Middle Iowa Watershed Management Authority

Middle Iowa Watershed Comprehensive Water Quality Management Plan

January 2025
Draft for WMA Approval

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Acknowledgements

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Created in Collaboration with

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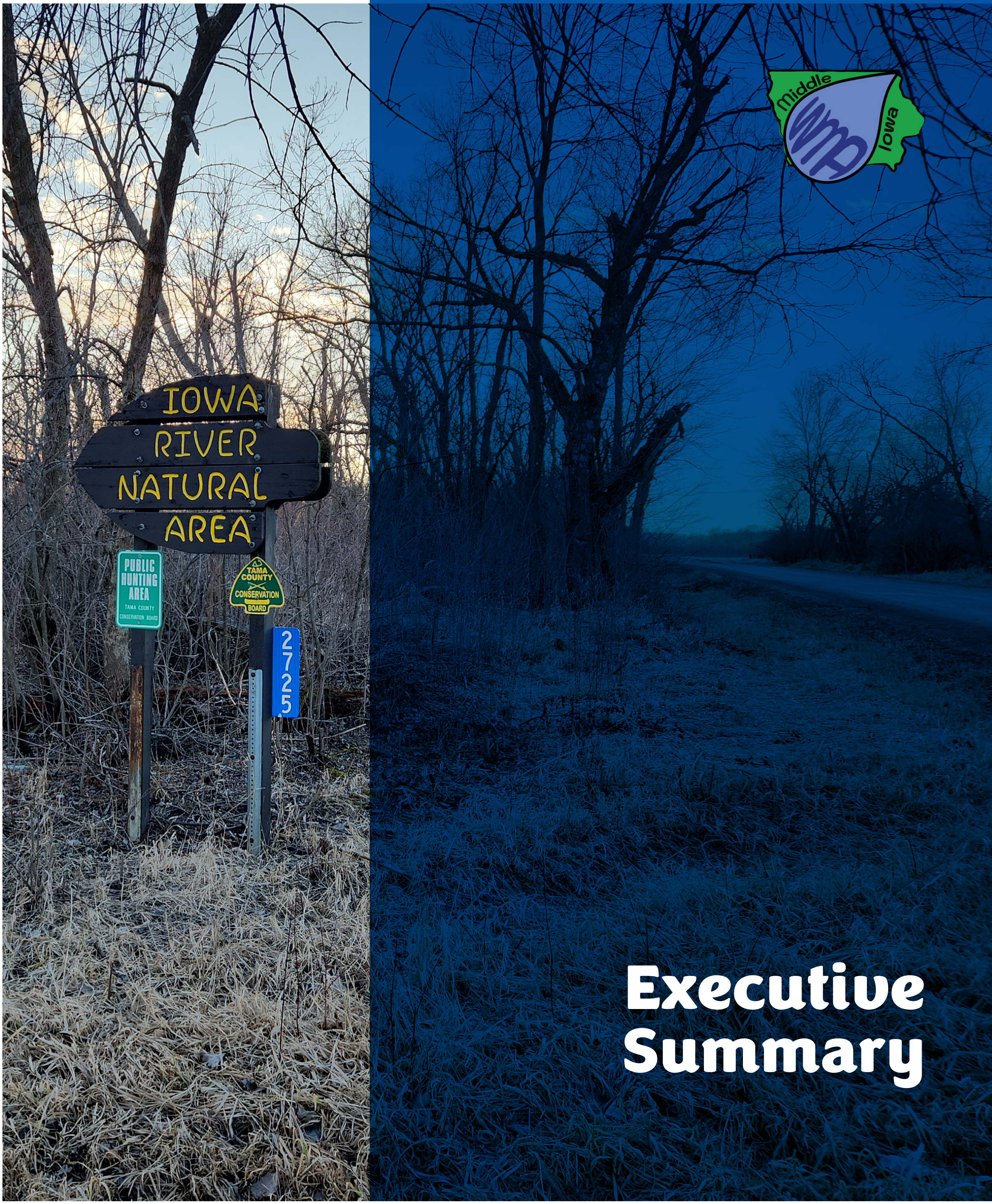
Plan Acronyms

This plan has many acronyms. Refer to this page for abbreviations.

ACPF	Agricultural Conservation and Planning Framework
AIS	Aquatic Invasive Species
BMP	Best Management Practices
BOS	Board of Supervisors
BRIC	Building Resilient Infrastructure and Communities
CDBG	Community Development Block Grant
CP	Conservation Practices
CRP	Conservation Reserve Program
CSP	Conservation Stewardship Program
CWQMP	Middle Iowa Comprehensive Water Quality Management Plan
DNR	Iowa Department of Natural Resources
EPA	Environmental Protection Agency
EQIP	Environmental Quality Incentives Program
FEMA	Federal Emergency Management Agency
FMA	Flood Mitigation Assistance
FNRT	Financial and Nutrient Reduction Tool
FRCN	Freshwater Resilient Connected Networks
FSA	Farm Service Agency
HMGP	Hazard Mitigation Grant Program
HMP	Hazard Mitigation Plan
HSEM	Homeland Security and Emergency Management
HUC	Hydrologic Unit Code
HUD	Housing and Urban Development
IBI	Index of Biological Integrity
IDALS	Iowa Department of Agriculture and Land Stewardship
IIHR	Iowa Institute of Hydraulic Research
INRS	Iowa Nutrient Reduction Strategy
IR	Integrated Report
LiDAR	Light Detection and Ranging
MIWMA	Middle Iowa Watershed Management Authority
MJHMP	Multi-Jurisdictional Hazard Mitigation Plan
NACD	National Association of Conservation Districts
NOAA	National Ocean and Atmospheric Administration
NPDES	National Pollutant Discharge Elimination System
NPSMP	Nonpoint Source Management Plan
NRCS	Natural Resources Conservation Service
OEC	Outreach and Engagement Committee

RCPP	Regional Conservation Partnership Program
REAP	Rural Energy for America Program
RPS	Restoration and Protection Screening
SPARROW	SPAtially-Referenced Regression On Watershed attributes
SSTS	Subsurface Septic Treatment Systems
SWCD	Soil and Water Conservation Districts
TAC	Technical Advisory Committee
TMDL	Total Maximum Daily Loads
TN	Total Nitrogen
TNC	The Nature Conservancy
TP	Total Phosphorus
TSI	Trophic State Index
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
WASCOBS	Water and Sediment Control Basin
WFPO	Watershed and Flood Prevention Operations Program
WIRB	Watershed Improvement Review Board
WMA	Watershed Management Authorities / Wildlife Management Area
WMP	Watershed Management Plan
WQIP	Water Quality Improvement Plans
WWTP	Wastewater treatment plants



Executive Summary

Executive Summary

Plan Overview

The Middle Iowa Comprehensive Water Quality Management Plan (CWQMP) is a document that is intended to be implemented from 2026-2035. **The purpose of this plan is to develop a roadmap for the Middle Iowa Watershed to address local water and natural resource priorities.**

The Middle Iowa Watershed Management Authority (MIWMA) formed in 2023 to bring together local stakeholders to address resource management issues such as degraded water quality, flooding, and habitat protection at a watershed scale. This plan:

- Identifies pollutant sources and other water-related issues
- Sets management goals and actions to meet goals
- Prioritizes subwatersheds and creates HUC-12 scale watershed plans
- Brings together watershed stakeholders and local agencies

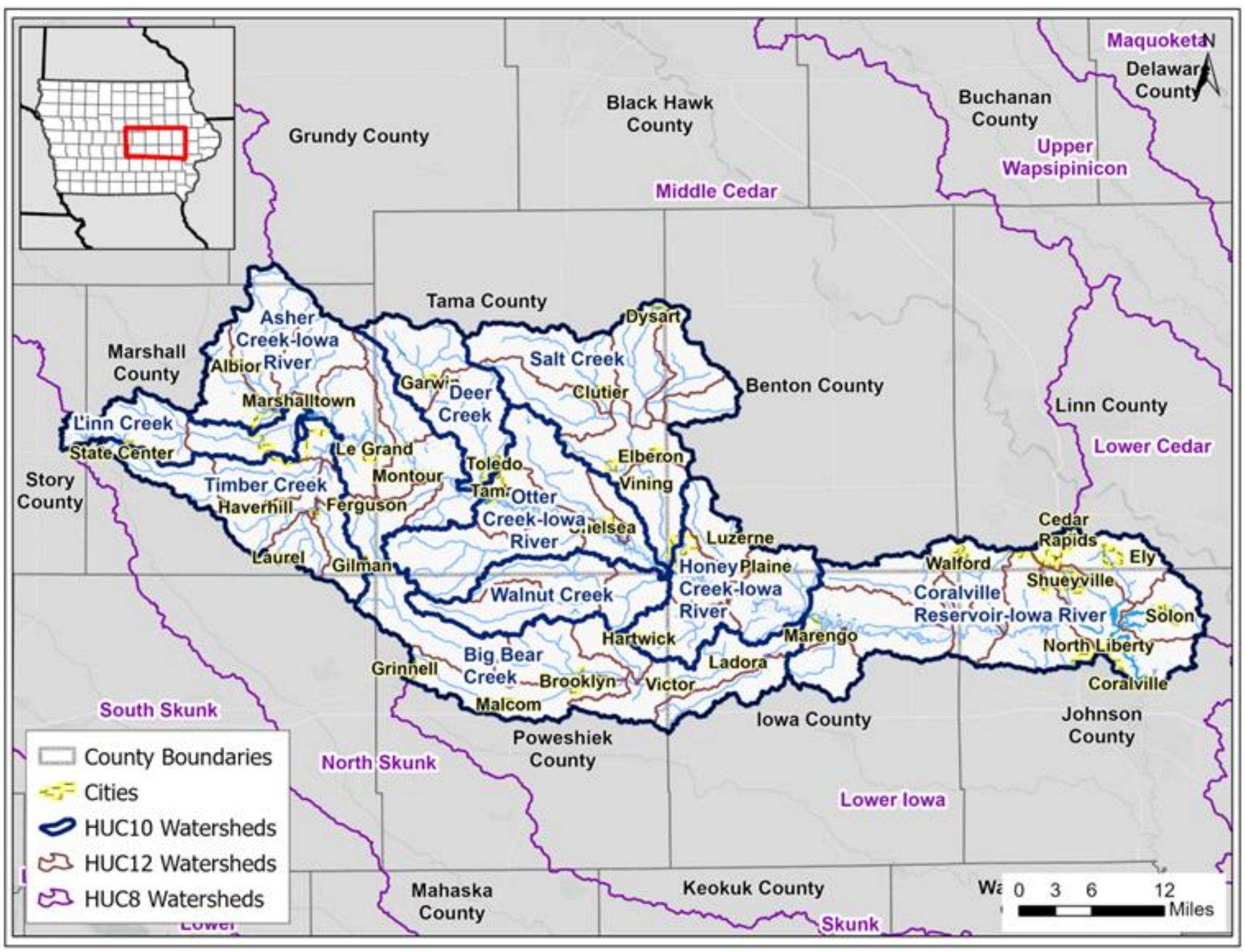


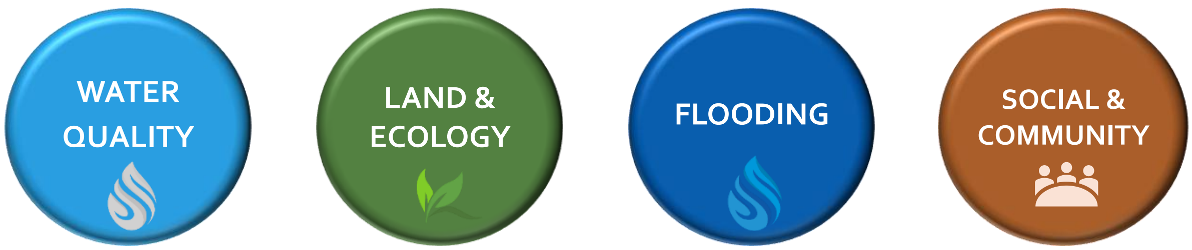
Figure ES-1. Middle Iowa Watershed

The Middle Iowa Watershed

The Middle Iowa Watershed is located in Central Iowa within the Iowa River Basin. It spans 1,060,480 acres (1,657 square miles) over 10 counties and includes 34 cities. The watershed follows the Iowa River and its tributaries from north of Marshalltown to the Coralville Reservoir. Most of the watershed has agricultural land use.

Watershed Issues

The issues faced by the watershed are placed into one of four categories:



Water quality issues include sediment and nutrient loading, which degrade aquatic habitat and increase likelihood of algae blooms. Land & Ecology issues include land conversion that has replaced prairies, altered hydrology, and degraded soil health.

One of the major concerns that led to the MIWMA formation and eventual development of this Plan was flooding. Flooding has devastated Iowa communities and poses risks not only to the environment and infrastructure, but also health and safety. Preventing floods and mitigating the impact of floods is a key focus in this plan.

Finally, Social & Community issues are those that relate to people and systems (e.g., source water protection or local government staff flood preparation). All of these issues are addressed through goals and actions set in the plan.

Priority Areas

In order to target work to a smaller, more feasible scale than the entire HUC-8 watershed, four subwatersheds were identified as priorities for implementation. Pollutant modeling was done in these subwatersheds to understand where pollutants are coming from and where best management practices should be implemented. Priority subwatersheds are Asher Creek (around the city of Albion), Hilton Creek (just south of Marengo), South Branch Salt Creek (between Clutier and Toledo), and Stoney Creek Big Bear Creek (north of Brooklyn).

Plan Goals

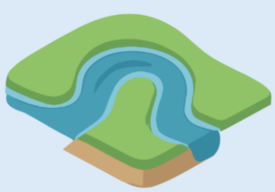
Four overarching goals were set to address issues discussed in Section 3. Each goal has multiple objectives that further support the 10-year goals.

- Water Quality Goal: Improve surface water quality by **reducing nutrient loading by 10%**
- Flooding Goal: Address altered hydrology and store water in the landscape to **mitigate flooding**
- Riparian Management Goal: **Protect and / or restore the riparian zone** for enhanced connectivity between streams and the floodplain
- Watershed Management Goal: Continue ongoing **land and water resources management** to benefit habitat, natural resources, and watershed recreation

Table 1. Water Quality Objectives to support the Water Quality Goal (sediment, nutrient, and nitrogen load reductions) and the Flooding Goal (water storage)

Sediment Load Reduction (tons/yr)	Phosphorus Load Reduction (lbs/yr)	Nitrogen Load Reduction (lbs/yr)	Water Storage (ac-ft)
5,701	11,231	142,271	4,905

Riparian and Stream Buffer Management Plan Section



This CWQMP contains a Riparian and Stream Buffer Management Plan which sets riparian-focused goal objectives in these areas:

- Linear riparian connectivity along the Iowa River corridor
- Lateral floodplain connectivity
- Oxbow restoration/protection potential
- Streambank restoration/stabilization

Source Water Protection Plan

Source water protection efforts seek to prevent drinking water contamination and ensure quality drinking water supplies for consumers. There are 17 Community Water Supply systems in the watershed that have participated in DNR's voluntary source water assessment. The Plan goal is to have all 17 communities complete Phase I and Phase II of source water protection planning (5 communities are remaining).

Plan Implementation

Implementation of plan actions will be an ambitious and collaborative effort amongst MIWMA members and partners. Soil and Water Conservation Districts, Counties, Cities, and state agencies will be lead implementation entities, but over 20 additional parters are identified.

Implementation actions are listed in a schedule with the action, description, output, responsible entity, and estimated cost. Actions are split into five categories:

Agricultural and Landscape: The Agricultural Conservation and Planning Framework (ACPF) model was used to find locations on the landscape that are suitable for the implementation of soil health practices and best management practices (BMPs) to meet subwatershed goals. Over 1,700 BMPs such as cover crops or riparian buffers are planned with the ACPF scenario in priority subwatersheds.

Streams, Lakes, and Wetlands: This category includes actions identified in the Riparian and Stream Buffer Management such as dam removal and oxbow wetland restoration.

Urban: Stormwater projects will improve water quality and add water storage. Additionally, three communities (Chelsea, Tama, Marengo) were selected as case studies to apply for Iowa Homeland Security and Emergency Management flood mitigation assistance.

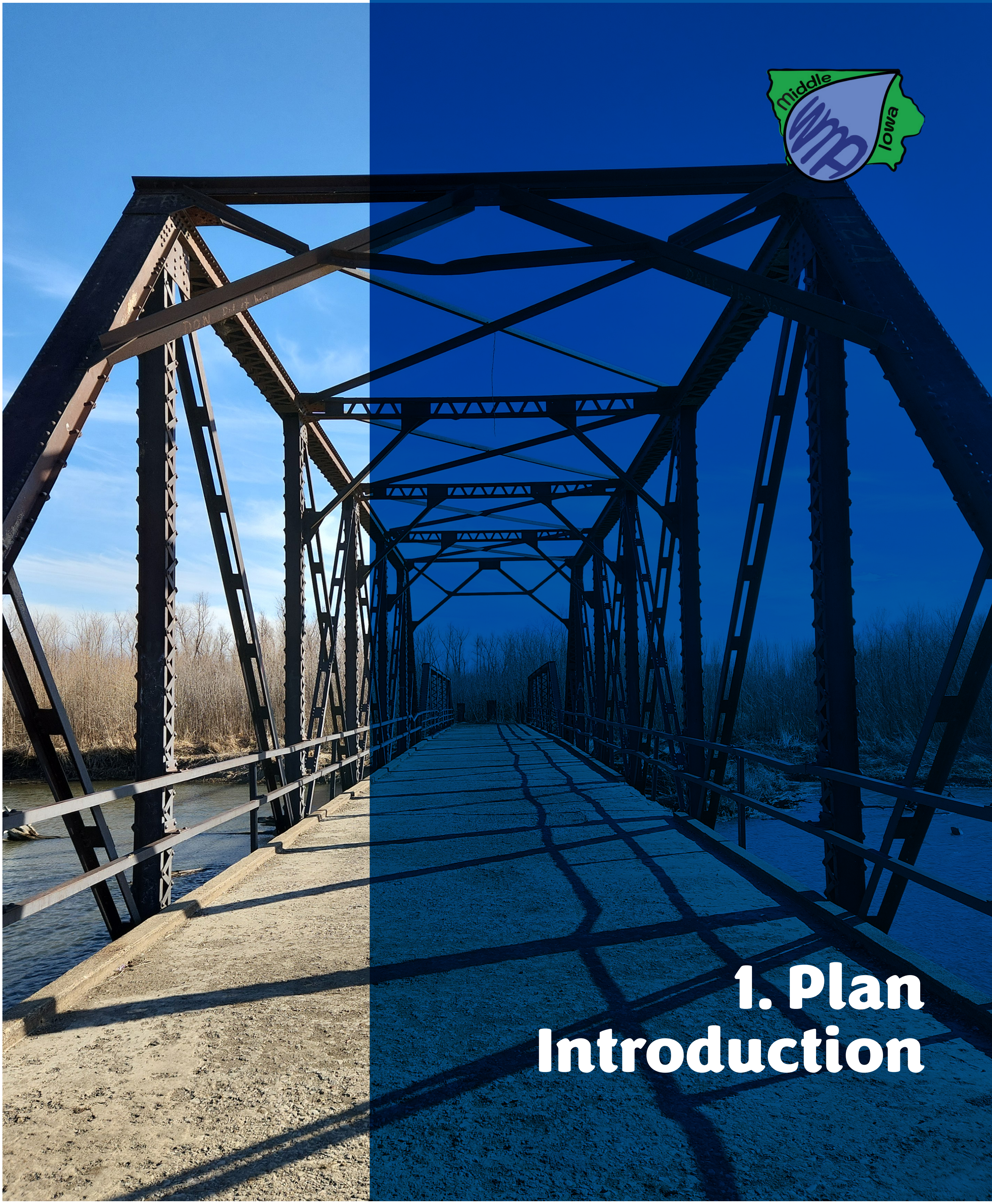
Education and Engagement: Engagement and Education plan actions are further elaborated on in their own section to form a Stakeholder Education and Engagement Plan. Actions include:

- Hiring a Watershed Coordinator and continued MIWMA network growth
- Aquatic Invasive Species education events
- Distribution of flood prevention and preparedness information
- Education events that could include field days, demonstration projects, workshops, etc.
- Watershed management for developing existing MIWMA relationships and growing new ones

Data Gathering: Actions such as continued water quality monitoring, identification of funding opportunities, and source water protection plans will bring in new information and support other plan actions.

The MIWMA built a website during plan development to inform on the Middle Iowa Watershed CWQMP and the MIWMA. Meeting minutes, plan implementation progress, and project success stories will be shared on the website.

Click on the MIWMA logo to be linked to the website.



