- July 21, 2021 in Windom
- July 22, 2021 in Slayton

Approximately 45 members of the public attended these planning meetings. During the meeting, attendees were invited to visit large maps of the watershed and identify resources that they cared most about, such as local lakes they recreate on or habitat areas they hunt on. Participants were then asked to complete a survey (Appendix D) to record what issues they thought are most important to address in the watershed. Top priorities of the public are summarized in the box to the right.

Prioritizing Issues – Engaging Local Committees

Issues were finalized and prioritized based on input from the public and the Steering, Advisory, and Policy Committees.

In September of 2021, the Steering Committee reviewed feedback from the public and discussed each issue as it pertained to a fixed set of criteria:

- Feasibility of addressing the issue
- Urgency of need
- Economic importance
- Ecosystem importance
- Cultural and social importance
- Intrinsic worth

Then, Steering Committee members assigned each issue as a Priority A, Priority B, or Priority C, using definitions shown below (Table 3.2).

Civic Engagement Spotlight: Public Meetings

The top five priority issues identified by the public were:

- ✓ Exposed soil conditions
- ✓ Urban runoff and point sources
- ✓ Streambank and in-channel erosion
- ✓ Peak flow from altered hydrology (tile and ditches)
- ✓ Loss and degradation of wetlands






Table 3.2: Definitions for Priority A, B, and C issues.


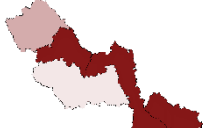

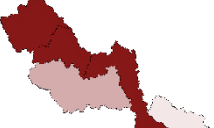



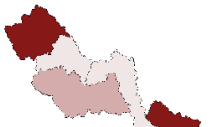
Priority A	We intend to address these issues first within the lifespan of this plan. These are the most important!
Priority B	We intend to address some of these issues throughout the lifespan of this plan. Still important, but less of a priority.
Priority C	We may address some of these issues through collecting additional data or funding throughout the lifespan of the plan. This issue may also be addressed through partner groups. Once again, still important, but the lowest local priority issues.

Once the Steering Committee reached consensus on the priority designations for each issue, they were forwarded along to the Advisory and Policy Committees for their consideration and approval. The issues were approved as A, B, and C issues by the Policy Committee during their October 21, 2021 meeting. These issues are summarized in the section below.


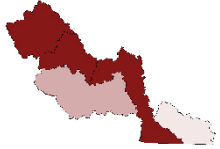

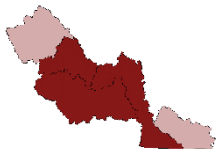



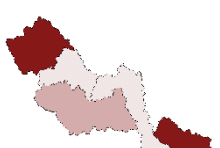

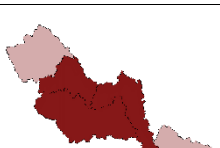
Although these issues are assigned as a Priority A, B, or C issue watershed-wide, the Steering Committee also wanted to indicate which planning region the issue was most prevalent in. This is shown in the “Planning Region Priority” column, where ■ = a higher priority ■ = a medium priority ■ = a lower priority within the planning region. Information supporting specific planning region prioritization is shown in Section 4. Measurable Goals.

Priority A Issues

These issues will be the focus of initial implementation efforts, and will have priority resources, goals, and actions assigned to them.


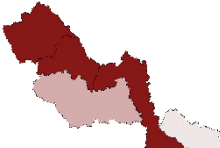

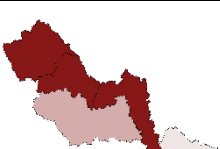

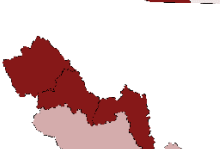
Category	Resource	Issue Statement	Planning Region Priority
	Aquifer	Protection of existing groundwater recharge areas and promotion of additional recharge and infiltration to augment limited groundwater supplies.	
	Drinking Water	Protection of drinking water quality from contaminants, including nitrates and pesticides , especially in areas with groundwater and surface water interaction.	
	Drinking Water	Protection of drinking water quality from contamination from unused wells and noncompliant septic systems .	
	Streams, Ditches	Peak flow from altered hydrology (tile and drainage ditches) and its impact on channel stability, infiltration rates, and water quality degradation.	



Category	Resource	Issue Statement	Planning Region Priority
	Streams	Excess <u>nitrates and ammonia</u> in streams impacting aquatic life.	
	Lakes & Streams	Excess delivery of sediment from <u>upland wind and water erosion</u> to lakes and streams impacting aquatic life and recreation.	
	Lakes & Streams	Excess <u>phosphorus loading</u> from runoff and resuspension in lakes causing nuisance algal blooms, impacting aquatic life and recreation.	
	Rural and Urban Communities	Insufficient <u>storage</u> on the landscape, especially in upland areas, and its impact on flooding.	
	Agriculture	Low crop diversity and lack of conservation tillage or residue management on fields, leaving soil exposed and impacting <u>soil health</u> .	


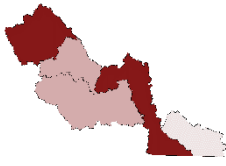

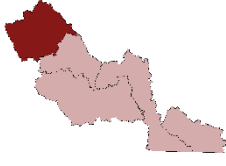

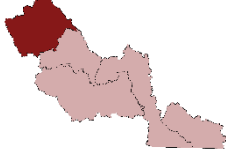

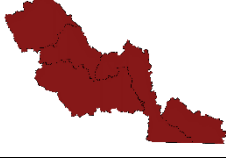

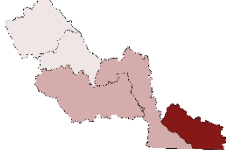

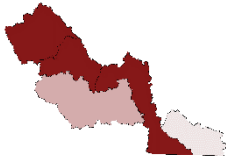
Priority B Issues

These issues will be addressed during implementation, and will have priority resources, goals, and actions assigned to them.

Category	Resource	Issue Statement	Planning Region Priority
	Streams	Need for continued <u>enhancement of buffers</u> along ditches, stream systems, and non-protected waters, impacting water quality and habitat.	
	Streams	<u>Streambank and in-channel erosion</u> contributing sediment to water, impacting water quality, and habitat.	
	Streams	<u>Livestock access to streams</u> causing degradation in water quality and instability to streambanks.	






Category	Resource	Issue Statement	Planning Region Priority
	Lakes & Streams	<u>Urban/impervious runoff</u> , stormwater runoff, and other urban point sources impacting downstream water quality conditions.	
	Lakes	Inadequate <u>lake shoreline habitat</u> to provide habitat and protect against shoreline erosion.	
	Drainage Ditches	Uncoordinated and inadequate <u>drainage management</u> to meet drainage network needs and promote water quality.	
	Rural and Urban Communities	Increasing extremes from a <u>changing climate</u> (drought and increasing precipitation patterns), and the need to plan for resiliency.	
	Wetlands	<u>Loss and degradation of wetlands</u> and its impact on wildlife habitat and water storage.	
	Upland Habitat	Degradation and fragmentation of <u>wildlife habitat</u> , including native prairie, woodlands, grasslands, and other areas	





Priority C Issues

Priority C issues are those that, while important, do not require immediacy in the way that Priority A and B issues do, or are addressed through different plans or funding sources. They may also be addressed through actions focused on other prioritized issues. These issues will not be priorities for this 10-year plan, and therefore will not have prioritized resources, goals, or action items assigned to them. In future updates, these issues could be elevated if deemed necessary.

Category	Resource	Issue Statement	Rationale
	Aquifer	Need for coordinated use of groundwater supply due to sensitivity from climate and increasing appropriations for industry, rural water, and agricultural irrigation.	High concern; low ability to address as a local group acting under a local plan





Category	Resource	Issue Statement	Rationale
	Drinking Water	Availability of domestic drinking water due to poor groundwater quality from natural background sources.	Primarily addressed by partner entities
	Streams	Lack of habitat within stream systems to support aquatic life.	Primarily addressed by partner entities
	Streams	Excess insecticides in streams impacting aquatic life.	Primarily addressed by partner entities
	Streams	Lack of stream connectivity impacting fish passage and altering the flow of water.	Primarily addressed by partner entities
	Lakes & Streams	Excess bacteria impacting aquatic recreation in lakes and streams.	Issue to be addressed through other priority issues
	Lakes	Lack of plant habitat in lakes impacting terrestrial and aquatic life.	Primarily addressed by partner entities
	Lake	Overabundance of rough fish (carp and bullhead) threatening other fish species and resuspending sediment.	Primarily addressed by partner entities
	Lakes	Presence of aquatic invasive species (fish and plants) threatening native species and water quality.	Primarily addressed by partner entities
	Mining	Management of sand and gravel pits in the Des Moines River valley to protect nearby sensitive features.	High concern; low ability to address as a local group; encourage land use planning
	Landfills	Monitoring and oversight of landfills to prevent degradation of surface and groundwater quality.	Primarily covered by local regulatory actions and controls
	Agriculture	Promotion of land protection programs for long-term or short-term protection (e.g. CRP).	Issue is addressed through other priority habitat issues
	Unique Habitats	Protection of rare and declining habitats (oak savanna, calcareous fens, trout stream, etc.).	Issue is addressed through other priority habitat issues
	Upland Habitat	Presence of terrestrial invasive species threatening native species richness and diversity.	Issue is addressed through other priority habitat issues





Emerging Issues

Emerging issues are concerns in the watershed that lie outside of the scope of traditional Clean Water Act-based watershed management, but affect the resources in the Des Moines River Watershed, now and in the future. These issues are described in this section.

Contaminants of Emerging Concern (CEC)

Water quality regulation and planning have focused on nutrient and sediment pollution and highly toxic substances. However, monitoring in Minnesota has identified new contaminants that don't fit within the current regulatory and planning system. These contaminants are also not currently treated in Waste Water Treatment Facilities. The effects of contaminants of emerging concern (CEC) on human and animal health are unclear. Examples of CECs include pharmaceuticals, estrogenic compounds, pesticides, Teflon, perfluorooctanoic acid (PFOA), PFCs in fire-fighting foam, microplastics, and many others. Some of these chemicals are known to be able to disrupt the reproductive systems of fish and other aquatic life. In May 2021, the Minnesota Department of Health released new [guidance on fish consumption](#) in Minnesota that indicate an emerging harm present in our ecosystem from these CECs. CECs are widespread and more research is needed to determine the health risks, especially in areas of the Des Moines River Watershed where there is shallow groundwater used for human consumption. More information can be found from the [Minnesota Pollution Control Agency](#). This plan will not treat CECs beyond this section, as more research is under way to determine health impacts of CECs and how to manage them within existing or new regulatory frameworks.

Invasive Species

Invasive species are those species which are not native to Minnesota and cause environmental, economic, or human health harm. Invasive species are categorized as aquatic or terrestrial. The Des Moines River Watershed has had multiple natural processes interrupted by both aquatic and terrestrial invasive species.

Aquatic invasive species observed in the watershed include common carp, grass carp, narrow-leaved cattail, reed canarygrass, hybrid cattail, zebra mussels, purple loosestrife, and watercress. Lake Sarah is the only known zebra mussel infestation in the watershed, confirmed relatively recently in 2018. Zebra mussels alter the food web of lakes in a way that may negatively impact sport fish populations (McEachran et al., 2019), so it is important to monitor the situation closely, and target education and outreach to stop the spread of zebra mussels throughout the watershed.

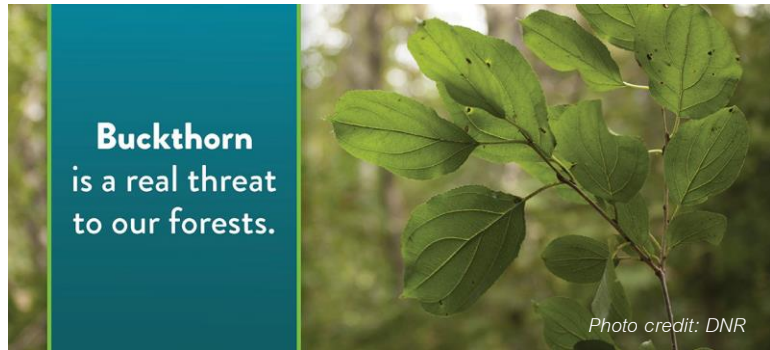


Carp are one of the most visible invasive species in watershed; anglers can hear them splashing when they feed and swim into shallow tributaries to spawn in the spring. Carp can be a large driver of sediment and phosphorus resuspension in shallow lake systems, driving eutrophication and poor water quality. Further, they are prolific even in the face of poor water quality, as they are often the only species that can flourish in degraded water quality. They are often thought undesirable for anglers, and the dominant fishing and regulatory culture considers carp to



be “rough fish” at best. However, there is a growing culture of sport angling for carp, and throughout the long history of carp, they have formed an important part of people’s diet in some cultures in Asia and Europe. Bighead and silver carp have been found near the watershed in southern Jackson County, although have not been reported in the Des Moines River Watershed in Minnesota.

Many terrestrial invasive species have been observed in the watershed, including several invasive thistle species, grass and weed species, European Starling, Emerald Ash Borer, and common buckthorn. Earthworms are also present. Several of the terrestrial invasive species in the region can interact to facilitate one another’s invasion: starlings disperse seeds of buckthorn, which serves as a host overwintering plant for soybean aphid. Soybean aphid can have devastating consequences for soybean plants, indicating that buckthorn invasion has negative ramifications for the dominant agricultural system in the watershed. Buckthorn (through shading and prolific invasion of the forest understory), and earthworms combine to suppress the fluffy litter layer on the forest floor, changing the composition of forest soils and homogenizing the understory of area woodlots, groves, and forests. Buckthorn also outcompetes seedlings of native tree species. Active forest management and buckthorn control can help maintain healthy forests, but challenges remain to control the spread of terrestrial invasive species in the region into the future.



Renewable Energy and Conservation Action

Solar and wind energy are expanding in Minnesota. In 2014, wind energy supplied approximately 16% of electricity generated in Minnesota, with the state ranking in the top 10 for wind energy generation (MN Commerce Department). Within the Des Moines River Watershed, wind turbines are especially prominent in the westernmost border of the watershed along the Buffalo Ridge, a high ridge towering 100-200 feet over the surrounding plains landscape that is part of the larger Coteau des Prairies feature.

When implemented, wind and solar farms can provide opportunities to fund native habitat projects such as grassland and pollinator restoration using matching funds from energy companies (Minnesota Farmers Union, 2019). However, land right and easement issues can also restrict potential for additional conservation action.

Drainage Management as an Economic Driver of Communities

The amount of subsurface tile drainage has been increasing in recent decades in the Des Moines River Watershed. Increased subsurface drainage can impact water quality and quantity, including flood peaks and in-channel erosion. However, agronomic benefits incentivize the installation of drainage systems, including increasing profitability of some farmers. Further, tax revenue from drained land forms a driving tax base for local communities, funding schools, and local infrastructure. Therefore, it is critical to gain more information on life-cycle environmental and economic impacts of subsurface drainage systems, increase environmentally sound management of drainage systems, and also weigh the economic benefits and tax revenue of drained land as contributing to public services.



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Section 4. Measurable Goals



Section 4. Measurable Goals



Measurable Goals

This Plan Section summarizes the goals for addressing each priority issue and how progress toward goals will be tracked during implementation.

Background

Good resource management – and the ability to demonstrate progress – relies on setting measurable goals for locally important issues and resources. As such, measurable goals are set for every Priority A and Priority B issue in the Des Moines River Watershed. Goals were established for two different time scales:

- **Desired future condition** goals describe the resource condition (water quality, water availability, habitat quality) planning partners are striving to attain, regardless of timeframe.
- **Ten-year** goals describe the quantifiable change in resource condition that planning partners expect to achieve during implementation of this plan.

Information used to develop measurable goals included:

- Goals from existing management plans, studies, reports, data, and information, including the WRAPS, TMDLs, local water plans, and state strategies;
- Results from the Prioritize, Target, and Measure Application (PTMApp); and
- Stakeholder input gathered from Steering, Advisory, and Policy Committee members.

This plan section details the 14 measurable goals that collectively address this plan's priority issues. The measurable goals are presented as a series of 2-page summaries for each goal, each detailing:

- The priority issue(s) the goal addresses;
- Background information about the issue and goal;
- The desired future condition and ten-year goals; and
- A map of specific resources and/or subwatersheds that are the geographic focus of initial implementation efforts for that goal.

Priority resources were identified based on a review of scientific data and expertise of the Steering and Advisory Committees. They include (for example) lakes and streams that are impaired, stream reaches and drainage systems that require stabilization or enhancement, and locations most suitable for habitat expansion. Priority resources also include “nearly” and “barely” impaired resources. The Nonpoint Priority Funding Plan for Clean Water Funding Implementation prioritizes protection and restoration of water bodies that are nearly or barely impaired. To align implementation efforts with state-level funding priorities, protection and restoration categories for streams, rivers, and lakes were mapped to identify resources that are nearly or barely impaired (Minnesota Soybean Research and Promotion Council, 2019). Including these resources in the plan is intentional to align local implementation efforts with the Nonpoint Priority Funding Plan.





In addition to priority resources, this plan identifies subwatersheds (HUC-12 scale) that should be the initial geographic focus of implementation efforts specific to each goal. These subwatersheds were identified based on a geospatial analysis that considered the prominence of priority resources present in each subwatershed and loading information from PTMApp. For more information about geospatial data used in this analysis, please see Appendix E.

Using Models and Tools to Create Goals

This plan uses PTMApp data to inform measurable goals and priority subwatersheds pertaining to overland sediment, total nitrogen, and total phosphorus loading. Table 4.1 below provides a comparison of loading estimates to a point along the Des Moines River just south of Jackson, MN. Load estimates shown in the table are from PTMApp, HSPF, and from monitored data summarized in the Des Moines River WRAPS.

Table 4.1: PTMApp load estimates to Jackson, MN, compared to HSPF loads and monitored data presented in the Des Moines River WRAPS Report.

Parameter	PTMApp (load/yr)	HSPF Total Load (load/yr)	HSPF Landscape Load ¹ (load/yr)	WRAPS Report annual average load ²
Sediment (tons)	55,906	50,301	31,894	47,010
Phosphorus (lbs)	49,340	498,487	414,338	290,071
Nitrogen (lbs)	992,573	8,151,628	7,829,182	9,348,027

¹Total minus point sources, atmospheric deposition, and streambank/bed sources.

²Years of data (2008-2016)

Phosphorus and nitrogen load estimates from PTMApp are low in comparison to the monitored loads and HSPF loads. This is primarily due to two factors. First, default land-use runoff yields estimates were used for this planning effort, and nutrient application rates and runoff yields tend to be higher in the southwest portion of the state. Second, PTMApp only accounts for the loading coming from surface runoff, and therefore does not consider point-source contributions or in-channel sources. More information on the theory and mechanics of PTMApp may be found in Appendix F.

Multiple Benefits of Conservation Action


Many priority issues (and therefore goals) are interrelated. For example, implementing cover crops to address soil health may also accrue benefits to goals pertaining to groundwater recharge, upland and wind erosion, phosphorus loading, and water storage (which in turn builds resiliency to climate change). The interrelated nature of these issues and benefits of conservation action are summarized in the Action Tables presented in Section 5. Targeted Implementation.





Groundwater Recharge

Priority Issue

 Protection of existing **groundwater recharge** areas and promotion of additional recharge and infiltration to augment limited groundwater supplies.

Groundwater is replenished in areas of high infiltration when water flows downward in the soils faster than it flows over the landscape or through shallow subsurface flow. Groundwater recharge is especially prominent in locations with sandy soils that transmit this vertical movement of water well. However, conservation action can be taken to increase recharge in some areas by increasing the likelihood that water infiltrates down to water supplies. Examples include planting deep-rooted plants that decrease compaction, and promoting land uses that do not compact the soil, such as forestry and perennial agriculture.

The Des Moines River Watershed has areas with scarce groundwater resources. Most of the Des Moines River Watershed is in Minnesota Groundwater Province 5, which is marked by fine-grained glacial sediments, with limited areas of surficial sand and buried sand aquifers. Although surficial sands can be a moderate source of groundwater, buried sands and bedrock aquifers tend to be limited in their suitability for aquifer use. It is critical, then, to support aquifer recharge on known high-quality aquifers to maintain a sustainable drinking water source for the future.

This plan’s measurable goals for groundwater recharge are focused on implementing innovative recharge conservation practices (e.g. alternative cropping such as Kernza or solar farms, current or new conservation easements, nutrient or residue management) to promote infiltration of water where public drinking water is sourced – within DWSMAs. These are areas critical to ensure recharge and water quality protection and sustainability into the future.

Desired Future Condition


- All 20,630 acres of land within vulnerable DWSMAs have been assessed for or have implemented innovative recharge conservation practices as a means of improving groundwater recharge and protection.

Ten-Year Goal

- 5,000 acres of innovative recharge conservation practices are implemented within DWSMAs as a means of improving groundwater recharge and protection.

Metric or Indicator

- Acres treated with innovative recharge conservation practices.



Kernza crop

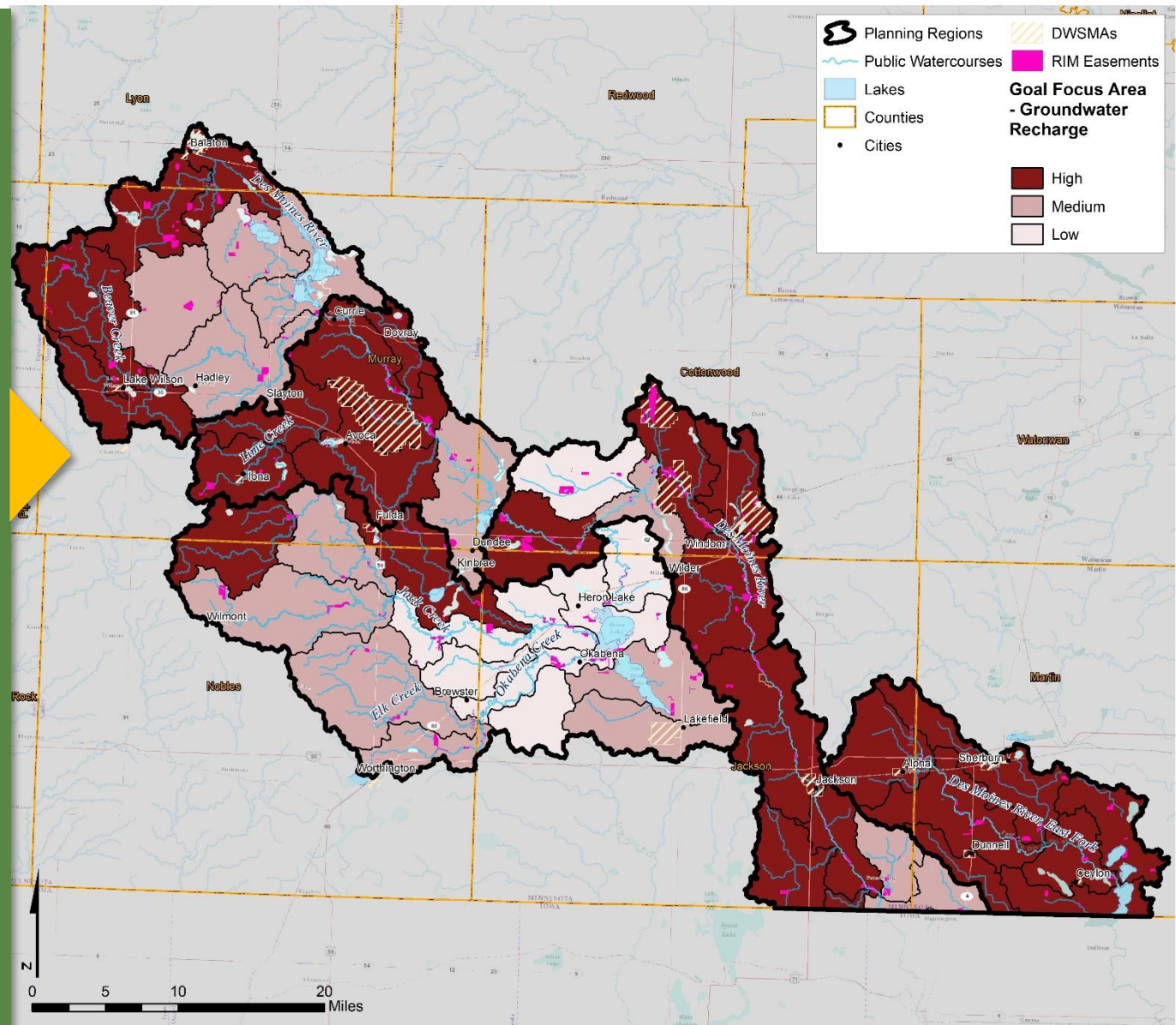


Focus Areas

Several locations throughout the watershed are focus areas for implementation efforts related to this goal, including:

- DWSMAs
- Where groundwater recharge is already high

The map to the right summarizes subwatersheds where these locations are especially prominent in dark red. The DMR partners aim to focus implementation efforts around vulnerable DWSMAs, where the drinking water for communities is managed.





Unused Wells and Septic Systems

Priority Issue



Protection of drinking water quality from contamination from **unused wells** and noncompliant **septic systems**.

The drinking water for all residents in the Des Moines River Watershed is sourced from groundwater, underscoring the public health importance of maintaining high-quality groundwater in the watershed for generations to come. However, where residential development has occurred in both the countryside and in small towns in the watershed, abandoned wells can form a direct conduit for pollutants from the land surface to reach the groundwater, as it removes the protection from being filtered by soils. Further, unmaintained and noncompliant septic systems can be a direct source of nutrients and pathogens to groundwater supplies.

It is currently unclear which water quality impairments and groundwater pollution beyond human health standards may be influenced by unused wells and noncompliant septic systems. Further, these sources of pollution are present throughout the watershed, and may affect both public water supplies and private wells throughout the watershed.

This plan's desired future condition for this issue is for all abandoned wells sealed and all septics to be in compliance. The ten-year goal represents realistic progress which be made towards the desired future condition.

Desired Future Condition

- All abandoned wells are sealed and all septic systems are in compliance, protecting drinking water quality.

Ten-Year Goal

- 26 wells are sealed per year, or 260 wells are sealed in the 10- year plan.
- 26 septic systems are upgraded or abandoned per year; or 260 in the 10-year plan.

Metric or Indicator

- Number of wells sealed; number of septic systems brought into compliance.



Example faulty well (Picture: MDH)

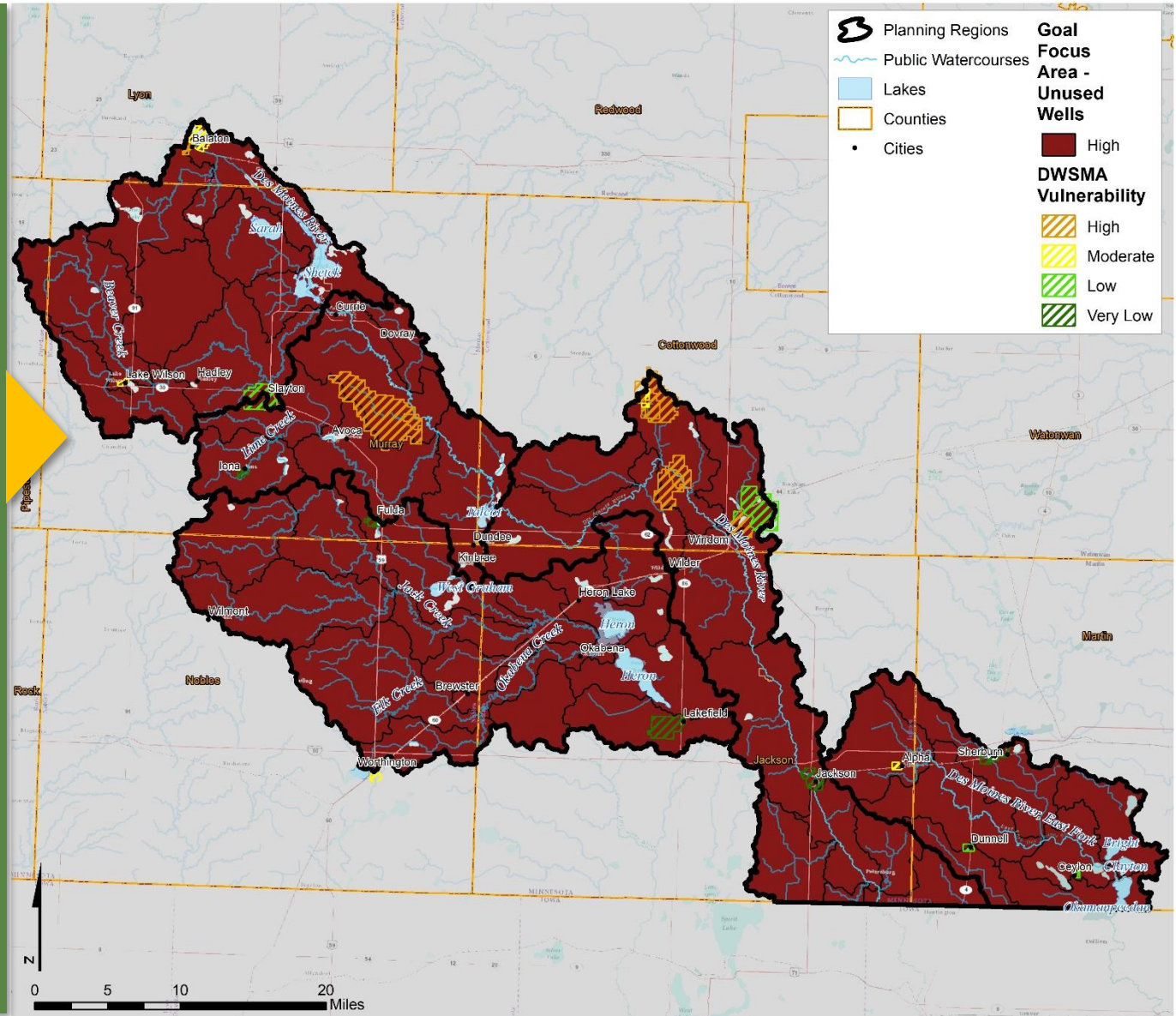




Focus Areas

Abandoned wells and noncompliant septic systems are a problem watershed-wide, but may be especially problematic when they are near a sensitive DWSMAs.

Local knowledge will be used to prioritize well sealing and septic work watershed-wide, on a case-by-case basis.



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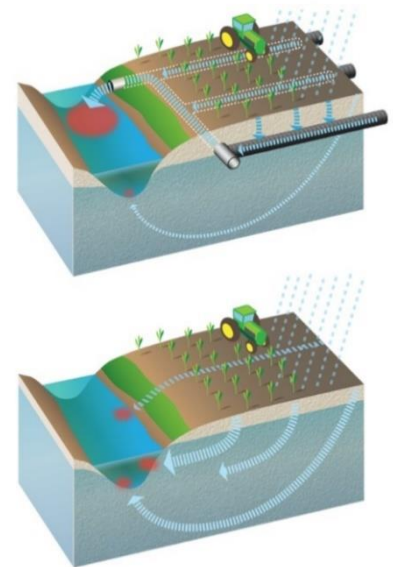
Excess Nitrates

Priority Issues	
	Protection of drinking water quality from contaminants, including nitrates and pesticides , especially in areas with groundwater and surface water interaction.
	Excess nitrates and ammonia in streams impacting aquatic life.

Nitrogen can be a substantial source of pollution in both surface water and groundwater. Nitrogen as nitrate is the most common form of nitrogen found in the environment, which can be toxic to aquatic life. Nitrate can also be harmful to human health, especially infants. The U.S. Environmental Protection Agency (EPA) standard for nitrate in drinking water is 10 milligrams of nitrate per liter of drinking water (mg/L). In the Des Moines Watershed, most nitrogen that reaches waterbodies is from cropland drainage and agricultural groundwater (MPCA, 2021). Inputs to agricultural fields also include pesticides that can pollute groundwater and surface water.

In the Des Moines River Watershed, four of the 563 wells tested for nitrates have had levels above the EPA Drinking Water Standard. For surface waters, part of the main stem of the Des Moines River (between Windom and Jackson) is listed as impaired for ammonia, and two stream reaches (Beaver Creek and Jack Creek) are impaired for pesticides (Chlorpyrifos).

This plan's desired future conditions state for groundwater is no wells above the EPA drinking water standard for nitrates. The plan's desired future condition for surface water aligns with nitrate percentage reduction targets established in the Des Moines River Basin WRAPS for improving aquatic life conditions and making progress toward state nutrient reduction strategies and local water quality impairments goals (MPCA, 2021). Mass load reduction goals are based on application of WRAPS-defined percentage reduction targets to calculated PTMApp mass loads. The ten-year goal represents realistic progress toward the desired future condition.



Pathways for nitrate pollution in tiled cropland (top image) vs. not tiled (bottom). Picture: MPCA

Desired Future Condition

- Nitrogen loading is reduced by 30%, or 1,830,000 lbs/year, reducing in-stream concentrations and loads of nitrogen.
- No wells above EPA Drinking Water Standard of 10 mg/L.

Ten-Year Goal

- Nitrogen loading is reduced by 4%, or 246,800 lbs/year over the ten-year plan as estimated by PTMApp (edge-of-field).

Metric or Indicator

- lbs/year of total nitrogen reduced, as estimated by PTMApp (edge-of-field).

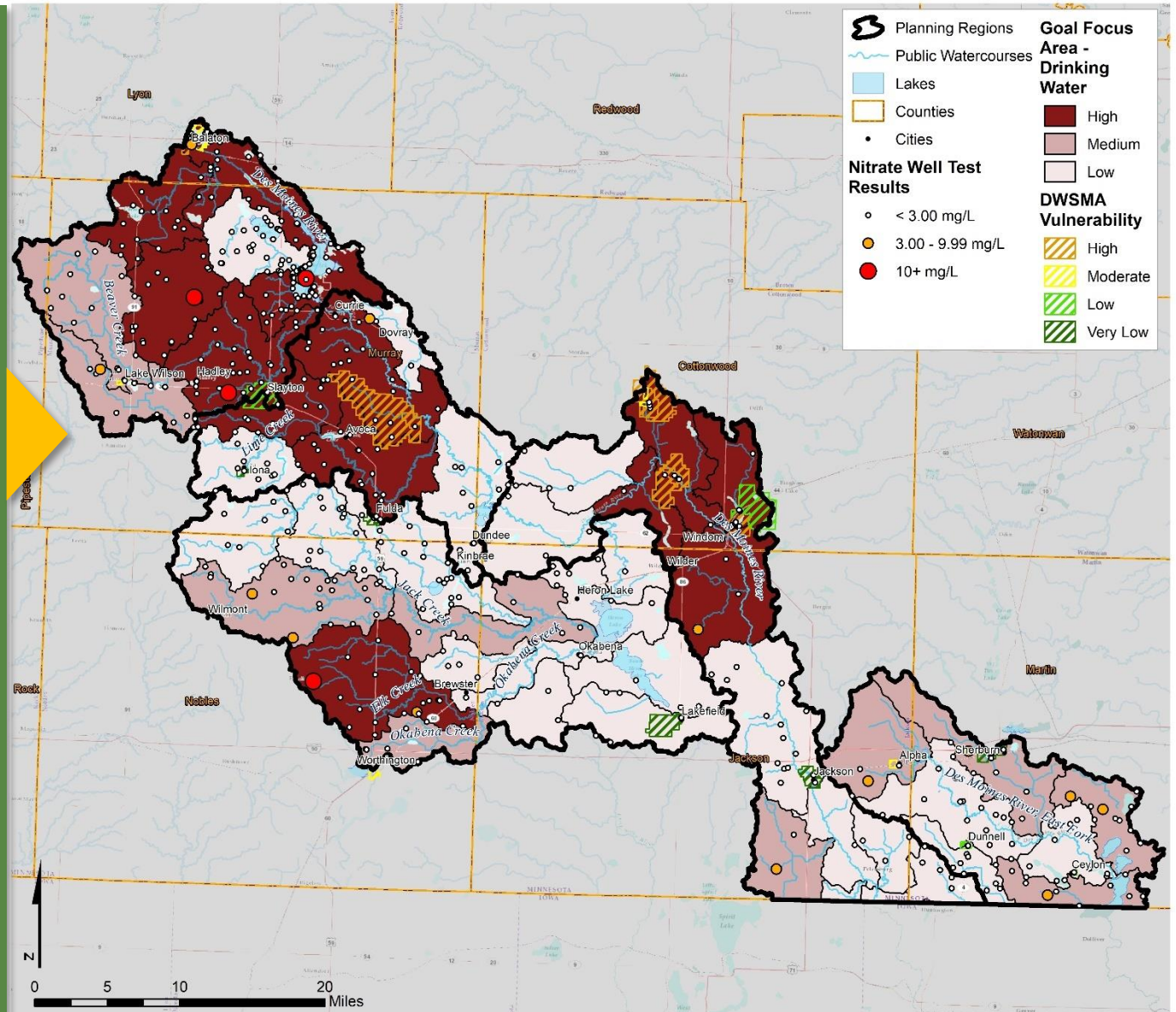


Focus Areas

Several locations throughout the watershed are focus areas for this goal.

- Vulnerable DWSMAs
- Nutrient or pesticide-impaired surface waters
- Areas with elevated nitrates in wells (3 - 10+ mg/L)

The map to the right summarizes these locations. The DMR partners aim to focus efforts around DWSMAs that are classified as “high” vulnerability. Areas in the watershed where these features are most prominent are shown in red and will be the focus area for implementation related to this measurable goal.



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Priority A

Upland Wind and Water Erosion

Priority Issue



Excess delivery of sediment from **upland wind and water erosion** to lakes and streams impacting aquatic life and recreation.

Impacts of falling raindrops, flowing water, and wind erode soils and transport detached sediment over the surface of the landscape. Eroded sediment enters and clouds streams and lakes, and chokes waterways in sediment that would have otherwise been held on the landscape as fertile soil. Critical habitat for fish disappears and becomes less diverse as it gets covered in fine sediment, especially habitat for prized gamefish species that depend on coarse substrate textures to make spawning beds.

In the Des Moines River Watershed, upland erosion is the largest source of sediment to surface waters (MPCA, 2021). Upland erosion includes farm field surface and gully erosion, sediment that is washed away from roads and developed areas, and surface erosion from other areas (MPCA, 2021). Twenty stream reaches are impaired for sediment or turbidity in the Des Moines River Watershed, including a majority of the Des Moines River mainstem. Further, four reaches are considered nearly or barely impaired for turbidity.

A collaborative process with local entities determined feasible yet impactful goals within the ten-year plan, and for desired future conditions. The plan's desired future condition goal for upland wind and water erosion aligns with sediment percentage reduction targets established in the Des Moines River Basin WRAPS (MPCA, 2021). Mass load reduction goals are based on application of the WRAPS-defined percentage reduction targets to calculated PTMAApp mass loads. Individual stream reach reductions may be more or less than the basin-wide goal based on specific conditions (see **Appendix G**). The ten-year goal represents realistic progress that can be made during plan implementation.

Desired Future Condition

- Upland sediment loading is reduced by 30%, or 443,600 tons/year, reducing in-stream concentrations and loads of sediment.

Ten-Year Goal

- Upland sediment loading is reduced by 10%, or 155,000 tons/year over the ten-year plan, as estimated at the edge-of-field from PTMAApp.

Metric or Indicator

- Tons/year of total sediment reduced, as estimated at the edge-of-field from PTMAApp



Turbid waters (Picture: MPCA)



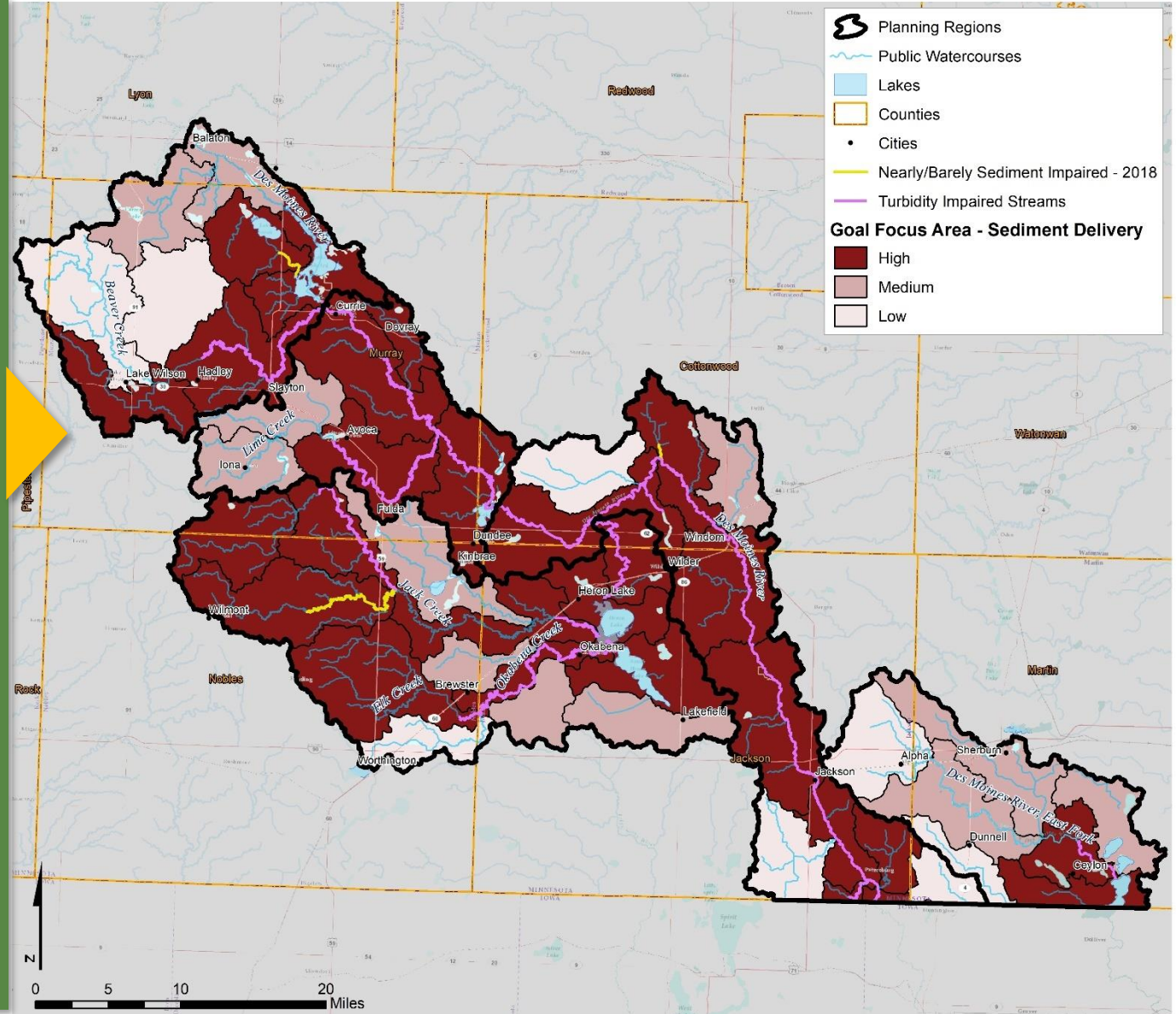


Focus Areas

Several subwatersheds are focus areas for this goal based on their prominence of the following:

- Sediment impaired streams,
- Nearly and barely impaired reaches for sediment, and
- Areas of elevated overland sediment loading

The map to the right summarizes these locations. The DMR partners aim to focus implementation efforts around areas that have a demonstrated history of sediment issues, particularly watersheds that have high soil erosivity close to streams (determined by PTMApp), and where there are sediment impairments (or reaches that are nearly or barely impaired for sediment).



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Phosphorus Loading

Priority Issue

Excess phosphorus loading from runoff and resuspension in lakes causing nuisance algal blooms, impacting aquatic life and recreation.

Phosphorus is a nutrient that fuels algae and aquatic plant growth. When supplied with an abundance of phosphorus, algae respond by growing rapidly, creating algal blooms. Once algae and aquatic plants bloom in a lake, they can block out sunlight, decreasing the oxygen level available to other aquatic life. Algal blooms also affect aquatic recreation, making waters undesirable or even dangerous to swim in due to the potential presence of toxic blue-green algae (MPCA, 2021).

Twenty-three lakes in the Des Moines River Watershed are impaired for excess nutrients. Phosphorus loading in the Des Moines River Watershed is primarily from nonpoint sources (91%), which includes watershed runoff and crop tile (MPCA, 2021). This phosphorus is primarily sourced from agricultural fertilizer inputs. Internal loading is also a large source of lake phosphorus. Although much phosphorus stored in lakebeds was originally sourced from applied landscape phosphorus, remobilization of legacy phosphorus accumulated on the lakebed of shallow lakes by wind, waves, and bottom-feeding fish also is a substantial driver of lake phosphorus in some regional lakes.

The plan's desired future condition aligns with basin-wide phosphorus percentage reduction targets established in the Des Moines River Basin WRAPS, as means to make progress toward both state nutrient reduction strategies and local lake and stream standards (MPCA, 2021). Mass load reduction goals are based on application of the WRAPS-defined percentage reduction targets to calculated PTMAApp mass loads. Individual stream reach and lake reductions may be more or less than the basin-wide goal based on specific conditions (see Appendix G). The ten-year goal represents realistic progress that can be made during implementation.

Desired Future Condition

- Total phosphorus loading is reduced by 45%, or 145,400 lbs/year, reducing in-stream and lake concentrations and loads of phosphorus.

Ten-Year Goal

- Total phosphorus loading is reduced by 4%, or 13,500 lbs/year over the ten-year plan, reducing in-stream and lake concentrations and loads of phosphorus, as estimated by PTMAApp (edge of field).

Metric or Indicator

- Pounds/year of total phosphorus reduced, as estimated by PTMAApp (edge of field).

Algal bloom in lake (Picture: MPCA)

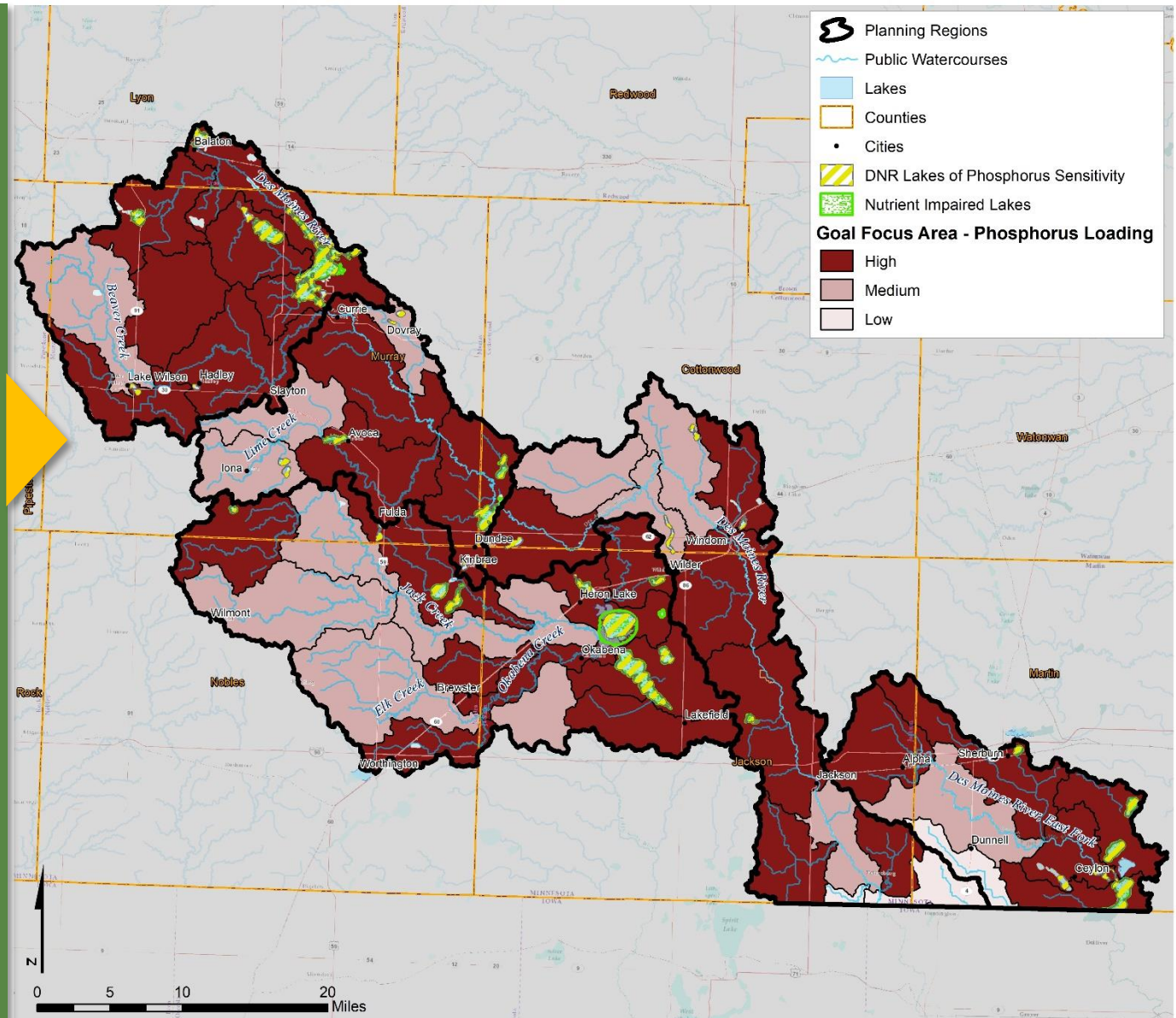


Focus Areas

Several subwatersheds are focus areas for implementation efforts related to this goal.

- Phosphorus-impaired lakes
- DNR Lakes of Phosphorus Sensitivity
- Recreationally Important Lakes (MPCA, 2021)
- Areas of elevated overland total phosphorus loading, as estimated by PTMApp

The map to the right summarizes these locations. The planning partners aim to focus implementation efforts in those regions shown by dark red to reduce impacts of phosphorus loading in the watershed.



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Storage and Altered Hydrology

Priority Issues	
	Peak flow from altered hydrology (tile and drainage ditches) and its impact on channel stability, infiltration rates, and water quality degradation.
	Insufficient storage on the landscape, especially in upland areas, and its impact on flooding.
	Increasing extremes from a changing climate (drought and increasing precipitation patterns), and the need to plan for resiliency .

The natural drainage patterns of the Des Moines River Watershed have been altered substantially since Euro-American colonization and settlement of the area. Wetlands have been drained, streams straightened, drainage ditches dug, and tile drainage installed to increase the farmable area in the watershed for agronomic benefits and decrease the preponderance of mosquito borne illness (such as malaria). Land cover and land use has also changed from prairie grass to row crop agriculture. Further, climatic changes in the last several decades have increased the magnitude of precipitation events in the area. These changes have all been associated with increased peak streamflow and flooding, which can cause in-channel erosion of streams and water quality degradation. Increased storage in upland and riparian areas is needed to “slow the flow” of water and increase stream health, in addition to decreasing downstream flooding.

The DNR completed the Evaluation of Hydrologic Change (EHC) for the Des Moines River Watershed, which identifies hydrologic alteration before and after a point of greatest hydrologic change within the historical record. To support this plan, an additional altered hydrology analysis was also completed (**Appendix H**), using DNR’s identified point to create an acre-feet storage goal for mitigating the impacts of altered hydrology.

For planning purposes, a desired future condition storage goal for the watershed is 2.34 inches of additional water storage across the basin. The ten-year goal represents realistic progress that can be made. **Progress** towards these goals will also build resiliency to impacts of climatic changes within the watershed.

Desired Future Condition

- Mitigate impacts of altered hydrology by adding 2.34 inches of storage across the watershed, or 191,825 acre-feet of storage

Ten-Year Goal

- Add 0.48 inches of storage across the watershed, or 39,000 acre-feet of storage

Metric or Indicator

- Acre-feet of additional water storage



Flooded Des Moines River in Currie, MN
(Picture: Star Tribune)



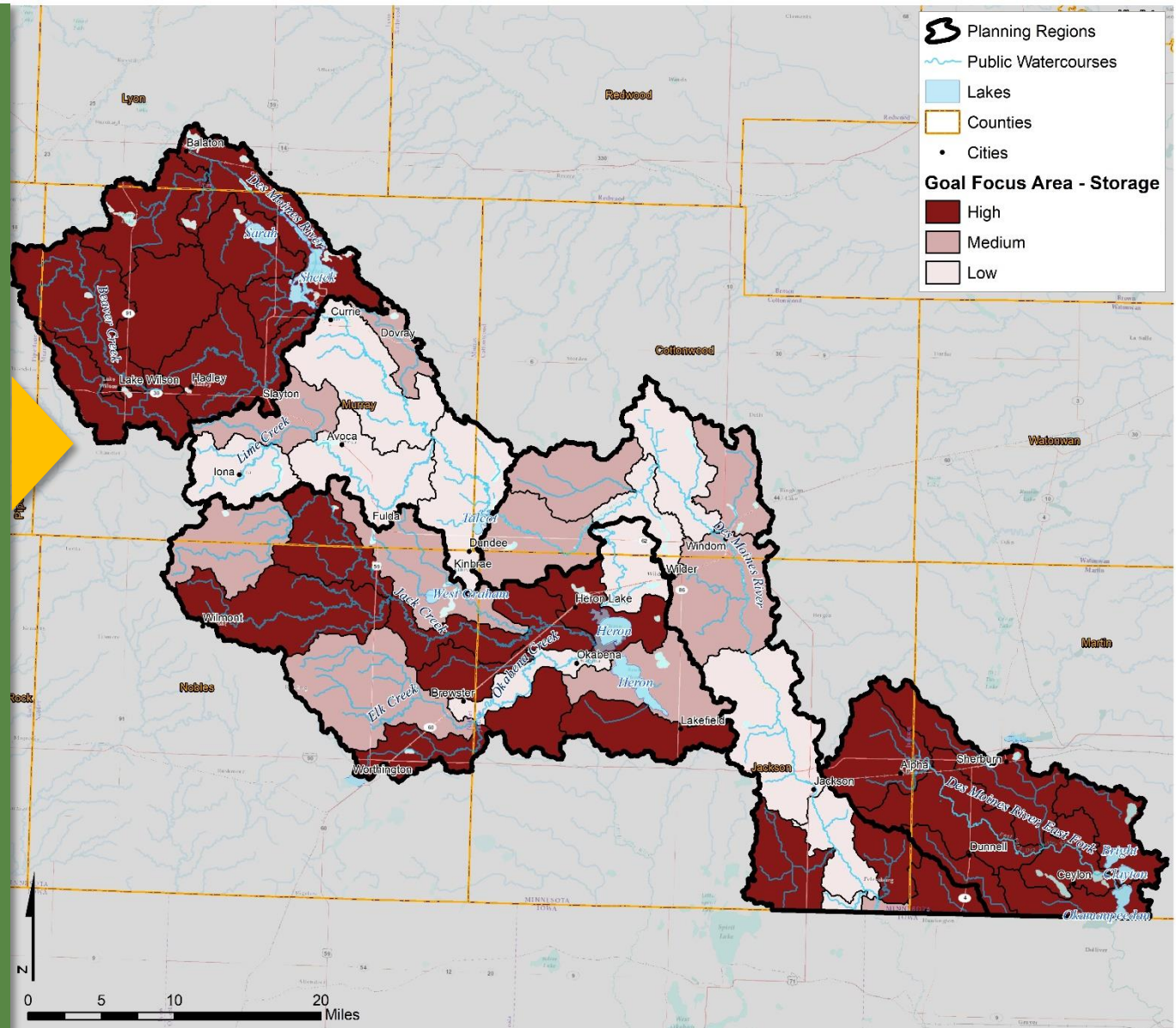


Focus Areas

Several locations throughout the watershed are focus areas for this goal, as determined by their presence and prominence of:

- DNR's Watershed Health Assessment Framework Hydrological Storage Index low storage areas
- Altered hydrology stressor areas (MPCA, 2021)
- Local knowledge for storage opportunity areas

The map to the right summarizes locations that will be the focus for adding additional storage on the landscape. The planning partners aim to focus implementation efforts around areas that already have low storage, that have been recorded as stressed from altered hydrology, and where local partners have identified areas of interest and opportunity for installing storage practices.



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Soil Health



Priority Issues



Low crop diversity and lack of conservation tillage or residue management on fields, leaving soil exposed and impacting **soil health**.

Agricultural production is the primary economic driver in the Des Moines River Watershed, followed by agricultural products processing. Current land use reflects this: the watershed is predominantly covered in agriculture, with 77% in corn and soybean production. As such, having health soils for supporting agricultural production is critical for the health and vitality of the community as well as for resources downstream.

Soil health is defined as the enduring capacity of soil to function as a living ecosystem that sustains plants and animals, including humans (USDA-NRCS, 2021). Natural factors such as weather conditions, soil types, and slope play major roles in determining the health of the soil and its seasonal viability for productive crops. How the land and soil is managed also impacts soil health. Fields that are intensively tilled or have minimal residue or vegetative cover are especially vulnerable to erosion, which can result in loss of valuable and non-renewable topsoil.

This measurable goal focuses on implementation of soil management practices—such as cover crops, nutrient management, perennial cover, field residue management, and alternative cropping—to keep soil covered, improve soil health, and increase productivity. These same practices improve infiltration rates, water holding capacity, and water quality, and can also increase carbon sequestration. These practices can also reduce the amount of fertilizers, fuel, and other inputs needed for agriculture, thus reducing greenhouse gas emissions while reducing costs (BWSR, 2019).



Cover crops at harvest in Cottonwood County (Picture: HLWD)

Desired Future Condition

- All farmable land is assessed for or managed with soil management practices.

Ten-Year Goal

- 24,000 acres of farmable land are managed with soil management practices.

Metric or Indicator

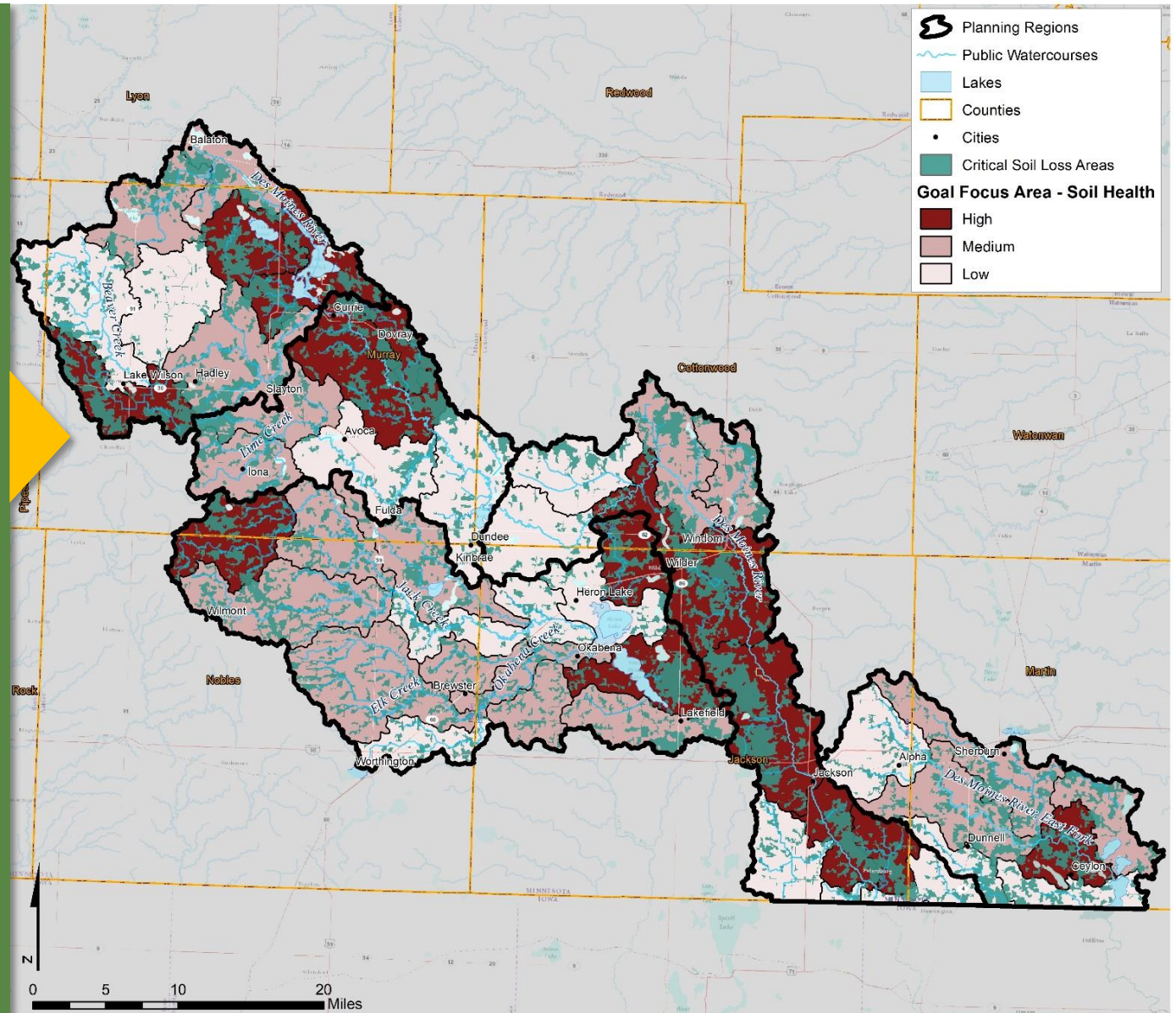
- Acres of land managed by soil management practices.



Focus Areas

“Critical soil loss areas” are areas that are most vulnerable to overland erosion. They are identified and targeted in this plan through use of PTMApp. This map shows critical soil loss areas on the landscape (in 40-acre catchment average areas) that contribute the top 25% of sediment yield, as estimated at the edge of the field. These locations would benefit most from soil management practices.