1. Plan Introduction

Section 1. Introduction

Middle Iowa Watershed Management Authority

In 2008, Iowa experienced record flooding. This in part spurred the 2010 law establishing a pathway for the development of Watershed Management Authorities (WMAs) which are legal agreements between cities, counties, and Soil and Water Conservation Districts (SWCDs) that coordinate water quality management and flood resiliency efforts. The rules and operation guidelines of WMAs can be found in Iowa Code Chapter 28E.

The Middle Iowa Watershed Management Authority (MIWMA) formed in June 2023 to bring together local stakeholders through an official legal entity to engage in watershed management in the Middle Iowa Watershed (Figure 1-1). At the time this plan was written, there were 15 entities in the MIWMA (Figure 1-2) but the authority is open to new members as the watershed overlaps jurisdictional boundaries of 10 counties, 34 cities, and 10 SWCDs. A complete list of eligible and member cities and counties is provided in the official (MIWMA 28E Agreement), which is maintained on the Iowa Department of Natural Resources (DNR) web site for Current Iowa WMAs.

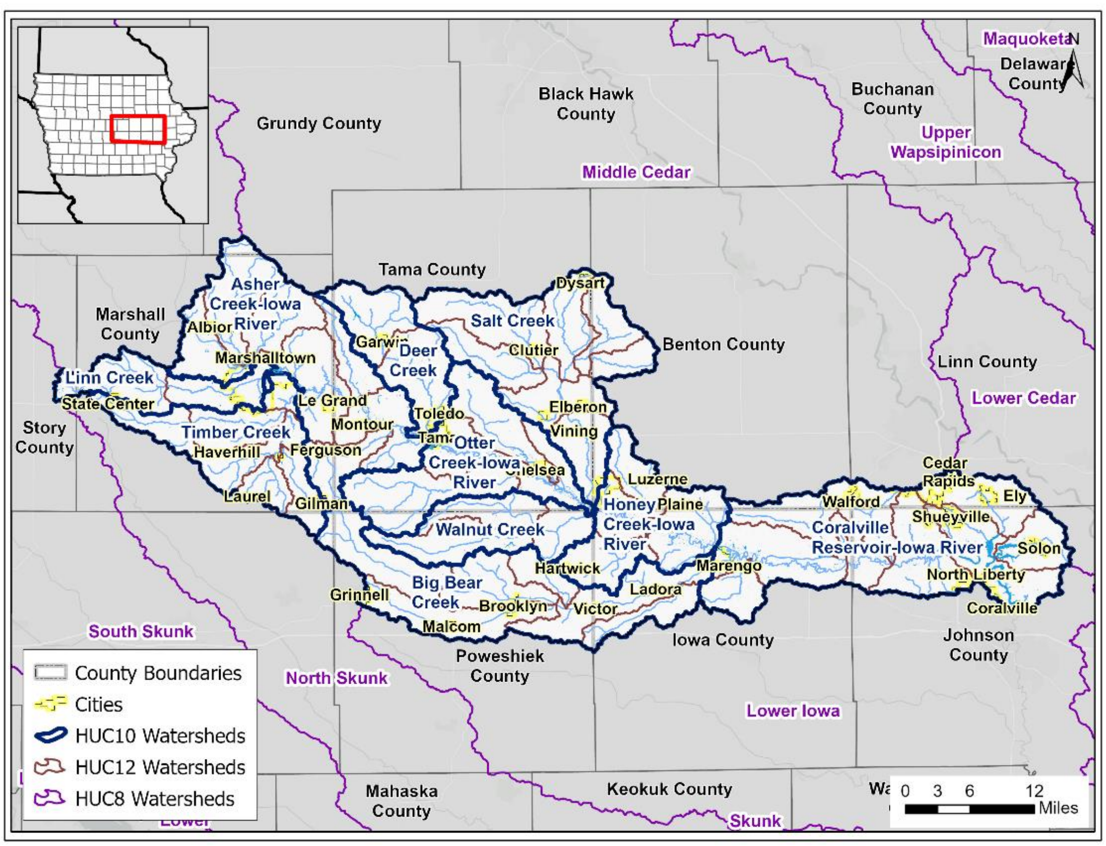


Figure 1-1. The Middle Iowa Watershed

The MIWMA received a watershed planning grant from the Iowa DNR through the Comprehensive Water Quality Management Planning Grant. Key issues that lead to application for the grant are flooding, water quality, and degraded habitat.

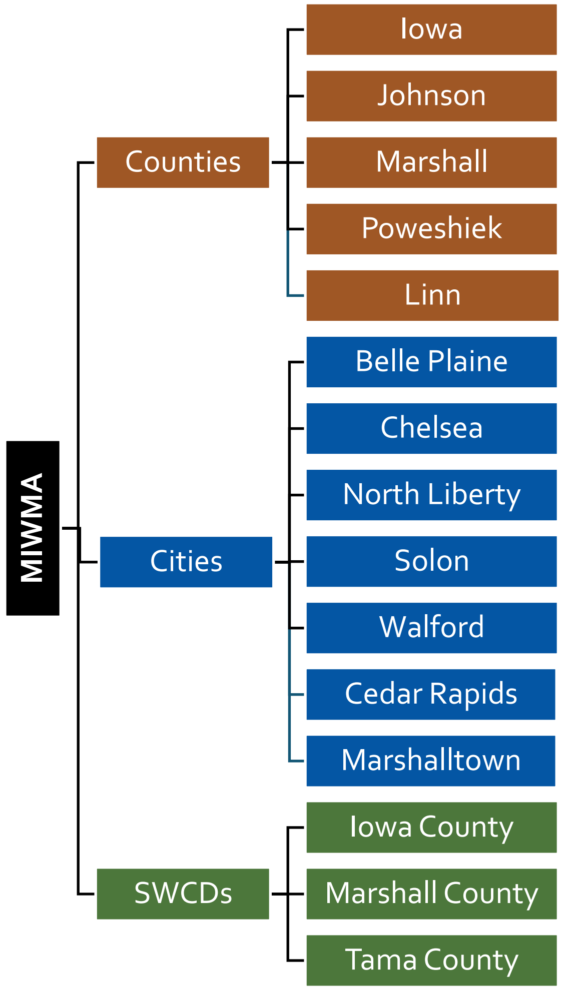
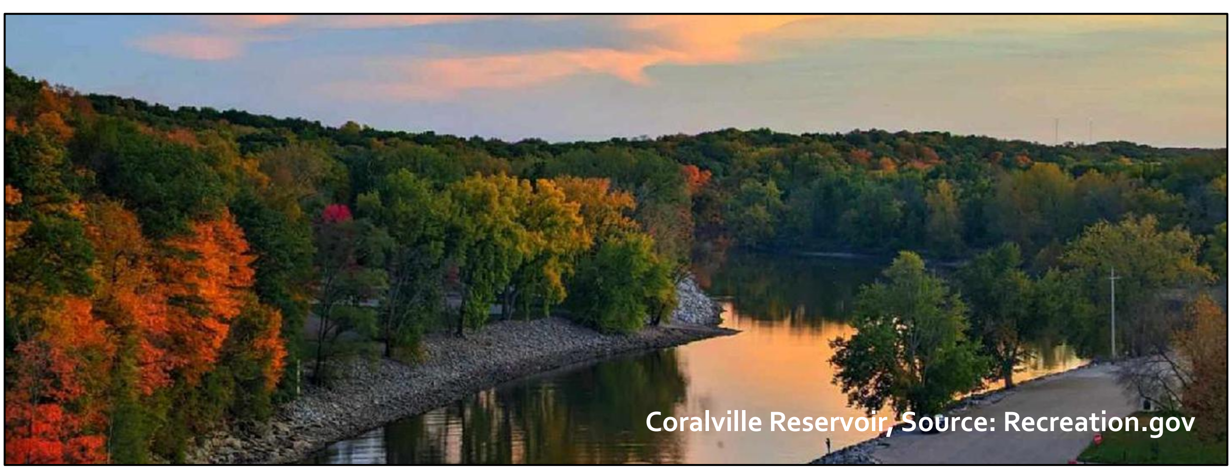


Figure 1-2. 2025 MIWMA member organizations. New members can join, view the current MIWMA composition on the website.



Plan Overview

The Middle Iowa Comprehensive Water Quality Management Plan (CWQMP) is a document that is intended to be a useful guide to accomplish MIWMA goals. The plan begins with the introduction, outlining the purpose of the plan, and an overview of planning committees, stakeholders, and watershed orientation. The CWQMP is organized by section and contains a large amount of information and planning frameworks, including:

- Section 2 – Watershed Characterization, which summarizes watershed conditions
- Section 3 – Issues Assessment , which contains discussion of impairments and pollutants
- Section 4 – Goals and Priority Subwatersheds, which establishes goals to address issues in priority subwatersheds that will be the focus of implementation efforts
- Section 5 – Case Studies, which identifies specific issues and lays out implementation opportunities for three specific communities or priority areas outside of the priority subwatersheds
- Section 6 – Riparian and Stream Buffer Management, which analyzes riparian zones and identifies opportunities for stream and riparian management
- Section 7 – Source Water Protection, which lists participating communities and describes Source Water Protection planning efforts associated with this CWQMP
- Section 8 – Implementation Schedule, which contains a detailed implementation plan and identifies potential funding sources for implementation
- Section 9 – Stakeholder Engagement and Education Plan, which describes the outreach plan to inform the public and build momentum for plan actions

Plan Purpose

The purpose of this plan is to develop a roadmap for the Middle Iowa Watershed to address local water and natural resource priorities. The plan identifies pollutant sources and other water-related issues, sets management goals, prioritizes subwatersheds, and identifies opportunities to improve watershed conditions including flooding, habitat, riparian zones, water quality, and source water.

The purpose of this plan is to develop a roadmap for the Middle Iowa Watershed to address water quality, flooding, source water, and degraded habitat through local partnerships and stakeholder engagement.

Previous water management planning has occurred in Middle Iowa subwatersheds, including Otter Creek, Price Creek, Little Bear, and Union Grove. However, this plan is the first CWQMP on the HUC-8 scale, as member entities of the MIWMA saw the need for a WMA to engage in watershed planning on that scale. Neighboring watersheds including the Middle Cedar and Lower Cedar have previously completed CWQMPs and found them useful for improving water quality.

Integration with Iowa Statewide Planning Initiatives

Iowa Smart Planning Principles

Iowa's Smart Planning Act requires that 10 Smart Planning Principles be considered when local and state agencies deliberate planning, zoning, development, and resource management decisions. Not all 10 principles are relevant to watershed planning, but where applicable, Iowa's Smart Planning Principles were applied to the planning process. In particular, the sections below are highlighted as they pertain to the Smart Planning Principles (Table 1-1).

IOWA SMART PLANNING

Table 1-1. Example Iowa Smart Planning Principles Addressed by Middle Iowa CWQMP

Smart Planning Principle	Primary Section Addressing Principle
Principle 1: Collaboration	• Section 1 – Introduction: MIWMA Overview; Planning Committees
Principle 2: Efficiency, Transparency and Consistency	• Section 1 – Introduction: Planning Committees; Stakeholder Input • Section 9 – Stakeholder Engagement and Education Plan
Principle 6: Housing Diversity	• Section 5 – Case Studies
Principle 8: Natural Resources and Agricultural Protection	• Section 4 – Watershed Goals and Priority Subwatersheds • Section 8 – Implementation Schedule
Principle 9: Sustainable Design	• Section 5 – Case Studies • Section 6 – Riparian and Stream Buffer Management

Principle 1: Collaboration
Participation in the MIWMA goes well beyond the identified member entities, and includes partners representing local, state, and federal organizations, and other stakeholder groups.

Iowa's Nonpoint Source Management Plan

Iowa's Nonpoint Source Management Plan (NPSMP) states Iowa's approach to addressing nonpoint source pollution within Iowa's surface and groundwater. The NPSMP has four primary goals listed with all four applying to watershed planning. These goals are:

- Improving Iowa's surface and groundwater quality
- Improving Iowa waters that affect public health
- Protecting native wildlife and recreation
- Reducing excess nutrient delivery to Iowa waters

All four of these goals are addressed throughout the Middle Iowa Watershed CWQMP.

Planning Committees

Technical Advisory Committee (TAC)

The purpose of the Technical Advisory Committee (TAC) is to provide logistical support, aid decision-making, and work with the project coordinator and planning consultant to develop the plan. The TAC is coordinated by Johnson County (Kasey Hutchinson) and includes the individuals listed in the Acknowledgements page.

Members of the TAC are responsible for providing information needed for the planning process, reviewing, providing suggested revisions for draft plan related information, and assisting in plan development. TAC members attend quarterly MIWMA meetings and met more frequently with the project coordinator and planning consultant during plan development.

Outreach and Engagement Committee (OEC)

The purpose of the Outreach and Engagement Committee (OEC) is to assist with outreach, engagement, and educational components of the planning process. The OEC acts as a sounding board to help identify outreach opportunities for the MIWMA and to ensure the MIWMA has a presence and voice at appropriate events and opportunities. OEC members also works with the MIWMA and the watershed plan consultant in the execution and attendance of field days, listening sessions, workshops, and other potential events. In addition to MIWMA members, OEC members include partner organizations with long-standing interests and collaboration with landowners and natural resources in the Middle Iowa Watershed.

Stakeholder Input

Local stakeholders came together to form the MIWMA. It was the intention of the planning group to further develop a local community engaged in resource management through the CWQMP development process and implementation. Increased partnerships and relationships lead to cooperation which is key to the voluntary implementation of projects. The planning process is intended to foster networks that will remain after the plan is approved that will increase capacity, information exchange, and strategies to build a resilient watershed and improve water quality. Some examples of partnerships expected to form include:

- Rural / urban
- Experts / members of the public
- Landowners / agencies equipped to provide management opportunities
- Local government / state government

A few specific stakeholders that have been and will continue to be involved in watershed education and actions include Friends of Coralville Lake, the Amana Society, and the Meskwaki Nation-led Iowa River Watershed Coalition.

Iowa River, Source: Houston Engineering

Public Engagement

Members of the public were invited to become part of the planning process through an official outreach campaign, of which events are described below.

Plan Kickoff Event

Input from watershed stakeholders (which can be anyone working in water or resource management) was further solicited through an ongoing outreach process to voice public concerns. Public input was first sought through a plan kickoff meeting held in Tama on July 11th, 2024.

Upon plan approval, an implementation kick-off event was held where watershed stakeholders were invited to learn how this plan will benefit the watershed and how they can participate.

Attendees were welcomed and given an introductory overview of the MIWMA, purpose in developing a CWQMP, and content that would form the CWQMP. Three exercises were done with attendees to hear public feedback and utilize it during plan development.

Visioning Exercise

Attendees were asked what the plan should address / achieve to make it a success. A few responses are:

- Water quality, soil health, and stewardship
- Effective communication to the watershed community
- Habitat and multiple ecological benefits

Conversely, attendees were asked if they have any concerns. Responses were:

- It needs to be flexible (not too rigid, adaptable)
- If there is lag time in results (stakeholders or public may grow impatient)
- Managing expectations (related to lag time in results)
- Ensuring the plan includes measurable outcomes

Gap Analysis Exercise

Watershed conditions and issues were discussed and split into three categories: Water Resources, Land and Ecology, and Social and Community. Existing DNR and USGS monitoring data was presented with a map of impaired waters. Attendees were asked if there were any gaps in the categories; responses are included below.

Gaps in Land / Ecology issues?

- Wetlands and groundwater recharge
- Riparian areas

Gaps in Water Resource issues?

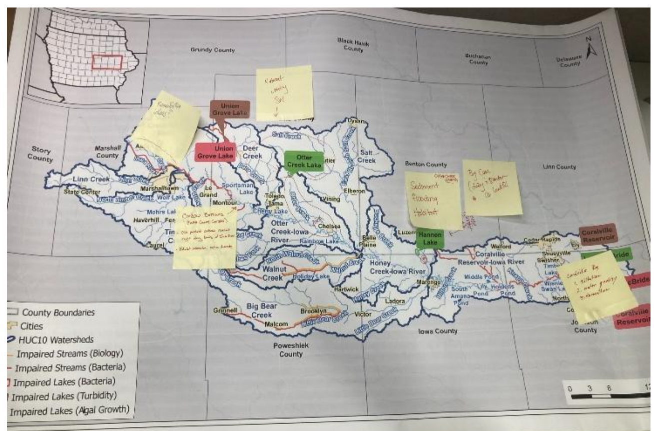
- Sediment
- Soil health and stewardship
- Closing data gaps in water quality and quantity during implementation

Gaps in Social / Community issues?

- Accessibility and social demographics to those impacted
- Policies and statewide coordination

Mapping Exercise

Finally, poster-sized maps were available for meeting attendees to add notes to. Maps were made for water quality impairments, land use, and cities. Attendees placed post-it notes on the map to indicate the geographic locations of concern. A repeated concern was sedimentation, flooding, and habitat degradation at Otter Creek Marsh. General resource concerns were sedimentation, nutrient loading, habitat protection, and ability to recreate.



Kickoff notes on impairments

Events During Plan Development

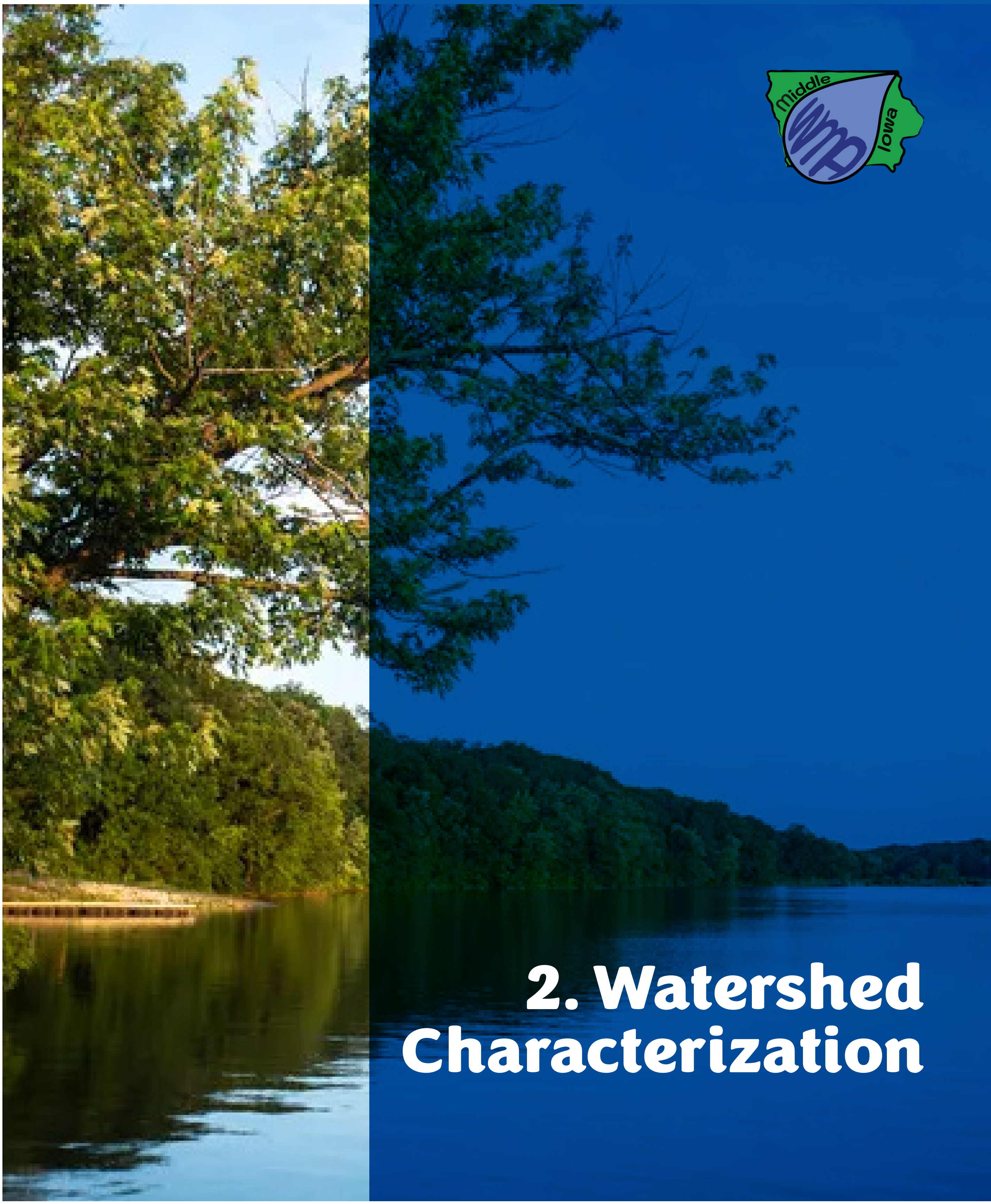
MIWMA members hosted or were involved in outreach and education events during plan development, at which the CWQMP development and MIWMA goals were discussed. MIWMA members listened to resident questions or concerns on watershed issues and these were incorporated into plan development.