Subwatersheds shown as a “High” priority in dark red have the largest prominence of these critical soil loss areas and should be the focus of initial implementation efforts.





Streambank and Channel Erosion & Enhanced Buffers



Priority Issues	
	Need for continued enhancement of buffers along ditches, stream systems, and non-protected waters, impacting water quality and habitat.
	Streambank and in-channel erosion contributing sediment to water, impacting water quality and habitat.

Healthy streams are connected to floodplains and have a natural near-stream, or riparian, area which provides for nutrient cycling, filtration, and natural in-channel processes. A degraded stream habitat can cause declines in water quality, and lead to streambank and in-channel erosion.

Streambank and in-channel erosion are the second highest contributors to surface water sediment load in the Des Moines River Watershed (MPCA, 2021). While some amount of channel migration and associated streambank erosion is natural, altered hydrology has likely increased stream flow, contributing to excessive streambank erosion (MPCA, 2021). In 2016, the Minnesota Buffer Law went into place which mandates buffers, or equivalent alternative practices, on public waters and public drainage systems. However, most waterways would benefit from buffer enhancements (quality and/or quantity), particularly where altered hydrology is identified as a stressor and where riparian habitat is poor, to prevent further erosion.

This plan’s goals were based on the overarching desire to have well-functioning, stable streams in the watershed. The desired future condition aligns with stream habitat basin wide goals established in the WRAPS – with increased stability and buffer enhancement, there is a measurable increase in stream habitat, as measured by the MPCA Stream Habitat Assessment (MSHA) score. The short-term goal is based on what is feasible and impactful during plan implementation.

Desired Future Condition


- All stream channels are enhanced or protected, with MSHA stream habitat score increasing 45% from current conditions as measured in 10-year watershed approach Stressor ID data.

Ten-Year Goal

- 5 miles of prioritized stream channels are enhanced or protected, improving MSHA stream habitat scores.

Metric or Indicator

- Miles of stream enhanced or protected, and stream habitat score.

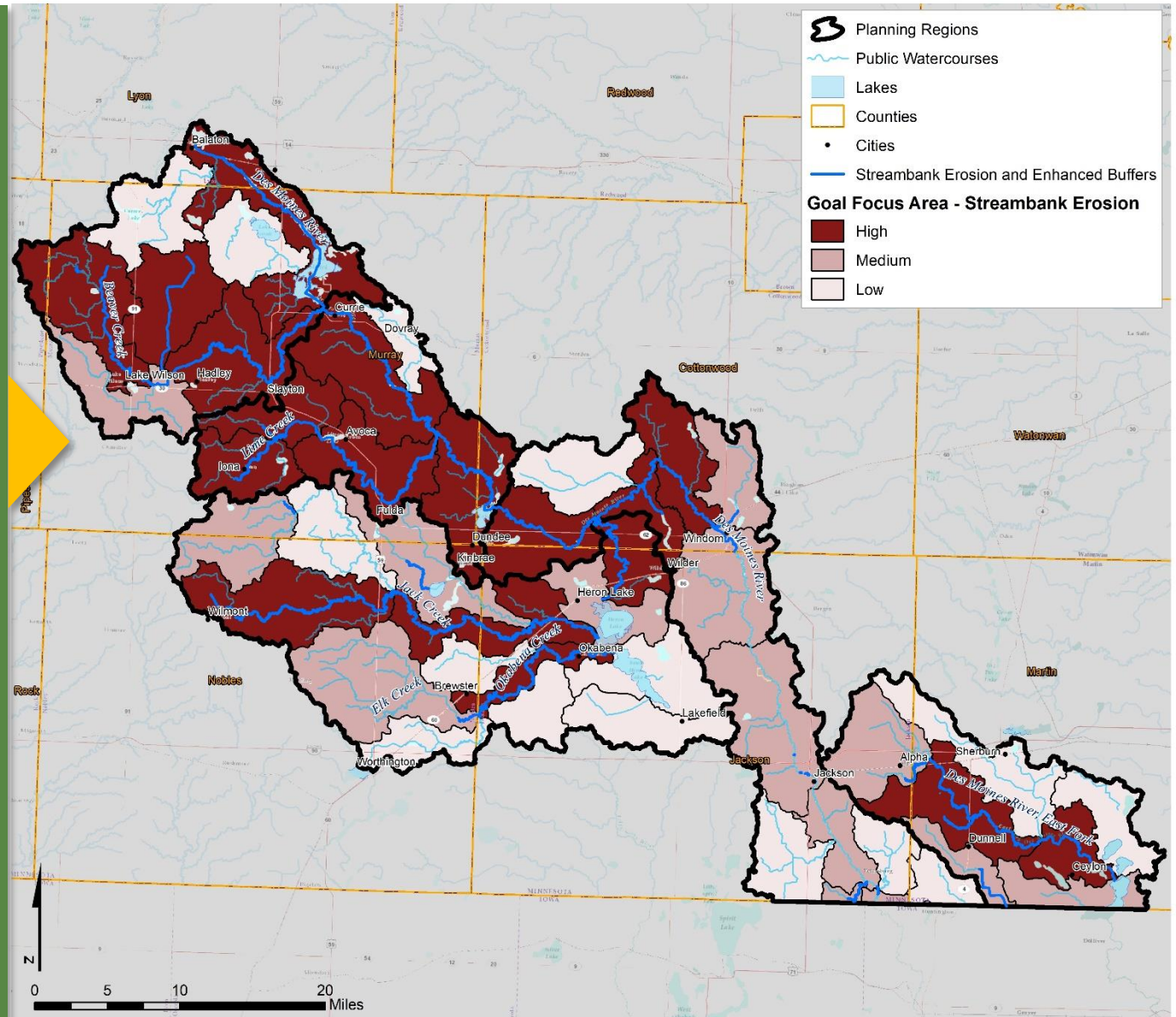


Buffered waterway (Picture: BWSR)



Focus Areas

Local knowledge was used to prioritize streams for buffer and streambank work under this goal. The priority streams length within each subwatershed was used to prioritize subwatersheds into high, medium, and low priority groups based on the relative length of priority streams in each catchment.



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Livestock Access to Streams



Priority Issue



Livestock access to streams causing degradation in water quality and instability to streambanks.

Streams can be a source of water for livestock; however, unrestricted livestock access to streams can destabilize streambanks due to trampling. Animal waste can also be a source of nutrients and bacteria to waterways. Excessive bacteria (*Escherichia coli*, or *E. coli*) in streams is a public health issue, as *E. coli* can cause serious illness in humans and hinders aquatic recreation. Specific sources of bacterial pollution in waterways can be determined through bacterial source tracking.

There are 27 stream reaches in the Des Moines River Watershed that are impaired for *E. coli* or fecal coliform bacteria, including much of the main stem of the Des Moines River. The furthest downstream reach of the Des Moines River is barely impaired.

This plan’s measurable goal for livestock access to streams aims to mitigate impacts of unrestricted livestock access on surface water quality, such as stream stabilization, nutrient loading, and bacteria loading. This plan accomplishes that goal by use of “managed” stream alongside pasture, with “managed” meaning the implementation of practices including, but not limited to livestock exclusion and restricted or managed grazing practices. The desired future condition is all streams with pasture are managed. The ten-year goal represents reasonable progress that can be made toward the desired future condition during plan implementation.

Desired Future Condition

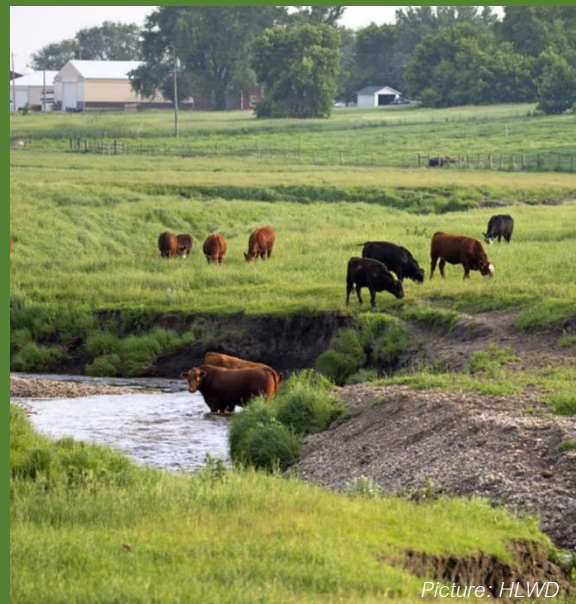
- All 88 miles of stream with pasture are actively managed.
- Stream water quality is improved 30% as measured in sediment and bacteria monitoring data and 10-year watershed approach Stressor ID data.

Ten-Year Goal

- 4 miles (or 2 lineal miles) of stream with pasture are managed per year, or 40 miles (20 lineal miles) in the ten-year plan.

Metric or Indicator

- Miles of stream managed; Stream sediment and *E. coli* monitoring data.



Picture: HLWD



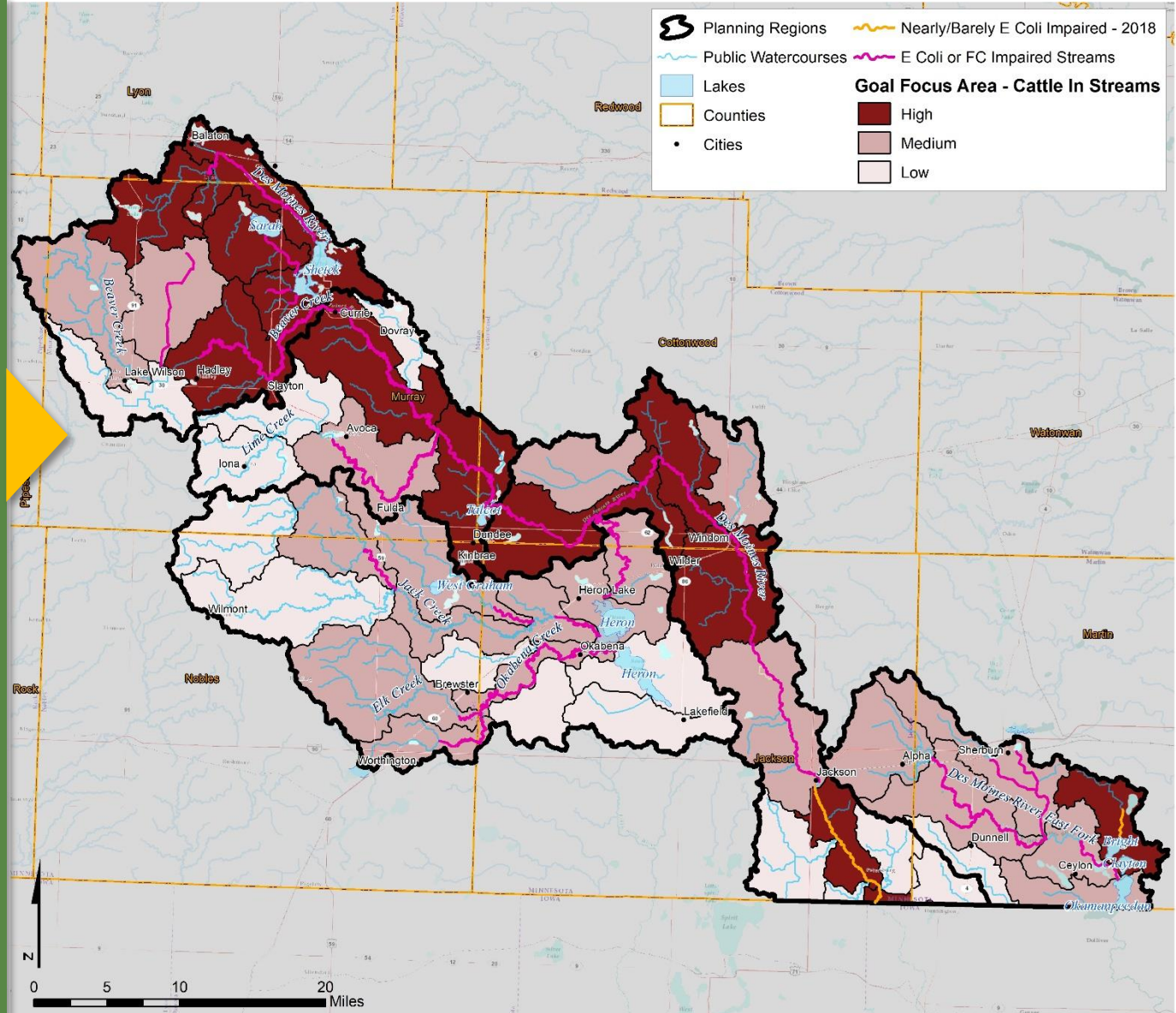


Focus Areas

Several locations throughout the watershed are focus areas for this goal. Information used to identify focus areas included:

- Nearly/barely impaired waters for *E. coli*
- *E. coli* or Fecal Coliform bacteria impairments
- Streams that intersect pasture land use

The map to the right summarizes these locations. Implementation related to this measurable goal focuses on areas where there is 1) evidence of pasture near streams, and 2) impairments that may be associated with livestock in streams.



Introduction



Land and Water Resources Narrative



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Urban and Developed Areas



Priority Issue



Urban/impervious runoff, stormwater runoff, and other urban point sources impacting downstream water quality conditions.

Developed areas, which include several small towns and cities in the watershed, are a highly manipulated land use, and can contribute higher levels of pollutants compared to more naturalized areas (MPCA, 2021). For example, treated wastewater discharge is a point source and is therefore regulated through a permitting process, however its discharge still has some nutrients that enter streams and rivers. Stormwater runoff, which is overland flow on impervious surfaces such as roads and sidewalks, is a nonpoint source of pollution that can pick up nutrients and pollutants as it moves through an urban landscape before entering streams and rivers.

The impact of developed, urban areas can be especially important when the developed area encompasses or is nearby a lake. Several towns and population centers have been identified near priority lakes. However, the point-source permitted discharges of phosphorus make up, on average, 0.1% of the total phosphorus loads in local nutrient-impaired lakes.

While highly manipulated urban land often does contribute higher levels of pollutants, the impacts can be reduced by adequately treating areas with urban best management practices (BMPs). Examples of urban BMPs include, but are not limited to, vegetative swales, storage practices for storm water, sediment removal practices and sediment basins, rain gardens, urban forestry, and ground cover improvement. This plan's desired future condition is to treat all contributing urban areas to improve water quality prior to entering receiving waters. The ten-year goal represents realistic progress that can be made in ten years. Progress made toward this goal will also accrue progress towards the overland sediment and phosphorus loading goals and storage/flooding goals. It will also address the emerging issue related to chlorides.

Desired Future Condition

- Treat all acres of contributing urban area with BMPs to improve water quality in receiving waters.

Ten-Year Goal

- Treat 300 acres of contributing urban area with urban BMPs over the 10-year plan (or 30 acres per year) as a means of improving water quality in receiving urban waters.

Metric or Indicator

- Acres of urban BMPs implemented.



Rain garden (Picture: HLWD)



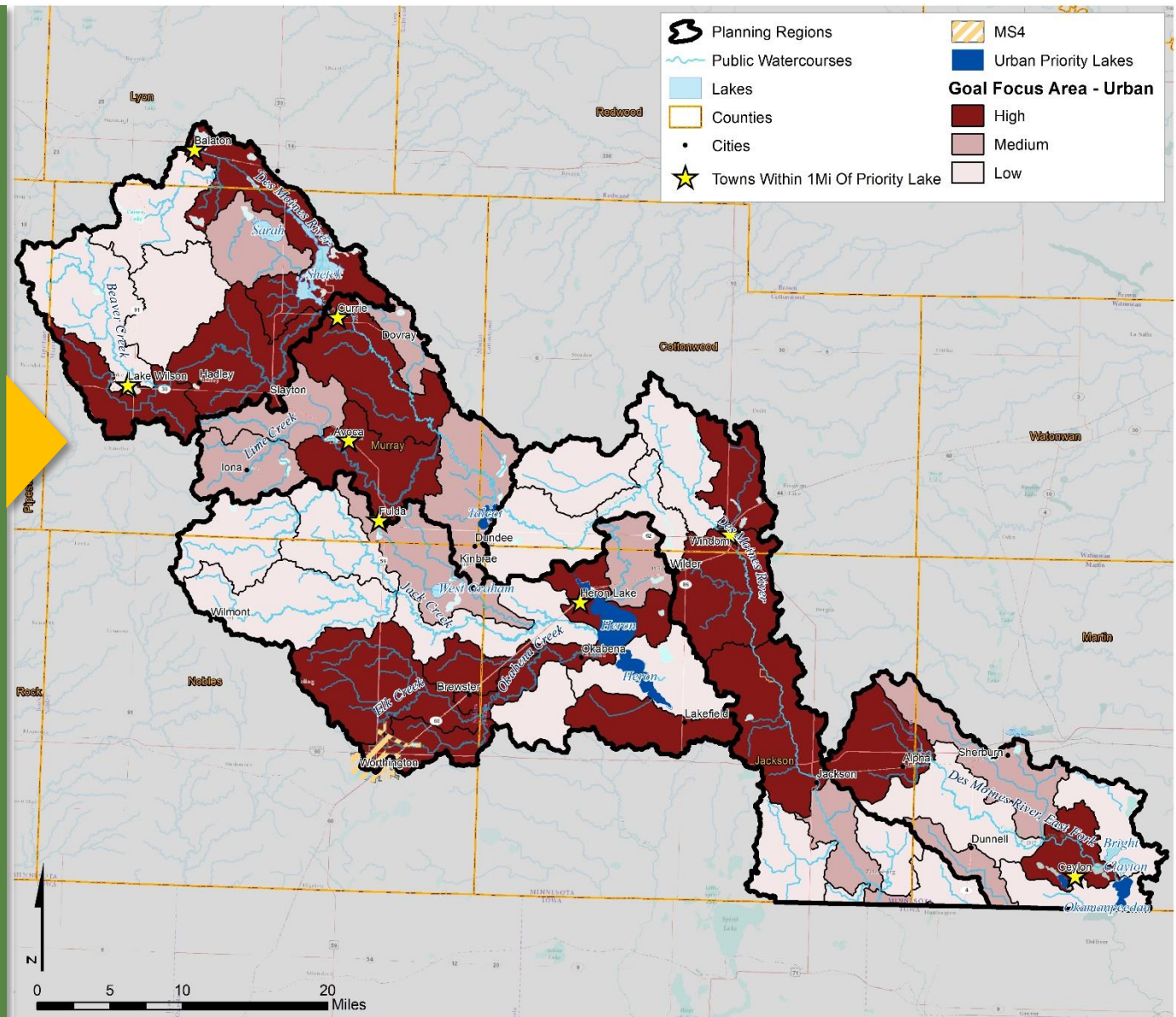


Focus Areas

Several locations throughout the watershed are focus areas for this goal. Information used in prioritizing focus areas included:

- Impervious surfaces
- Population centers
- MS4 boundaries
- Locally important lakes

The map to the right summarizes these locations. The planning partners aim to focus implementation efforts pertaining to urban runoff around areas where there is a high proportion of impervious surfaces, in addition to population centers and MS4 boundaries. Finally, locally important lakes were used to derive high-value, urban, surface water resources to protect.





Lake Shoreline Habitat

Priority Issue



Inadequate **lake shoreline habitat** to provide habitat and protect against shoreline erosion.

Natural vegetated lake shoreline is important habitat for both terrestrial and aquatic organisms, while providing a critical buffer and “filter” for overland flow into the lake. Shoreline erosion is caused by wave action, where the shoreline is not adequately protected by the deep roots of natural vegetation. Shoreline erosion can cause increased turbidity in lakes and be a source of some lake nutrients. Further, recreational use of the shoreline is lost when it erodes into the lake.

There are a multitude of locally important lakes throughout the Des Moines River Watershed. These lakes are mostly concentrated in the Headwaters planning region and in the Heron Lake complex of lakes. The region is known for its recreational lakes, from Shetek to Heron to Okamanpeedan - these lakes are important for protecting to preserve the unique resources in the region.

This plan’s desired future condition is to protect eight acres of shoreline in developed lakes from runoff and erosion and for shoreland owners to observe ordinances. For purposes of this plan, protection from runoff and erosion can be accomplished through implementation of enhanced shoreline buffers, shoreline restorations, native plantings, and rip rap where appropriate, with emphasis on wider buffers and shoreline restorations. The ten-year goal is focused on reasonable progress that can be made towards the desired future condition during

Desired Future Condition

- 8 acres of shoreline in developed lakes protected from runoff and erosion and shoreland owners observe ordinances.

Ten-Year Goal

- 2 acres of shoreline in developed lakes are protected from runoff and erosion.

Metric or Indicator

- Acres of shoreline protected from runoff and erosion.



Lake Cottonwood in Windom, MN

plan implementation.



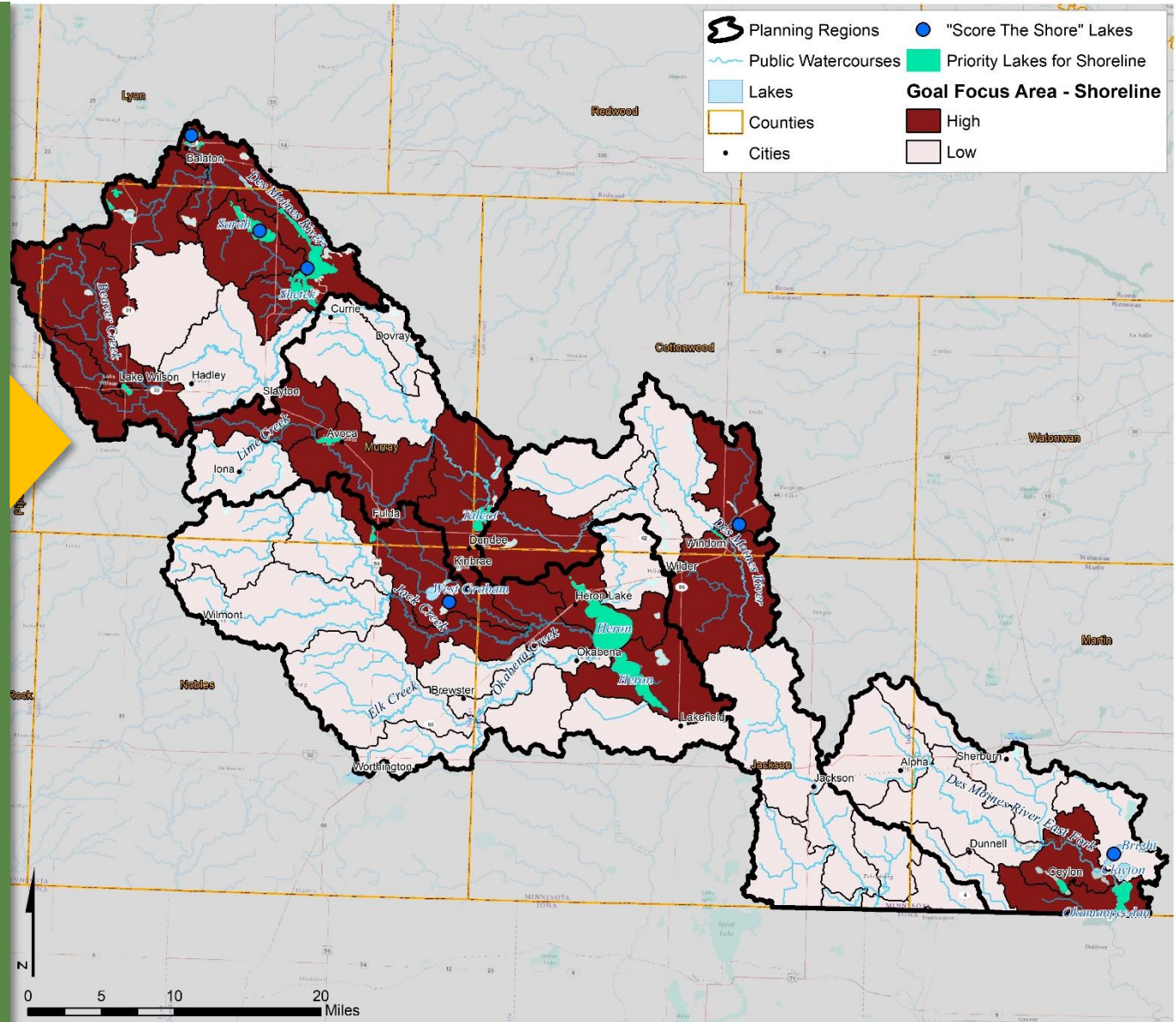


Focus Areas

Several locations throughout the watershed are focus areas for this goal. Subwatersheds and resources emerged as focus areas based on presence and prominence of:

- Recreationally important lakes (MPCA, 2021)
- Low “Score the Shore” ratings for shoreline health
- Local knowledge

The map to the right summarizes these locations. The planning partners aim to focus implementation efforts around lakes that are of high local value, in addition to areas with evidence of poor shoreline health already.



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Drainage Management

Priority Issue



Uncoordinated and inadequate **drainage management** to meet drainage network needs and promote water quality.

There are 254 miles of public agricultural drainage systems in the watershed, which is about 27% of the surface water stream length in the basin (DNR, 2019). This includes county and judicial ditches. Public drainage systems are managed by counties and the Heron Lake Watershed District on behalf of the benefitting landowners. Private drainage systems are managed by individual landowners.

Aging infrastructure and lack of maintenance of drainage ditches and tiles can cause erosion and excess sediment conveyance, causing downstream water quality issues. Inadequate conveyance of water results in poor drainage of fields, which negatively impacts crop yields and field operability. While increasing drainage conveyance generally does not increase runoff volume downstream, it can potentially modify hydrologic patterns in a matter that, in aggregate, increase peak flows at a watershed scale, potentially exacerbating existing flooding and erosion issues for downstream farmers and communities.

The focus of this goal's desired future condition is to restore failing drainage systems and provide adequate drainage capacity for modern agricultural practices while mitigating effects from altered hydrology. The ten-year goal focuses on development of multipurpose drainage management plans to target conservation practices along ditch systems. This forms a coordinated approach to benefit upstream and downstream users of the ditch system and water quality. This goal has synergies with other goals on altered hydrology and watershed storage to “slow the flow”, while maintaining functional ditch systems, and benefitting communities and farmers.

Desired Future Condition

- All 254 miles of public drainage systems are stable and convey water for their designed storm event.

Ten-Year Goal

- Develop 7 multipurpose drainage management plans to target conservation practices along ditch systems.

Metric or Indicator

- Miles of ditch stabilized or enhanced for water quality benefits.



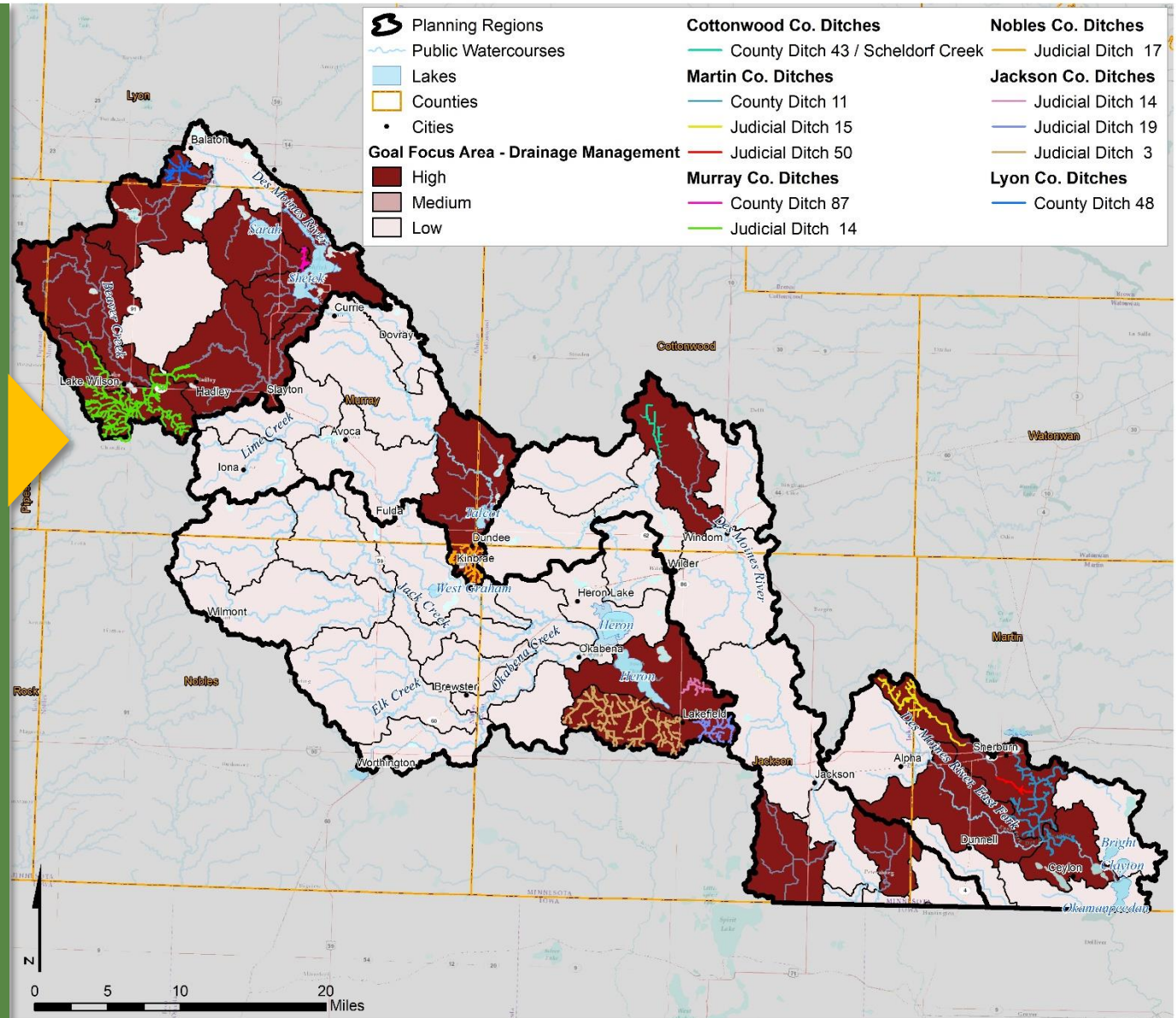
One example of multipurpose drainage management (of many: side inlet to a ditch (Picture: BWSR))





Focus Areas

Several locations throughout the watershed are focus areas for this goal. Local knowledge was used to identify public drainage systems that would most benefit from more coordinated management. These include systems that require large-scale repairs and systems that require minor maintenance and enhancements.



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Wetlands

Priority Issues

Loss and degradation of wetlands and its impact on wildlife habitat and water storage.

The Des Moines River Watershed is in the famed Prairie Pothole region of the Midwest, and the region has historically been known for its excellent waterfowl habitat for hunters and birdwatchers alike. However, many wetlands have been drained, which is a loss of wildlife habitat and water storage. Restoration of important wetland habitats will offer multiple benefits to the communities in the region, benefitting organisms from microbes and bugs unique to wetland environments to the ducks and whitetail deer that use this critical habitat. Wetland restoration is also a natural solution to water storage that oftentimes helps in goals to “slow the flow” of water. Not only will the restoration of lost wetlands help with these goals, but the enhancement of currently degraded wetland (e.g., through invasive species) will offer better habitat and more resilient natural infrastructure. Finally, some wetland restorations have the potential to store carbon in the landscape, offering a natural solution to decreasing carbon emissions.