Events held during plan development include:

- Iowa Learning Farms event
    - To educate residents on wetland benefits and opportunities
- Practical Farmers of Iowa event
    - To discuss agricultural commodities, equipment, and management practices to reduce fertilizer and herbicide and provide pollinator habitat
- Grinnell Urban Demonstration Projects
    - To tour successful urban water quality projects and discuss stormwater management and downstream impacts of urban pollution
- Source Water Workshop
    - To discuss source water protection
- Roots to Rivers event
    - Tama SWCD event to educate producers on the benefits of soil health on water quality
- Urban Workshop and listening session
    - Community listening events provide an opportunity for resident and stakeholder concerns and priorities to impact watershed management. At the listening sessions, staff presented on the CWQMP process and purpose and the MIMWA role. The listening session focused on urban issues, and attendees discussed challenges to urban pollution, community needs, and locations of key issues or important resources


Photo: 2025 Source Water Workshop


Photo: 2025 Urban Workshop



2. Watershed Characterization

Section 2. Watershed Characterization

Planning Area

The Middle Iowa Watershed is a Hydrologic Unit Code (HUC) – 8 (07080208) watershed located in Central Iowa in the Iowa River Basin. It spans 1,060,480 acres over 10 counties: Story, Marshall, Jasper, Grundy, Tama, Poweshiek, Benton, Iowa, Linn and Johnson. Most of the 34 cities in the watershed have populations under 2,000, but larger cities include Marshalltown, Toledo, Tama, Belle Plaine, North Liberty, Marengo, and Ely. The population of the watershed is estimated at about 100,000 (State Data Center, 2023). Most of the watershed is agricultural land, of which relevant statistics are provided in Table 2-1.

Table 2-1. County Statistics (USDA, 2022). Story and Grundy are not included as these counties cover 0.3% of the watershed.

County	Percent of County in the Watershed	County Population	Number of Farms	Percent Change in Number of Farms 2017-2022	Average Farm Size (Acres)	Percent Change in Average Farm Size 2017-2022	Total Acres in Farms	Number of Producers*	Female Producers (%)
Benton	7%	25,796	1,090	-5%	346	-6%	377,259	1,878	32%
Iowa	13%	16,381	968	0%	354	-1%	342,212	1,667	33%
Jasper	1%	37,919	1,151	17%	382	0%	439,310	2,019	34%
Johnson	10%	157,528	1,212	-4%	214	-11%	259,760	2,201	34%
Linn	2%	288,972	1,416	3%	239	1%	338,977	2,576	36%
Marshall	21%	40,014	898	1%	371	4%	333,581	1,617	33%
Poweshiek	16%	18,453	792	-7%	364	-9%	288,668	1,370	31%
Tama	30%	16,833	1,056	-1%	596	-10%	360,619	1,838	32%

*Data collected for a maximum of four producers per farm

Hydrology and Geology

The watershed begins north of Marshalltown, after Minerva Creek joins the Iowa River. The watershed follows the Iowa River and its tributaries to the Coralville Reservoir, which is the outlet of the watershed. See **Appendix A** for a list of Middle Iowa Watershed subwatersheds. The upstream watershed is the Upper Iowa and the Lower Iowa is downstream. The Middle Iowa Watershed is also bordered by the Middle and Lower Cedar Watersheds to the east, and North Skunk Watershed to the west. Major lakes in the watershed include Green Castle Lake, Union Grove Lake, Otter Creek Lake, Hannen Lake, and Lake Macbride. The Coralville Reservoir was constructed in 1955 and is a popular recreational lake but is decreasing in volume due to sediment buildup.

The Iowa River is prone to flooding, with notable floods occurring in 1993, 2008, and 2013. Historical peak flow and average daily flow in the Iowa River at Marengo is shown in Figure 2-1. The peak flow in 2013 approached the peak discharge of the 2% annual exceedance probability (50-year flood) at Marengo. Flood prone communities and agricultural lands will benefit from practices that restore hydrology, provide flood storage, and increase channel stability.

Many Middle Iowa Watershed residents receive drinking water from groundwater. There are 156 active public drinking water wells in the watershed, many of which are in the eastern side of the watershed in Johnson County (DNR, 2023a). Of these, 61 are deemed highly susceptible to contamination (see Section 7. Source Water Protection). There are many private wells used for drinking water as well. About 7% of Iowans rely on private wells and there are a total of 2,613 active household wells in the watershed (DNR, 2025a; DNR, 2025b).

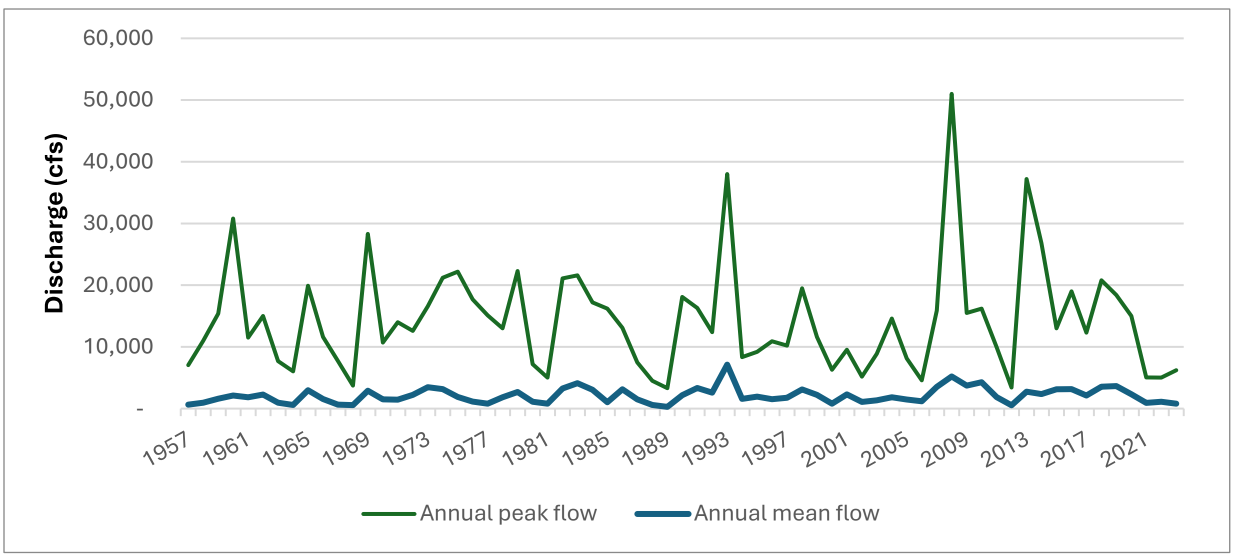


Figure 2-1. Annual mean and peak flows in Iowa River at Marengo (USGS, 2024)

The geology and topography of Iowa was formed by glacial activity. Most of the watershed is in the Southern Iowa Drift Plain landform, with the northern border of the watershed extending into the Iowan Surface landform. The Southern Iowa Drift Plain was shaped by older glaciers than those that formed the northern part of the state. Glaciers that reached into Missouri left behind glacial drift over bedrock, which was later covered by a layer of silty and sandy loess. The age of this landscape has provided time for streams to carve into the surface, resulting in a hilly landscape. The Iowan Surface landform has a lower relief with more open views than the steep rolling hills to the south. Hills in both landforms are known for having stepped surfaces as a remnant of past stream and erosion activity (Prior, n.d.).

The Cambrian-Ordovician Aquifer System is a deep bedrock aquifer that can supply water to agricultural and municipal wells in the watershed. The Silurian-Devonian aquifer also underlies most of Iowa. There are other smaller and shallow alluvial aquifers along the river that are more hydraulically connected to the river and more commonly support shallow private wells and influence baseflow.

Climate

The climate of the watershed is typical of the Midwest, with cold snowy winters and hot summers. Climate data from Belle Plaine was used as a central location for the watershed. In Belle Plaine from 1950-2023, the annual low averages -17˚F and the annual high measures 97˚F. The annual average temperature is 48˚F. The total annual precipitation has averaged at 35 inches (NOAA, 2024).

Iowa's climate is experiencing changes, such as increased precipitation extremes and higher temperatures that are expected to continue into the future. In the agricultural Middle Iowa Watershed, impacts such as an extended growing season, heat stress to crops, and favorable conditions for crop pests are important to understand and plan for.

Natural Resources

Natural spaces are abundant in the watershed, especially along the Iowa River. Throughout the watershed, there are over 45,000 acres of recreational land and water. The most significant of these include Hawkeye Wildlife Management Area (WMA), Iowa River WMA, Coralville Reservoir, Otter Creek Marsh WMA, and Lake Macbride State Park (Figure 2-2). These spaces provide recreational opportunities for watershed residents as well as fuel tourism into the watershed. For example, Coralville Reservoir receives an average of 1.1 million visitors a year (USACE, 2023). The Upper Iowa River is a popular destination for paddlers, but opportunities for recreation are also present on the Middle Iowa River. The scenic riparian corridors provide potential for the development of water trails and additional wildlife management areas.

The watershed is a home to several threatened or endangered species, including the eastern prairie fringed orchid, northern long-eared bat, and the eastern massasauga (threatened) as well as the endangered Indiana bat, Higgins eye, and rusty patched bumble bee (Center for Biological Diversity, n.d.). Habitat and natural spaces are particularly abundant in riparian areas of the Iowa River.

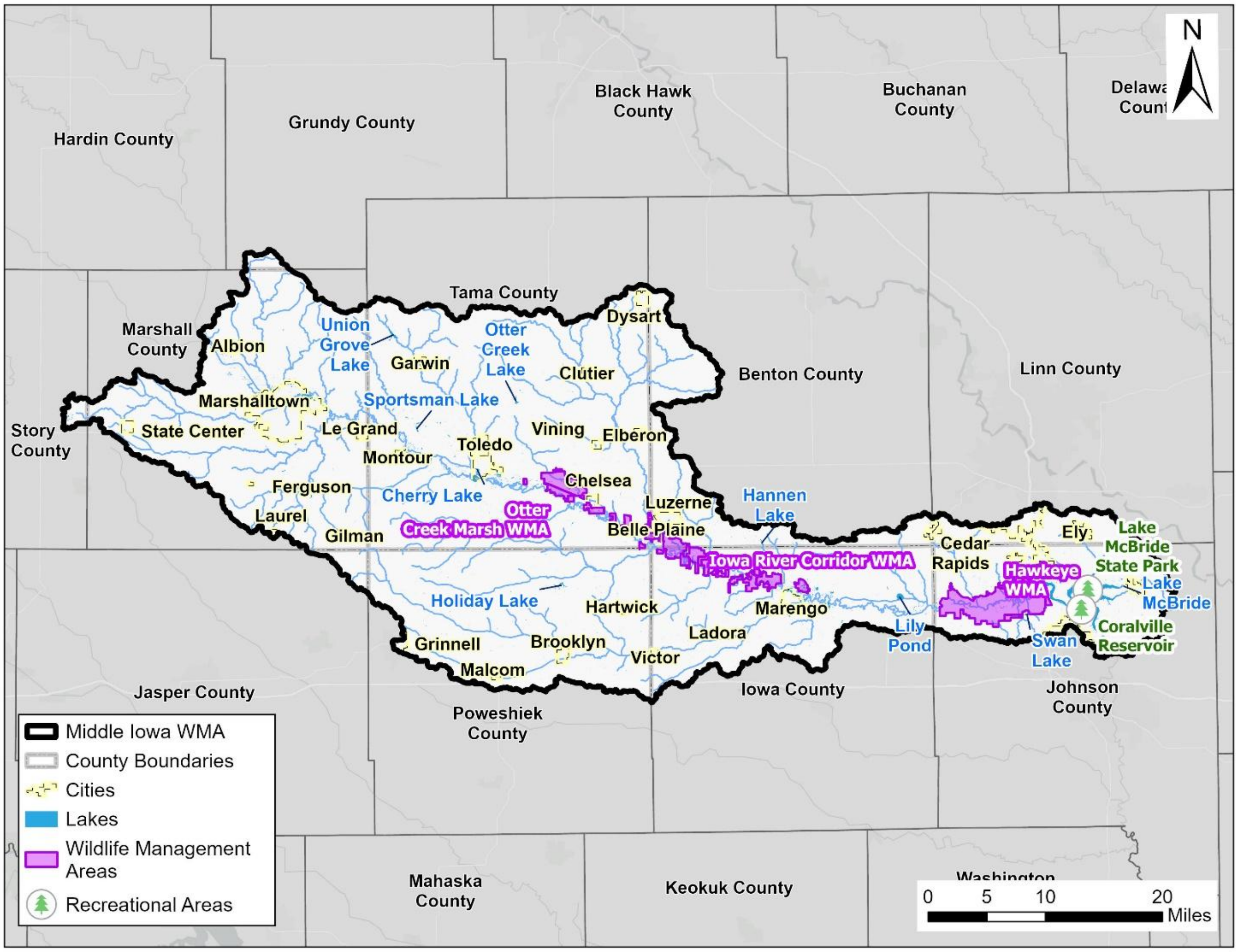


Figure 2-2. Lakes and natural resources in the watershed

Land Use

The majority of land in the watershed is used for agricultural purposes (67% row crops, 12% hay or pasture), with another 9% wooded, 7% developed, and 6% open water or wetlands (Figure 2-3). Agriculture is influential to the land use, economy, and way of life in the region. There are about 2,600 farms in the watershed with an average farm size of 350 acres (USDA-NASS, 2022). Farming row crops is not the only use of productive land, as there are also 95 feedlots with over 300 animal units that support swine, cattle, and chickens (DNR, 2024). Impacts such as flooding and drought are of particular concern to farmers.

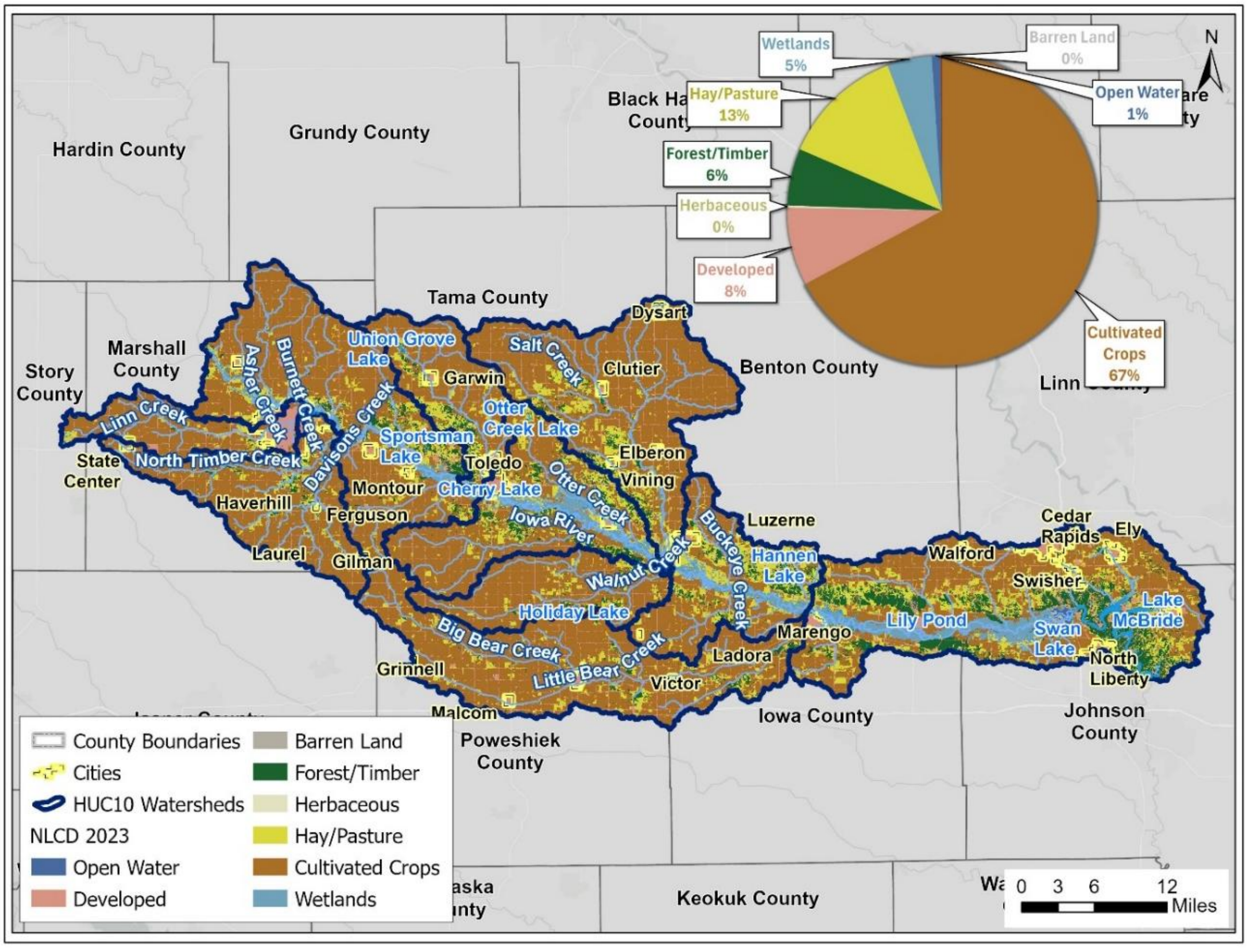


Figure 2-3. Land Use in the Middle Iowa Watershed.

Summary of Existing Data and Reports

The Middle Iowa Watershed has a rich foundation of existing data and reports to build this plan on (Table 2-2). This includes numerous Total Maximum Daily Load (TMDL) reports, watershed plans, studies, and Hazard Mitigation Plans that contain information relevant to this plan. The background and key findings of these reports are summarized in this section. Each of these were reviewed for incorporation into this CWQMP, as the planning partners recognize the strategies in this CWQMP build upon earlier watershed work.

Table 2-2. Reports discussed in Section 2

Category	Name	Year
Total Maximum Daily Loads (TMDLs)	Iowa River Basin	2017
	Hannen Lake	2012
	Lake Macbride	2005
	Statewide Beach Bacteria	2022
	Union Grove Lake	2009
	Otter Creek Lake	2014
Watershed and Lake Plans	Otter Creek Lake Watershed Management Plan	2015
	Price Creek Watershed Management Plan	2010
	Union Grove Lake Watershed Management Plan	2012
	Little Bear Creek Watershed Improvement Project	2015
	Coralville Lake Reservoir Master Plan	2023
Hazard Mitigation Plans	Benton County	2021
	Iowa County	2020
	Johnson County	2025
	Linn County	2025
	Marshall County	2017
	Poweshiek County	2011

Total Maximum Daily Loads (TMDLs)

Waters are declared impaired by DNR after sampling. Many waters have not been formally assessed so a lack of listing does not indicate the water body is in good condition. More river and stream reaches in the watershed will likely become impaired if additional monitoring data is collected. Water monitoring to understand baseline conditions across Iowa is recommended. See Section 3 for more information on impaired waters.

Total Maximum Daily Load (TMDL) reports are required for streams and lakes on the impaired waters list through the Clean Water Act (Figure 2-4). TMDLs are referred to by DNR as Water Quality Improvement Plans (WQIP) and these must be approved by the EPA. The Middle Iowa Watershed has four lakes with TMDLs and one TMDL report for the Iowa River that contains load reduction goals for all bacteria-impaired reaches in the watershed.