The state’s Wetlands Conservation Act (WCA) and federal Clean Water Act (CWA) combine to provide protections for most wetlands from filling or drainage. This plan’s goals are based on restoring 10% and 25% (for ten-year and desired future condition goals, respectively) of all small (<5 acres) freshwater emergent wetlands in the region, with planning region milestones as shown below.

Planning Region Milestone	Headwaters	Lime Creek-Upper Des Moines	Heron Lake WD	Main Stem Des Moines	Headwaters East Fork
Desired Future Condition	975 acres	625 acres	1,100 acres	800 acres	375 acres
Ten Year	390 acres	250 acres	440 acres	320 acres	150 acres

Desired Future Condition

- Restore 3,875 acres of wetlands within the watershed.

Ten-Year Goal

- Restore 1,550 acres of wetlands within the watershed.

Metric or Indicator

- Acres of wetland restored.

Waterfowl in Des Moines River Watershed (Picture HLWD)

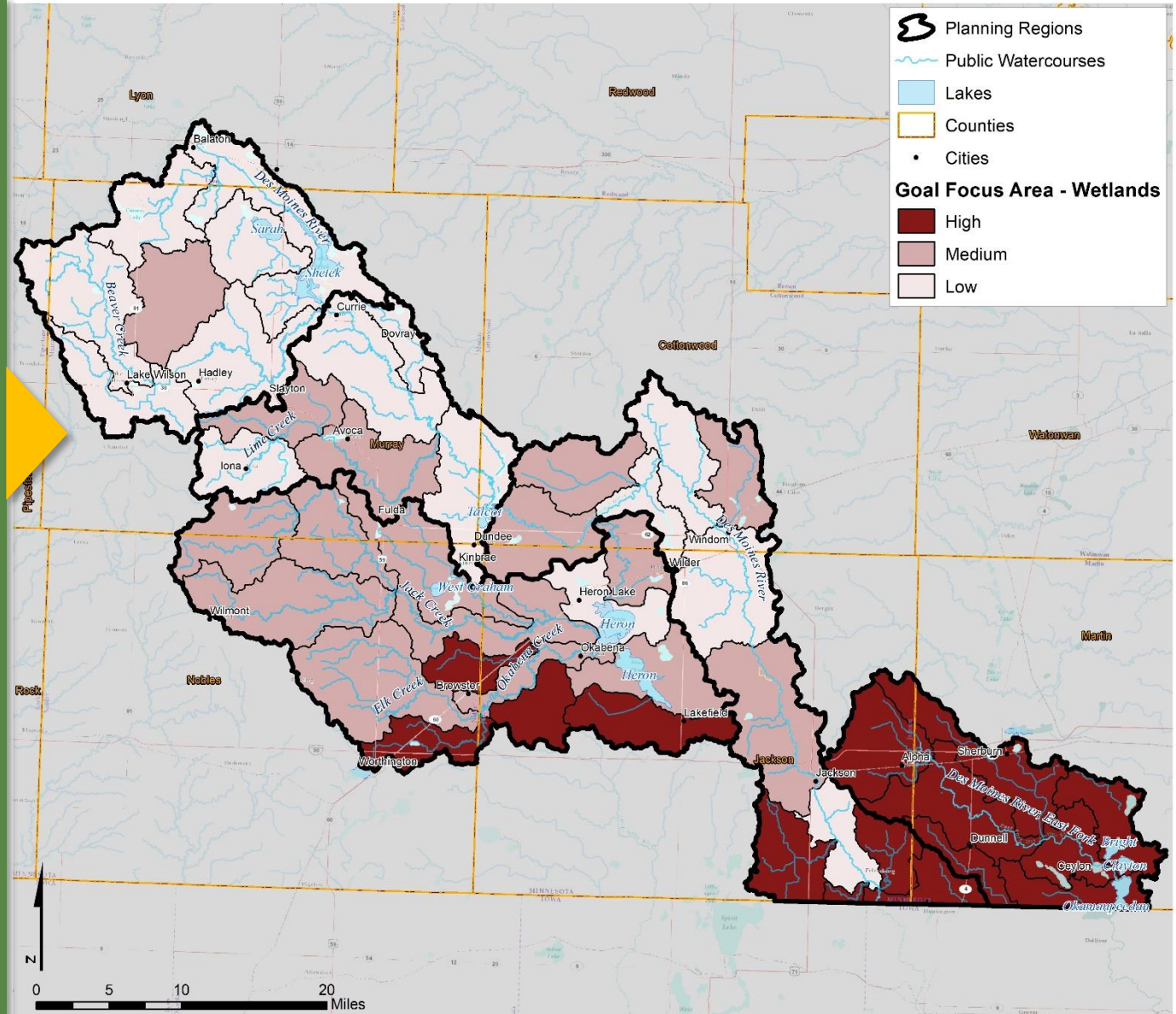


Focus Areas

Several locations throughout the watershed are focus areas for this goal. Information used to identify focus areas for wetland restoration are:

- DNR Watershed Health Assessment Framework Wetland Loss Score

The map to the right summarizes these locations where there has been the most historical loss of wetlands. This is where restoration efforts will be focused.



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Wildlife Habitat



Priority Issues

Degradation and fragmentation of **wildlife habitat**, including native prairie, woodlands, grasslands, and other areas.

The Des Moines River Watershed is unique in the southern region of Minnesota in its concentration of natural habitats and unique features. However, compared to a pre-settlement baseline, wildlife habitat in the Des Moines River Watershed is degraded and fragmented on a large scale, from widespread conversion to uniform agricultural land uses concentrated in primarily two crops, wetland drainage, and invasive species. However, there are some areas with high concentrations of natural habitat that offer a starting point for enhancement of what is already there, in addition to a basis for expansion. Particularly, the area around the Des Moines River between the Great Bend and the Minnesota-Iowa border offers many natural areas and is part of the Prairie Core, as designated by the Minnesota Prairie Plan. Enhancement and restoration of native habitats offer many quantifiable benefits, such as increased tourism and recreation; these areas also offer invaluable cultural benefits.

The Minnesota Prairie Plan offers a comprehensive vision for the state of, and future of, prairie landscapes in Minnesota. This plan's desired future condition is focused on meeting Prairie Plan goals for the Des Moines River Watershed, as a means of protecting land sufficient to support threatened, endangered, unique species. The ten-year goal is focused on keeping protected Conservation Reserve Program (CRP) land that is expiring in the next ten years to remain in protection and add additional perpetual easements in the watershed.

Desired Future Condition

- Reach habitat goals established by the Prairie Plan within the watershed by attaining 137,000 acres of corridor habitat (40% grass; 20% wetland); and 73,000 acres in core habitat.

Ten-Year Goal

- Re-enroll 12,000 acres of land that is expiring from CRP in protection programs. Obtain additional perpetual easements and protected areas for 1,940 acres.

Metric or Indicator

- Acres of land protected.

Hunting in Des Moines River Watershed

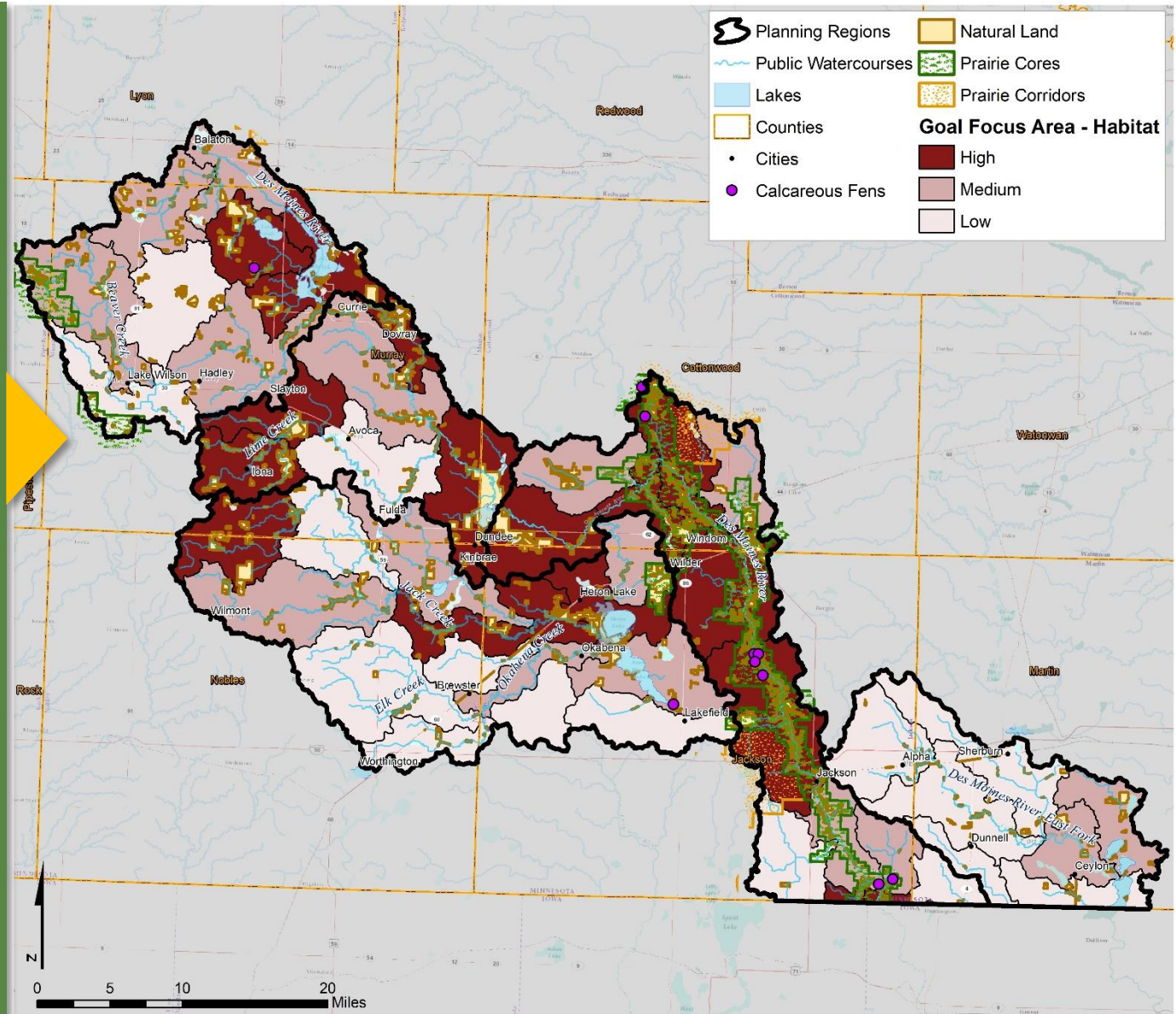


Focus Areas

Several locations throughout the watershed are focus areas for this goal. Focus areas were prioritized based on their presence of:

- DNR Native Plant Communities observations
- Protected land for wildlife management, conservation easement, state, or federal ownership
- Prairie Plan focus areas
- Calcareous fens, a rare habitat

The map to the right summarizes these locations. The focus will be working in areas that already have high amounts of natural habitat to create necessary linkages and getting the most value for conservation in these areas.



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Section 5. Targeted Implementation



Section 5. Targeted Implementation



This Plan Section identifies the targeted actions that will be implemented in the next 10 years to address priority issues and make progress toward measurable goals.

Targeted Implementation

This section of the plan identifies the targeted actions that will be implemented in the next 10 years to address priority issues and make progress toward measurable goals. This is summarized in “Action Tables” that include information about each action, where and when actions will be targeted, how those actions will be measured, and how much it will cost.

Making progress toward goals is largely dependent on funding, as more actions can be implemented with more funding. As such, this plan recognizes three funding levels (Table 5.1). With an approved CWMP, planning partners in the Des Moines River Watershed are eligible to receive non-competitive Watershed-Based Implementation Funding (WBIF) through BWSR. In recognition of this important source of funding, funding levels are organized in terms of current funding, current funding with WBIF, and what actions will be pursued with partners or through other competitive funding programs. Actions pursued under Funding Level 2 (Current Funding + WBIF) are the focus of this section.

Table 5.1. Funding levels for the Des Moines River Watershed

Funding Level	Name	Description
1	Current Funding	This level assumes plan funding is similar in magnitude to current funding focused on natural resource issues within the plan area.
2	Current Funding + WBIF	This level assumes plan funding is like current funding focused on natural resource issues within the plan area (Level 1), plus an additional \$1,400,000 per biennium (or \$700,000/year) from WBIF dollars.
3	Partner and Other Funding	This funding level recognizes that there are other organizations and agencies doing work in the watershed that can help make progress towards plan goals. This level contains additional implementation activities identified during the plan development process that are the responsibility of agencies and organizations better suited in the watershed.

This plan contains five different Action Tables that group similar action types together in five implementation programs (Figure 5.1). Implementation programs are the funding mechanism to implement actions. Actions within the Capital Improvements Projects, Education and Outreach, Research and Assessments, and Regulatory Administration implementation programs are implemented watershed-wide. Actions within the Projects and Practices Implementation Program are targeted to a planning region scale to reflect changing issues and



priorities from one planning region to the next. For more details on each of these implementation programs, see Section 6. Plan Implementation Programs.



Figure 5.1: Implementation programs in the Des Moines River Watershed.



Projects and Practices

Funding

Actions pertaining to the planning, design, technical and engineering support, and implementation of structural and non-structural conservation practices or protection of land are funded by the Projects and Practices Implementation Program (Section 6. Implementation Programs).

At 58% of the total plan budget, the Projects and Practices Program receives more funding than any other implementation program in the plan (Figure 5.2). This funding amounts to approximately \$12.1 million dollars over the 10-year plan.

Because so much funding is going to the Projects and Practices Program, planning partners needed to decide how funding would be distributed throughout the watershed. The Steering Committee elected to distribute funding between the five planning regions so that the funding followed plan priority issues and where issues are most prominent.

In Section 4. Measurable Goals, each priority issue (Priority A or B) is assigned a measurable goal and a map that identifies focus subwatersheds (HUC-12) for implementation efforts. Figure 5.3 combines all focus subwatershed maps for all priority issues into one comprehensive ranking map. More information about how this comprehensive map was created, and maps summarizing comprehensive ranks for surface water, groundwater, habitat, and land stewardship are available in Appendix E.

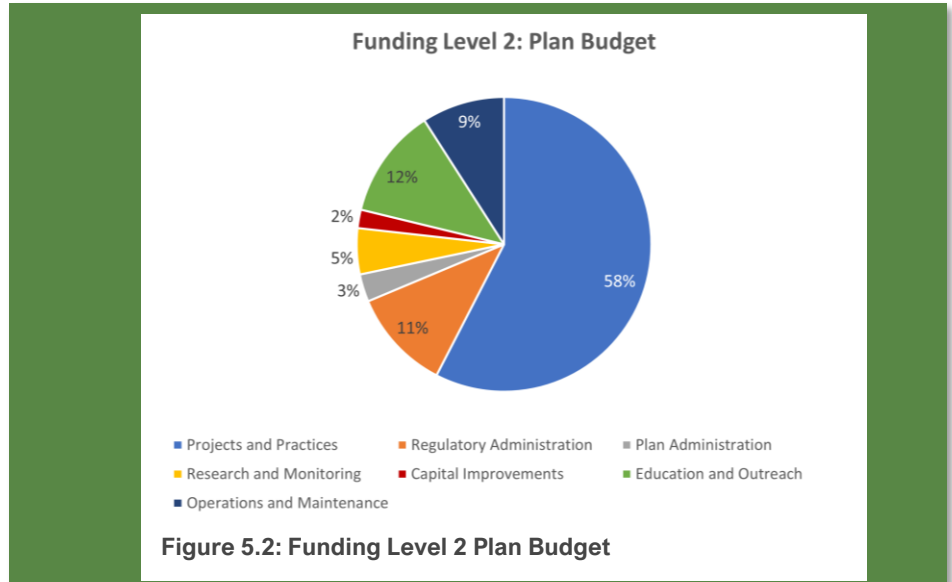


Figure 5.2: Funding Level 2 Plan Budget

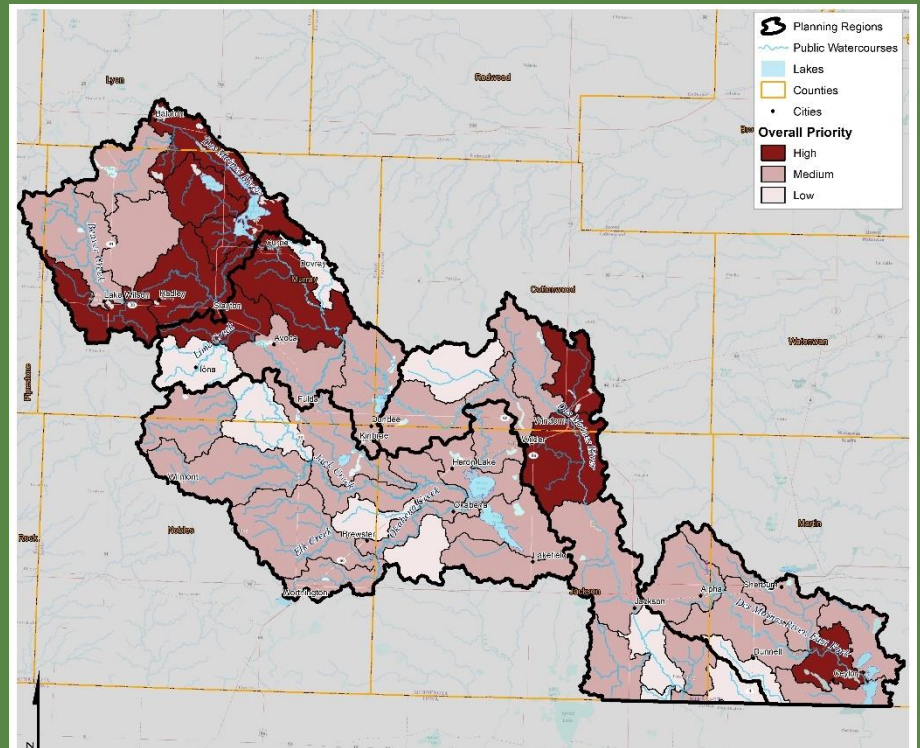


Figure 5.3: Comprehensive ranking map for all priority issues.





Based on the comprehensive ranking map, the Headwaters Planning Region has the highest prominence of priority subwatersheds, and therefore will receive the highest percentage of Projects and Practices funding. Figure 5.4 summarizes how this strategy was applied for all five planning regions to reach a distribution of Projects and Practices dollars between the five planning regions. Annual budgets for each planning region will be finalized during work planning (see Section 7. Plan Administration and Coordination).

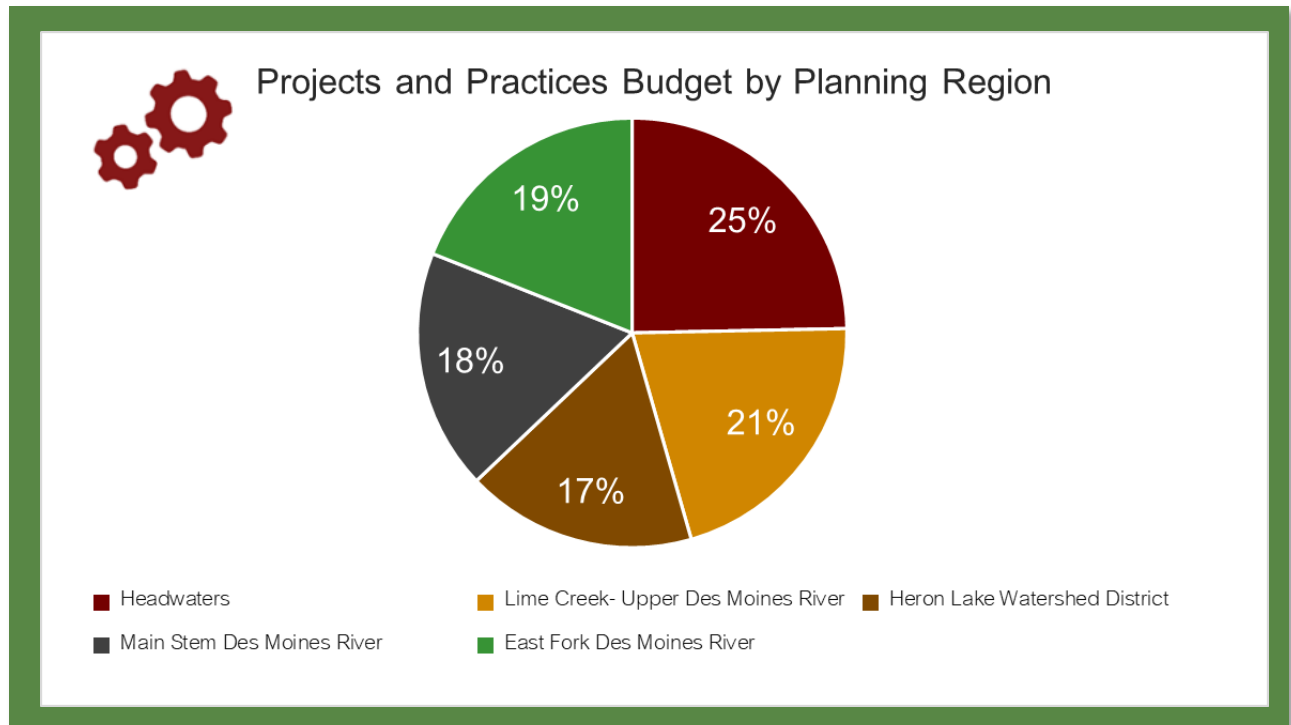


Figure 5.4: Projects and Practices budget distribution between planning regions.

Targeting Conservation

To make the best use of Projects and Practices funding within each planning region, planning partners need information about where new conservation practices are feasible, how much implementation will cost, what the estimated water quality benefit is, and how much progress implementation of that action can make toward goals. The Prioritize, Target, and Measure Application (PTMAApp) was used for providing this information in the plan.

PTMAApp estimates existing pollutant loads and water quality benefits for a wide range of conservation practices (full list shown in Appendix F). Pollutant loads and water quality benefits are expressed in terms of annual load reductions of sediment, total phosphorus (TP), and total nitrogen (TN) that result from implementing the practice. The practices included in this plan’s Action Tables were selected to align with voluntary local implementation trends and have the highest cost-benefit ratios for reducing sediment, with benefits measured at the edge of the field. For more information about how PTMAApp was used to inform implementation and benefits (sediment, TP, and TN) arising from PTMAApp practices, see Appendix F.

The numbers, cost, and locations of practices in the Action Tables represent a best-case scenario for planning. Due to voluntary participation, field verification, and funding availability, prioritized projects may not be feasible, in which case the next highest priority project will be targeted. In addition, projects may emerge that were not



identified in the Action Tables and supporting maps. These projects will still be pursued if environmental and economic benefits are comparable to those identified in the Action Tables.

A variety of factors will ultimately determine where implementation occurs, including but not limited to the following:

- Voluntary participation by landowners and residents
- Field verification of practice type and location
- Amount of funding available for implementation
- New data on resource conditions or practices
- Practices/projects ready to implement
- Effectiveness of education and outreach and research initiatives
- Technical feasibility

Planning Region Summaries

The prominence of priority issues changes by planning region (and even by subwatershed within each planning region). To reflect this, the Steering Committee elected to create Project and Practices Action Tables specific to each individual planning region.

Actions are included in the Action Tables to make progress toward plan goals. Oftentimes, actions listed have a direct relation to the measurable goal and will directly relate to how the goal will be tracked during implementation. This is indicated in the Action Tables by placing a “●” in the column for a measurable goal.

For example, the ten-year measurable goal for Streambank and Channel Erosion & Enhanced Buffers is: “5 miles of prioritized stream channels are enhanced or protected, improving MSHA stream habitat scores.” The focus areas for the Streambank and Channel Erosion & Enhanced Buffers goal is primarily in the Headwaters and Lime Creek planning regions, with moderate focus in the other planning regions (Figure 5.5). The magnitude of the action output (and therefore funding) aimed at addressing this goal between each planning regions reflects this.

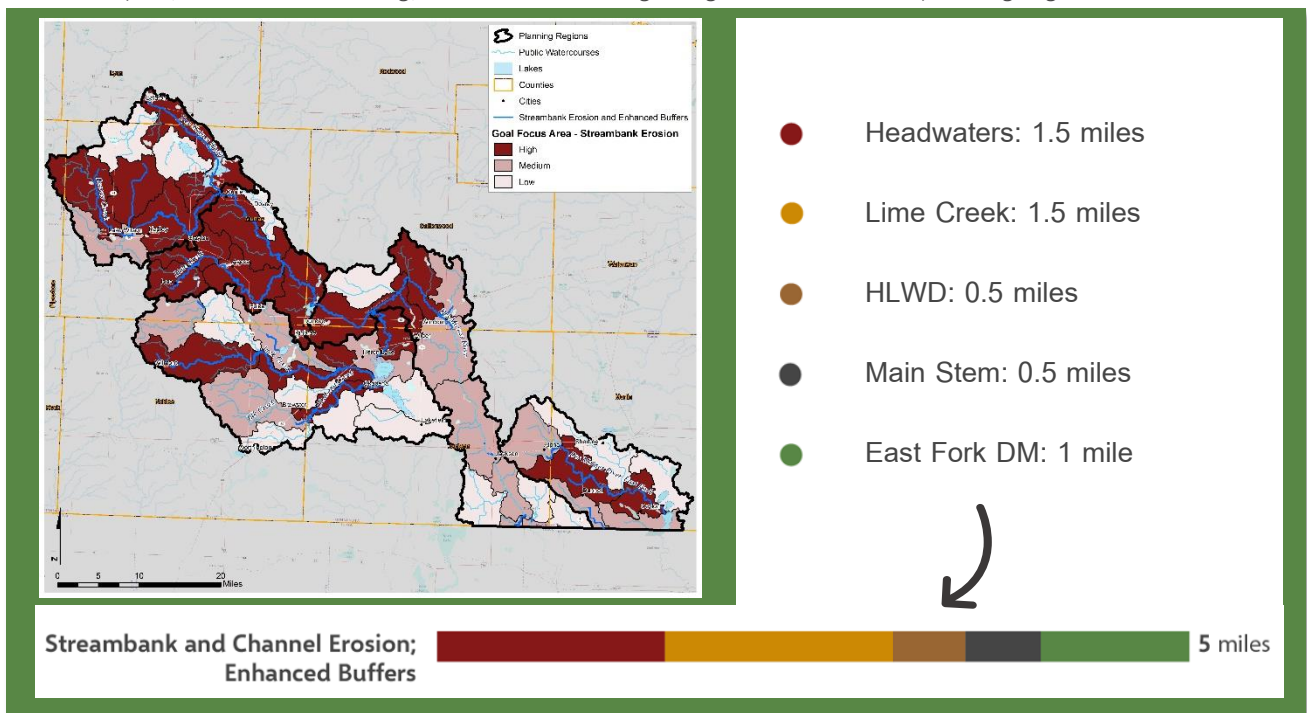


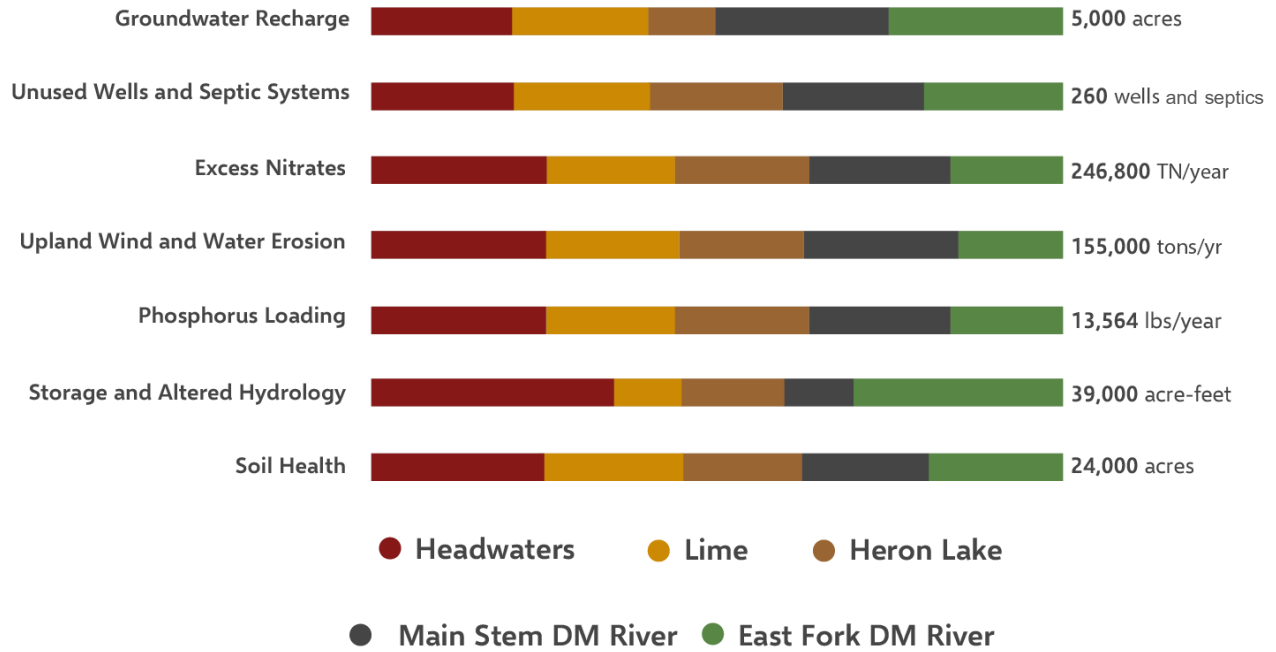
Figure 5.5. Example of outputs by planning region reflecting focus area map





This is also shown visually in each planning region summary. Each Priority A and Priority B ten-year measurable goal for the Des Moines River Watershed is shown in a chart, similar to Figure 5.6. Each goal has a milestone that each planning region will aim to meet to make progress toward the watershed-wide goal. Issues that are more important in one planning region will have a larger milestone goal.

Priority A Goals Overview



Priority B Goals Overview

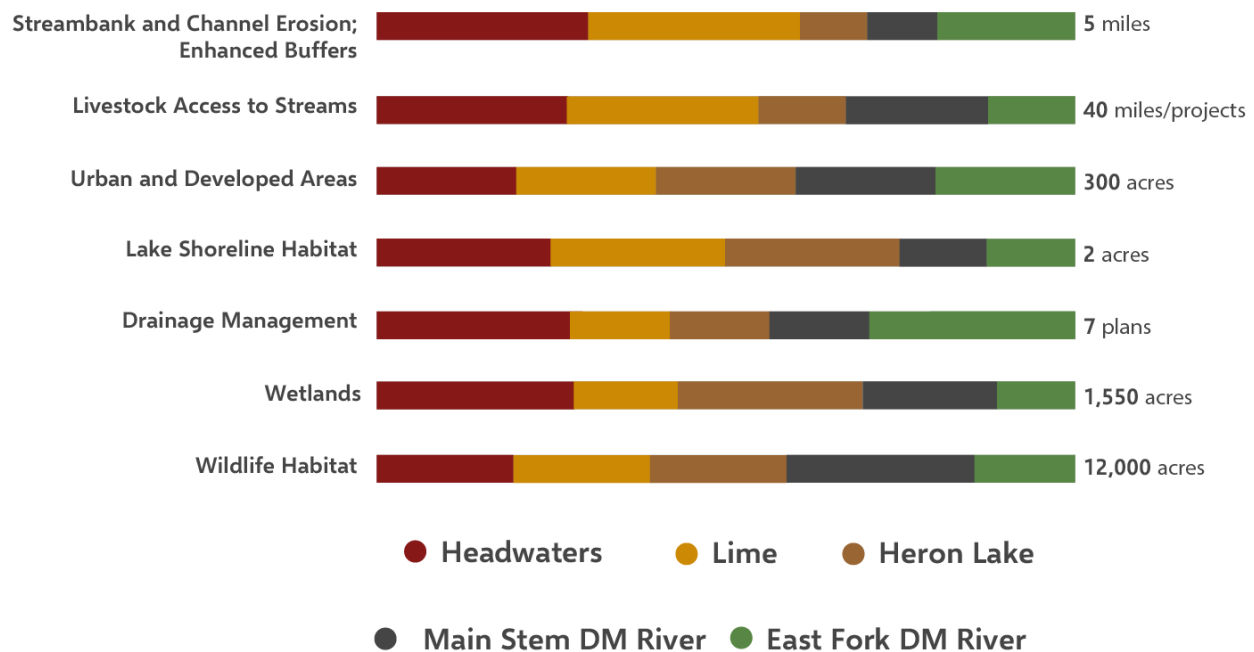
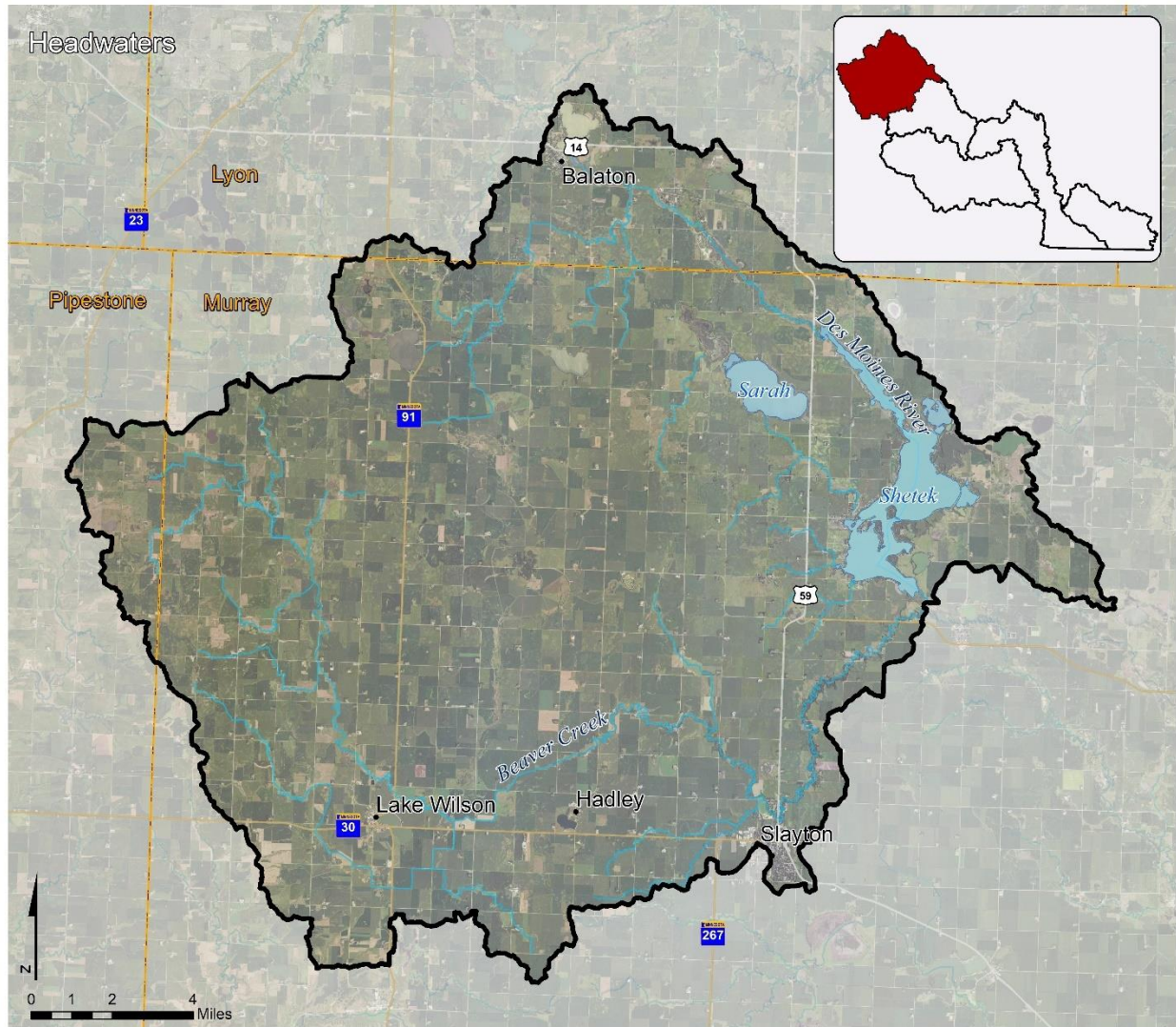


Figure 5.6. Watershed Priority A and B measurable goals with planning region milestones






Headwaters Planning Region

The Headwaters Planning Region is the most upland area of the Des Moines River Watershed, encompassing 20% of the plan area (196,200 acres). The planning region is characterized by its relative abundance of lakes, including two high value recreational lakes in the watershed: Lake Sarah and Lake Shetek. This planning region is a higher elevation than the others, so water falling on this area of the watershed is commonly routed downstream to lower elevation planning regions.



Planning Region Summary

-  Cities: Balaton, Lake Wilson, Hadley, Slayton
-  Unique Resources: Lake Sarah, Lake Shetek, Des Moines River
-  Counties: Lyon, Murray, Pipestone



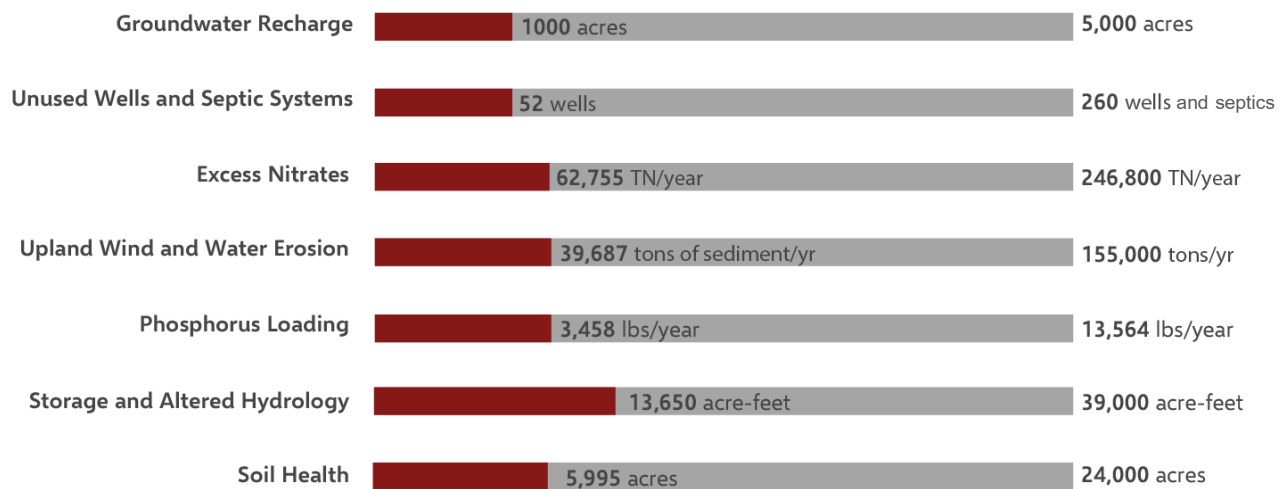
Headwaters Planning Region: Goals and Milestones

Below is a summary of the Priority A and Priority B ten-year measurable goals for the Des Moines River Watershed. Each goal has a planning region milestone that the Headwaters Planning Region will aim to meet to make progress toward the watershed-wide goal. Planning region milestones are shown in red. For issues that are more prominent in the Headwaters Planning Region, the red bar will move further toward the watershed wide goal mark (end of the grey bar).

The Action Table on the following page shows the actions that will be taken to accomplish these milestones.

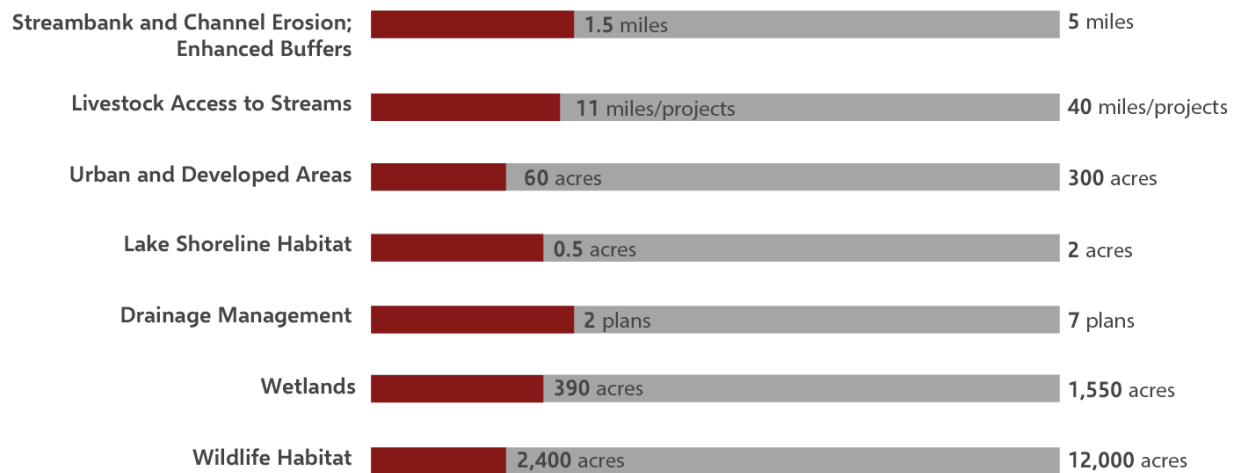
● Headwaters Planning Region

Priority A Goals



● Headwaters Planning Region

Priority B Goals





Headwaters Planning Region: Projects and Practices

The table below summarizes actions for implementing new structural and nonstructural practices. These actions will be funded by the Projects and Practices Implementation Program, described more in Section 6. Implementation Programs. Practices will be targeted to focus area subwatersheds and resources, shown by maps on the following page. Outputs and costs show what will be accomplished with Level 2 (Current Funding + WBIF) funding, and what will be pursued under Level 3 (Partner and Other Funding).

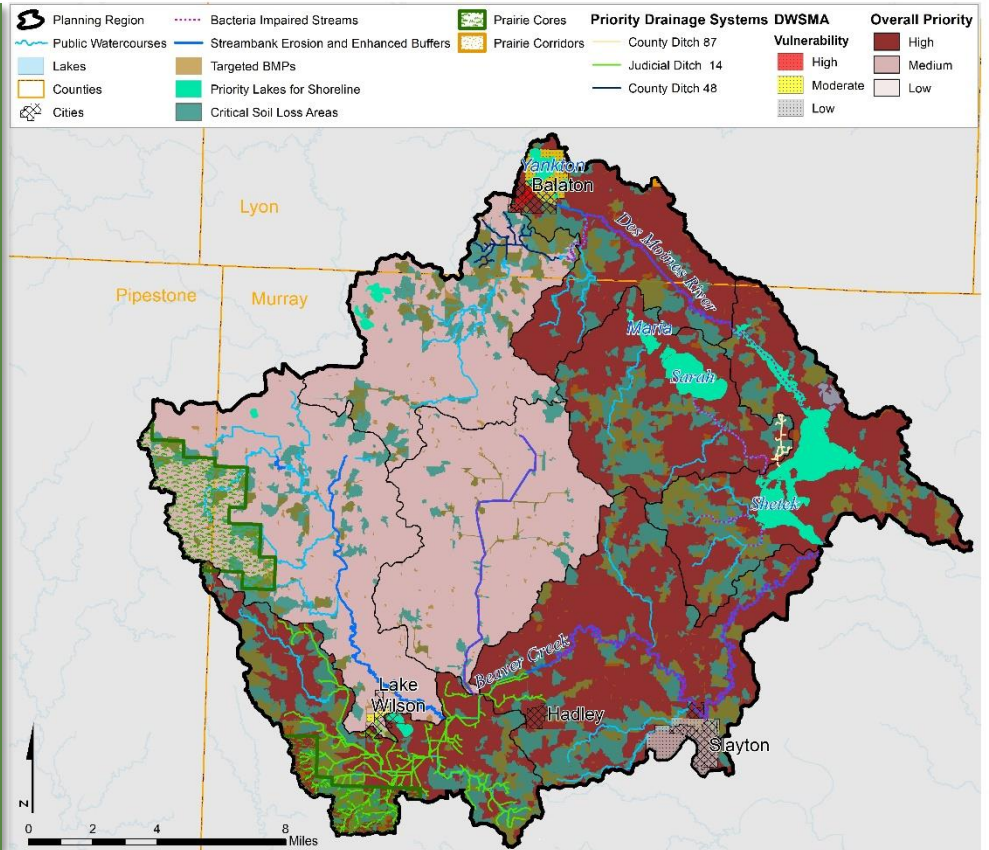
Action Description	Focus Area	Output	Measurable Goals														Implementation Lead and Partners	Timeline					Level 2 10-Year Cost	
			Priority A							Priority B								2023-2024	2025-2026	2027-2028	2029-2030	2031-2032		
			GW Recharge	Wells / Septics	Nitrates	Upland Erosion	Phosphorus	Storage / Altered Hydrology	Soil Health	Channel Erosion and Buffers	Livestock Access to Stream	Urban and Developed Areas	Lake Shoreline	Drainage Mgmt.	Wetlands	Wildlife Habitat								
H-1. Structural Conservation Practices and Multipurpose Drainage Management (Farm pond/wetlands, drainage water management, WASCOBs, large wetlands, riparian buffers, filtration strips, saturated buffers, denitrifying bioreactors, grassed waterways, grade stabilization)	Targeted BMPs; Overall Priority: High	14,822 tons sediment / yr 2,064 lbs TP / year 35,872 lbs TN / year 1,113 acre-feet storage	o		•	•	•	•	o	o									•	•	•	•	•	\$1,797,800
H-2. Nonstructural Soil Management Practices (Cover crops, nutrient management, perennial cover, field residue management, alternative cropping, kernza)	Critical Source Areas; Overall Priority: High	5,995 acres treated 24,865 tons sediment / yr 1,394 lbs TP / year 26,883 lbs TN/ year	•		•	•	•	•	•										•	•	•	•	•	\$899,200
H-3. Provide cost share to well owners for sealing of unsealed, abandoned wells	Watershed-Wide	52 wells sealed	o	•	o	o	o												•	•	•	•	•	\$52,000
H-4. Fix/address non-compliant septic systems	Watershed-Wide	52 septic systems addressed	o	•															•	•	•	•	•	Level 3 – Partner Funding
H-5. Buffer and streambed enhancements with consideration for fish barriers	Priority reaches for Streambank Erosion and Enhanced Buffers	1.5 miles of stream channel enhanced				o	o			•											•	•	•	\$7,500
H-6. Bacteria management practices (e.g. cattle fencing, rotational grazing, improved crossings, alternative watering)	Bacteria impaired streams	11 miles of projects				o					•				o					•	•	•	•	\$82,500
H-7. Urban best management practices (e.g. vegetative swales, storage practices for storm water, sediment removal practices and sediment basins, rain gardens, urban forestry, and ground cover improvement)	Municipal boundaries	60 acres treated	o		o	o	o	o											•		•	•	•	\$90,000
H-8. Shoreline restoration and enhancements (e.g. native vegetation planting, buffers, riprap, buckthorn removal)	Priority Lakes for Shoreline	0.5 acres of shoreline protected				o				o					•					•	•	•	•	\$2,500
H-9. Restore wetlands	Freshwater Emergent Wetlands	390 acres restored				o		o		o									•	•	•	•	•	Level 3 - Partner Funding
H-10. Re-enroll private lands in temporary set-aside programs or land rental with local incentives (e.g. CRP)	Prairie Plan	2,400 acres re-enrolled	o							o										•	•	•	•	\$72,000
H-11. Obtain perpetual easements and protected areas (e.g. RIM, CREP, land acquisitions)	Prairie Plan	360 acres in permanent protection	o				o			o										•	•	•	•	Level 3 - Partner Funding
Key: • = Action tracked for goal; o = Indirect benefit														Level 2 Planning Region Total					\$3,003,500					



Headwaters Planning Region: Targeting and Tracking

Targeting Focus Areas

Shown on the map are the specific field-scale structural targeted BMPs (shown in brown) and comprehensive rank, or Overall Priority, of each subwatershed (highest priority shown in red). Also shown are the resources prioritized in Section 4- Measurable Goals. Targeting actions to these locations will make the most progress towards plan measurable goals.



Estimated Benefits per Practice



Planning partners recognize that implementing conservation practices is voluntary. To allow for flexibility during implementation, average benefits for the targeted structural conservation practices within this region are provided here, as estimated by PTMApp at the edge of the field. See Appendix F for PTMApp theory and literature values used to arrive at practice benefits.

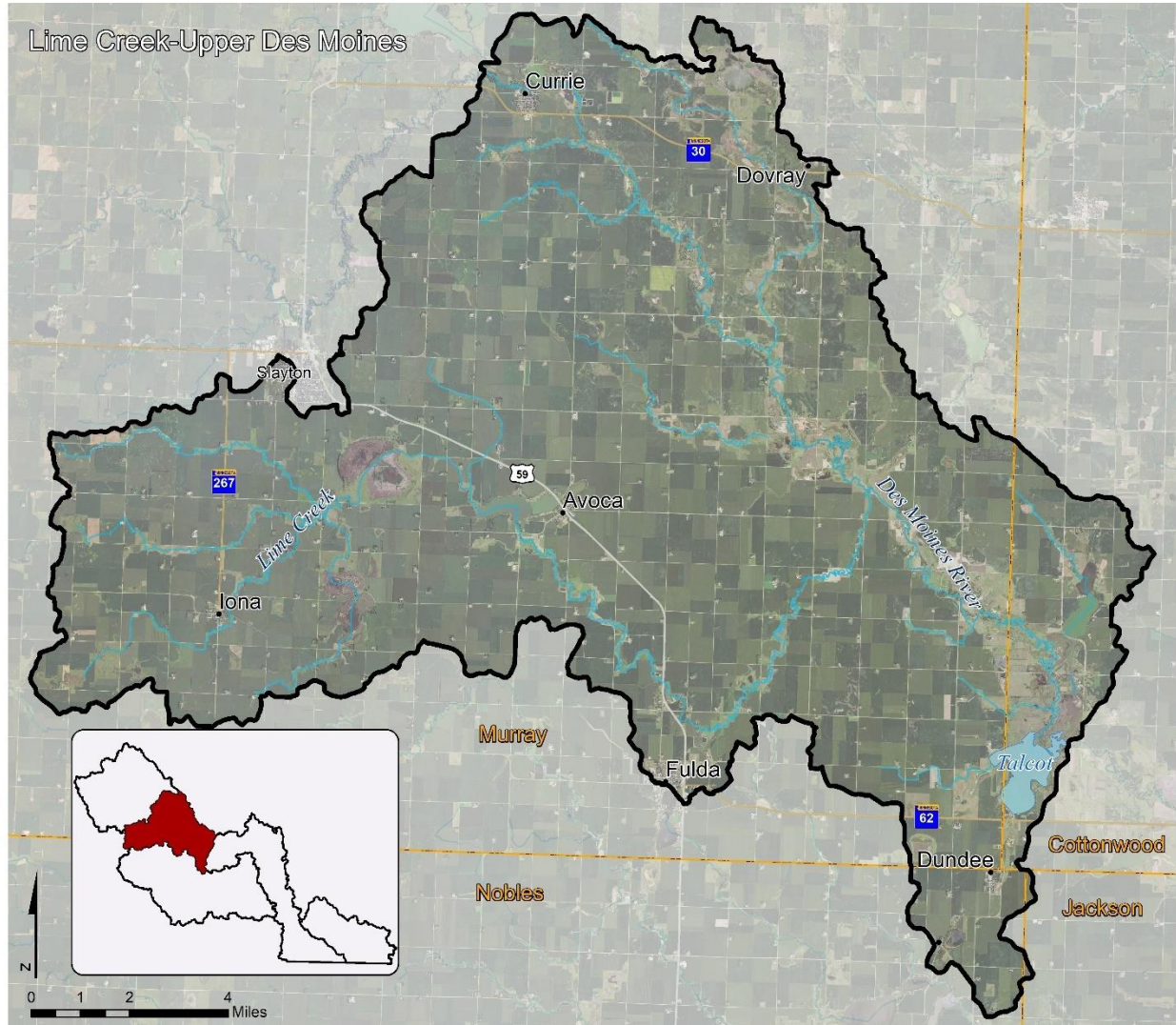
Practice Type	Average Load Reduction		
	Sediment (lbs/yr)	Total Phos. (lbs/yr)	Total Nitrogen (lbs/yr)
Farm ponds/ wetlands	37.1	7.6	143.9
Drainage water management	14.5	2.6	44.7
WASCOBs	108.4	9.0	130.6
Large wetlands	145.8	10.5	321.5
Riparian buffer	8.8	2.3	42.8
Filtration strips	3.9	0.6	12.3
Saturated Buffers	12.0	1.2	28.3
Grade Stabilization	8.1	0.5	9.4
Grassed waterway	11.2	0.6	11.2





Lime Creek- Upper Des Moines Planning Region

The Lime Creek-Upper Des Moines River Planning Region encompasses 14% of the watershed planning area, or 135,600 acres. The planning region retains some of the characteristics of the Headwaters area in geology and soils but lacks the prevalence of lakes. Red Rock Rural Water Lindstrom wellfield is highly vulnerable to contamination and directly connected to the surface water resources.



Planning Region Summary



Cities: Currie, Dovray, Avoca, Iona, Fulda, Dundee, Kinbrae



Unique Resources: Des Moines River, Lime Creek, Lake Talcot



Counties: Murray, Cottonwood, Nobles, Jackson



Introduction



Land and Water Resources Narrative



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Implementation Programs



Plan Administration and Coordination



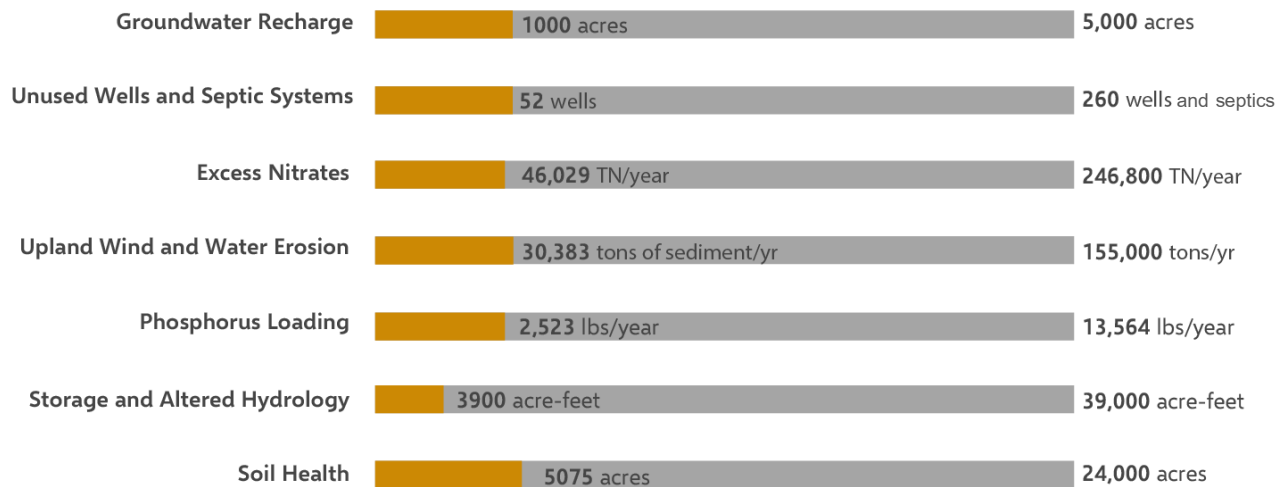
Lime Creek-Upper Des Moines: Goals and Milestones

Below is a summary of the Priority A and Priority B ten-year measurable goals for the Des Moines River Watershed. Each goal has a planning region milestone that the Lime Creek- Upper Des Moines Planning Region will aim to meet to make progress toward the watershed-wide goal. Planning region milestones are shown in orange. For issues that are more prominent in the Lime Creek – Upper Des Moines Planning Region, the orange bar will move further toward the watershed wide goal mark (end of the grey bar).

The Action Table on the following page shows the actions that will be taken to accomplish these milestones.

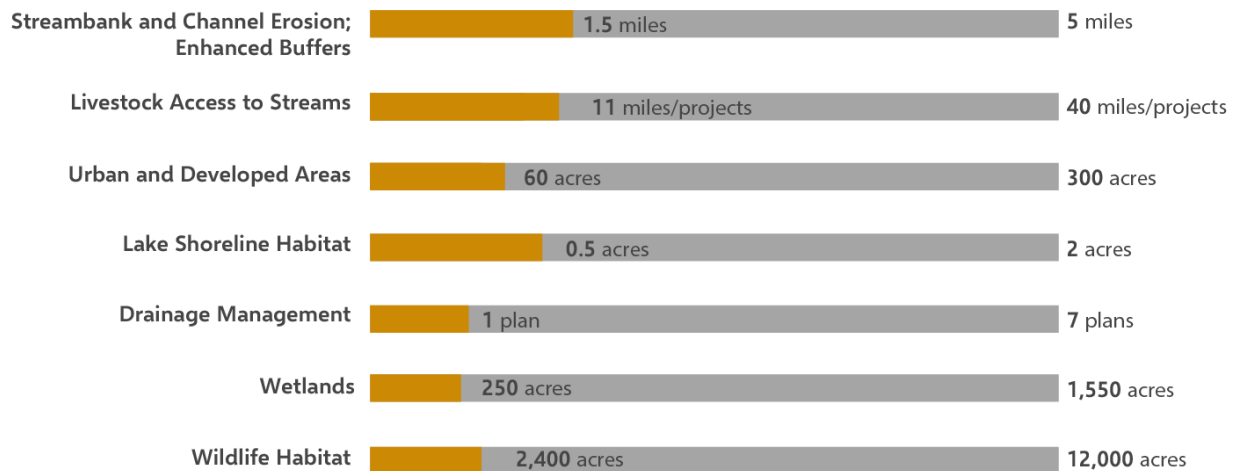
● Lime Planning Region

Priority A Goals



● Lime Planning Region

Priority B Goals





Lime Creek-Upper Des Moines Planning Region: Projects and Practices

The table below summarizes actions for implementing new structural and nonstructural practices. These actions will be funded by the Projects and Practices Implementation Program, described more in Section 6. Implementation Programs. Practices will be targeted to focus area subwatersheds and resources, shown by the map on the following page. Outputs and costs show what will be accomplished with Level 2 (Current Funding + WBIF) funding, and what will be pursued under Level 3 (Partner Funding).

Action	Focus Area	Output	Measurable Goals														Implementation Lead and Partners	Timeline					Level 2 10-Year Cost	
			Priority A							Priority B								2023-2024	2025-2026	2027-2028	2029-2030	2031-2032		
			GW Recharge	Wells / Septics	Nitrates	Upland Erosion	Phosphorus	Storage /	Soil Health	Channel Erosion and Buffers	Livestock Access to Stream	Urban /Developed Areas	Lake Shoreline Habitat	Drainage Mgmt	Wetlands	Wildlife Habitat								
LC-1. Structural Agricultural Conservation Practices and Multipurpose Drainage Management (Farm pond/wetlands, drainage water management, WASCOBs, large wetlands, riparian buffers, filtration strips, saturated buffers, denitrifying bioreactors, grassed waterways, grade stabilization)	Targeted BMPs; Overall Priority: High	9,996 tons sediment / year 1,385 lbs TP / year 24,144 lbs TN / year 873 acre-feet storage	o		•	•	•	•	o	o									•	•	•	•	•	\$1,462,900
LC-2. Nonstructural Soil Management Practices (Cover crops, nutrient management, perennial cover, field residue management, alternative cropping, kernza)	Critical Source Areas; Overall Priority: High	5,075 acres treated 20,387 tons sediment / yr 1,139 lbs TP / year 21,885 lbs TN / year	•		•	•	•	•	•										•	•	•	•	•	\$761,400
LC-3. Provide cost share to well owners for sealing of unsealed, abandoned wells	Watershed-Wide	52 wells sealed	o	•	o	o	o												•	•	•	•	•	\$52,000
LC-4. Fix/address non-compliant septic systems	Watershed-Wide	52 septic systems	o	•															•	•	•	•	•	Level 3- Partner Funding
LC-5. Buffer and streambed enhancements with consideration for fish barriers	Streambank Erosion and Enhanced Buffers	1.5 miles of stream channel enhanced				o	o			•											•	•	•	\$7,500
LC-6. Bacteria management practices (e.g. cattle fencing, rotational grazing, improved crossings, alternative watering)	Bacteria impaired streams	11 miles of projects										•									•		•	\$82,500
LC-7. Urban best management practices (e.g. vegetative swales, storage practices for storm water, sediment removal practices and sediment basins, rain gardens, urban forestry, and ground cover improvement)	Municipal boundaries	60 acres treated	o		o	o	o	o														•	•	\$90,000
LC-8. Shoreline restoration and enhancements (e.g. native vegetation planting, buffers, riprap, buckthorn removal)	Priority Lakes for Shoreline	0.5 acres of shoreline protected				o				o												•	•	\$2,500
LC-9. Restore wetlands	Freshwater Emergent Wetlands	250 acres restored				o		o		o											•	•	•	Level 3- Partner Funding
LC-10. Re-enroll private lands in temporary easements or land rental with local incentives	Prairie Plan	2,400 acres re-enrolled	o							o											•	•	•	\$72,000
LC-11. Obtain perpetual easements and protected areas (e.g. RIM, CREP, land acquisitions)	Prairie Plan	360 acres in permanent protection	o				o			o											•	•	•	Level 3- Partner Funding
Key: • = Action tracked for goal; o = Indirect benefit													Level 2 Planning Region Total					\$2,530,800						

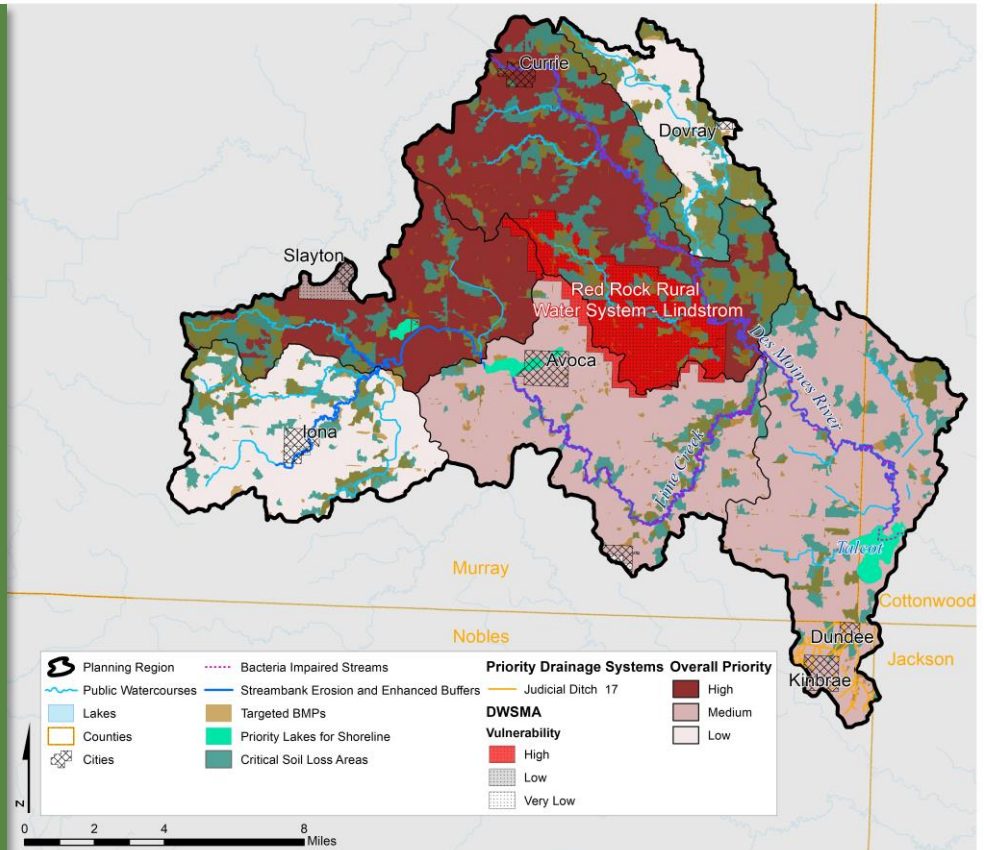


Lime Creek-Upper Des Moines: Targeting and Tracking



Targeting Focus Areas

Shown on the map are the specific field-scale structural targeted BMPs (shown in brown) and comprehensive rank, or Overall Priority, of each subwatershed (highest priority shown in red). Also shown are the resources prioritized in Section 4- Measurable Goals. Targeting actions to these locations will make the most progress towards plan measurable goals.