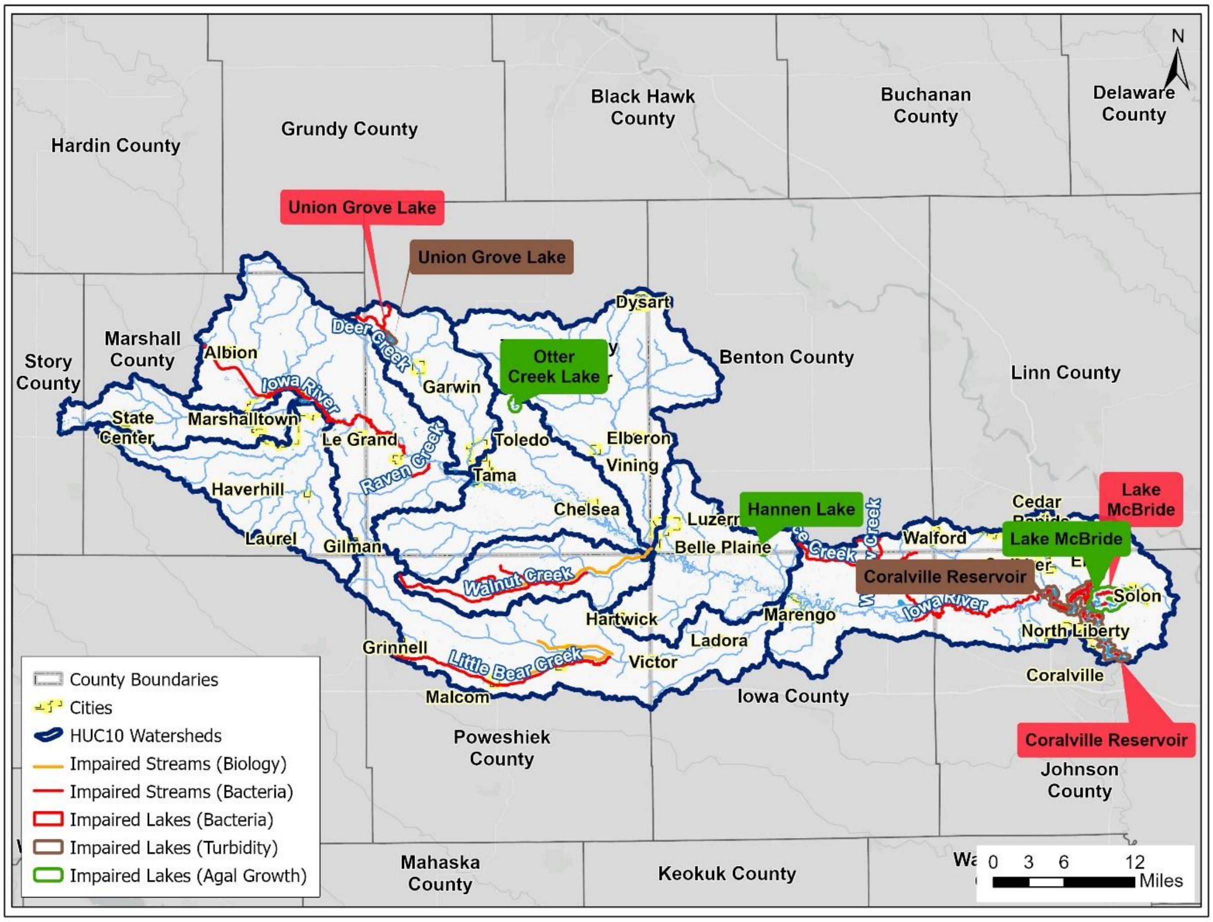


Figure 2-4. Middle Iowa Watershed Impairments (2022)

Iowa River Basin

A WQIP with TMDL calculations for bacteria impaired resources was developed for the Iowa River Basin in 2017, which includes the Upper, Middle, and Lower Iowa River Watersheds. The Iowa River begins in Hancock County and forms the main channel in Wright County. Eventually it meets the Mississippi River downstream of Lock and Dam No 17. The Basin has 47 stream reaches that do not meet their use for primary contact recreation due to *E. coli*. *E. coli* is not always dangerous but is used as a monitored indicator of the likelihood of other pathogenic bacteria that may be present in the water.

This WQIP identifies the pollutant loading capacity to fully support recreation as having a geometric mean under 126 organisms per 100 ml or no single sample over 235 organisms per 100 ml. Load duration curves using mean daily flows and the geometric mean were used to obtain the loading capacity of each impaired river reach. The existing bacteria load, a load duration curve, and TMDLs were developed for each segment across different flow regimes. A summary of each Middle Iowa River Watershed TMDL is included in Table 5-47 of the WQIP. Following TMDL calculations, the report describes potential best management practices (BMPs) to reduce bacteria loading and discusses implementation of future monitoring and watershed planning projects.

Hannen Lake

A TMDL was released in 2012 for Hannen Lake, which did not support primary contact recreation in 2010 due to algae and pH. Hannen Lake, in Benton County, was the first artificial lake in the county. It was built to 49 acres but shrunk to 37 acres as of 2005. The existing phosphorus load is estimated to be 649 lbs/year, and the target load is set to 138 lbs/year. Most of the phosphorus is sourced from nutrient runoff from cropland and internal loading, with geese manure also contributing.

The TMDL lays out an idealized monitoring plan if funding and logistics were not a consideration. It consists of biweekly water chemistry sampling, an annual fish and plant inventory, and continuous monitoring of dissolved oxygen. The report recommends dredging, discouraging geese on the lake, and agricultural management practices such as cover crops, buffer strips, terraces, contour farming, and water and sediment control structures to improve water quality. It also suggests forest and parkland assessments to understand gully erosion and if a forest management plan is needed.

Lake Macbride


Lake Macbride, Source: Iowa City Cedar Rapids

Lake Macbride TMDL was published in 2005 due to the lakes failure to support primary contact recreation and aquatic life due to phosphorus and siltation. Lake Macbride in Johnson County was originally 178 acres and is within a state park that draws many visitors for recreation. The 2,180-acre park offers camping and boat rentals and is a draw for tourism, making the lake water quality essential. The lake was increased to 812 acres with the construction of the Coralville Reservoir in 1955. The level of the lake was drawn down in 2000 for restoration work, followed by a 319 project to protect the lake from excessive silt.

The TMDL estimates the existing phosphorus load at 19,520 lbs/year and sediment at 34,500 tons/year. A Trophic State Index (TSI; a rating based on a classification system) goal of under 62 was set for phosphorus and under 60 for chlorophyll-a (algae) and Secchi depth. As this was met in the early 2000s, the targeted load capacity was set to the existing load. Sources of phosphorus are modeled as largely overland runoff and internal loading, with some point source and atmospheric deposition as well. Main sources of sediment include upland erosion in farm fields, gully erosion, and streambank erosion. As with phosphorus, the allowable annual sediment loading was modeled well over the existing load, meaning the existing load was set as the annual load capacity. The implementation section recommends agricultural best management practices, lake management to control internal loading, dredging, installation of check dams on small tributaries, and streambank protection.

Lake Macbride has a bacteria impairment as of 2006 and a chlorophyll-a impairment as of 2010. An additional statewide TMDL for beach bacteria was published in 2021 and revised in 2022. It includes a beach on Lake Macbride that does not support primary contact recreation for *E. coli*. It sets a bacteria load reduction goal of 59% at Lake Macbride.

Union Grove Lake

Photo: Union Grove Lake Watershed Management Plan

Union Grove Lake was declared impaired because of algae, turbidity, pH, and bacteria in 2004 and has designated uses of primary contact recreation, lake/wetland warm water wildlife and aquatic life, and human health. Its TMDL was published in 2009, which sets an annual total phosphorus delivery target of 3,006 lbs/ year. The TMDL estimates annual loading is over 10,000 lbs/ year (58% watershed runoff, 37% internal loading, 4% groundwater seepage, and 1% failing septic, wildlife, and atmospheric deposition), but the Union Grove Watershed Management Plan (WMP) published in 2012 estimates current loading to the lake at over 8,000 lbs/ year, showing an improving trajectory.

The TMDL also covers bacteria, which DNR estimates allowable daily loads can be met through reducing bacteria concentrations by 80%. Most bacteria loading occurs during precipitation, when runoff is the highest. Additionally, the residence time of water in the lake can be long, allowing continuous loads from livestock, wildlife, and nutrients from failing septic systems to accumulate in the lake.

Otter Creek Lake

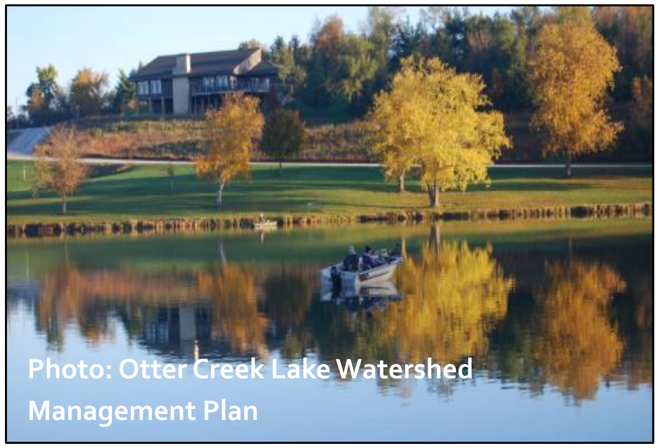


Photo: Otter Creek Lake Watershed Management Plan

A TMDL for Otter Creek Lake was released in 2014 due to the lake not supporting its designated use of primary contact recreation due to elevated chlorophyll-a. The lake has high turbidity, phosphorus and chlorophyll-a. Modeling found all phosphorus is from nonpoint sources, with most of the phosphorus sourced from manure and fertilizer application to fields along with sheet and rill erosion. The TMDL estimates the existing phosphorus load is 1,497 lb/year and sets a reduction goal of 70% to 451 lb/year.

The TMDL suggests dredging to remove phosphorus accumulated in sediment and released through internal loading. It has an implementation plan which recommends conservation practices (conservation tillage, cover crops, diverse planting, vegetative buffers, nutrient management, and riparian buffers) and structural practices (terraces, water and sediment control basins, wetlands). Otter Creek Lake has undergone significant work 2021-2023, including:

- Tree removal and management
- Construction of ponds for nutrient and sediment reduction
- Lake drawdown
- Dredging
- Shoreline stabilization
- Creation of fishing jetties and fish habitat
- Updating the lake outlet structure
- Beach renovations to improve drainage and safety

Watershed and Lake Plans

Otter Creek Lake

The Otter Creek Lake Watershed Management Plan (WMP) was published in 2015 by the Tama County Conservation Board, Tama SWCD, DNR, and Iowa Department of Agriculture and Land Stewardship. It was edited in 2020. Otter Creek Lake is a 66-acre lake within a large county park, and is an important recreational site for swimming, boating, fishing, and more. Otter Creek Lake was first declared impaired for its designated primary contact recreation use in

2008 due to algae blooms. Siltation was also a major concern, affecting a third of the lake to the point where recreation is impeded. Turbidity is a new and only impairment on the draft 2024 impaired waters list.

Most phosphorus is from cropland, especially highly erodible soils. About 90% of the sediment load to the lake is estimated to be from erosion from farm fields. In order to improve lake quality, the plan sets three goals:

1. Implement watershed improvement measures to increase water clarity and enhance the lake aesthetics
2. Enhance public awareness and understanding of the Otter Creek Lake watershed
3. Implement in-lake restoration measures to improve aquatic habitat and recreational opportunities

The plan was intended to be carried out over a ten-year time period, through which actions with specific measurements of success are planned to meet goals. The lake restoration effort, through the DNR Lake Restoration Program and Tama County Conservation, was completed in 2023 and the lake regained its normal pool elevation in 2024-2025.

Otter Creek Lake Restoration, Source: Houston Engineering

Price Creek

Price Creek Watershed is a HUC-12 of about 19,000 acres and located north of the Iowa River. It is named for Price Creek, which flows 13 miles through Benton County. The watershed land use is largely row crops and livestock production. The creek is an important water source for livestock and tourism, and it runs through the tourist destination of the Village of Amana. A majority of the soils are highly erodible, making sediment loss a concern. Sediment and bacteria are the main issues facing the watershed. The WMP finds it likely that the watershed is a source of bacteria to the Iowa River (which is impaired for bacteria), but more data and modeling is needed.

The WMP, developed by Iowa and Benton SWCDs, gives an overview of the watershed, monitoring data, and models. About seven miles of streambank are identified as unstable, and about 16,000 tons/year of sediment is modeled as delivered into Price Creek from streambank erosion. SWAT is used to model bacteria, which identifies priority areas and needed load reductions. A bacteria reduction of over 90% is needed in any flow regime. In order to reduce sediment and bacteria loading, the WMP set four objectives:

1. Eliminate livestock access (approximately 12 miles) to Price Creek and its tributaries
2. Reduce bacteria loading by breaking the delivery network on the most critical areas
3. Reduce sediment loading by 4,500 tons/year on the most critical cropland and stream bank
4. Eliminate bacteria loading from failing septic systems

The number and/or area of livestock and cropland BMPs and conservation practices was planned in order to meet these objectives.

Union Grove

Tama SWCD published the Union Grove Lake Watershed Management Plan in 2012, intended to be implemented over 14 years. Union Grove Lake of Tama County is a popular recreational lake within Union Grove State Park. The lake was declared impaired because of algae, turbidity, pH, and bacteria in 2004 and has designated uses of primary contact recreation, lake/wetland warm water wildlife and aquatic life, and human health.


Photo: Union Grove TMDL

Its TMDL (discussed in previous section) was determined in 2009, which set an annual total phosphorus delivery target of 3,006 lbs per year. The WMP updates the annual phosphorus load from the TMDL, estimating current loading to the lake at over 8,000 lbs per year, half from nonpoint sources such as agricultural runoff, leaking septic systems, wildlife, lakeshore development, and half from internal loading. The TMDL also covers bacteria, which DNR estimates allowable daily loads can be met through reducing bacteria concentrations by 80%. Top sources of bacteria include livestock, manure applied to fields, failing septic systems, and wildlife.

The plan sets six goals, each with additional objectives and resulting actions:

- Conduct in-lake restoration activities to reduce internal phosphorus nutrient contribution to reduce total phosphorus by 3,365 lb/yr
- Reduce the watershed contribution of sediment and phosphorus, such that the watershed's total phosphorus load is reduced by 1,673 lb/yr
- Reduce bacteria concentrations in Union Grove Lake in order to fully support the lake's designated uses, eliminate beach closings, meet geometric mean and maximum sample concentration limits, and achieve threshold *E. coli* loads named in the plan
- Assess, evaluate, and monitor water resources
- Conduct a public outreach program
- Protect the existing private constructed wetland complex in order to reduce sediment and phosphorus delivery to Union Grove Lake

Little Bear Creek Watershed Improvement Project

Little Bear Creek is located in Poweshiek County and drains approximately 29,000 acres. It is impaired for bacteria and biology. Sediment loading is a water quality concern in the creek, and this report summarizes work done by Poweshiek Soil and Water Conservation District (SWCD) in the drainage area to reduce sediment delivery and improve water quality.

The report states sediment loading from cropland, a lack of sufficient riparian buffers, and poor streambank conditions are main contributors of sediment to the stream. To address this, the SWCD worked with landowners and local partners to implement grassed waterways, terraces, water and sediment control basins, cover crops, and rainscaping practices. This reduced sediment loading by an estimated 550 tons/year and phosphorus loading by an estimated 710 lbs/year.

Coralville Lake Reservoir Master Plan

The US Army Corp of Engineers (USACE) manages the Coralville Lake Reservoir, which was constructed in 1958. The reservoir was originally for flood control and has since been expanded to provide recreational and habitat benefits. USACE estimates the flood damages prevented by the reservoir since it's installation amounts to over $680,000,000. The Master Plan "provides guidance and facilitates appropriate management, use, development, enhancement, protection, and conservation of the natural, cultural, and man-made resources" of the reservoir (USACE, 2023).

USACE has been studying sedimentation in the lake, which is inherent to the site but has been occurring more quickly than anticipated during design. To visualize the sedimentation, USACE equates its volume as 1.5 empire state buildings of sediment accumulating annually. The water storage benefits of the reservoir will continue into the future but there is concern over the recreation in a few decades. A reduction in sediment loading as planned in this CWQMP will assist in reducing sediment build-up.

Studies

Nutrient in the Middle Iowa River Basin, Iowa

The USGS conducted a study to assess nutrient loads in the Middle Iowa Watershed from 1980-1996, 2006-2010, and 2011-2018 to evaluate progress towards Iowa's statewide nutrient reduction strategy goal of a 45% reduction in nitrogen and phosphorus by 2035. They found that despite an overall increase in stream flow, nutrient concentrations and loads decreased in the most recent study period compared to historical ones. Average annual yields near Marshalltown for 2011-2014 are about 20 lbs/ac for nitrogen and nitrate (33% decrease for total nitrogen and 47% decrease for nitrate from 1980-1996) and 0.9 lb/ac (a 10% decrease) for total phosphorus. The study identified a lack of complete data upstream of Marshalltown and near Marengo as a barrier to comparing the time periods (Garrett and Kalkhoff, 2021).

In-Stream Nitrogen Processing and Dilution

A Master's thesis was published on the results of a study on the Cedar Iowa River Basin (which includes the Middle Iowa River Watershed) to determine the degree to which three mechanisms can explain the trend of decreasing nitrogen downstream in the watershed. This study was done during a unique season, as there was drought in 2012, so nutrients applied to cropland largely remained on fields rather than being carried downstream during precipitation events. Sampling during the following year captured a massive pulse of nitrogen following spring rainfall which elevated stream nitrogen concentrations for about six weeks. The research sought to explain the role processes have in reducing nitrogen from the headwaters to downstream reaches, and found that the timing of inputs, surface and groundwater dilution, and nutrient spiraling likely all play a role, but spiraling is the most responsible (Prior, 2015).

County Hazard Mitigation Plans

Each county has a Hazard Mitigation Plan (HMP) as required by the Disaster Mitigation Act of 2000, which requires local governments to prepare plans to be eligible for federal funds in case of a disaster. The Federal Emergency Management Agency (FEMA) defines a hazard as any source of danger that threatens property, humans, and the environment. The plans are intended to foresee potential hazards to the community, assess their likelihood of occurring, who or what would be impacted, the financial toll, and the amount of warning before an incident occurs. Each plan gives an overview of county demographics and resources before identifying hazards and their potential impact to the community. Current hazard mitigation actions are discussed along with planning for improvements and goals. HMPs help prepare a community in case of disaster.

Plan goals are to 1) Minimize losses in hazard areas with a focus on critical facilities, lifelines, and identified assets, 2) protect the health and safety of residents and visitors, 3) Educate residents on hazards and preparedness, and 4) Ensure the continuity of local operations will not be significantly disrupted in case of a disaster. Each local entity has actions to take described in the mitigation action plan to meet goals.

While some hazards may not relate to environmental or water resources, planning for disasters such as flooding will overlap between a HMP and this watershed plan. Additionally, HMP are multi-jurisdictional between local governments. The partnerships developed through hazard mitigation planning will be further developed in watershed planning.

2024 Iowa River flooding;
Source: Iowa Public Radio

Benton County

The initial multi-jurisdictional HMP for Benton County was approved in 2011, and the plan was updated in 2021. Local jurisdictions involved in the planning process include:

- Unincorporated Benton County area
- The Cities of Atkins, Belle Plaine, Blairstown, Garrison, Keystone, Luzerne, Mt. Auburn, Newhall, Norway, Shellsburg, Urbana, Van Horne, Vinton
- The Belle Plaine Community School District, the Benton Community School District, and the Vinton-Shellsburg School District
- Vinton Municipal Electric Utility

The plan identifies 16 natural hazards and 24 human-caused or combination hazards. These were ranked, with the top hazards as energy failure, a transportation hazardous materials incident, and a highway transportation incident. The plan determined that the only dam in the county is not a significant enough hazard to be included. Flooding was given a hazard score of 2, which incorporates event probability, the severity, the warning time, and its duration and places flooding at a hazard ranking of 11. The hazard with the highest score is a tornado or windstorm, with the destructive nature of these evidenced by the 2020 derecho that caused widespread damage to infrastructure, property, and crops.

Iowa County

The initial multi-jurisdictional HMP for Iowa County was approved in 2015, and the plan was last updated in 2025. Local jurisdictions involved in the planning process include:

- Iowa County
- The Cities of Ladora, Marengo, Millersburg, North English, Parnell, victor, and Williamsburg
- The English Valleys, HLV, Iowa Valley, and Williamsburg School Districts

The plan identifies 13 natural hazards, 5 technological hazards, and one human caused hazard. Hazards were ranked on a variety of factors including the warning time, probability, magnitude, and duration. The highest ranking hazards are flash floods, severe winter storms, thunderstorms, tornado or windstorm, and levee or dam failure.

Johnson County

Much of Johnson County lies outside of the Middle Iowa Watershed; however, the northeast corner of the watershed is upstream of Coralville Reservoir, which is the outlet of the Middle Iowa HUC-8. The Johnson County HMP was updated in 2025 and includes:

- Unincorporated Johnson County
- Cities of Coralville, Hills, Iowa City, Lone Tree, North Liberty, Oxford, Shueyville, Solon, Swisher, Tiffin, and University Heights
- Clear Creek Amana Community School District, Iowa City Community School District, Lone Tree Community School District, Solon Community School District, and the University of Iowa

The HMP identifies 13 natural hazards and 6 man-made hazards. Tornados, flooding, and severe winter storms ranked the highest in Johnson County. The largest risk from dam failure is for communities downstream of the Coralville Dam, and most of the floodprone areas are outside of the Middle Iowa Watershed boundaries.

Linn County

The Linn County HMP was released in 2025 and participants include:

- Alburnett, Bertram, Cedar Rapids, Center Point, Central City, Coggon, Ely, Fairfax, Hiawatha, Lisbon, Marion, Mount Vernon, Palo, Prairieburg, Robins, Springville, Walford, Walker, and Linn County
- Alburnett, Cedar Rapids, Center Point-Urbana, Central City, College Community, Linn-Mar, Lisbon, Marion Independent, Mount Vernon, North Linn, and Springville Community School Districts

The HMP identifies 12 natural hazards and 8 additional hazards. Flash flooding is identified as an issue throughout the county, and several cities are within the 1% annual chance floodplain.