Estimated Benefits per Practice



Planning partners recognize that implementing conservation practices is voluntary. To allow for flexibility during implementation, average benefits for the targeted structural conservation practices within this region are provided here, as estimated by PTMApp at the edge of the field. See Appendix F for PTMApp theory and literature values used to arrive at practice benefits.

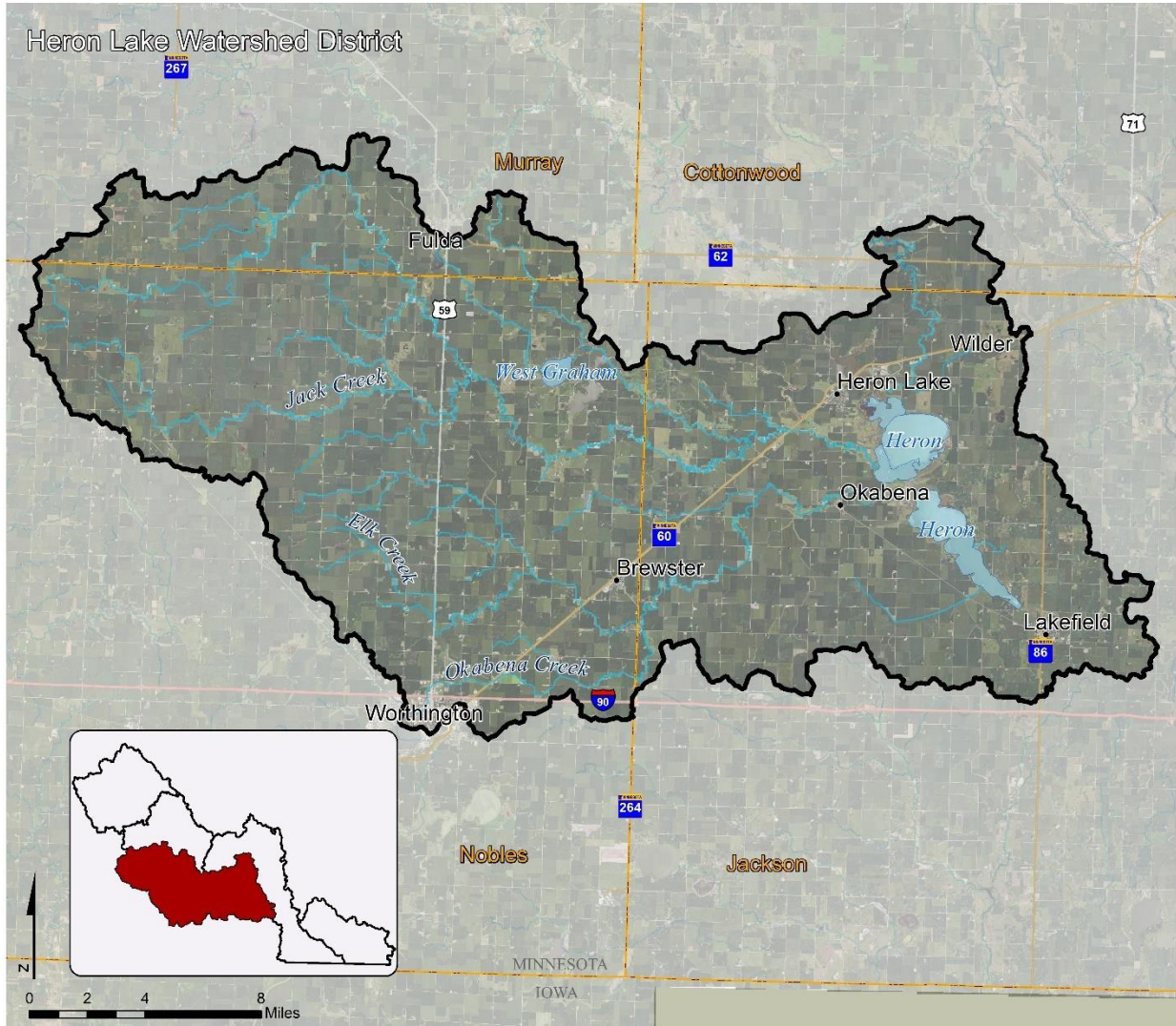
Practice Type	Average Load Reduction		
	Sediment (lbs/yr)	Total Phos. (lbs/yr)	Total Nitrogen (lbs/yr)
Farm ponds/ wetlands	29.1	4.3	90.3
Drainage water management	10.1	2.2	37.3
WASCOBs	104.5	8.5	122.2
Large wetlands	36.3	2.8	82.4
Riparian buffer	6.0	1.5	29.1
Filtration strips	3.3	0.5	10.4
Saturated Buffers	9.2	1.0	25.6
Grade Stabilization	9.2	0.5	9.3
Grassed waterway	12.9	0.6	12.0





Heron Lake Watershed District Planning Region

The Heron Lake Watershed District Planning Region is the largest planning region in the Des Moines River Watershed, encompassing 30% of the plan area, or 298,000 acres. The planning region follows the watershed district's jurisdictional boundary, and includes Heron Lake, West Graham Lake, and other natural features summarized below.



Planning Region Summary



Cities: Fulda, Brewster, Okabena, Heron Lake, Wilder, Lakefield, Worthington



Unique Resources: Elk Creek, Jack Creek, Heron Lake, West Graham Lake



Counties: Murray, Nobles, Jackson, Cottonwood



Introduction



Land and Water Resources Narrative



Priority Issues



Measurable Goals



Targeted Implementation



Implementation Programs



Plan Administration and Coordination



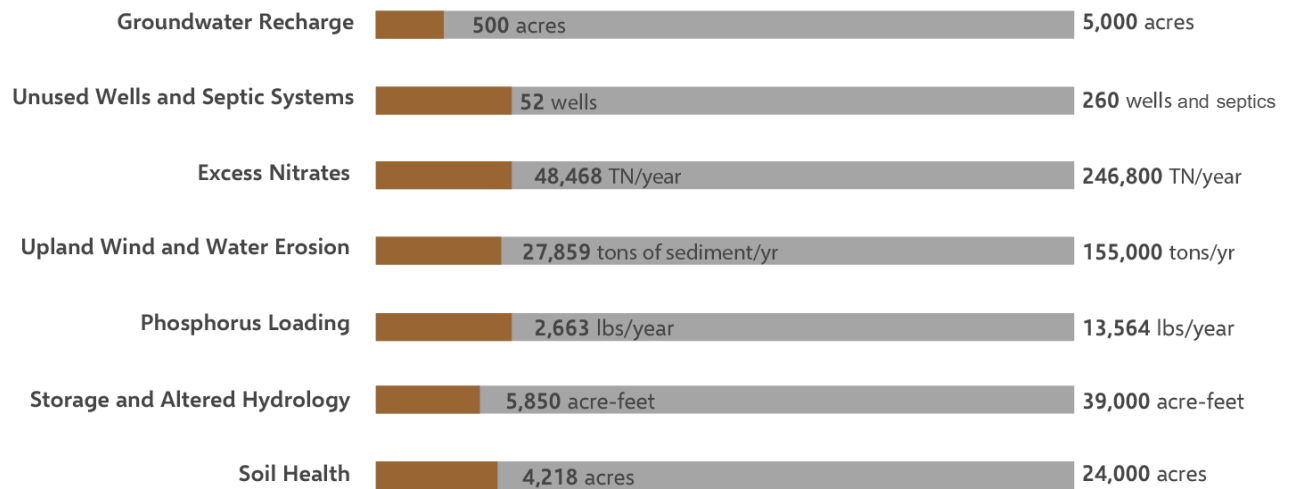
Heron Lake Planning Region: Goals and Milestones

Below is a summary of the Priority A and Priority B ten-year measurable goals for the Des Moines River Watershed. Each goal has a planning region milestone that the Heron Lake Planning Region will aim to meet to make progress toward the watershed-wide goal. Planning region milestones are shown in brown. For issues that are more prominent in the Heron Lake Planning Region, the brown bar will move further toward the watershed wide goal mark (end of the grey bar).

The Action Table on the following page shows the actions that will be taken to accomplish these milestones.

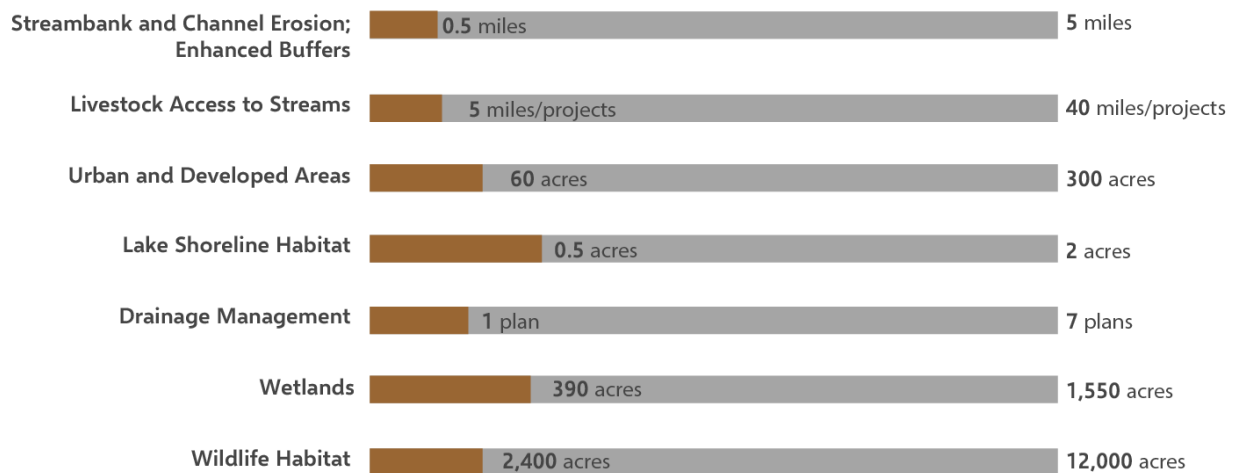
● Heron Lake Planning Region

Priority A Goals



● Heron Lake Planning Region

Priority B Goals



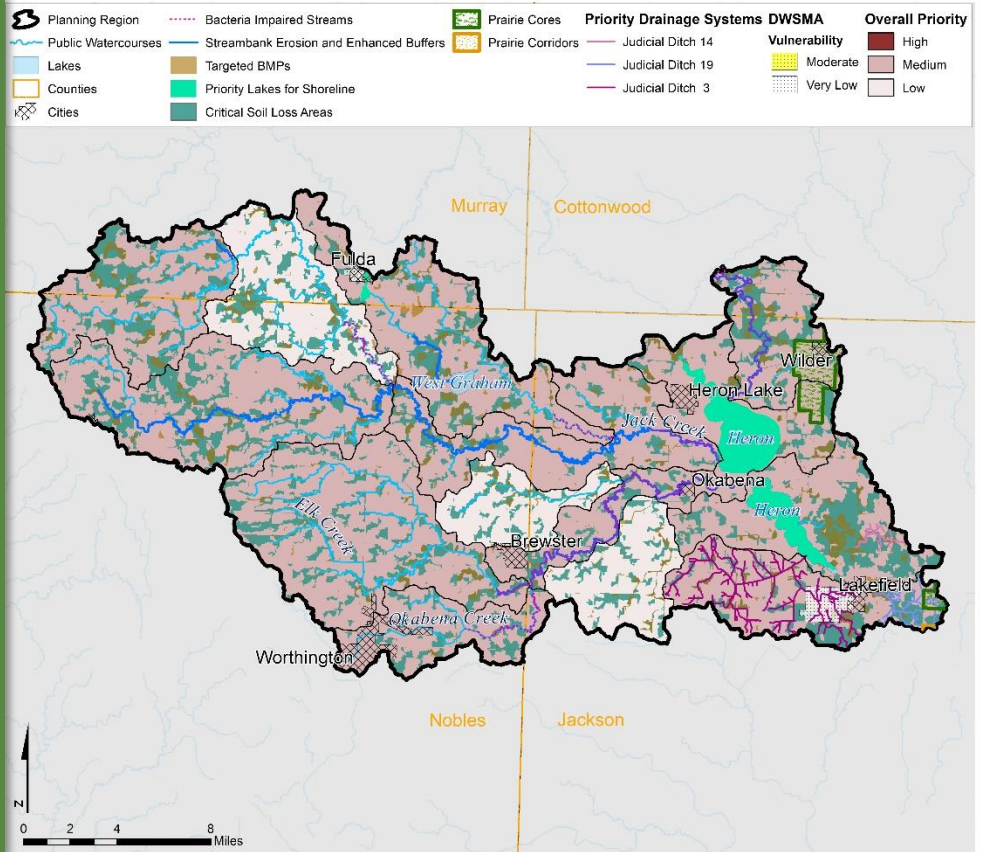


Heron Lake Planning Region: Targeting and Tracking



Targeting Focus Areas

Shown on the map are the specific field-scale structural targeted BMPs (shown in brown) and comprehensive rank, or Overall Priority, of each subwatershed (highest priority shown in red). Also shown are the resources prioritized in Section 4-Measurable Goals. Targeting actions to these locations will make the most progress towards plan measurable goals.



Estimated Benefits per Practice



Planning partners recognize that implementing conservation practices is voluntary. To allow for flexibility during implementation, average benefits for the targeted structural conservation practices within this region are provided here, as estimated by PTMApp at the edge of the field. See Appendix F for PTMApp theory and literature values used to arrive at practice benefits.

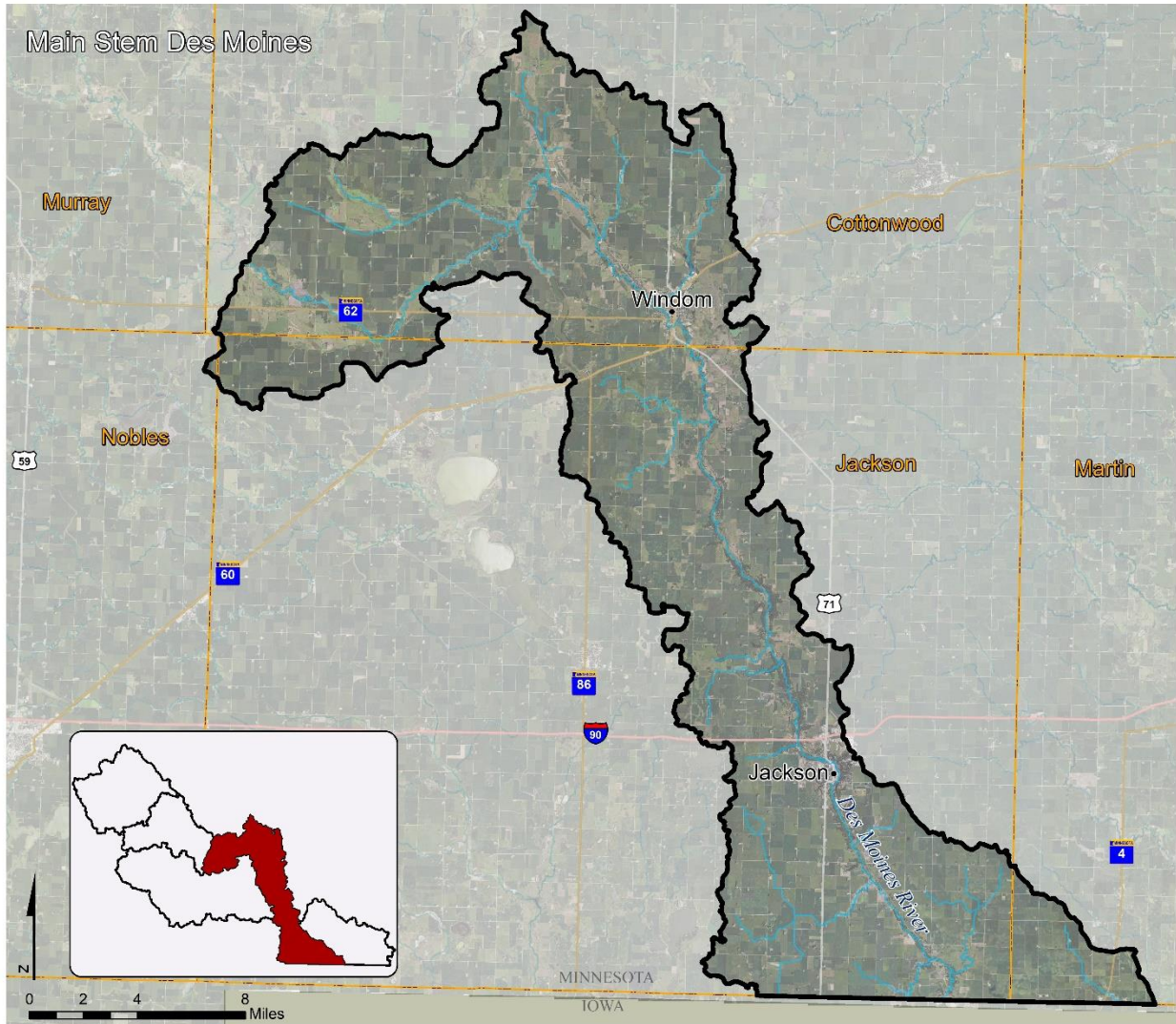
Practice Type	Average Load Reduction		
	Sediment (lbs/yr)	Total Phos. (lbs/yr)	Total Nitrogen (lbs/yr)
Farm ponds/ wetlands	19.4	3.9	82.5
Drainage water management	16.6	3.6	62.7
WASCOBs	69.6	8.4	116.7
Large wetlands	52.0	2.8	143.2
Riparian buffer	14.2	2.7	53.0
Filtration strips	4.3	0.7	14.4
Saturated Buffers	13.6	1.9	45.0
Grade Stabilization	15.5	0.6	10.0
Grassed waterway	13.4	0.6	10.3





Main Stem Des Moines River Planning Region

The Main Stem of the Des Moines River Planning Region encompasses 23% of the plan area, or 222,400 acres. Within this planning region, the Des Moines River flows past Windom and Jackson, the two largest population centers in the Des Moines River Watershed. In addition to the Des Moines River, this planning region contains several calcareous fens and the only trout stream in the watershed (Scheldorf Creek). Windom, Red Rock Rural Water Great Bend, and Red Rock Rural Water Lake Augusta wellfields are also present in this planning region.



Planning Region Summary



Cities: Windom and Jackson



Unique Resources: Des Moines River, calcareous fens, Scheldorf Creek trout stream



Counties: Jackson, Martin, Cottonwood, Nobles



Introduction



Land and Water Resources Narrative



Priority Issues



Measurable Goals



Targeted Implementation



Implementation Programs



Plan Administration and Coordination



Main Stem Des Moines River: Goals and Milestones

Below is a summary of the Priority A and Priority B ten-year measurable goals for the Des Moines River Watershed. Each goal has a planning region milestone that the Main Stem Des Moines River will aim to meet to make progress toward the watershed-wide goal. Planning region milestones are shown in black. For issues that are more prominent in the Main Stem Des Moines River Planning Region, the black bar will move further toward the watershed wide goal mark (end of the grey bar).

The Action Table on the following page shows the actions that will be taken to accomplish these milestones.

● Main Stem DM River Planning Region

Priority A Goals



Priority A

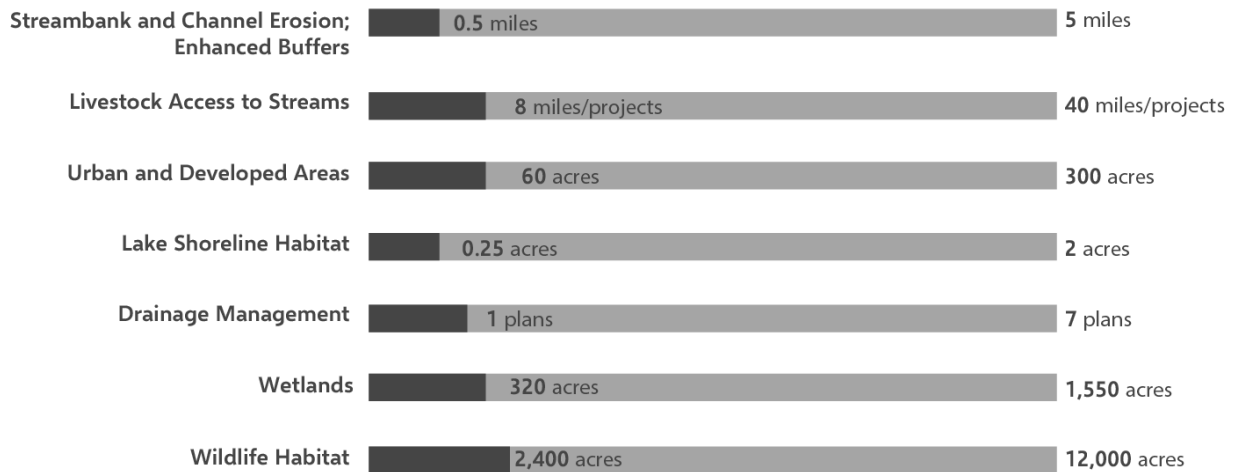


● Main Stem DM River Planning Region

Priority B Goals



Priority B





Main Stem Des Moines River Planning Region: Projects and Practices

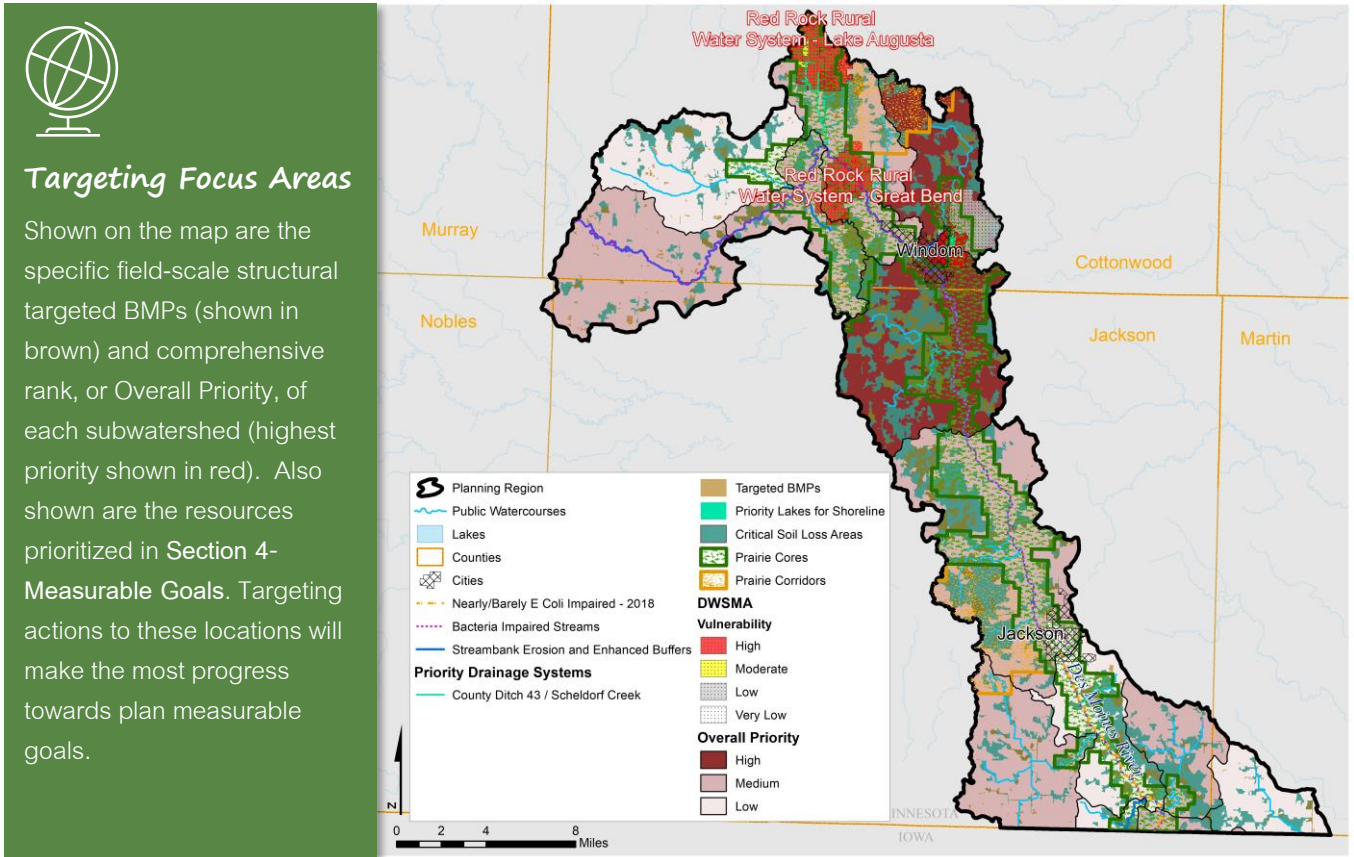
The table below summarizes actions for implementing new structural and nonstructural practices. These actions will be funded by the Projects and Practices Implementation Program, described more in Section 6. Implementation Programs. Practices will be targeted to focus area subwatersheds and resources, shown by the map on the following page. Outputs and costs show what will be accomplished with Level 2 (Current Funding + WBIF) funding, and what will be pursued under Level 3 (Partner Funding).

Action	Focus Area	Output	Measurable Goals													Implementation Lead and Partners	Timeline					Level 2 10-Year Cost							
			Priority A							Priority B							2023-2024	2025-2026	2027-2028	2029-2030	2031-2032								
			GW Recharge	Unused Wells / Septics	Nitrates	Upland Erosion	Phosphorus	Storage / Hydrology	Soil Health	Channel Erosion / Buffers	Livestock Access to Stream	Urban / Developed Areas	Lake Shoreline Habitat	Drainage Mgmt.	Wetlands								Wildlife Habitat						
MS-1. Structural Agricultural Conservation Practices and Multipurpose Drainage Management (Farm pond /wetlands, drainage water management, WASCOBs, large wetlands, riparian buffers, filtration strips, saturated buffers, denitrifying bioreactors, grassed waterways, grade stabilization)	Targeted BMPs; Overall Priority: High	13,639 tons sediment / year 1,734 lbs TP / year 30,706 lbs TN / year 840 acre-feet storage	o	o	●	●	●	●	o	o							o						●	●	●	●	●	\$1,248,900	
MS-2. Nonstructural Soil Management Practices (Cover crops, nutrient management, perennial cover, field residue management, alternative cropping, kernza)	Critical Source Areas; Overall Priority: High	4,396 acres treated 20,767 tons sediment / yr 1,014 lbs TP / year 19,357 lbs TN / year	●		●	●	●	●	●															●	●	●	●	●	\$659,500
MS-3. Provide cost share to well owners for sealing of unsealed, abandoned wells	Watershed-Wide	52 wells sealed	o	●	o	o	o																●	●	●	●	●	\$52,000	
MS-4. Fix/address non-compliant septic systems	Watershed-Wide	52 septic systems addressed	o	●																			●	●	●	●	●	Level 3 - Partner Funding	
MS-5. Buffer and streambed enhancements with consideration for fish barriers	Priority reaches for Streambank Erosion and Enhanced Buffers	0.5 miles of stream channel enhanced					o	o			●													●	●	●	●	\$2,500	
MS-6. Bacteria management practices (e.g. cattle fencing, rotational grazing, improved crossings, alternative watering)	Bacteria impaired streams	8 miles of projects					o				●						●		o						●	●	●	\$60,000	
MS-7. Urban best management practices (e.g. vegetative swales, storage practices for storm water, sediment removal practices and sediment basins, rain gardens, urban forestry, and ground cover improvement)	Municipal boundaries	60 acres treated	o		o	o	o	o									●								●	●	●	\$90,000	
MS-8. Shoreline restoration and enhancements (e.g. native vegetation planting, buffers, riprap, buckthorn removal)	Priority Lakes for Shoreline	0.25 acres of shoreline protected					o				o								●						●	●	●	\$1,300	
MS-9. Restore wetlands	Freshwater Emergent Wetlands	320 acres restored					o		o		o								●		o			●	●	●	●	●	Level 3 - Partner Funding
MS-10. Re-enroll private lands in temporary easements or land rental with local incentives	Prairie Plan	3,000 acres re-enrolled	o								o													●	●	●	●	●	\$90,000
MS-11. Obtain perpetual easements and protected areas (e.g. RIM, CREP, land acquisitions)	Prairie Plan	660 acres in permanent protection	o				o				o													●	●	●	●	●	Level 3 - Partner Funding
													Level 2 Planning Region Total					\$2,204,200											

Key: ● = Action tracked for goal; o = Indirect benefit



Main Stem Des Moines: Targeting and Tracking



Estimated Benefits per Practice



Planning partners recognize that implementing conservation practices is voluntary. To allow for flexibility during implementation, average benefits for the targeted structural conservation practices within this region are provided here, as estimated by PTMApp at the edge of the field. See Appendix F for PTMApp theory and literature values used to arrive at practice benefits.