Marshall County

The Marshall County HMP was released in 2012 and includes:

- Unincorporated Marshall County
- Cities of Albion, Le Grand, Clemons, State Center, Liscomb, Ferguson, Marshalltown, Gilman, Melbourne, Haverhill, Rhodes, Laurel, St. Anthony
- East Marshall Community School District, Marshalltown Community School District

The HMP identifies 14 natural hazards and 7 man-made hazards. Tornados, flooding, and severe winter storms ranked the highest in Marshall County. All dams are expected to only cause minor damage if they fail. Planning found that there are over 70 structures in the floodplain.

Poweshiek County

The Poweshiek County HMP was published in 2011 and includes the following entities:

- Cities of Brooklyn, Deep River, Grinnell, Hartwick, Malcom, Montezuma, and Searsboro
- Unincorporated land in Powesheik County
- Brooklyn-Guernsey-Malcom Community School District, Grinnell-Newburg Community School District, Montezuma Community School District

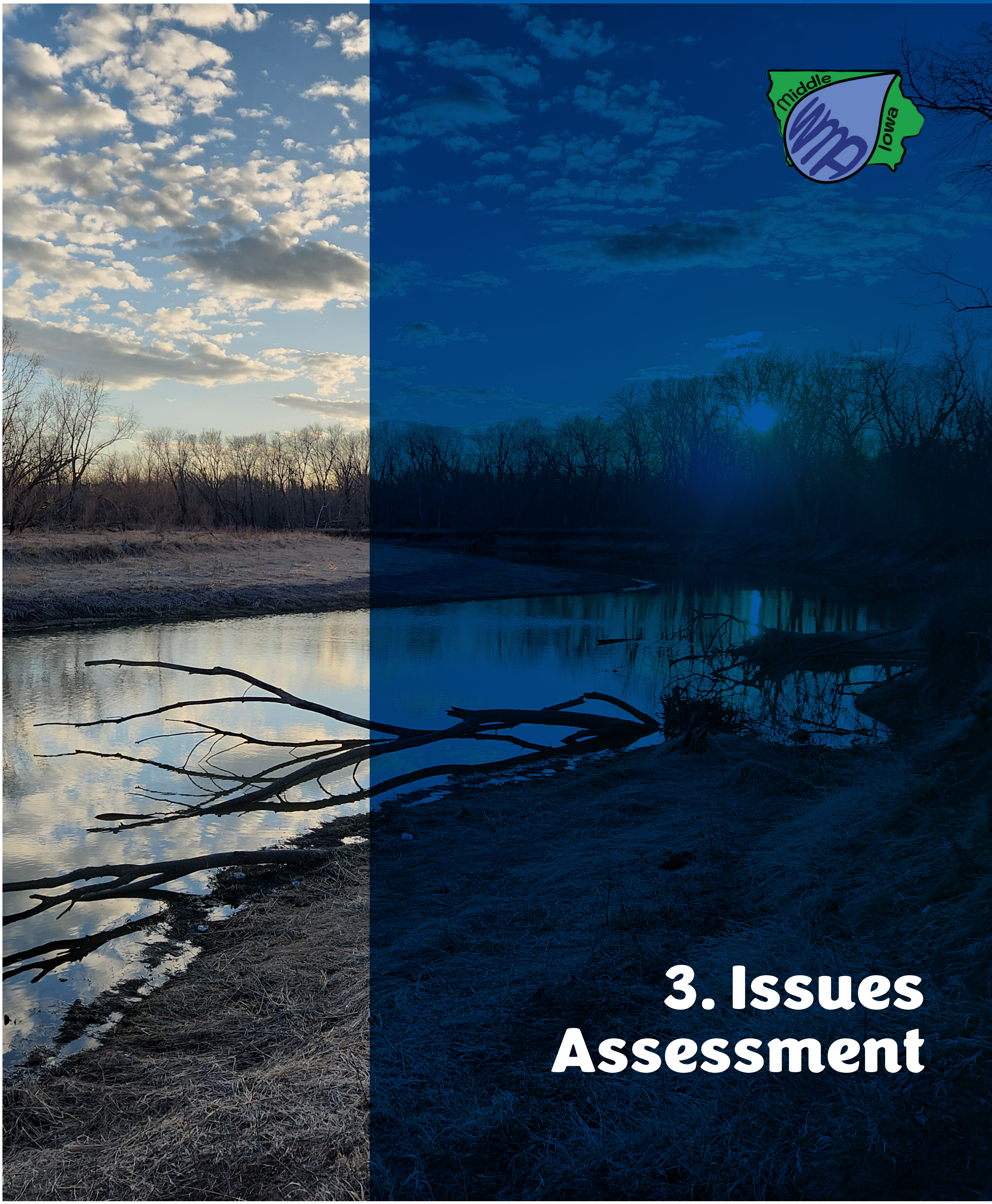
The HMP lists 16 natural hazards and 24 man-made hazards. Hailstorms, tornados, and windstorms are the top ranked hazards in the Powesheik County HMP. Flooding and dam failure are in the middle of the rankings.

Tama County

The Tama HMP was first approved in 2015 and updated in 2021. Local jurisdictions involved in the planning process include:

- Unincorporated Tama County
- Cities of Chelsea, Clutier, Dysart, Elberon, Garwin, Gladbrook, Lincoln, Montour, Tama, Toledo, Traer, Vining
- South Tama School District, South Tama School District, Union Community Schools, and GMG Schools

The plan addresses 20 natural hazards and 6 other hazards. The highest scored hazards are thunderstorms/lightning/hail, windstorms, and tornados. Flooding is a medium priority in Tama County. Major hazards identified include flooding, extreme heat, winter storms, tornadoes, and windstorms.



3. Issues Assessment

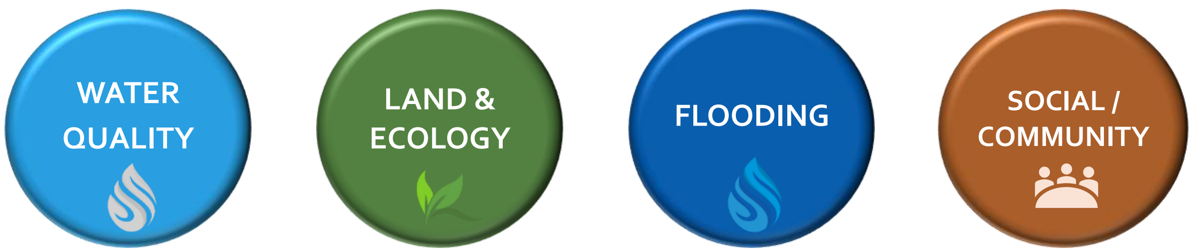
Section 3. Issues Assessment

Issues are any environmental concern that can be addressed to protect or restore natural resources in the watershed. This section describes the issues in the Middle Iowa Watershed.

The first step in identifying watershed issues was to develop a comprehensive list of issues from existing data and studies. These studies are summarized in Section 2, and include:

- Total Maximum Daily Loads (TMDLs)
- Watershed Plans
- Studies
- County Hazard Mitigation Plans

Planning participants also brainstormed watershed issues at the watershed planning kick-off meeting in July of 2024. Issues identified in existing studies and feedback from meetings were organized into four main issue categories shown below. They will be summarized in this section accordingly.



Water Quality

Water quality issues occur when excess pollutants end up in lakes and streams and impact aquatic life or recreation, cause nuisance algae blooms, or impact public health. These pollutants can be from many sources including point sources, cropland runoff, urban runoff, subsurface septic treatment systems (SSTSs), and livestock.

Excess pollutants can result in a lake or stream being impaired. Iowa assigns recreation uses (Class A1/A2/A3), aquatic life uses (Class BWW1/BWW2/Bww3, BLW, and BCW1/BCW2), and drinking water uses (Class C) to water resources throughout the state.

Other uses include:

- Class HH – Human Health – when fish are harvested for human consumption
- Class OIW – Outstanding Iowa Waterbody – for outstanding resources to protect

If a surface water is not meeting its designated use, it is classified as "impaired." As of the 2022 impaired waters inventory, there are 12 impaired streams and 5 impaired lakes in the Middle Iowa Watershed. Impairments are due to the types and numbers of fish present (fish Index of Biological Integrity, or IBI), macroinvertebrate IBI, *E. coli*, mercury in fish tissue, turbidity, chlorophyll-a, and low dissolved oxygen. It is noted that a lack of an impairment classification does not mean a waterbody is in good condition. Impairments only reflect waterbodies that have been assessed by DNR and it is likely additional waterbodies in the Middle Iowa will become impaired if additional monitoring is done. A summary of all impaired waters with the segment identification, designated use, and Integrated Report (IR) categories, and year listed is included in Table 3-1. A TMDL has been completed for IR category 4a, and a TMDL is needed for Category 5a. The latest impaired waters inventory is available on DNR ADBNet, which posts Integrated Reports and has an impaired waters map:
https://programs.iowadnr.gov/adbnet/Assessments/Summary/Home

Table 3-1. 2022 Impaired Streams and Lakes.

Resource Name	Segment ID	Designated Use / IR Category	Year Listed	Impairment
Streams				
Bear Creek	702	BWW2 / 5b-t	2006	Biological: Low Fish And Macroinvertebrate IBIs- Cause Unknown
Deer Creek	6538	A1 / 4a	2014	Bacteria: Indicator Bacteria – *E. coli*
Iowa River	633	A1 / 4a	2004	Bacteria: Indicator Bacteria – *E. coli*
		HH / 5a	2014	Fish Consumption Advisory - Mercury
	634	HH / 5a	2014	Fish Consumption Advisory - Mercury
	635	HH / 5a	2014	Fish Consumption Advisory - Mercury
	638	HH / 5a	2014	Fish Consumption Advisory - Mercury
	641	A1 / 4a	2004	Bacteria: Indicator Bacteria – *E. coli*
		HH / 5a	2014	Fish Consumption Advisory - Mercury
	642	A1 / 4a	2004	Bacteria: Indicator Bacteria – *E. coli*
		HH / 5a	2014	Fish Consumption Advisory - Mercury
	639	HH / 5a	2014	Fish Consumption Advisory - Mercury

Resource Name	Segment ID	Designated Use / IR Category	Year Listed	Impairment
	640	A1 / 4a	2016	Bacteria: Indicator Bacteria – *E. coli*
Little Bear Creek	705	A1 / 4a	2014	Bacteria: Indicator Bacteria – *E. coli*
		BWW2 / 5b-t	2014	Biological: Low Fish And Invertebrate IBIs-Cause Unknown
	706	A1 / 4a	2014	Bacteria: Indicator Bacteria – *E. coli*
Price Creek	699	A1 / 4a	2010	Bacteria: Indicator Bacteria – *E. coli*
	6377	A1 / 4a	2010	Bacteria: Indicator Bacteria – *E. coli*
Raven Creek	723	A1 / 4a	2010	Bacteria: Indicator Bacteria – *E. coli*
Unnamed Tributary to Price Creek	3063	A1 / 5p	2022	Bacteria: Indicator Bacteria – *E. coli*
	3064	A1 / 5p	2022	Bacteria: Indicator Bacteria – *E. coli*
Unnamed Tributary to Walnut Creek	6317, 6318	A1 / 4a	2012	Bacteria: Indicator Bacteria – *E. coli*
	6590	A1 / 4a	2014	Bacteria: Indicator Bacteria – *E. coli*
Unnamed Tributary to Willow Creek	6587	A1 / 4a	2014	Bacteria: Indicator Bacteria – *E. coli*
Walnut Creek	708	BWW2 / 5b-t	2006	Biological: Low Macroinvertebrate IBI
	709	A1 / 4a	2012	Bacteria: Indicator Bacteria – *E. coli*
		BWW2 / 5b-t	2004	Biological: Low Fish IBI
	1916	A1 / 4a	2012	Bacteria: Indicator Bacteria – *E. coli*
Willow Creek	6586	A1 / 4a	2014	Bacteria: Indicator Bacteria – *E. coli*
	Lakes			
Coralville Reservoir	630	A1 / 5a	2006	Turbidity
		A1 / 5a	2020	Bacteria: Indicator Bacteria – *E. coli*
Hannen Lake	704	A1 / 4A	2008	Algal Growth: Chlorophyll-a
		BLW / 5a	2022	Organic Enrichment: Low Dissolved Oxygen
Lake Macbride	629	A1 / 5a	2006	Bacteria: Indicator Bacteria – *E. coli*
		A1 / 5*	2010	Algal Growth: Chlorophyll-a
Otter Creek Lake	720	A1 / 4a	2008	Algal Growth: Chlorophyll-a
Union Grove Lake	724	A1 / 4a	2006	Bacteria: Indicator Bacteria – *E. coli*
		A1 / 4a	2004	Turbidity

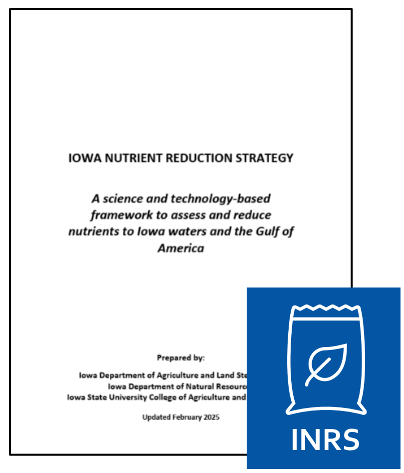
*potential delisting next cycle

Water Quality Stressors

Nutrients


Algae in pond in Otter Creek Watershed, Source: Houston Engineering

Nutrients, specifically nitrogen and phosphorus, are essential to life and aquatic ecosystems. However, additions of nitrogen and phosphorus from human activity combined with altered hydrology and land use changes have resulted in excess loading of nutrients into surface waters. Phosphorus is understood to be a limiting nutrient in freshwater, meaning that excess phosphorus can fuel algae growth and lead to algae blooms. Nutrients are a primary driver in waterbodies listed as impaired for Chlorophyll-a in Table 3-1. Algae blooms are not only undesirable for recreation, but they can also produce toxins harmful to humans and animals and decrease dissolved oxygen, which threatens aquatic life.



The Iowa Nutrient Reduction Strategy (INRS), updated in 2017, was developed by IDALS and IDNR to assess and reduce nutrient loading from Iowa to the Gulf of Mexico. The Nutrient Reduction Strategy nonpoint load reduction goal is a 41% decrease in total nitrogen and 29% decrease in total phosphorus. Stakeholders throughout Iowa are working to improve Iowa water quality and reduce nutrient loading.

Wastewater Treatment Plants

Wastewater treatment plants (WWTPs) are essential for treating and safely discharging wastewater generated by communities, however, they are a point source of nutrient loading. There are 56 wastewater facilities with National Pollutant Discharge Elimination System (NPDES) permits that are discharging into surface waters (DNR, 2023b). See **Appendix B** for a list of NPDES-permitted wastewater facilities. The Nutrient Reduction Strategy estimates Iowa WWTPs are responsible for an estimated 8% of total nitrogen and 20% of total phosphorus statewide loading. Iowa requires WWTP to implement nutrient removal which the INRS estimates will reduce discharge of total nitrogen by 4% and total phosphorus by 16%. WWTPs are not the main source of nutrient loading but are still an important source to consider in efforts to reduce statewide loads.

Sediment


Fish in non-turbid waters

Upland, wind, and bank erosion lead to excess sediment in surface water. Sediment pollution increases turbidity, which obstructs light, decreases photosynthesis, and reduces dissolved oxygen. Cloudy water impacts fish behavior and degrades habitat quality. Additionally, excess sediment can cover the stream bed that reduces habitat quality for macroinvertebrates. Sediment is also a concern because it carries other contaminants including phosphorus, metals, or bacteria.

Bacteria

Several streams in the Middle Iowa River Watershed are impaired due to *E. coli* (Table 3-1). *E. coli* is used as an indicator of potential fecal contamination because the bacteria are present in the gut of warm-blooded animals. Samples that exceed bacteria standards can indicate fecal contamination and thus pose a threat to recreational waters. *E. coli* can be found in surface water from natural or background sources, or from human activity such as manure application, cattle grazing in riparian areas, or leaking septic systems.

Land & Ecology

When humans convert land from its natural state, it can impact habitat, water quality, and hydrology. Ecological indicators measure the capacity to maintain or reestablish natural structure and processes.

Ecological Stressors

Land Conversion

The Middle Iowa Watershed landscape looks much different than it did prior to settlement. Over time, and with the development of infrastructure, the area became increasingly developed with homes, businesses, farmland, and industry replacing prairies, woodlands, and wetlands. This past and continued land development and conversion can come with some ecological impacts. There have been concerns over land use change impacting groundwater recharge. The City of Belle Plaine has had water supply issues due to increasing pressure from construction of large data center facilities.

Prairies

Prairies are important for habitat, minimizing erosion, and infiltrating precipitation. Prairies on average produce about 50% less runoff than cultivated land with conventional tillage methods (Anderson & Kean 2004). Therefore, converting prairie to other land uses like row crops can lead to increased nutrient and sediment runoff. In addition, clearing prairies and woodlands along lakes and rivers for development increases runoff and decreases infiltration. These riparian corridors are sensitive areas that are also important habitat for birds and wildlife.

Soil Health

Healthy soils are crucial for Iowa where the majority of land is used for agriculture. Soil health is understood by the Natural Resources Conservation Service (NRCS) as the 'continued capacity of soil to function as a vital living ecosystem that sustains plants, animals, and humans'. Soil health principles include minimizing disturbance (i.e. no tillage), maximizing biodiversity (e.g. crop rotations), maximizing soil cover (e.g. cover crops,), and maximizing living roots (e.g. cover crops, residue). Production of crops with soil health practices decreases soil erosion, reduces sediment loading, reduces nutrient and pesticide runoff, and reduces flood risk through addition of water storage (NRCS, 2025).

Drainage

It is estimated that over 95% of Iowa wetlands have been drained (ISU, 2025). A decrease in wetlands can contribute to flooding risk, as there is less water being stored on the landscape. The straightening of streams and addition of ditches is important to convey water from productive croplands but can also impact the way water flows through and interacts with the landscape. Altering flow can lead to flashier stream systems, which can also impact aquatic habitats and water quality conditions.

Most of Iowa's cropland is drained, which is important for providing suitable land for row crops. Drainage can alter the hydrology of the landscape as runoff is directed into drainage systems such as tile and delivered to receiving waterbodies. Tile drainage can deliver water and contaminants, especially nitrate, to streams. Ensuring cropland can maintain suitable conditions for growing crops while also mitigating downstream impacts of drainage is important for sustainable land management.

Oxbow Wetlands

Oxbow wetlands are a specific type of wetland found adjacent to streams and rivers. Oxbows form when a stream meander is "cut off" from the stream due to channel migration and erosion or by intentional stream straightening. Some oxbows are created naturally as stream geomorphology changes over time. Oxbow wetlands provide a special niche in the landscape and are often home to a diverse range of aquatic organisms. Over time due to channel incision and/or land management, many of the historical oxbow wetlands in the Middle Iowa River corridor have been hydrologically disconnected from the floodplain. This eliminates the frequent inundation and replenishment of the oxbow wetland, and eventually, loss of its beneficial ecology.


Oxbow wetland, Source: The Nature Conservancy

Aquatic Invasive Species

When a species is introduced to a new region, it can outcompete native species through a lack of natural predators or limiting conditions. Aquatic invasive species (AIS) are those that are not native and determined by the DNR to threaten aquatic resources or infrastructure. They can quickly take over a lake and make recreation undesirable. Iowa's AIS program includes public outreach and education, as individual actions can enhance the spread of invasives.


Curlyleaf Pondweed, Source: IDNR

In the Middle Iowa Watershed, lakes with AIS include Hannen (Brittle Naiad and Curlyleaf Pondweed), Otter Creek (Curlyleaf Pondweed and Eurasian Watermilfoil), Macbride (Brittle Naiad and Curlyleaf Pondweed) and Union Grove (Curlyleaf Pondweed). Bighead and Silver carp have been found in the Iowa River just downstream of the watershed.

Flooding

Iowa has been repeatedly suffering from record breaking floods in recent decades. In extreme floods, property is damaged, evacuations occur, and lives have been lost. Flood reduction and protection are important issues because they cause damage to the natural landscape, agricultural production, private and public property, and infrastructure, deposit debris in undesirable locations, and contribute to stream and river erosion. Severe floods can lead to a significant loss of life and property, and can be a traumatic event for communities.

Prior to massive land use changes, precipitation fell on soil and infiltrated into the ground before running overland and into streams. Now, drainage of wetlands and agricultural fields and creation of developed land and paved surfaces have greatly altered the landscape hydrology, causing precipitation to be routed quickly to streams. This can result in 'flashy' stream flow, or sudden increases in flow following precipitation. An additional contributor to flooding is an increase in precipitation- Iowa has experienced above average spring and summer rainfall in the 21st century, and the frequency of large rain events has been increasing and is expected to continue increasing. While the cause of individual flood events is complex and likely due to interconnected natural and human-induced factors, adding water storage is an important action to reducing the impact of altered hydrology and an increase in precipitation.

Flooding can be mitigated by adding water storage into the landscape. Practices such as wetland restoration and soil health practices store water in the soil. Urban stormwater volume can be reduced by small and large-scale stormwater management BMPs. The Iowa Flood Information System (IFIS) is a useful resource for Iowans and watershed planning. It provides flood alerts, inundation maps, and live stream conditions.

Iowa flooding, Source: NWS

Social/Community

The social and community aspects of planning and managing natural resources are important for setting policies, responding to natural and man-made disasters, and keeping the public engaged. Community, regulatory, economic, or behavioral factors can intersect with natural resource management in ways that impede management success or enhance it. Social and community issues and considerations were thus discussed as the fourth issue category during CWQMP planning. A few examples of social and community factors are the coordination and preparation of local government staff in flood communication, if private well owners are aware of state well testing guidelines, or if local ordinances protect riparian areas. It is important for all to have equal access to programs and support, especially in times of water related threats to public health and safety, such as floods, pollutant spills, or other events that can cause acute threats to potable water supplies.

Drinking Water

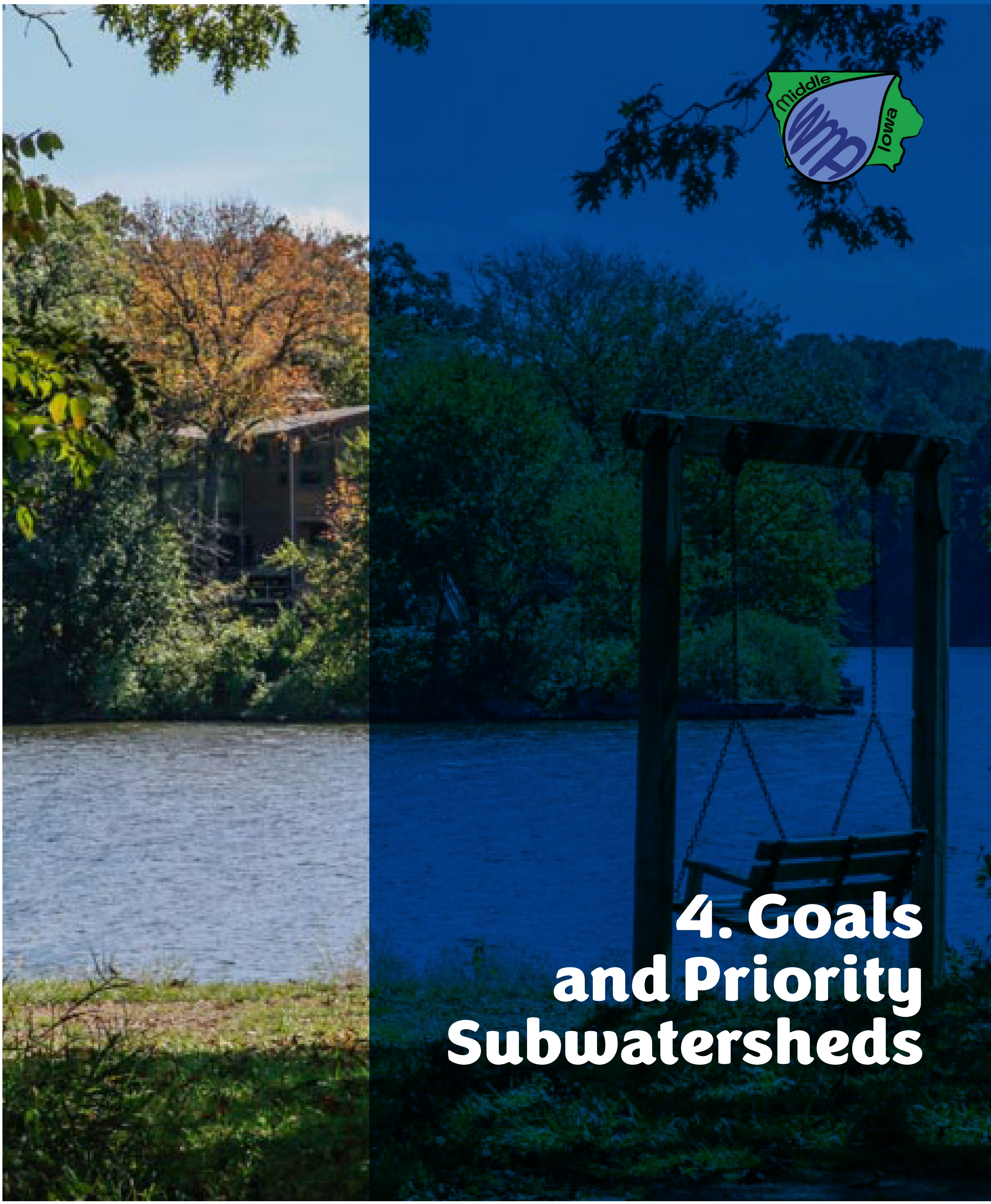
Water quantity and quality can impact the watershed communities' water supplies and residents who use private wells. Groundwater quality is an important issue and the reason why a Source Water Protection Workshop was held for communities as part of this planning effort. Primary issues of concern are nitrates, bacteria, arsenic, and per- and polyfluoroalkyl substances (PFAS) in drinking water wells. Public water supplies are particularly concerned with rising concentrations of nitrate, which is dangerous for formula-fed infants and has been linked to cancer.

Droughts and fluctuating groundwater levels can create water shortages. Floods and infrastructure damage can temporarily make drinking water unsafe if it leads to flooding of treatment facilities or infiltration of wells and/or the distribution system. This Middle Iowa Watershed CWQMP also includes a Source Water Protection component (Section 7) to help watershed communities develop plans and projects to protect and sustain drinking water sources to be resilient against floods, droughts, and pollution.

From Issues to Opportunities

This Issues Assessment for the Middle Iowa Watershed is an overview illustrating the variety of water and natural resources issues present across the entire watershed. Subsequent chapters build off this assessment to provide more detail, to prioritize, and to develop "plans within the plan" to protect and improve specific resources:

- **Subwatershed prioritization** (**Appendix C**) assesses potential "stressors" to each HUC-12 subwatershed in the watershed, including sediment, phosphorus, and nitrogen loading potential and threats to riparian ecosystems. **Appendices D-G** include **four more detailed plans at the HUC-12 scale** that identify specific needs, goals, actions, and a cost/benefit analysis for each of the four priority subwatersheds
- Three **case studies** (Section 5) examine flooding issues facing watershed communities, impacting public safety and infrastructure
- A **Riparian and Stream Buffer Management Plan** (Section 6) evaluates riparian characteristics to identify needs and opportunities to improve floodplain connectivity, riparian connectivity, address stream/river erosion, and restore oxbow wetlands
- **Source water protection** planning efforts (Section 7) are summarized to help individual communities identify potential threats and develop safe, sustainable water supplies.



4. Goals and Priority Subwatersheds

Section 4. Goals and Priority Subwatersheds

Good watershed management – and the ability to demonstrate progress arising from implemention – relies on setting goals that relate to priority areas and issues. This section of the plan introduces watershed-wide goals that set the course for resource management. This section also introduces priority subwatersheds for focusing implementation, with goals specific to each priority subwatershed.


PFI Cover Crop Event

Plan goals were developed to address Middle Iowa Watershed issues discussed in Section 3 - Issues Assessment. The overarching intent of this plan is to make progress towards the Iowa Nutrient Reduction Strategy (INRS) goals, reduce the impacts of flooding, and protect or restore resources while engaging watershed residents and stakeholders.

Watershed-Wide Goals

This plan sets four watershed-wide goals described in Table 4-1 through Table 4-4. Goals are narrative in nature and have multiple objectives to reach each goal. They are ambitious yet achievable given local staff capacity and funding. The Water Quality goal is watershed-wide and broken down into priority subwatershed goals in Table 4-5 and Table 4-6.

Goals are 10-year goals unless otherwise noted as a long-term goal. Long-term goals have no set timeframe in which they are to be met - they represent a desired future condition.

Achieving Goals

Section 8 - Implementation Schedule contains activities planned to meet objectives and goals. Each goal has an overview description of implementation activities that will be done to meet the goal and connects back to the objective(s) it most directly addresses. Further detail on implementation is included in Section 8.

Water Quality Goal

Table 4-1 sets a water quality goal for the Middle Iowa Watershed to reduce nutrient loading. Ten-year and long-term load reduction goals were set for priority subwatersheds and summed to create watershed-wide goal objectives. Goals were determined based on existing subwatershed loads. Existing loads at subwatershed outlets were quantified using the SPAtially-Referenced Regression On Watershed attributes (SPARROW) model (discussed further on Subwatershed Pollutant Source Assessment subsection below). Short-term load reduction goals (Objectives 1.1-1.3) were set based on a 10% reduction from existing loads at priority subwatershed outlets of sediment, total phosphorus, and total nitrogen as recommended by the Technical Advisory Committee.

INRS

Long-term goals apply INRS nutrient load reductions to existing loads, which calls for a reduction in nonpoint nitrogen and phosphorus loading by 41% and 29%, respectively (Table 4-6). As the INRS only sets nitrogen and phosphorus load reduction goals, there is no long-term sediment reduction goal. However, it should be noted that conservation action that addresses phosphorus loading typically has positive benefits for reducing sediment loading. See **Appendices D-G** for detailed discussion on subwatershed loads and goals.

Table 4-1. Water Quality Goal

Goal 1: Improve surface water quality by reducing nutrient loading by 10%	
Objective 1.1	Reduce sediment loading 10% (or 5,701 tons/yr) in priority subwatersheds
Objective 1.2	Reduce phosphorus loading 10% (or 11,231 lbs/yr) in priority subwatersheds
Objective 1.3	Reduce nitrogen loading 10% (or 142,271 lbs/yr) in priority subwatersheds
Objective 1.4 ⌛	Reduce phosphorus loading by 29% (or 65,752 lbs/yr) in priority subwatersheds (long-term)
Objective 1.5 ⌛	Reduce nitrogen loading by 41% (or 583,312 lbs/yr) in priority subwatersheds (long-term)

Nutrient and sediment reductions 10-year goals will be met through conservation practice and best management practice (BMP) implementation. Modeling revealed that implementation of 1,741 BMPs on the landscape will be required to meet sediment, phosphorus, and nitrogen load reduction goals. Additional load reductions will occur through wetland restorations, stormwater management, and enhanced landowner education and stewardship, leading to better nutrient management strategies.

Benefits of Water Quality Goal

Reducing nutrient loading will improve aquatic habitat, reduce stress on aquatic life, and improve aquatic recreation. It has both direct impacts on issues (such as a reduced nutrient loading) and indirect benefits such as increased water storage and soil health from the practices implemented to reduce nutrient and sediment loading. A reduction in nitrogen loading reduces nitrate in drinking water supplies, which is a human health concern. It will benefit watershed resources as well as improve downstream conditions.

Issues addressed from Section 3:

- ✓ Reduced bacteria loading
- ✓ Reduced nitrogen and phosphorus loading, leading to:
- ✓ Reduced algal growth and likelihood of algae blooms, leading to:
- ✓ Reduced likelihood of low dissolved oxygen

- ✓ Improved soil health from conservation practice implementation

- ✓ Increased water storage from conservation practice implementation

- ✓ Reduced algae blooms improves aquatic recreation, tourism, and property values
- ✓ Reduced risk to human health from drinking water contamination

Resource Callout

Achieving the Water Quality Goal could lead to the delisting of algal growth and oxygen enrichment impairments for Hannen Lake, Lake Macbride, and Otter Creek Lake and improvement of other waterbodies in the watershed.

The Water Quality goal seeks to avoid events such as this algae bloom on Union Grove Lake, Source: TAC member

Flooding Goal

As discussed in Section 3, flooding is a serious issue that impacts the environment and infrastructure, and threatens lives. Multiple counties in the Middle Iowa Watershed have issued emergency flood declarations in recent years. This plan seeks to alleviate the impacts of altered hydrology and mitigate flooding by adding water storage, stabilizing streambanks, and restoring floodplain connectivity. One objective to mitigate flooding is to specifically work to improve conditions in Freshwater Resilient and Connected Networks (FRCNs) (TNC, 2025). FRCNs represent freshwater systems that have characteristics that provide resilience to climate change, or could provide resilience if managed in certain ways to restore a specific physical factor (e.g. flow regime, connectivity, etc.). Objectives of the Riparian Management Goal will also make progress towards the Flood Goal.

Table 4-2. Flooding Goal

Goal 2: Address altered hydrology and store water in the landscape to mitigate flooding	
Objective 2.1	Identify opportunities for water storage, for at least 4,905 ac-ft
Objective 2.2	Construct, restore, or improve 4 oxbows or wetlands to achieve 3,265 ac-ft of storage (inclusive of storage in Objective 2.1)
Objective 2.3	Improve altered hydrology conditions resulting in the classification of two Freshwater Resilient Connected Networks as 'Protected'
Objective 2.4	Implement 10 stormwater projects to add 165 ac-ft of urban water infiltration and/or storage (inclusive of storage in Objective 2.1)
Objective 2.5	Educate watershed residents on flood preparedness
Objective 2.6	Create an inventory of productive land that is at risk of flooding

Flooding is such a key concern in the watershed that a section of this plan, Section 6. Riparian and Stream Buffer Management Plan, was developed to restore floodplain function and help reduce flood-related damages. The Riparian Management Plan elaborates on goals to store water, address altered hydrology, enhance connectivity, increase water storage, and restore riparian habitat and function. A watershed-wide approach to mitigating the impacts of altered hydrology, land use change, and changing precipitation is necessary.

Oxbow restorations are estimated to add 3,265 ac-ft of water storage, stormwater projects are planned to add 165 ac-ft, and agricultural projects planned to add 1,475 ac-ft. Oxbow water storage was estimated by assuming 6 feet of additional depth in the 4 largest oxbow restoration sites in **Appendix H**, and stormwater BMP storage was estimated with an assumed 40-acre drainage area and 5 inches of runoff infiltrated. Future work in the watershed could include hydrologic modeling to understand where best to work and quantify the flood reduction benefits of projects.

Benefits of Flooding Goal

Adding water storage to the landscape and addressing altered hydrology to reduce the likelihood and impacts of flooding is important to address key issues related to flood damage. The most important outcome of flood mitigation is protection of human lives. Additional benefits are numerous, including protecting riparian habitat, cropland and property in the floodplain, and an improvement in water quality.

Objective 2.4 will also increase community resilience to flooding and increase support for plan implementation. Adding urban water storage will not only reduce runoff following rain events, but will also reduce urban pollutant loading. A reduction in overland runoff reduces peak flows and flashy stream flow that erode banks and degrade aquatic habitat.

Issues addressed from Section 3:

- ✓ Stormwater management reduces nutrient, sediment, and bacteria loading to surface water
- ✓ Wetland restoration cycles nutrients

- ✓ Protection of aquatic habitat

- ✓ Reduced risk of flooding, damage to property, and loss of lives

- ✓ Increase in community resilience to flooding
- ✓ Protect drinking water supplies from flooding

Resource Callout

Achieving the Flooding Goal will protect dozens of floodplain communities in the Middle Iowa Watershed. See Figure 6-1 for a 500-year floodplain map in the watershed.

Iowa River canoeing, Source: TAC member

Riparian Management Goal

Reference Section 6 for more information on riparian goals and objectives. The Riparian and Stream Buffer Management Plan for the Middle Iowa River Watershed outlines a comprehensive strategy to protect, restore, and enhance the ecological integrity of the Iowa River corridor. This is planned through:

- Linear connectivity through dam removal to benefit fish passage and recreational use
- Floodplain connectivity to restore natural hydrologic interactions between the river and its floodplain
- Oxbow restoration to increase water storage, improve water quality through sediment and nutrient reduction, and increase habitat diversity
- Streambank stabilization to reduce erosion, protect infrastructure, and improve water quality

Table 4-3. Riparian Management Goal

Goal 3: Protect and / or restore the riparian zone for enhanced connectivity between streams and the floodplain	
Objective 3.1	Identify funding for restoration of oxbow wetlands
Objective 3.2	Removal or modification of two of three lowhead dams in the Iowa River
Objective 3.3	Identify areas of riparian erosion and implement 10 projects to stabilize banks and reduce erosion
Objective 3.4	Increase protected land within the Riparian Focus Area by 5% (2,300 acres)
Objective 3.5	Evaluation and implementation of buffer policies by local jurisdictions
Objective 3.6 ⌛	Maintain and restore linear stream connectivity within the Iowa River (long-term)


Oxbow wetland,
Source: The Nature Conservancy

Benefits of Riparian Management Goal

Riparian and streambank management efforts will provide multiple watershed benefits. The focus on water storage and altered hydrology will reduce the likelihood and impact of flooding. Reduced peak flows, restored wetlands, and protected riparian areas all protect and enhance habitat. An additional benefit of riparian management is increased watershed recreation.

Issues addressed from Section 3:

- ✓ Reduced peak flows improve aquatic habitat
- ✓ Reduced peak flows reduce sediment and phosphorus loading from bank erosion

- ✓ Land protection enhances recreational opportunities, wildlife habitat, and ecosystem services
- ✓ Reducing erosion

- ✓ Reduced peak flows and increased connectivity lead to lesser flood events

- ✓ Increased resident understanding of the importance of floodplain connectivity
- ✓ Protection of property

Resource Callout

The Iowa River, the namesake of the watershed, is a landmark natural resource that will benefit from riparian management. Increased lateral and longitudinal connectivity will reduce flooding and improve aquatic habitat.


Iowa River, Source: Tama County

Watershed Management Goal

The Watershed Management Goal encompasses a range of general protection, outreach, and data gathering objectives. This plan was developed based on existing information, and local staff will continue to monitor surface water to understand conditions and the potential impact implementation activities will have on resources. Additional monitoring will require additional staff and / or collaboration (a watershed coordinator is planned for the future). A successful education and engagement plan (see Section 9) will depend on cooperation between MIWMA and other partner organizations in the watershed.

Education and outreach are essential for supporting each plan goal (see Objective 4.4). Many Middle Iowa Watershed residents are already conservationists and stewards of the land. Educational events can reach interested residents to provide knowledge and skills for watershed protection. Outreach events can also impart to residents the importance of resource protection and raise a generation of environmental stewards through youth outreach.

Landowners can be reached for continued education on individual behaviors that impact natural resources through educational materials and events. For example, encouraging producers to engage in precision nutrient application and homeowners to reduce lawn fertilizer application will be an additional avenue apart from the Water Quality Goal to achieve nutrient load reductions.

Table 4-4. Watershed Management Goal

Goal 4: Continue ongoing land and water resources management to benefit habitat, natural resources, and watershed recreation.	
Objective 4.1	Continue and expand current water quality monitoring
Objective 4.2	Keep up to date on new data and information
Objective 4.3	Build on existing partnerships in the watershed and develop new relationships to grow the MIWMA network
Objective 4.4	Hold education and outreach events to encourage members of the public to engage in resource protection
Objective 4.5	Protect drinking water quality through Source Water Protection

Plan actions to accomplish the Watershed Management Goal are in the 'Education and Engagement' and 'Data Gathering' implementation groups in Section 5. Actions will include continued monitoring of surface water, annual MIWMA meetings, and continued workshops, field days, and events to engage watershed residents. The final objective, 4.5, is to protect drinking water quality. This vital resource can be protected by determining public water supply Source Water Protection Plan status and supporting systems as they progress in drinking water protection.

Benefits of Watershed Management Goal

Work towards achieving the Watershed Management Goal will impact all areas of watershed protection. Education and outreach events have influence over a diverse range of issues from improved stormwater management to reduced spread of AIS. Additionally, an engaged and educated citizenry fosters support for voluntary plan actions.

Issues addressed from Section 3:

- ✓ Reduced nutrient loading from voluntary agricultural nutrient management and urban landowner education

- ✓ Reduced spread of invasive species

- ✓ Increased flood protection through a strong MIWMA planning network

- ✓ Support existing stewardship efforts and build new partnerships
- ✓ Protect community drinking water supplies

Resource Callout

Achieving the Watershed Management Goal will protect drinking water supplies.

Iowa Learning Farms Event, Source: TAC member

Priority Subwatersheds

Four priority subwatersheds were identified to target implementation efforts and set more explicitly-defined goals at the HUC-12 scale. The process for choosing priority areas and setting goals is discussed below, and a full report is given in **Appendix C.**

Priority Subwatershed Criteria

Planning partners selected four HUC-12 subwatersheds in which to target implementation efforts. An overview of the selection process and priority subwatersheds is summarized here, with more details provided in **Appendix C**.