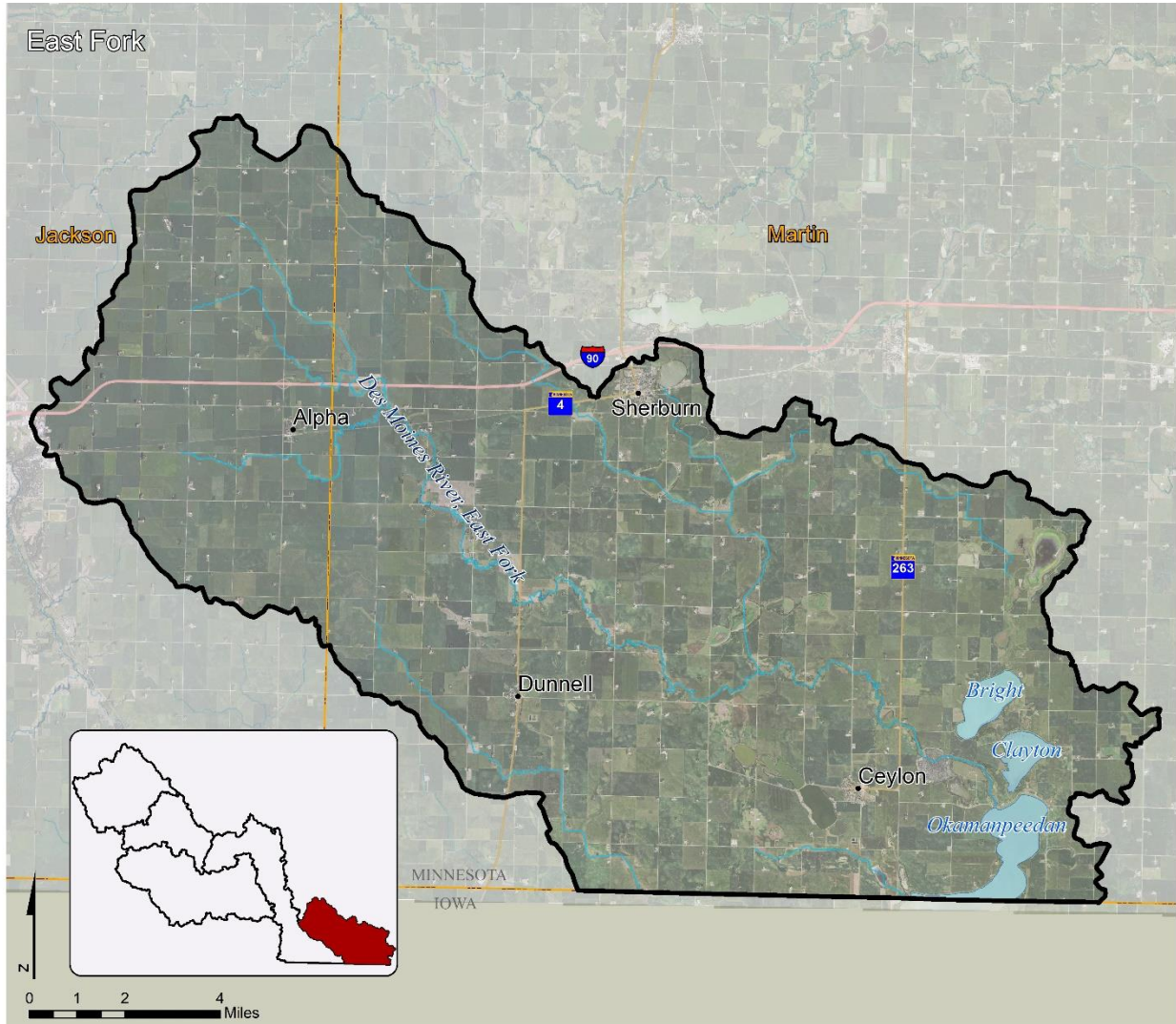
Practice Type	Average Load Reduction		
	Sediment (lbs/yr)	Total Phos. (lbs/yr)	Total Nitrogen (lbs/yr)
Farm ponds/ wetlands	43.1	5.6	115.4
Drainage water management	18.1	3.2	55.1
WASCOBs	134.0	9.5	136.7
Large wetlands	20.8	1.8	49.5
Riparian buffer	15.6	3.4	65.7
Filtration strips	3.8	0.6	11.8
Saturated Buffers	10.1	0.9	16.4
Grade Stabilization	15.0	0.6	11.0
Grassed waterway	16.9	0.7	13.1





East Fork Des Moines River Planning Region

The East Fork of the Des Moines River Planning Region is its own unique watershed. It is the smallest planning region in the Des Moines River Watershed, encompassing 127,500 acres, or 13% of the watershed. This planning region also includes notable resources such as Bright, Clayton, and Okamanpeedan Lake.



Planning Region Summary



Cities: Alpha, Sherburn, Dunnell, Ceylon



Unique Resources: East Fork of the Des Moines River, Okamanpeedan Lake, Clayton Lake, Bright Lake



Counties: Jackson, Martin



Introduction



Land and Water Resources Narrative



Priority Issues



Measurable Goals



Targeted Implementation



Implementation Programs



Plan Administration and Coordination



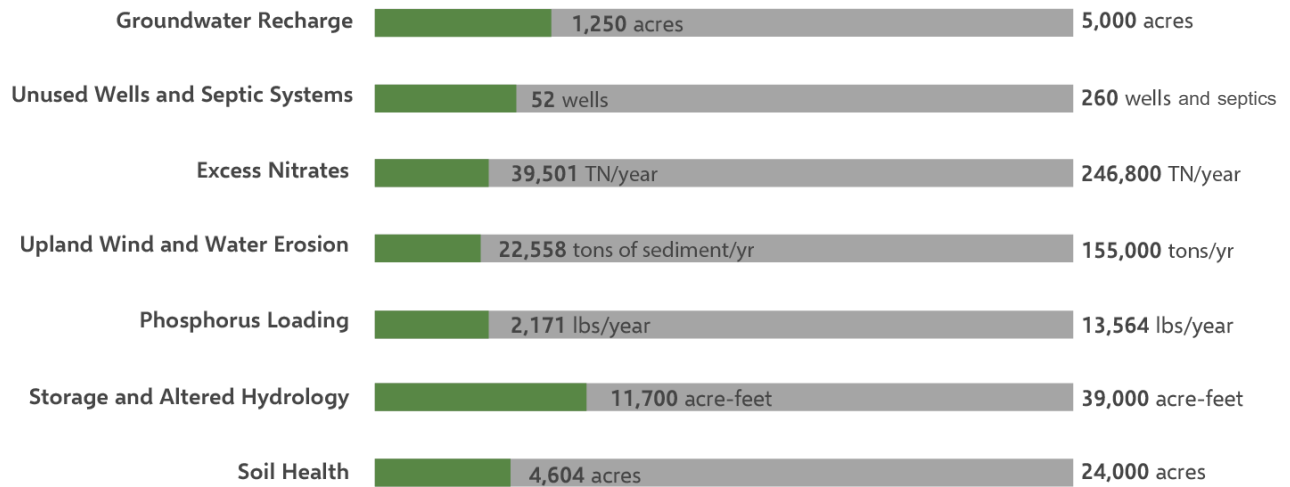
East Fork Des Moines River: Goals and Milestones

Below is a summary of the Priority A and Priority B ten-year measurable goals for the Des Moines River Watershed. Each goal has a planning region milestone that the East Fork Des Moines River Planning Region will aim to meet to make progress toward the watershed-wide goal. Planning region milestone targets are shown in green. For issues that are more prominent in the East Fork Des Moines River Planning Region, the green bar will move further toward the watershed wide goal mark (end of the grey bar).

The Action Table on the following page shows the actions that will be taken to accomplish these milestones.

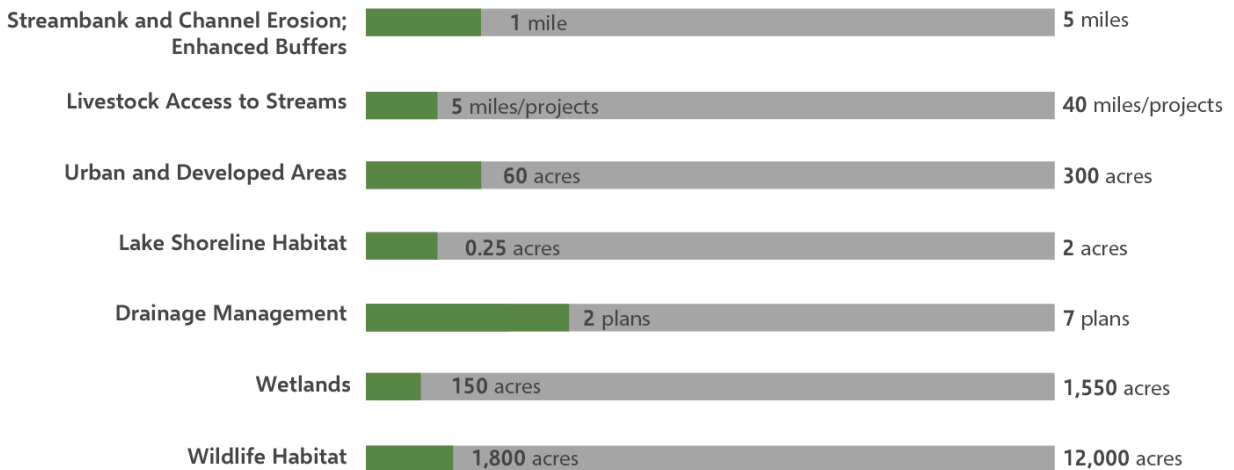
● East Fork DM River Planning Region

Priority A Goals



● East Fork DM River Planning Region

Priority B Goals





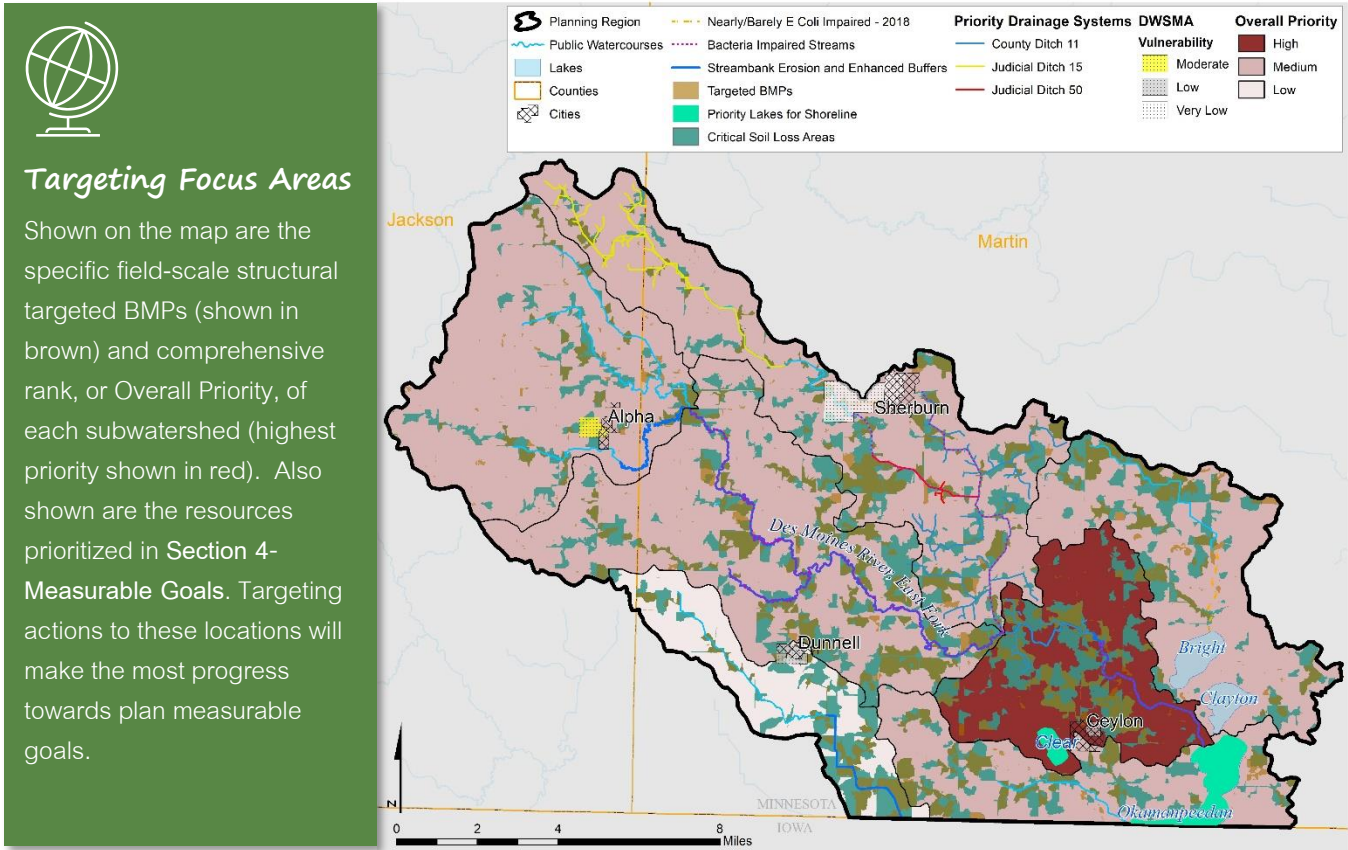
East Fork Des Moines River Planning Region: Projects and Practices

The table below summarizes actions for implementing new structural and nonstructural practices. These actions will be funded by the Projects and Practices Implementation Program, described more in Section 6. Implementation Programs. Practices will be targeted to focus area subwatersheds and resources, shown by the map on the following page. Outputs and costs show what will be accomplished with Level 2 (Current Funding + WBIF) funding, and what will be pursued under Level 3 (Partner Funding).

Action	Focus Area	Output	Measurable Goals														Implementation Lead and Partners	Timeline					Level 2 10-Year Cost	
			Priority A							Priority B								2023-2024	2025-2026	2027-2028	2029-2030	2031-2032		
			GW Recharge	Unused Wells and	Nitrates	Upland Erosion	Phosphorus	Storage / Altered	Soil Health	Channel Erosion / Buffers	Livestock Access to Stream	Urban / Developed	Lake Shoreline Hab.	Drainage Mgmt.	Wetlands	Wildlife Habitat								
EF-1. Structural Agricultural Conservation Practices and Multipurpose Drainage Management (Farm pond/wetlands, drainage water management, WASCObS, large wetlands, riparian buffers, filtration strips, saturated buffers, denitrifying bioreactors, grassed waterways, grade stabilization)	Targeted BMPs; Overall Priority: High	7,042 tons sediment / year 1,123 lbs TP / year 19,357 lbs TN / year 516 acre-feet storage	o		•	•	•	•	o	o					o	o	o	SWCD, NRCS, BWSR, MDA	•	•	•	•	•	\$1,398,100
EF-2. Nonstructural Soil Management Practices (Cover crops, nutrient management, perennial cover, field residue management, alternative cropping, kernza)	Critical Source Areas; Overall Priority: High	4,604 acres treated 15,516 tons sediment / yr 1,048 lbs TP / year 20,144 lbs TN / year	•		•	•	•	•	•								o	SWCD, NRCS, BWSR, MDA	•	•	•	•	•	\$690,600
EF-3. Provide cost share to well owners for sealing of unsealed, abandoned wells	Watershed-Wide	52 wells sealed	o	•	o	o	o	o										Counties, SWCD, Cities, MDH, BWSR	•	•	•	•	•	\$52,000
EF-4. Fix/address non-compliant septic systems	Watershed-Wide	52 septic systems addressed	o	•														Counties, MPCA, BWSR	•	•	•	•	•	Level 3 - Partner Funding
EF-5. Buffer and streambed enhancements with consideration for fish barriers	Priority reaches for Streambank Erosion and Enhanced Buffers	1 mile of stream channel enhanced				o	o			•								SWCD, NRCS, BWSR, MDA			•	•	•	\$5,000
EF-6. Bacteria management practices (e.g. cattle fencing, rotational grazing, improved crossings, alternative watering)	Bacteria impaired streams	5 miles of projects				o					•		o					SWCD, NRCS, BWSR, MDA, MPCA		•		•		\$37,500
EF-7. Urban best management practices (e.g. vegetative swales, storage practices for storm water, sediment removal practices and sediment basins, rain gardens, urban forestry, and ground cover improvement)	Municipal boundaries	60 acres treated	o		o	o	o	o								•		SWCD, Cities, NRCS, BWSR		•		•		\$90,000
EF-8. Shoreline restoration and enhancements (e.g. native vegetation planting, buffers, riprap, buckthorn removal)	Priority Lakes for Shoreline	0.25 acres of shoreline protected				o				o					•		o	SWCD, NRCS, BWSR, FWS				•	•	\$1,300
EF-9. Restore wetlands	Freshwater Emergent Wetlands	150 acres restored				o		o		o					•		o	SWCD, NRCS, BWSR, DNR	•	•	•	•	•	Level 3 - Partner Funding
EF-10. Re-enroll private lands in temporary easements or land rental with local incentives	Prairie Plan	1,800 acres re-enrolled	o							o							•	SWCD, NRCS, BWSR, DNR	•	•	•	•	•	\$54,000
EF-11. Obtain perpetual easements and protected areas (e.g. RIM, CREP, land acquisitions)	Prairie Plan	200 acres in permanent protection	o				o			o							•	SWCD, NRCS, BWSR, DNR, FWS	•	•	•	•	•	Level 3 - Partner Funding
Key: • = Action tracked for goal; o = Indirect benefit														Level 2 Planning Region Total					\$2,328,500					



East Fork Des Moines River: Targeting and Tracking



Targeting Focus Areas

Shown on the map are the specific field-scale structural targeted BMPs (shown in brown) and comprehensive rank, or Overall Priority, of each subwatershed (highest priority shown in red). Also shown are the resources prioritized in Section 4- Measurable Goals. Targeting actions to these locations will make the most progress towards plan measurable goals.

Estimated Benefits per Practice



Planning partners recognize that implementing conservation practices is voluntary. To allow for flexibility during implementation, average benefits for the targeted structural conservation practices within this region are provided here, as estimated by PTMApp at the edge of the field. See Appendix F for PTMApp theory and literature values used to arrive at practice benefits.





Practice Type	Average Load Reduction		
	Sediment (lbs/yr)	Total Phos. (lbs/yr)	Total Nitrogen (lbs/yr)
Farm ponds/ wetlands	35.7	7.8	165.5
Drainage water management	6.1	1.3	22.7
WASCOBs	62.1	7.8	105.5
Large wetlands	21.8	2.4	64.1
Riparian buffer	12.6	2.6	48.7
Filtration strips	3.8	0.6	11.8
Saturated Buffers	15.7	2.7	74.0
Grade Stabilization	5.8	0.4	6.8
Grassed waterway	9.1	0.7	11.3





Watershed-Wide Summary

Unlike Projects and Practices, actions in the following implementation programs are implemented watershed-wide. This allows for flexibility during implementation, ensures consistency in implementation efforts throughout the plan area. Actions funded by these programs are summarized in tables on the following pages.

 <ul style="list-style-type: none">• Large, one-time projects (over \$250,000) <p>Capital Improvements</p>	 <ul style="list-style-type: none">• Demonstration plots• Well testing clinics <p>Education and Outreach</p>
 <ul style="list-style-type: none">• Water quality monitoring and studies• Closing data gaps <p>Research and Monitoring</p>	 <ul style="list-style-type: none">• WCA• Feedlots <p>Regulatory Administration</p>



Capital Improvement Projects

The Capital Improvement Projects Action Table summarizes the actions pertaining to the construction, repair, retrofit, or increased utility or function of physical facilities, infrastructure, or environmental features. Capital improvements require external funding. They will be implemented through the Capital Improvement Projects Implementation Program, described further in **Section 6. Implementation Programs**. Where eligible, the planning partners intend to use approximately 5% of the WBIF (~\$35,000/year) to support implementation of these projects.

Capital Improvement Project	Description	Lead Entity	Information Source	Years Start /End	Estimated Cost*
Wetland Restoration	CREP Wetland Restoration projects restore hydrology while providing habitat for wildlife and protecting drinking water	Martin SWCD/ BWSR	N/A	2023/2024	\$250,000
Lake Shetek Dikes	CSAH 13 (Valhalla Road) Improvement Project – widening and raising the three dikes, including shoulders, and walking path	Murray Hwy	CSAH 13 Improvements Feasibility Study	2023/2026	\$2,808,828
Lake Sarah Dam	Replace existing concrete dam with rock arch rapids	Murray Parks	Lake Sarah Dam Feasibility Study	2023/2025	\$366,000
Lime Lake Dam	Replace existing concrete dam with rock arch rapids	Murray Parks	Lime Lake Dam Feasibility Study	2022/2024	\$440,000
Lake Shetek Dam	Repair berm along channel and work on dam to allow for water release during times of high water	SALA/ Murray County/Murray SWCD/ DNR	Shetek Area Lake Association (SALA)	2024/2026	\$250,000



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Plan Administration and
Coordination



Research and Assessments

Actions in the Research and Assessments Action Table will be implemented watershed-wide. They will be funded by the Research and Assessments Implementation Program, described in Section 6. Implementation Programs.

Action	Focus Area	Output	Measurable Goals													Implementation Lead and Partners	Timeline					Level 2 10-Year Cost	
			Priority A							Priority B							2023-2024	2025-2026	2027-2028	2029-2030	2031-2032		
			GW Recharge	Unused Wells and Septics	Nitrates	Upland Erosion	Phosphorus	Storage / Altered Hydrology	Soil Health	Channel Erosion and Buffers	Livestock Access to Stream	Urban and Developed Areas	Lake Shoreline Habitat	Drainage Management	Wetlands		Wildlife Habitat						
RA-1. Continue and expand surface water monitoring efforts by jurisdictional area	Watershed-wide	Ongoing			o	o	o	o		o	o			o			Counties, SWCD, HLWD, MPCA, DNR	●	●	●	●	●	\$600,000
RA-2. Coordinate with public water suppliers on implementation of Wellhead Protection Plans	DWSMAs	1 coordination meeting annually, or as needed	o	o	o												Counties, SWCD, HLWD, MDH	●	●	●	●	●	\$10,000
RA-3. Complete multipurpose drainage management planning	Watershed-wide	Plans completed for 5 ditches								o					o	o	Counties, HLWD, SWCD, NRCS, BWSR, MDA, DNR			●			\$60,000
RA-4. Assessment of records for compliant septic systems throughout the watershed	Watershed-wide	1 assessment completed	o	o	o												MPCA, Counties		●				\$40,000
RA-5. Use updated data (e.g. WRAPS/TMDL/stream monitoring) to prioritize best locations to work on water quality improvements	Watershed-wide	1 prioritized project plan completed	o	o	o	o	o	o	o	o	o	o	o	o	o	o	Counties, MPCA, SWCD, NRCS, BWSR, MDA	●	●	●	●	●	\$50,000
RA-6. Inventory unused or unsealed drinking wells throughout the watershed	Watershed-wide	1 inventory completed	o	o	o												Counties, SWCD, MDH			●			\$40,000
RA-7. Update flood maps watershed-wide	Watershed-wide	Floodplain maps	o	o				o					o				Counties	●	●	●	●	●	\$40,000
RA-8. Assess multiple benefits of conservation action on climate change and resiliency	Watershed-wide	1 plan developed	o	o	o	o	o	o	o	o	o	o	o	o	o	o	SWCD, NRCS, BWSR, MDA, MPCA	●	●	●	●	●	\$25,000
RA-9. Use Atlas-14 precipitation values for design of BMPs	Watershed-wide	Project design on a case-by-case basis								o			o				SWCD, NRCS, BWSR, MDA	●	●	●	●	●	\$10,000
RA-10. Continue to track and address gaps in groundwater observation wells	Watershed-wide	1 coordination meeting annually, or as needed	o	o	o				o					o		o	DNR, MDH, Counties, MPCA	●	●	●	●	●	\$10,000
RA-11. Field trials and monitoring of installed BMPs	Watershed-wide	Annual BMP monitoring			o	o	o	o	o	o	o						SWCD, NRCS, BWSR, MDA			●	●	●	\$75,000
RA-12. Develop strategy for pursuing local involvement in ecosystem services and carbon market	Watershed-wide	1 strategy completed			o	o	o		o								SWCD, NRCS, BWSR, MDA			●	●	●	\$60,000
RA-13. Prevent spread of aquatic invasive species	Watershed-wide	1 coordination meeting annually, or as needed									o	o	o			o	Counties, DNR, SWCD, NRCS, BWSR	●	●	●	●	●	\$10,000
Key: ● = Action tracked for goal; o = Indirect benefit													Level 2 Research and Assessments Total					\$1,030,000					




















Implementation Summary

Below are the estimated costs for implementing actions in the plan for Funding Level 2 (Current Funding + WBIF) (Table 5.2). Costs are also included for the operations and maintenance of natural and artificial waterways at or near their current levels, for regulatory actions, and for plan administration and administrative costs related to implementation. This plan assumes local, state, and/or federal fiscal support remains unchanged. Benefits arising from plan implementation are summarized visually below.

Table 5.2: Estimated cost of implementing the Des Moines River CWMP under Funding Level 2 (Current Funding + WBIF).

	Funding Level 2 Current + WBIF	
	Est. Annual Cost	Est. 10-Year Cost
Implementation Programs		
Projects and Practices	\$1,217,700	\$12,176,000
Capital Improvement Projects	\$35,900	\$359,000
Education and Outreach	\$260,900	\$2,609,000
Research and Assessments	\$103,100	\$1,031,000
Regulatory Administration – See Section 6. <i>Implementation Programs for more detail</i>	\$242,800	\$2,428,000
Additional Expenses		
Operations and Maintenance	\$186,600	\$1,866,000
Administration	\$70,000	\$700,000
Total	\$2,117,000	\$21,169,000

Benefits of Implementing the Plan


 5,000 acres recharge practices	 260 sealed wells	 4% nitrogen reduction	 10% sediment reduction	 4% phosphorus reduction
 39,000 acre-feet storage	 24,000 acres soil management	 5 miles stream channels enhanced	 40 miles stream with pasture management	 300 urban acres treated
 2 acres shoreline protected with projects	 7 multipurpose drainage mgmt. plans	 1,550 acres wetland restored	 12,000 acres land re-enrolled in protection	



Section 6. Implementation Programs



Section 6. Implementation Programs



This Plan Section establishes common implementation programs within the Des Moines River Watershed and describes them. Implementation programs are the funding mechanism to implement the Action Tables.

Implementation Programs

This plan establishes five main implementation programs, shown visually in Figure 6.1 with some example activities that each program may fund. These programs are briefly described in the following pages.



Figure 6.1: Implementation programs in the Des Moines River Watershed.



Projects and Practices

The Projects and Practices Program funds actions pertaining to the planning, design, and implementation of conservation practices on the landscape. It also funds or incentivizes the protection of land. The program assists landowners in implementing voluntary actions through cost share, financial assistance, technical assistance, tax exemption, conservation easement, or land acquisition, and is funded by local, state, and federal dollars.

During implementation, local planning partners will create decision-making processes, like a ranking and scoring sheet related to priority issues and priority resources, for identifying what practices get funded. A grant policy document will also be created to specify funding categories and how much funding practices may receive. This will be completed in conjunction with the local Policy Committee. Funding will be preferentially given to projects and practices identified within the Action Table and any subsequent amendments, consistent with the priority issues and goals established in this plan.

Cost Share Programs

The purpose of cost-share programs is to financially assist landowner(s) with the cost of installing a project or practice that accrues natural resource benefits. Projects and practices can be structural (i.e., grassed waterways, controlled drainage) or nonstructural (i.e., nutrient management, conservation tillage).

During and after installation, regular on-site inspections and maintenance will ensure the project’s continued function and success. The detailed records, notes, and photos related to the project should be included with each project’s Operations and Maintenance Plan. BWSR’s recommended inspection plans, according to the Grants Administration Manual (GAM), includes a conservation practice with a minimum effective life of 10 years. With this practice, inspections at the ends of years 1, 3, and 9 after the certified completion are recommended.

Land Protection Programs

Land protection programs serve to maintain existing acres of the watershed enrolled in temporary set-aside programs or land rental. They also serve to work with partners to obtain additional perpetual easements. This plan recognizes that there are many state, federal, and partner funded and other perpetual easements of value in the plan area. An example of a frequently used program in the watershed is Conservation Reserve Program, or CRP.

CRP is a land conservation program administered by Farm Service Agency (FSA). In exchange for a yearly rental payment, farmers enrolled in the program agree to remove environmentally sensitive land from agricultural production and plant species that will improve environmental health and quality. Contracts for land enrolled in CRP are 10-15 years in length. Land enrolled in this and similar protection programs produce numerous environmental benefits. For example, converting row cropped lands with conventional tilling methods to perennial grasslands using programs such as CRP typically reduce runoff and erosion (Gilley et al., 1997).





Education and Outreach

Implementation of actions in this plan is voluntary and requires willing landowner participation. As such, public participation and engagement are essential for successful implementation. The Education and Outreach Implementation Program funds actions to increase engagement and understanding and address conservation barriers. The program builds on a foundation of engagement activities already occurring in the watershed through individual partners. This work is summarized in Figure 6.2 and is expected to continue during plan implementation.

Youth Engagement

- Children’s Water Festival
- Environmental Fair
- Focused watershed tours
- Earth Day event(s)
- Primary and secondary school events
- Environmental camps for 4H students
- Envirothon events




The Youth Program is dedicated to engaging young people on the importance of the natural landscape and the environmental issues.

Landowner Engagement


- Field days and demonstrations
- Landowner events on specific topic matters (e.g., lakeshore and streambank stabilization, wetland restoration, and drinking water)
- Direct mailings
- Workshops and seminars
- Events with agronomists and conservation partnerships




Engaging landowners is critical for understanding issues that impact residents and viable solutions.

Outreach Support

- Newsletters
- Presentations to local groups and entities
- Watershed tours
- Demonstrations (e.g. rain gardens)
- Workshops and seminars at area colleges and schools
- Meetings with lake associations and sportsman’s clubs
- Focused public meetings
- County Fair booths
- Billboard education
- WRAPS status update activities




General public education and outreach will continue through these items.

Virtual Engagement

- Local websites
- Facebook
- Twitter
- YouTube
- E-mail
- Newsletters
- News articles




Many local government staff use virtual platforms to communicate important watershed information easily and effectively.