The selection of priority subwatersheds was based on ecological, social, nitrogen, phosphorus, and sediment indicators ranked by the Restoration and Protection Screening (RPS) Tool. The RPS tool helps to prioritize HUC-12 subwatersheds by analyzing three composite "index" scores to determine the likelihood of successful protection or restoration of watersheds. These indices include:

- **An ecological index** which measures the ability to maintain or restore environmental stability,
- **A stressor index** which measures anthropogenic sources that impact water quality, and
- **A social index** that measures societal and economic factors.

Each index is composed of one or more "indicators" that relate directly to a specific measurable parameter.

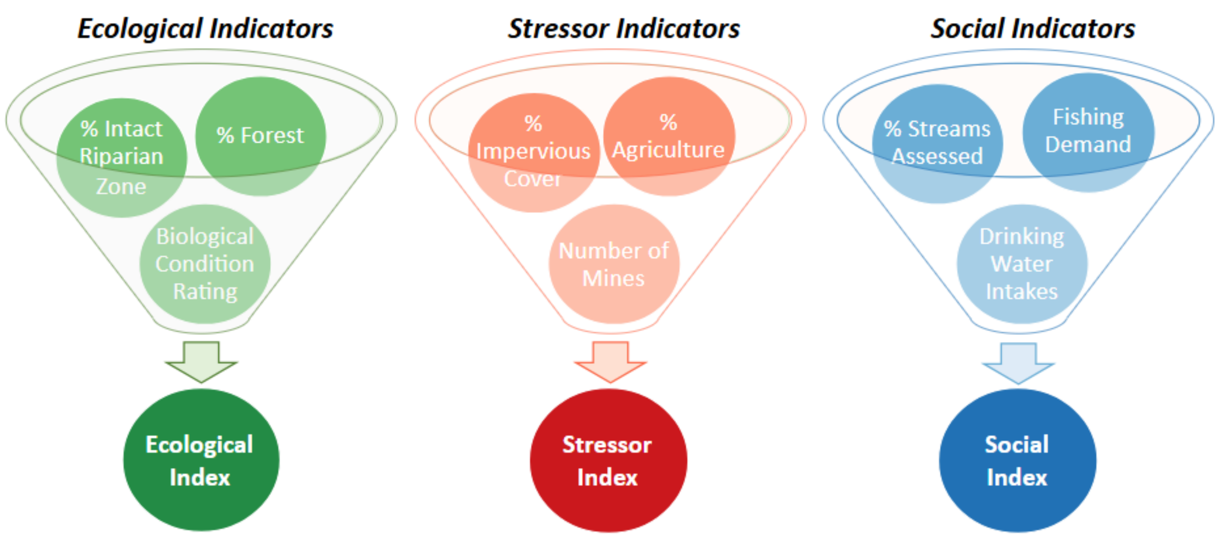


Figure 4-1. RPS Tool indicators

Priority Subwatershed Selection

The RPS tool identified 13 subwatersheds as possible priorities. To narrow the focus of this planning effort, the TAC selected four of these based on their pollutant stressors, ecological protection potential, and the intent to disperse efforts throughout the watershed. The four priority subwatersheds for purposes of this Middle Iowa Watershed plan are:

- Asher Creek
- Hilton Creek
- South Branch Salt Creek
- Stoney Creek-Big Bear Creek (Figure 4-2)

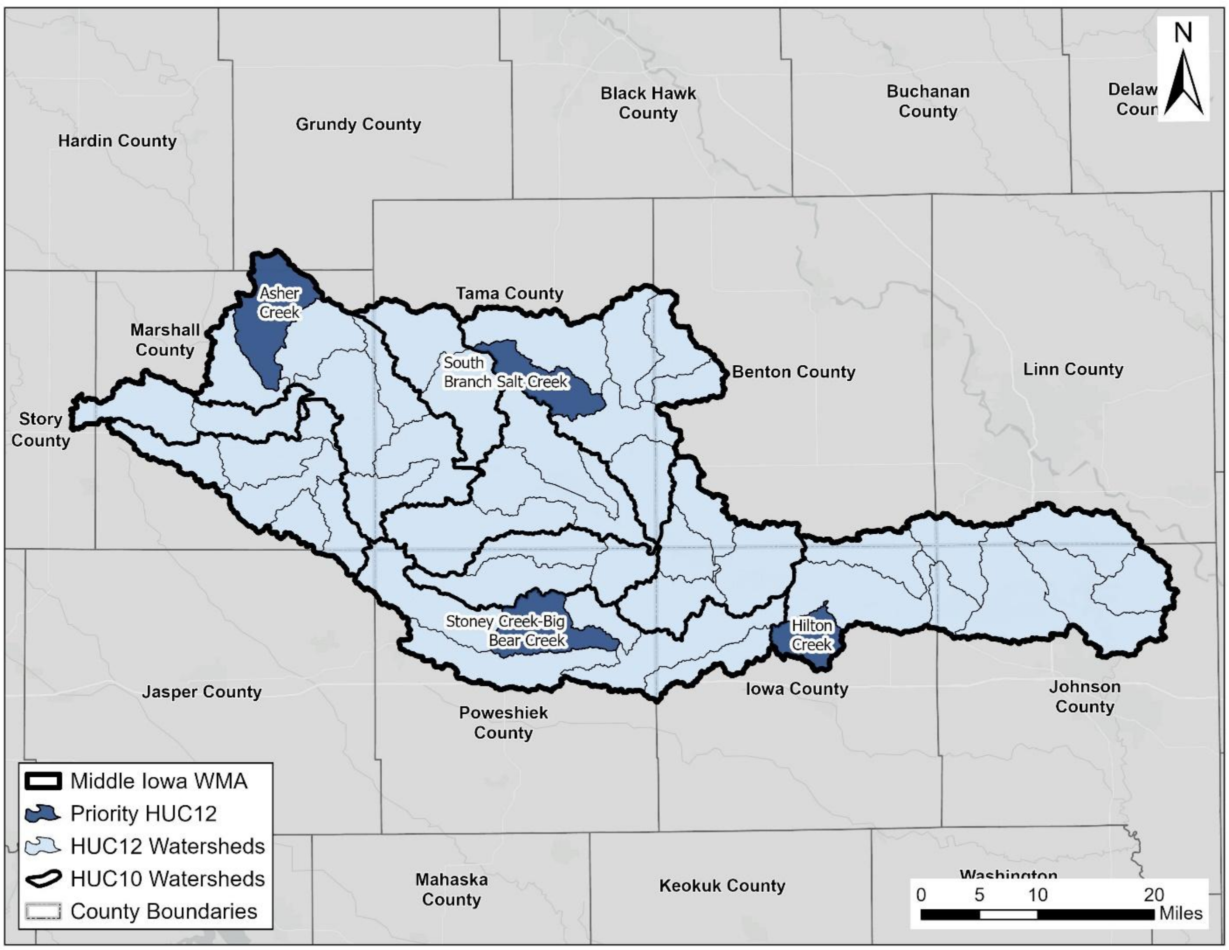


Figure 4-2. Priority Subwatersheds

Subwatershed Pollutant Source Assessment

Models are useful for providing information about where implementation efforts can or should be focused to make the greatest impact on downstream waterbodies. As such, heatmaps showing the general sources and quantities of sediment, total phosphorus, total nitrogen, and runoff were generated for each of the four priority subwatersheds using the US Geological Survey (USGS) SPAtially-Referenced Regression On Watershed attributes (SPARROW) model. Predicted pollutant yields and load were summarized for runoff volume, sediment, total phosphorus, and total nitrogen. Phosphorus yields lost within each subwatershed are shown in Figure 4-3. Full figures for each pollutant of concern and associated datasets are included in **Appendices D-G**.

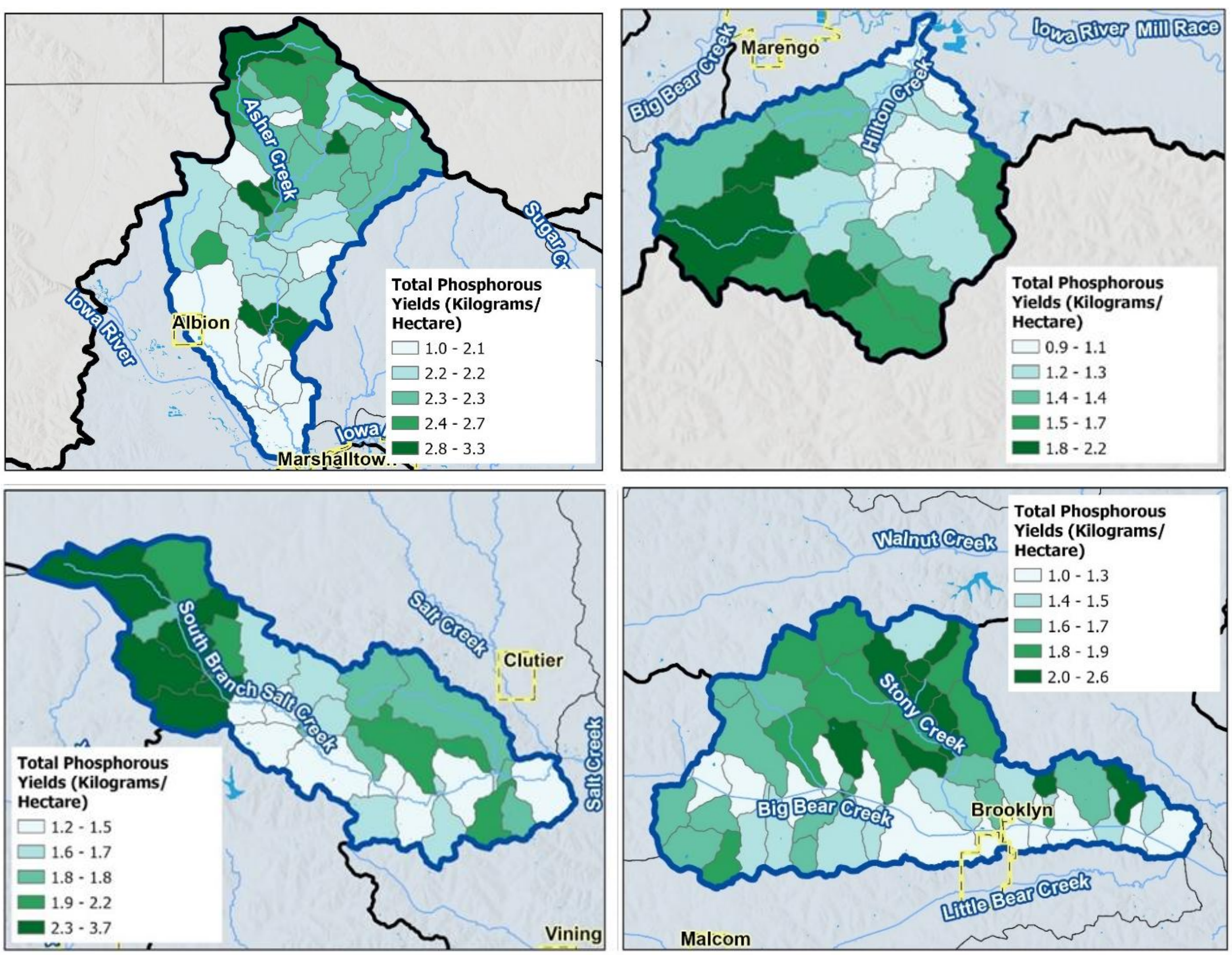


Figure 4-3. Modeled phosphorus yields for Asher Creek (top left), Hilton Creek (top right), South Branch Salt Creek (bottom left), and Stoney Creek – Big Bear Creek (bottom right).

BMP Suitability Analysis

The Agricultural Conservation and Planning Framework (ACPF) model was used within each of the four priority subwatersheds to find locations on the landscape that are suitable for the implementation of conservation practices and BMPs. Costs for implementation of the BMPs was determined from NRCS Environmental Quality Incentives Program (EQIP) payment schedule costs. Conservation practices and BMPs modeled include:

- Nutrient Reduction Wetland
- Grassed Waterway
- Drainage Water Management
- Cover Crops - Rye
- Contour Buffer Strips
- Bioreactor
- Saturated Buffer
- Riparian Buffer
- Water and Sediment Control Basin (WASCOB) / Farm Ponds

Load reduction estimates for each individual BMP were estimated using the underlying SPARROW data and assumed load reduction efficiencies of each BMP type. Then, the 'best' BMP implementation scenario was developed for each subwatershed, based on BMP popularity and interest and nitrogen reduction effectiveness.

Subwatershed Goal Progress

Watershed-wide water quality goals are set in Table 4-1. Ten-year sediment, phosphorus, and nitrogen load reduction goals are planned to be met through subwatershed BMP implementation (Table 4-5). Long-term goals are set to align with the Iowa Nutrient Reduction Strategy (Table 4-6).

Table 4-5. Priority subwatershed short-term goals (measured at the subwatershed outlet)

Subwatershed	Sediment Load Reduction (tons/yr)	Phosphorus Load Reduction (lbs/yr)	Nitrogen Load Reduction (lbs/yr)
Asher Creek	1,363	4,240	59,051
Hilton Creek	975	1,519	19,016
South Branch Salt Creek	1,243	2,528	28,004
Stoney Creek-Big Bear Creek	2,120	2,944	36,200
Total	**5,701**	**11,231**	**142,271**

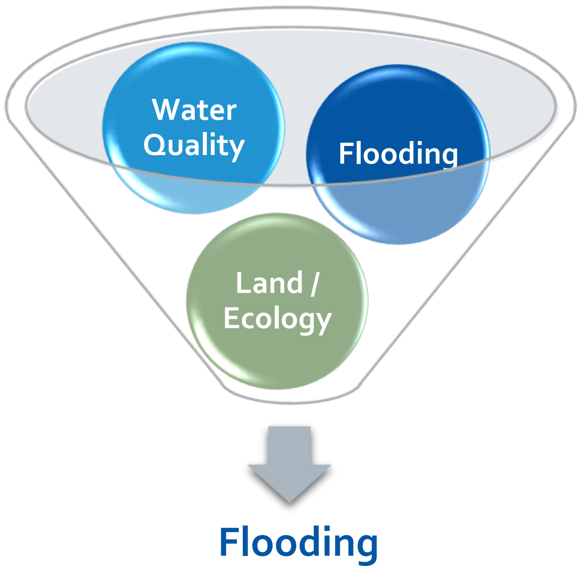
Table 4-6. Priority subwatershed long-term goals

Subwatershed	Phosphorus Load Reduction (lbs/yr)	Nitrogen Load Reduction (lbs/yr)
Asher Creek	12,296	242,108
Hilton Creek	4,407	77,967
South Branch Salt Creek	7,332	114,817
Stoney Creek-Big Bear Creek	8,537	148,420
Total	**65,752**	**583,312**

5. Case Studies

Section 5. Case Studies

Community-Level Flooding



Watershed issues are discussed in Section 3 – Issue Assessment. This section's purpose is to delve into a watershed issue at the community level and develop an action plan to tackle three specific Case Studies. A variety of watershed issues were considered for Case Studies, including stormwater management, water quality projects, and flood reduction/protection. After considering these options, the TAC determined flooding was the pre-eminent issue of concern that was not specifically addressed by other sections of this Plan.

To evaluate and provide options to address flooding, this section of the CWQMP focuses on known flooding areas in several communities across the watershed. Evaluations were done at the local level with the goal of identifying good candidates for Case Studies that were well-positioned to seek technical and financial assistance for flood mitigation from the Iowa Department of Homeland Security and Emergency Management (HSEM) and other state and federal partners.

Mitigation: actions to reduce or eliminate potential flood damage

Resilience: the ability of communities to withstand, recover from, and adapt to flooding

Case Study Approach

Part of the Case Study analysis was to identify options for addressing problem areas. Although summarizing problem flooding areas across the watershed is important, without a plan for obtaining the technical and financial resources, problems will persist. Therefore, evaluation and prioritization of alternatives included suitability for various assistance programs and the feasibility of mitigating the problem.

Criteria used in the evaluation included:

- Clarity in defining the issue – what and where is the problem?
- Assessing the frequency of the problem (at what magnitude of events are problems experienced)?
- What are the consequences of flooding for communities – for people and for infrastructure?
- Have past flood damages been quantified?
- Are there identifiable solutions?
- Are there suitable funding mechanisms?

As potential case studies were evaluated, conversations with HSEM and DNR officials indicated that the Help CUT Flooding program was the best fit and an appropriate target program for developing Case Studies in the Middle Iowa River Watershed. Participation in the program will place the cities in a competitive position for grant applications for flood mitigation work. Therefore, this plan views community-specific flooding issues through the lens of potential fit and eligibility for the Help CUT Flooding Program.

Case Study Objective: Develop "Application ready" information for the Help CUT Flooding Program in three Case Study communities to receive technical and potential financial support for future flood mitigation actions.

Tama Conservation Center,
Source: HEI

Flooding Case Study Identification

MIWMA planning partners approached Case Study development with a "blank slate" and no pre-defined alternatives determined. Therefore, objective screening was needed to capture potential opportunities, prioritize them based on feasibility, benefits, and funding potential, and then develop application-ready Case Studies for three of the communities.

Flood Risk MAP Assessment

FEMA conducts Risk Mapping, Assessment, and Planning (Risk MAP) to identify flood-related risk and potential mitigation opportunities in communities. An outcome of this is the FEMA Flood Risk Report (FRR), released in 2015 for the Middle Iowa Watershed. Because flood risk often extends beyond community limits, the FRR included flood risk data for the entire watershed as well as for each individual community.

The FRR contains a map (Figure 5-1) that ranks flood risks by census blocks and also includes information on:

- Key emergency routes that could be overtopped
- Past flood insurance claim hotspots
- Areas of significant riverbank erosion
- If there are essential facilities (e.g. hospitals, schools, etc.) at risk
- Other flood risk areas

The FEMA flood risk MAP (Figure 5-1) was evaluated to identify communities with high flood risk and/or damage potential. Special focus was given to annualized flood damages, risks associated with critical facilities, and a high number of repetitive losses from past floods. Based on these criteria, a short list was presented to the TAC to review and prioritize.

Chelsea flooding,
Source: The Des Moines Register

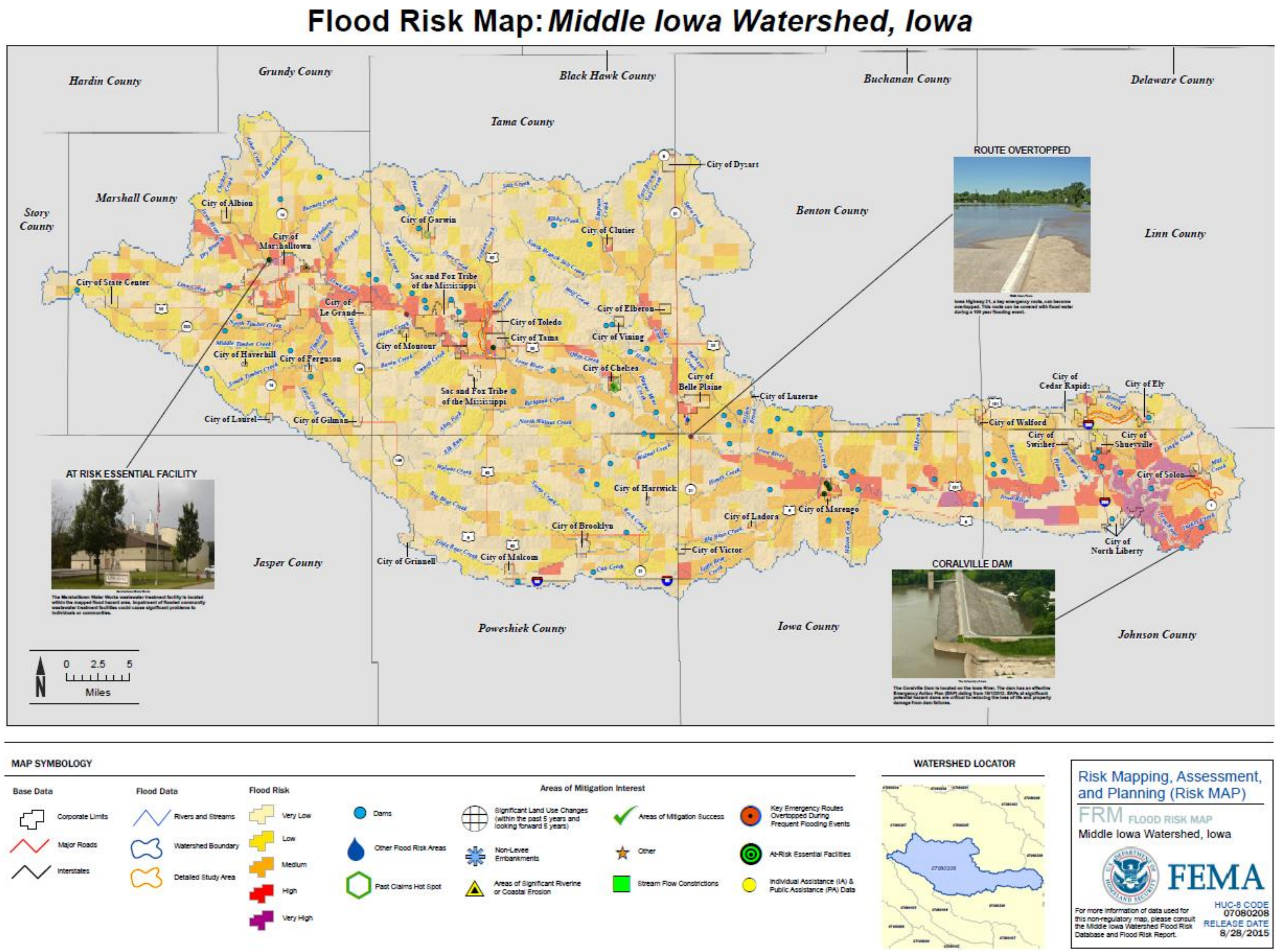


Figure 5-1. Middle Iowa Watershed FEMA Flood Risk Map

Potential Case Studies identified using the Risk MAP and presented to the TAC for review and prioritization are listed below:

- Chelsea
- Ely
- Garwin
- Tama
- Marengo
- Belle Plaine
- Marshalltown
- Highway 21 overtopping south of Belle Plaine
- Highway 30 overtopping north of Montour
- A past claims "hotspot" from Linn Creek near the intersection of Highway 330 and Marsh Avenue 2 miles west of Marshalltown

The Belle Plaine, Highway 30, Highway 21, and rural Linn Creek alternatives were eliminated from consideration by the TAC due to limited perceived benefits or previous or existing projects that already address the problem.