Figure 6-2: Education and outreach activities in the Des Moines River Watershed.



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Research and Assessments

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

Currently, a wide variety of monitoring is carried out by multiple government and local organization levels (Table 6.1). These existing data helped determine the current conditions of surface water, groundwater, and habitat in this plan and developed a starting point for measuring goals moving forward.

Table 6.1: Summary of ongoing water quality and quantity monitoring programs. RS = rivers and streams, L = lakes, W = wetlands, and GW = groundwater (Source: BWSR).

Parameters	MPCA	DNR	MDH	MDA	County, SWCD, and WD	Lake Associations
Nutrients	RS, L, W	RS, L		RS, GW	RS, GW, L	L
Suspended Solids	RS, L, W	RS		RS	RS	
Productivity	RS, L	RS			L	L
Pesticides				RS, L, W, GW		
Bacteria	RS, L		GW		RS	
Biology	RS, L, W	RS, L				
Water level/Flow	RS, L	RS, L			RS	
Algal Toxins	L					
Invasive Species		RS, L			L	L
Fish Contaminants	RS, L	L				
Chlorides	RS, L, W	RS	RS, L, GW			
Sulfates	RS, L, W	RS, L	RS, L, GW			

As summarized in Table 6.1, ongoing surface water monitoring programs are led by local and state entities. The Heron Lake Watershed District has a history of focusing seasonal monitoring on three major stream sites in the Heron Lake watershed, including water quality samples, stream stage, and discharge readings. The HLWD has also monitored Fulda Lakes, Graham Lakes, and Heron Lakes. Local entities have been successful securing Surface Water Assessment Grants, and some include monitoring as part of general operating expenses.

Between the MPCA, local entities, and citizens (through the Citizen Lake Monitoring Program and Citizen Stream Monitoring Program), over 50 sites in the Des Moines River Basin were monitored for use in the assessment of waters during the Assessment Phase of the watershed approach. The watershed will be monitored again by the MPCA during the WRAPS update starting in 2025. Other agencies responsible for stream gauging in the watershed are MPCA, DNR, MDA, and the federal USGS. Two stream gaging stations on the Des Moines River, near Avoca and near Jackson, serve as Watershed Pollutant Load Monitoring Network (WPLMN) sites that are benchmark monitoring sites for MPCA. Results from these networks and other ongoing tracking and monitoring programs can be used to document measurable water quality and quantity changes resulting from implementation activities (Table 6.2).





Table 6.2: Summary of how information will be used to track resource condition improvements from implementation.

Level	Description	Des Moines CWMP Application
Tracking	Practices, acres	Outputs in Action Table (Section 5). Projects will be tracked with a system and reported in eLINK during implementation.
Estimating	Using lower resolution calculators and tools to give a sense of the collective impacts of projects.	PTMApp results
Modeling	Incorporating landscape factors and project information to predict future conditions.	HSPF in WRAPS Cycle 2
Measuring	Using field-collected information to assess the condition of the water.	Lake Monitoring, Pollutant Load Monitoring Network stream monitoring
Proving	Having enough measurements to compare with standards and decide if it's improved.	Analysis of lake and stream water quality trends and parameter assessments; Analysis of loading at watershed pour point(s)

Ongoing monitoring efforts also track groundwater supply quantity and quality trends. Current programs include Public Water Supplier Monitoring, MDA's township testing, MDA's Pesticide Water Quality Monitoring, MPCA's Ambient Groundwater Monitoring Program, DNR high-capacity permitting program, and the DNR Observation Well Network. These programs have provided valuable information but are not yet extensive enough to fully assess the state of groundwater in the region.

Participating LGUs recognize that project funds are extremely limited, and that requests for information, tracking, evaluation, and assessment are activities that require staff time and office resources, decreasing the amount of funds available for projects. Outside of projects through watershed-based implementation funds, each LGU will be responsible for providing assessment, tracking, evaluation, and reporting data for their own organization's activities. The Research and Assessments Program will be collaborative (especially where efforts cross administrative boundaries), with Partnership entities sharing services wherever possible.





Capital Improvement Projects

A capital improvement is defined as a major non-recurring expenditure for the construction, repair, retrofit, or increased utility or function of physical facilities, infrastructure, or environmental features. The life expectancy of these projects is generally at least 25 years. Some capital improvements are beyond the 'normal' financial means of the Partnership, often exceeding \$250,000, and are unlikely to get constructed without external funding.

Proposed capital improvements are shown in **Section 5. Targeted Implementation**. Members of the Policy Committee or the Partnership's individual and representative Boards may discuss the means and methods for funding new capital improvements with potential funding partners. Capital improvement projects (CIPs) completed through this plan will be operated and maintained by the owner of the project for its lifespan.

As highlighted throughout this plan, public drainage systems are prevalent throughout much of the plan area. Drainage authorities help coordinate implementing the targeted implementation schedule to make progress towards plan goals. Based on this engagement, drainage authorities could access implementation funds to adopt drainage actions in the Action Tables (**Section 5. Targeted Implementation**) during 103D and 103E processes and procedures when the opportunity arises within the planning area. 103B.335 (special taxing district) also allows for these type of projects.

Operations and Maintenance

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



Lime Lake outlet, west of Avoca



Regulatory Program

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

The HLWD has rule making authority per MS 103D.341 and permitting authority per 103D.345; it retains its authority and ability to amend its rules, bylaws, inventories, permits, policies, procedures, and restrictions. Current rules were last revised in 2005 and could periodically change during this plan. The HLWD Rules are available by reference in Appendix I. To review current rules, please see the HLWD website (<https://hlwdonline.org/php/>).

Counties and the watershed district will meet when applicable to discuss ordinances and counties will notify each other of proposed ordinance amendments. These entities will also review similarities and differences in local regulatory administration to identify local successes and identify changes needed in the future to make progress towards goals outlined in this plan. A full comparison of how local ordinances are used to administer statutory responsibilities is provided in Appendix J.



Shoreland Management

The Minnesota Legislature delegated responsibility to LGUs to regulate the subdivision, use, and development of shorelands along public waters. This helps preserve and enhance the quality of surface waters and conserving the economic and natural environmental values of shorelands. This statute is administered and enforced as a local zoning ordinance for all participating counties, and as a rule for the HLWD. These local shoreland ordinances also manage the extraction of aggregate resources.



Floodplain Management

Floodplain zoning regulations guide development in the floodplain to minimize loss of life and property, disruption of commerce and governmental services, extraordinary public expenditure for public protection and relief, and interruption of transportation and communication. The DNR and FEMA are in the process of updating floodplain maps on a county basis. Current flood maps can be found on the DNR website. All counties in the watershed have ordinances relating to floodplains.



Subsurface Sewage Treatment Systems (SSTs)

The MPCA administers the Subsurface Sewage Treatment System (SSTS) Program to protect the public health and environment. SSTS Ordinances are adopted and enforced at the county level to meet state requirements. All counties in the watershed administer Minnesota Rules Chapter 7080-7083 for SSTSs through local ordinances.



Solid Waste Management

Minnesota's Waste Management Act has been in place since 1980 and establishes criteria for the management of all types of solid waste, including mixed municipal solid waste, construction and demolition waste, and industrial waste. To receive annual grant funding to assist in implementing waste management programs, each county must have an MPCA-approved Solid Waste Management Plan. Cottonwood, Jackson, Martin, Murray, and Nobles counties have local solid waste ordinances.



Hazard Management

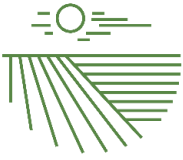
Hazard mitigation is defined as any action taken to eliminate or reduce the future risk to human life and property from natural and human-caused disasters. Extreme weather events and infrastructure resilience also play a part in hazard management. These requirements direct the state to administer cost-sharing. Hazard mitigation local emergency management departments are deployed in each of the contributing counties within the plan area.



Public Drainage Systems

Drainage authority is granted to counties and watershed districts through MS 103E to establish, construct, and in perpetuity maintain public drainage systems. County and watershed district boards serve as the drainage authorities for public drainage systems in the Des Moines River Watershed.





Feedlots

Feedlots rules, regulations, and programs were established under MN Rules 7020 to govern the collection, transportation, storage, processing, and land application of animal manure and other livestock operation wastes. The program is administered through the MPCA, but all local counties in the watershed have accepted delegation of this authority. All counties in the watershed have ordinances relevant to feedlots.



Buffers

The Riparian Protection and Water Quality Practices statute (Minnesota Statute 103F.48, commonly referred to as the Buffer Law) requires a 50-foot average continuous buffer of perennial vegetation with a 30-foot minimum width along all public waters and a 16.5-foot minimum width continuous buffer of perennial vegetation all along public drainage systems. All counties, SWCDs, and the watershed district implement and assess compliance with the Buffer Law through their local ordinances or rules. The local SWCDs are also responsible for landowner assistance with the Buffer Law. In most situations, landowners have the option of working with their SWCD to determine if other alternative practices aimed at protecting water quality can be used in lieu of—or in combination with—a buffer. Questions or requests for information about buffer or shoreland ordinances should be directed to the respective county soil and water conservation district.



Aquatic Invasive Species

Aquatic Invasive Species (AIS) can cause ecological and economic damage to water resources. The DNR has regulatory authority over aquatic plants and animals. Permits are required by the general public for transporting lake water and species as well as for treating AIS. No local entities in the watershed have an AIS ordinance.



Wetland Conservation Act

The Minnesota Legislature passed the Wetland Conservation Act (WCA) of 1991 (Minnesota Rules Chapter 8420) to achieve no net loss of, increase the quantity, quality, and biological diversity of, and avoid direct or indirect impacts to Minnesota’s wetlands. LGUs are responsible for administering, regulating, and educating landowners on WCA.



Construction Erosion Control

Temporary construction erosion control is the practice of preventing and/or reducing the movement of sediment from a site during construction. Projects disturbing one acre or more of land will require a National Pollutant Discharge Elimination System (NPDES) Permit from MPCA. Some local entities default to state standards (Cottonwood, Martin), while others have local ordinances (Murray, Jackson, Lyon). Nobles administers through the Okabena-Ocheda Watershed District.



Wellhead Protection

The Minnesota Department of Health (MDH) administers the state wellhead protection rule, Minnesota Rules, Chapter 4720.5100 - 4720.5590, that sets standards for wellhead protection planning. Municipalities within the watersheds have completed, or will be completing, wellhead protection plans. The most recent listing of completed wellhead protection plans can be obtained from MDH.

Comprehensive or Land Use Plans

Counties and municipalities within the Des Moines River Watershed are responsible for land use planning, which is administered through local zoning ordinances. Comprehensive or land use plans have been adopted by the LGUs within the watershed. From a regulatory perspective, land and resource management may overlap with the local government entities listed below. Therefore, meeting goals and strategies of local planning may also involve other governmental or non-governmental entities. LGUs within the watershed that have comprehensive and/or land use plans are provided in **Table 6.3**. Please note this is not intended to be all-inclusive.



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Table 6.3: Local Comprehensive or Land Use Plans in the Des Moines River Watershed

Local Governmental Unit	Comprehensive or Land Use Management Plan
Cottonwood County	Cottonwood County 2005 Comprehensive Plan (2005)
Jackson County	Jackson County Comprehensive Plan (2010)
Martin County	Martin County Land Use Plan (2003)
Murray County	Murray County Comprehensive Plan (2016)
Nobles County	Nobles County Comprehensive Plan (2001)
Lyon County	Lyon County Comprehensive Plan (2002)

Conservation Action and Climate Resiliency

Resilience is the ability of a system to experience change but not be affected. Resilience can be both social and ecological (MGLP, 2021). Social resilience is organization and regulation. For example, having a Lake Association builds social framework to implement lake projects. Ecological resilience includes landscape diversity, water retention, and fixing past hydrological alterations. For example, improving soil health and protecting wildlife habitat provides resilience to increasing precipitation trends.

This plan includes actions and programs that build both social and ecological resilience. Social resilience programs and actions include:

- Actions funded by the Regulatory Program,
- Education and outreach activities, and
- Cost share incentives for practices.

Ecological resilience programs and action include:

- Wildlife and habitat protection,
- Soil management practices,
- Wetland protection and restoration, and
- Urban and rural stormwater retention.



Picture: University of Minnesota



Section 7. Plan Administration and Coordination



Section 7. Plan Administration and Coordination



This Plan Section summarizes roles for implementing this plan, how the plan will be funded, and how the plan will be assessed for implementation success.

Plan Administration and Coordination

The Des Moines River Watershed CWMP will be implemented through a Joint Powers Entity between the following entities:

- The counties of Cottonwood, Jackson, Martin, Murray, Nobles, and Lyon,
- The Cottonwood, Jackson, Martin, Murray, Nobles, and Lyon Soil and Water Conservation Districts (SWCDs), and
- The Heron Lake Watershed District.

The entities implementing the plan will be collectively referred to as the Des Moines River Watershed Partnership (Partnership). Individual local government units, governed separately by their respective boards, are individually responsible for their roles implementing this plan.

Decision-Making and Staffing

Implementation of the Des Moines River Watershed CWMP will require increased capacity, funding, and coordination from current levels. Successful implementation will depend on continuing and building on partnerships in the watershed with landowners, planning partners, state agencies, and organizations.

At least two committees serve this plan during implementation:

- **Policy Committee:** As established in the Joint Powers Entity, the Policy Committee is comprised of elected and appointed board members (one County Commissioner and one SWCD Board Supervisor from each of the participating entities, and one Manager from the HLWD); and
- **Steering Committee:** Comprised of local SWCD, county, and watershed district staff (with their respective alternates), with regular input and coordination from state agencies and local stakeholders.

Table 7.1 outlines the probable roles and functions of these committees during implementation. Expectations are that the roles of each committee will shift and change focus during implementation. Fiscal and administrative duties may be assigned to a member LGU through a Policy Committee decision as outlined in the formal agreement. The Steering Committee will annually revisit the responsibilities for annual work planning and serving as the fiscal agent.





Table 7.1: Roles for implementing the Des Moines River Watershed CWMP.

Committee Name	Primary Implementation Roles
Policy Committee	<ul style="list-style-type: none"> ▪ Approve work plan ▪ Review and confirmation of priority issue recommendations ▪ Approve plan amendments ▪ Implement county ordinances and state statutory responsibilities separately from plan implementation ▪ Approve assessments as needed ▪ Oversee grant agreement and contracts and potential to delegate
Steering Committee	<ul style="list-style-type: none"> ▪ Review the status of available implementation funds from plan participants ▪ Review opportunities for collaborative grants ▪ Review work plan and adjust as needed ▪ Review reports submitted to BWSR as required ▪ Biennial review and confirmation of priority issues ▪ Prepare plan amendments ▪ Implement the Action Tables
Local Fiscal and Administrative Agent	<ul style="list-style-type: none"> ▪ Convene committee meetings ▪ Prepare and submit grant applications/funding requests ▪ Prepare work plan ▪ Compile results for annual assessment

Collaboration

Collaboration Between Planning Partners

Although collaboration informally and formally is encouraged by this plan, mandatory participation is not required by this plan. Local governmental units who adopt this CWMP can choose whether to approve and participate in future formal implementation agreements. The benefits of successful collaboration between planning partners include consistent implementation of actions watershed-wide, increased likelihood of funding, and resource efficiencies gained, ultimately resulting in more water quality benefits. The Partnership will pursue opportunities for collaboration with fellow planning partners to gain administrative and program efficiencies, pursue collaborative grants, and provide technical assistance. The Partnership will also review similarities and differences in local regulatory administration to identify successes as well as future changes needed to make progress towards goals outlined in this plan. However, there are costs associated with collaboration – for example, increased meeting and travel time; increased tracking, assessment, evaluation, and reporting requirements; a decrease of efficiency when actions must be coordinated in concert with 13 separately governed organizations, and possible increases to project completion timelines.

Collaboration with Other Units of Government

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





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

Collaboration with Others

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



Funding

This section describes how the plan will be funded and how that funding will be used. As introduced in Section 5. Targeted Implementation, this plan recognizes and includes three funding levels (Table 7.2).

Table 7.2: Estimated cost for implementing the Des Moines River Watershed CWMP. Funding Level 2 is the focus of this plan.

Funding Level	Name	Estimated Annual Average	Estimated Ten-Year Plan Total
1	Current Funding	\$1,415,000	\$14,150,000
2	Current Funding + WBIF	\$2,117,000	\$21,169,000
3	Partner and Other Funding	Dependent on Partner and Grant Funding Availability	

The Funding Level 1 (Current Funding) is based on the estimated annual revenue and expenditures for plan participants combined and allocated to the plan area based on the percentage of each county’s land area in the watershed. Funding Level 1 includes local, state, and federal funding, as explained in the following sections, and summarized in Table 7.3.

Local Funding

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

Local funds will be used for locally focused programs where opportunities for state and federal funding are lacking because of misalignment of a program’s purpose with state or federal objectives. These funds will also be used for matching grants.





State Funding

State funding includes all funds derived from the State tax base. Examples of state funding include conservation delivery, state cost share, Natural Resources Block Grants, Clean Water Funds (CWF), and SWCD Local Capacity Grants.

The planning Partnership will apply as an entity for collaborative grants, which may be competitive or non-competitive. The assumption is that future base support for implementation will be provided to the Des Moines River Watershed as non-competitive WBIF grants (Level 2). Where the purpose of an implementation program aligns with the objectives of various state, local, non-profit, or private programs, these dollars will be used to help fund the implementation programs described by this plan.

Federal Funding

Federal funding includes all funds derived from the Federal tax base. For example, this includes programs such as EQIP and CRP. Partnerships with federal agencies are an important resource for ensuring implementation success. An opportunity may exist to leverage state dollars through some form of federal program. Where the purpose of an implementation program aligns with the objectives of various federal agencies, federal dollars will be used to help fund the implementation programs described by this plan. For example, the NRCS will likely provide support for agricultural conservation practices, while the FSA may provide land-retirement program funds such as CRP.

Table 7.3: Estimated sources of funding for Funding Level 1 (Current Funding) for the Des Moines River Watershed CWMP

Program	Local		State		Federal		All Sources	
	Annual	Total	Annual	Total	Annual	Total	Annual	Total
Projects and Practices	\$359,900	\$3,599,300	\$365,700	\$3,657,200	\$0	\$0	\$725,700	\$7,256,600
Research and Monitoring	\$50,400	\$504,400	\$11,500	\$115,000	\$6,200	\$61,900	\$68,100	\$681,300
Education and Outreach	\$165,900	\$1,659,200	\$25,000	\$250,000	\$0	\$0	\$190,900	\$1,909,200
Regulatory Administration	\$53,700	\$537,400	\$189,000	\$1,890,400	\$0	\$0	\$242,800	\$2,427,800
Capital Improvements	\$900	\$9,000	\$0	\$0	\$0	\$0	\$900	\$9,000
Operations and Maintenance	\$154,700	\$1,547,000	\$31,900	\$319,000	\$0	\$0	\$186,600	\$1,866,000
Total	\$785,600	\$7,856,400	\$623,200	\$6,231,700	\$6,200	\$61,900	\$1,415,000	\$14,149,900

Funding Level 2 is Level 1 funding plus the new Watershed-Based Implementation Funding (WBIF) that will be available upon completion of this plan (estimated \$700,000/ year). Funding Level 3 funding summarizes projects that help make progress to plan goals, but are not administered by planning partners (counties, SWCDs, or





HLWD). Funding Level 3 includes partner funding through programs such as CRP, RIM, NRCS Regional Conservation Partnership Program (RCPP), and the Lessard-Sams Outdoor Heritage Council (LSOHC) funds.

Figure 7.1 below shows how implementation programs are funded within this plan under Funding Level 1 and Level 2. Planning partners elected to use 70% of their WBIF in implementation of projects and practices, with 5% of funding going toward Capital Improvement Projects. This plan recognizes the overlap between these two critical programs, where structural and non-structural projects are commonly implemented to support larger Capital Improvement Projects.

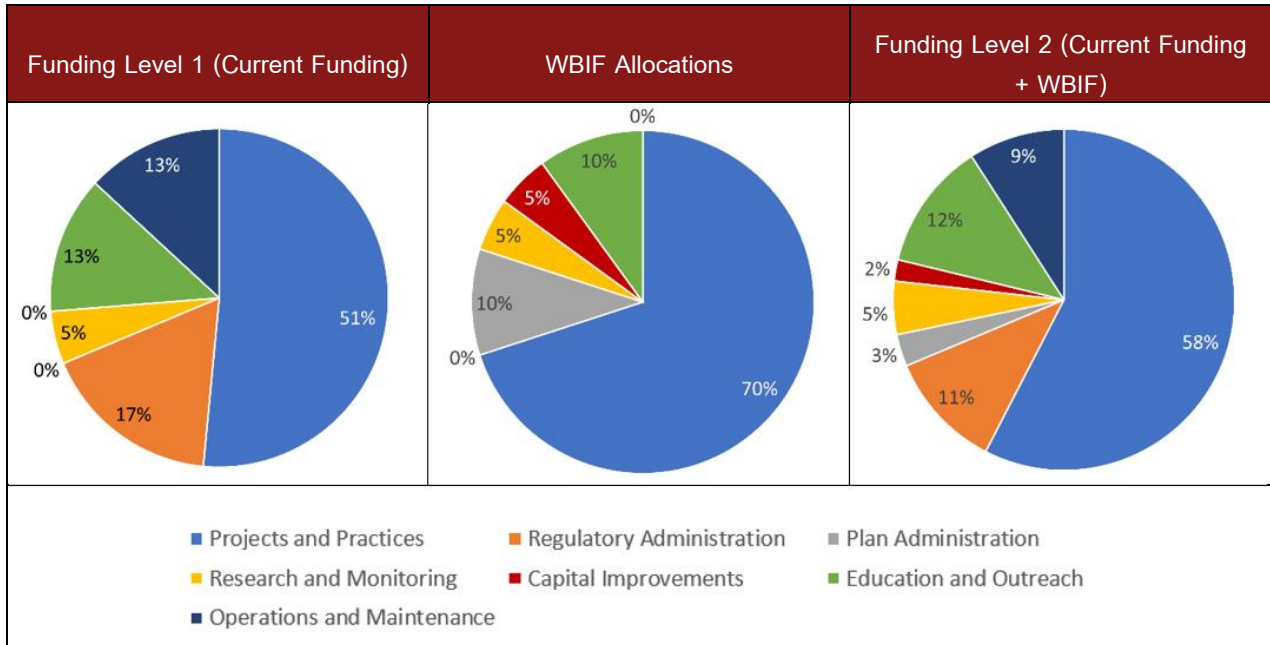


Figure 7.1. Funding for implementation programs by Funding Level

Additional Funding Sources

Current programs and funding (Level 1) will not be enough to implement the full Action Table. As such, the success of implementing the plan will depend on collaboratively sought competitive state, federal, and private grant dollars, and increased capacity.

Plan participants may pursue grant opportunities collaboratively or individually to fund the Action Table’s implementation. Within the Action Table, actions are assigned implementation programs. Table 7.4 shows the most used state and federal grants for executing the actions described by this plan cross-referenced to plan implementation programs, thereby showing potential sources of revenue for implementation.

Several non-governmental funding sources may also provide technical assistance and fiscal resources to implement the Action Table. This plan should be provided to all non-governmental organizations as a means of exploring opportunities to fund specific aspects of the Action Table. Private sector companies, including those specifically engaged in agribusiness, are often overlooked as a potential source of funding for implementation. Some agribusiness companies are providing technical or financial implementation support because they are interested in agricultural sustainability and carbon market benefits. This plan could be used to explore whether



the resource benefits arising from implementation have monetary value and therefore, provide access to funding from the private sector.

Table 7.4: Implementation programs and related funding sources for the Des Moines River Watershed. Note: List is not all-inclusive.

Program / Grant		Primary Assistance	Projects & Practices	Capital Improvements	Research & Assessments	Outreach
Federal Programs / Grants						
NRCS	Conservation Innovation Grant (CIG)	Financial	●			
	Conservation Stewardship Program (CSP)	Financial	●			
	Regional Conservation Partnership Program (RCPP)	Financial	●	●		
	Environmental Quality Incentives Program (EQIP)	Financial	●			
	Agricultural Conservation Easement Program (ACEP)	Easement	●			
FSA	Conservation Reserve Program (CRP)	Easement	●	●		
	Farmable Wetlands Program (FWP)	Easement	●			
	Grasslands Reserve Program (GRP)	Easement	●			
	Wetland Reserve Program (WRP)	Easement	●	●		
FSA/ USDA	Source Water Protection Program (SWPP)	Technical				●
USFWS	Partners for Fish and Wildlife Program	Financial/ Technical	●			
FEMA	Hazard Mitigation Grant Program (HMGP)	Financial	●	●		
	Pre-Disaster Mitigation (PDM)	Financial	●	●		
	Flood Mitigation Assistance (FMA)	Financial	●	●		
	Risk Mapping, Assessment, and Planning	Technical	●	●		
EPA	Water Pollution Control Program Grants (Section 106)	Financial				●
	State Revolving Fund (SRF)	Loan	●			
	Drinking Water State Revolving Fund (DWSRF)	Loan	●			
	Section 319 Grant Program	Financial	●		●	●
NACD	Technical Assistance Grants	Financial/ Technical	●	●	●	●
State Programs / Grants						
LSOHF	Lessard-Sams Outdoor Heritage Fund (LSOHF)	Financial	●	●	●	●
DNR	Aquatic Invasive Species Control Grant Program	Financial/ Technical	●			●
	Conservation Partners Legacy Grant Program	Financial	●	●		
	Pheasant Habitat Improvement Program (PHIP)	Financial	●			
	Flood Hazard Mitigation Grant Assistance	Financial	●	●	●	●
	Forest Stewardship Program	Technical	●			
	Aquatic Management Area Program	Acquisitions	●			
	Wetland Tax Exemption Program	Financial	●			
BWSR	Clean Water Fund Competitive Grants	Financial	●	●		●





Program / Grant		Primary Assistance	Projects & Practices	Capital Improvements	Research & Assessments	Outreach
	Erosion Control and Water Management Program	Financial	•			
	SWCD Capacity Funding	Financial	•		•	•
	Natural Resources Block Grant (NRBG)	Financial	•			•
	Reinvest in Minnesota (RIM)	Financial	•	•		•
MPCA	Surface Water Assessment Grants (SWAG)	Financial			•	•
	Clean Water Partnership	Loan	•	•		
	WRAPS Clean Water Fund	Technical			•	•
MDH	Source Water Protection Grant Program	Financial	•	•	•	•
	Public and Private Well Sealing Grant Program	Financial	•		•	
MDA	Agriculture BMP Loan Program	Financial	•			
	Minnesota Agricultural Water Quality Certification Program	Financial / Technical	•			•
	Nutrient Management Initiative (NMI)	Financial	•			
Other Funding Sources						
	Pheasants Forever	Financial/ Technical	•	•	•	•
	Ducks Unlimited	Financial/ Technical	•	•	•	•
	The Nature Conservancy	Financial	•	•	•	•
	Minnesota Land Trust	Financial	•	•	•	•





Work Planning

Local Work Plan

Work planning is envisioned to align priority issues, funds, and roles and responsibilities for implementation. A work plan will be developed by the Local Fiscal/Administrative Agent based on the Action Table. The work plan will be reviewed by the Steering Committee annually and adjusted to align with grant requests and changes identified through self-assessments. The work plan will then be presented as needed to the Policy Committee. The intent of these work plans will be to maintain collaborative progress toward completing the Action Table.

State Funding Request

The Steering Committee will collaboratively develop, review, and submit a biennial watershed-based implementation funding request from this plan to BWSR. This request will be submitted to and ultimately approved by the Policy Committee before submitting it to BWSR. The request will be developed based on the Action Table and any adjustments made through self-assessments.

Assessment, Evaluation, and Reporting

Assessments

The Steering Committee will provide the Policy Committee with an annual update on the progress of the plan's implementation each year. During this annual review process, feedback will be solicited from the boards and Policy Committee. This feedback will be presented by the Grant Admin or Fiscal Agent to the Policy Committee to set the coming year's priorities for achieving the plan's goals and to decide on the direction for collaborative grant submittals. In addition, this feedback will be documented and incorporated into annual and five-year evaluations.

Five-year Evaluation

This plan has a ten-year life cycle beginning in 2022. To meet statutory requirements, this plan will be updated and/or revised every 10 years. Over the course of the plan life cycle, progress towards reaching goals and completing the implementation schedule may vary. In addition, new issues may emerge and/or new monitoring data, models, or research may become available. As such, in 2025-26 and at every 5-year midpoint of a plan life cycle, an evaluation will be done to determine if the current course of action is sufficient to reach the goals of the plan or if a change is necessary.

Reporting

LGUs currently have a variety of reporting requirements related to their activities, programs, and grants or have those that are required by statute (e.g. watershed district annual report, buffer report). A number of these reporting requirements will remain the LGUs' responsibility. However, reporting related to grants and programs developed collaboratively and administered under this plan (including WBIF) may be reported by the Local Fiscal/Administrative Agent. In addition to annual reports, the Local Fiscal/Administrative Agent may also develop a State of the Watershed Report. This brief report will document progress toward reaching goals and completing the Action Table. It will also describe any new emerging issues or priorities. The information needed to annually update the State of the Watershed Report will be developed through the annual evaluation process.



Plan Amendments

The Des Moines River Watershed CWMP is effective through 2032. Activities described in this plan are voluntary and are meant to allow flexibility in implementation. An amendment will not be required for addition or substitution of any of the actions and projects if those changes will still produce outcomes that are consistent with achieving plan goals. This provision for flexibility includes changes to the activities except for those of capital improvement projects and water management districts, which will follow different procedures.



Revision of this plan may be needed through an amendment prior to the plan update if significant changes emerge in the priorities, goals, policies, administrative procedures, or plan implementation programs. Revisions may also be needed if issues emerge that are not addressed in this plan.

Plan amendments may be proposed by any agency, city, county, soil and water conservation district, or the watershed district within the plan area to the Policy Committee, but only the Policy Committee can initiate and pursue the amendment process upon consideration of cost, location, and the proposal's relationship to the plan. All recommended plan amendments must be submitted to the Policy Committee along with a statement of the problem and need, the rationale for the amendment, and an estimate of the cost to complete the amendment. However, the existing authorities of each LGU is still maintained.

Plan participants recognize the large work effort required to manage water-related issues. This plan provides the framework to implement this work by identifying priority issues, measurable goals, and action items. An amendment will not be required for the following situations:

- Any activity implemented through the “normal” statutory authorities of an LGU, unless the activity is deemed contrary to the intent and purpose of this plan; and
- The addition or deletion of action items, programs, initiatives, or projects, as long as they are generally consistent with the goals of this plan and will be proposed, discussed, and adopted as part of the bi-annual workplan budgeting process

If a plan amendment is needed, plan amendments will be prepared in a format consistent with 103B.314 subd. 6. The Des Moines River Watershed Partnership will be keeping BWSR, through the Board Conservationist, apprised of any proposed amendment who will in turn work to initiate the amendment procedure to ensure notification of plan authorities including state agency partners and special interested public entities upon a decision for amending the plan.



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