Hazard Mitigation Plan Evaluation

After initial screening using information in the FRR and Figure 5-1, the FEMA Multi-Jurisdictional Hazard Mitigation Plan (MJHMP) was reviewed for each county in the watershed. MJHMPs lay out a collaborative, regional strategy where multiple local governments (cities, counties, transit agencies, etc.) join forces to identify shared natural hazard risks (like earthquakes, floods, wildfires) and create joint, long-term actions to protect people and property, ensuring continued eligibility for FEMA disaster funding and grants by proactively reducing future losses. These plans assess risks, outline strategies (such as building codes, ordinances, and land use policy), and must be updated every five years to stay valid.

Analysis of MJHMP provided additional, supporting information about past flooding issues and future risks. Some MJHMPs included numeric flood damage estimates and detailed descriptions of problems and potential solutions. All MJHMPs included mitigation plans that described community-level actions to manage and minimize flood risks in the future. Of note, review of MJHMPs revealed additional problem areas in the cities of Walford and Montour.

Case Studies "Short List"

After the initial screening using the FEMA Risk MAP program information summarized in Figure 5-1 as well information in county-level MJHMPs, potential case study communities were evaluated to select those with the most compelling case to receive financial and technical assistance from Iowa's Help CUT Flooding program administered by the Iowa DNR and Iowa Homeland Security and Emergency Management (HSEM). The evaluation involved documenting the location and nature of historical flood damages, the frequency of flooding, potential solutions and mitigation options, potential benefits, and other factors affecting suitability for technical and funding assistance eligibility.

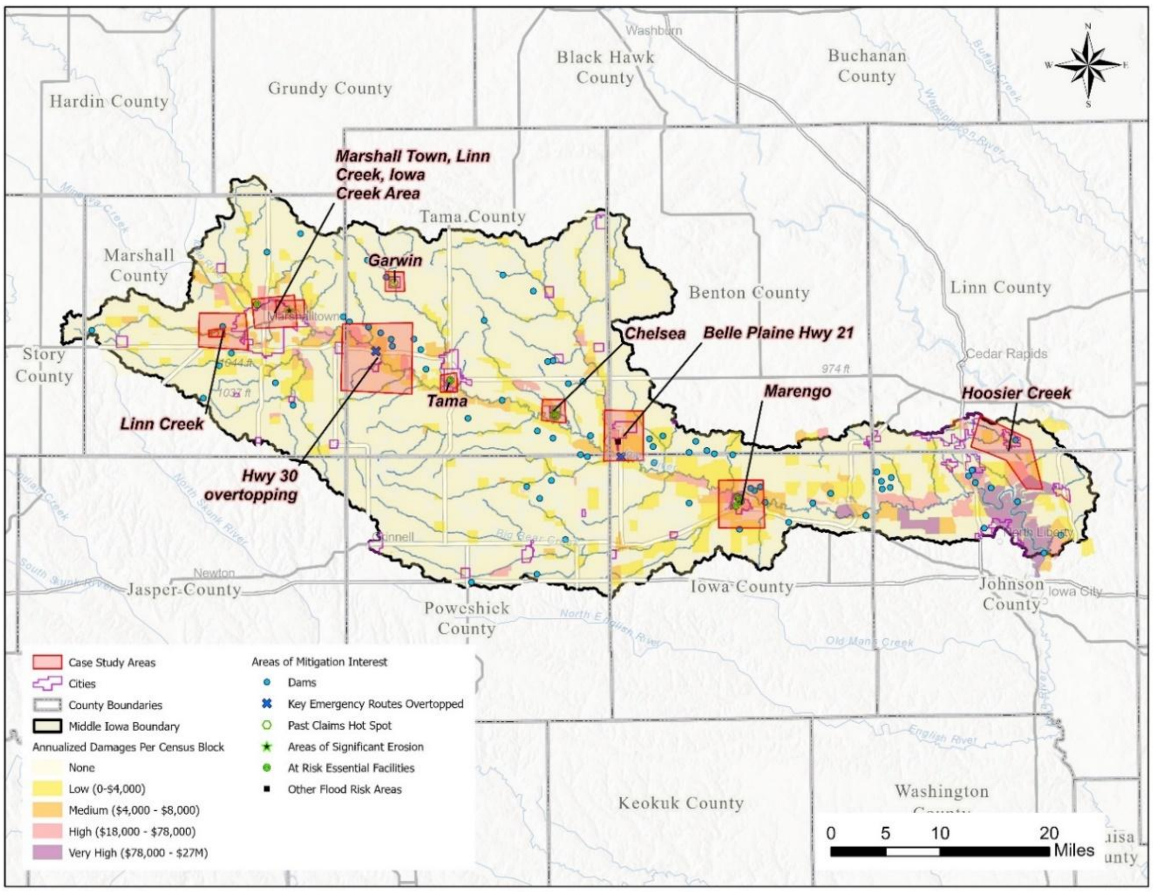
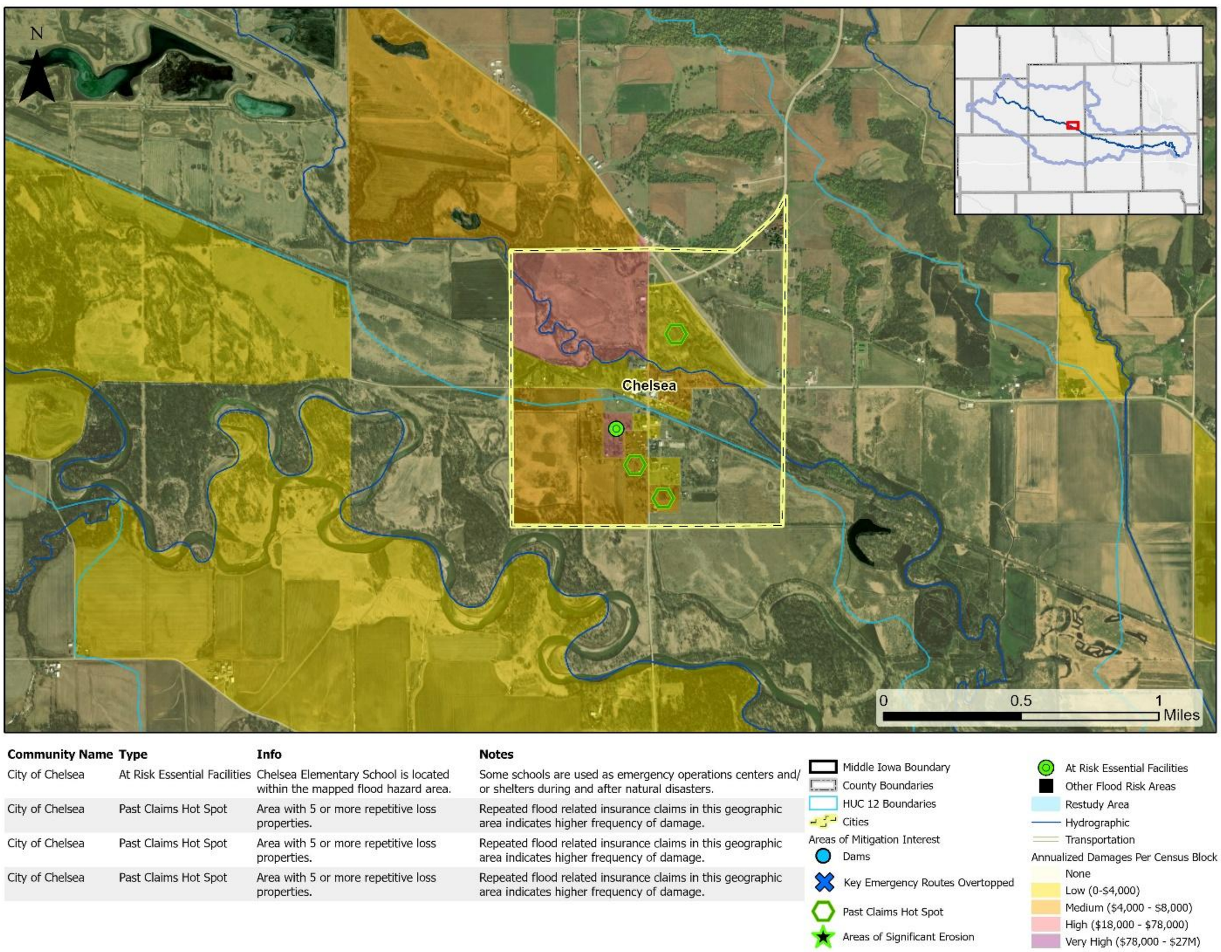


Figure 5-2. Potential case study areas and flood data. Note that the Hwy 30 overtopping label contains Montour and the Hoosier Creek label contains Ely.

Chelsea

Chealsea is located in Tama County with a population of about 230. Chealsea made national news for 1993, 2013, and 2014 floods, in which the former kept the city inundated for a month and destroyed over 40 homes. There are several past insurance claim hotspots as some properties have been bought out or elevated (Figure 5-3). The community experiences frequent flooding and annualized damages are estimated at $200,000. An elementary school is within the flood hazard area and the Hazard Mitigation Plan estimates 76% of the population and property would be impacted by flash flooding.



Community Name	Type	Info	Notes
City of Chelsea	At Risk Essential Facilities	Chelsea Elementary School is located within the mapped flood hazard area.	Some schools are used as emergency operations centers and/or shelters during and after natural disasters.
City of Chelsea	Past Claims Hot Spot	Area with 5 or more repetitive loss properties.	Repeated flood related insurance claims in this geographic area indicates higher frequency of damage.
City of Chelsea	Past Claims Hot Spot	Area with 5 or more repetitive loss properties.	Repeated flood related insurance claims in this geographic area indicates higher frequency of damage.
City of Chelsea	Past Claims Hot Spot	Area with 5 or more repetitive loss properties.	Repeated flood related insurance claims in this geographic area indicates higher frequency of damage.

Figure 5-3. Flood risk assessment for Chelsea

Garwin

The community of Garwin is in Tama County and has a population of about 460. Garwin experiences flooding along Deer Creek and south of W Center Street. From 1996-2020, the Multi-Jurisdictional Hazard Mitigation Plan reports Garwin had one flash flood event and future flash flooding is estimated to impact a quarter to half of the population. Annualized flood damages are estimated at $50,000. The City identified creating and/or maintaining drainage ditches as an action in the MJHMP to reduce localized ponding and flooding.

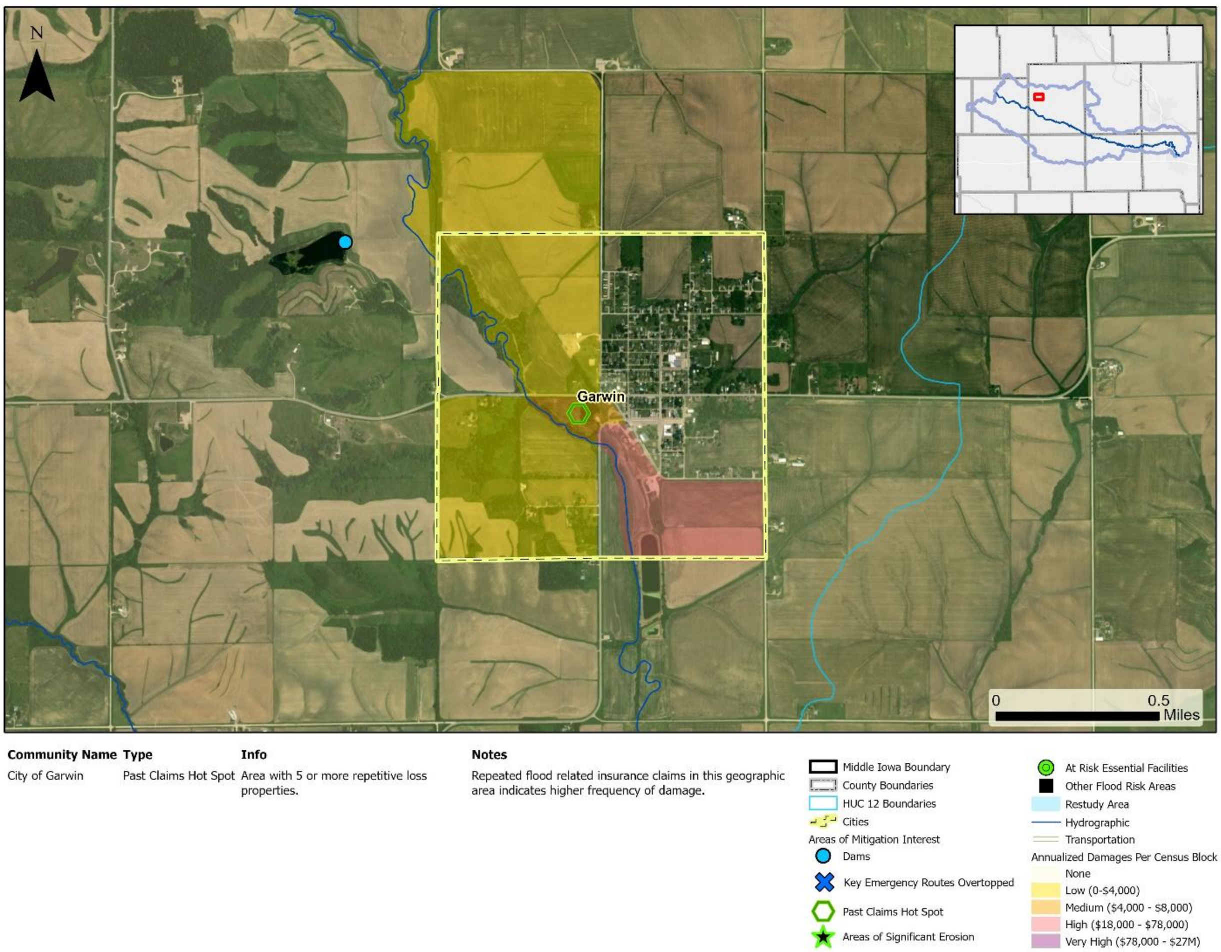


Figure 5-4. Flood risk assessment for Garwin

Ely

Hoosier Creek flows through Cedar Rapids and Ely before entering Coralville Reservoir. Rogers Creek flows into Hoosier Creek on the south end of Ely. Ely is located in Linn County with a population of about 2,300. Most of the city has no historical annualized flood damage, but some areas have under $5,000 annualized damage and the stretch between Hoosier Creek and State Street has high annualized damages estimated up to $78,000 (Figure 5-5).

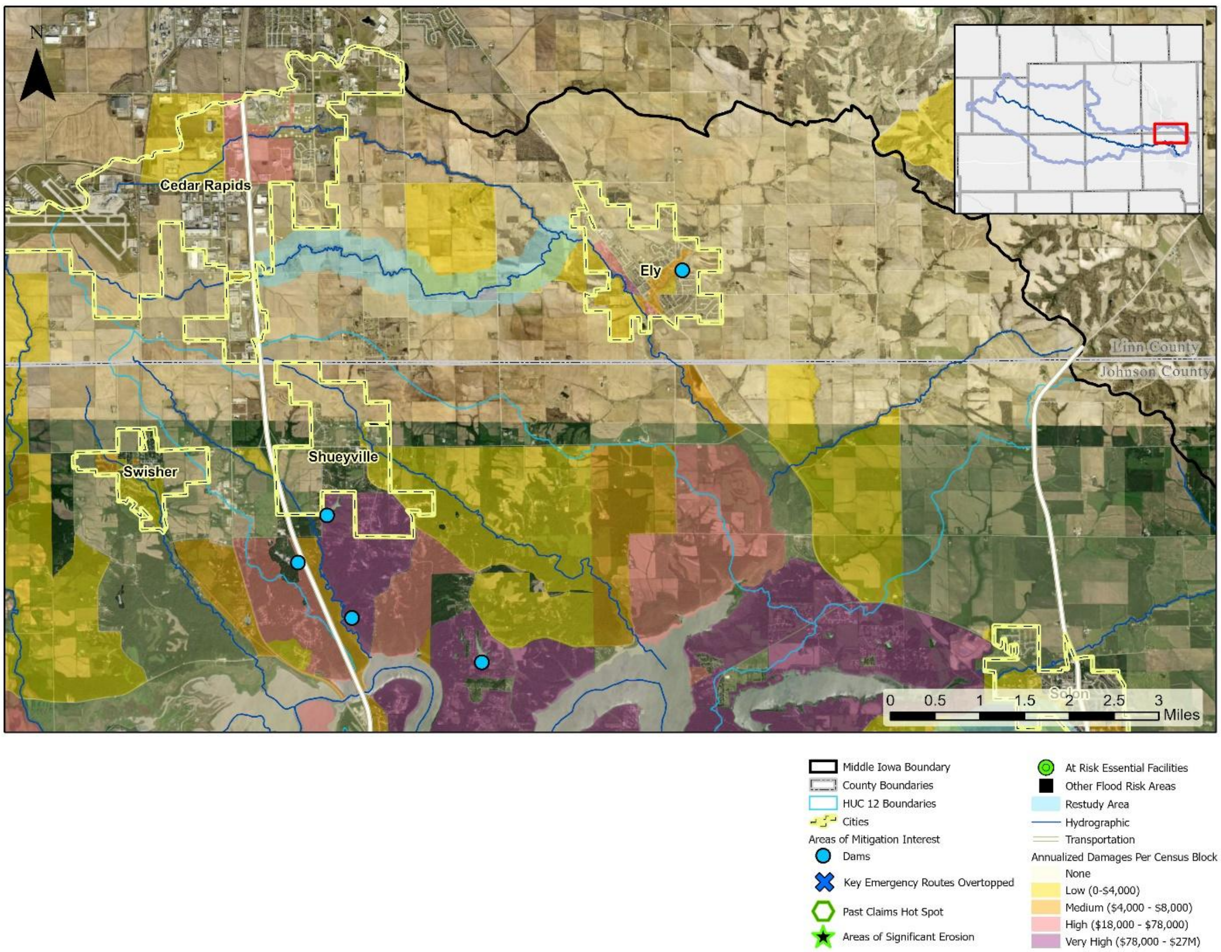


Figure 5-5. Flood Risk Map for Ely / Hoosier Creek area

Montour

The City of Montour in Tama County has an estimated population of 200. Indian Creek passes through western and northern Montour in which flash floods are an annual occurrence. In the MJHMP, officials from the City of Montour stated that flash flooding occurred as regularly as once every year, and they could recall more than 12 different flood events (between 1996 and 2020). On the west side of town, a creek can quickly rise due to field runoff. In past years, flash flooding has surrounded the lift station and the lagoon. Even during short periods of heavy rainfall, residents have reported sewer backups in their homes. Flooding is projected to impact between half and three-quarters of the community which includes agricultural land, homes, and commercial properties.

As a result, the City would like to install surge protection in critical places such as the office of the City Clerk and the lift station. The City also listed maintenance and improvement of culverts and streambanks as important in the MJHMP action plan.

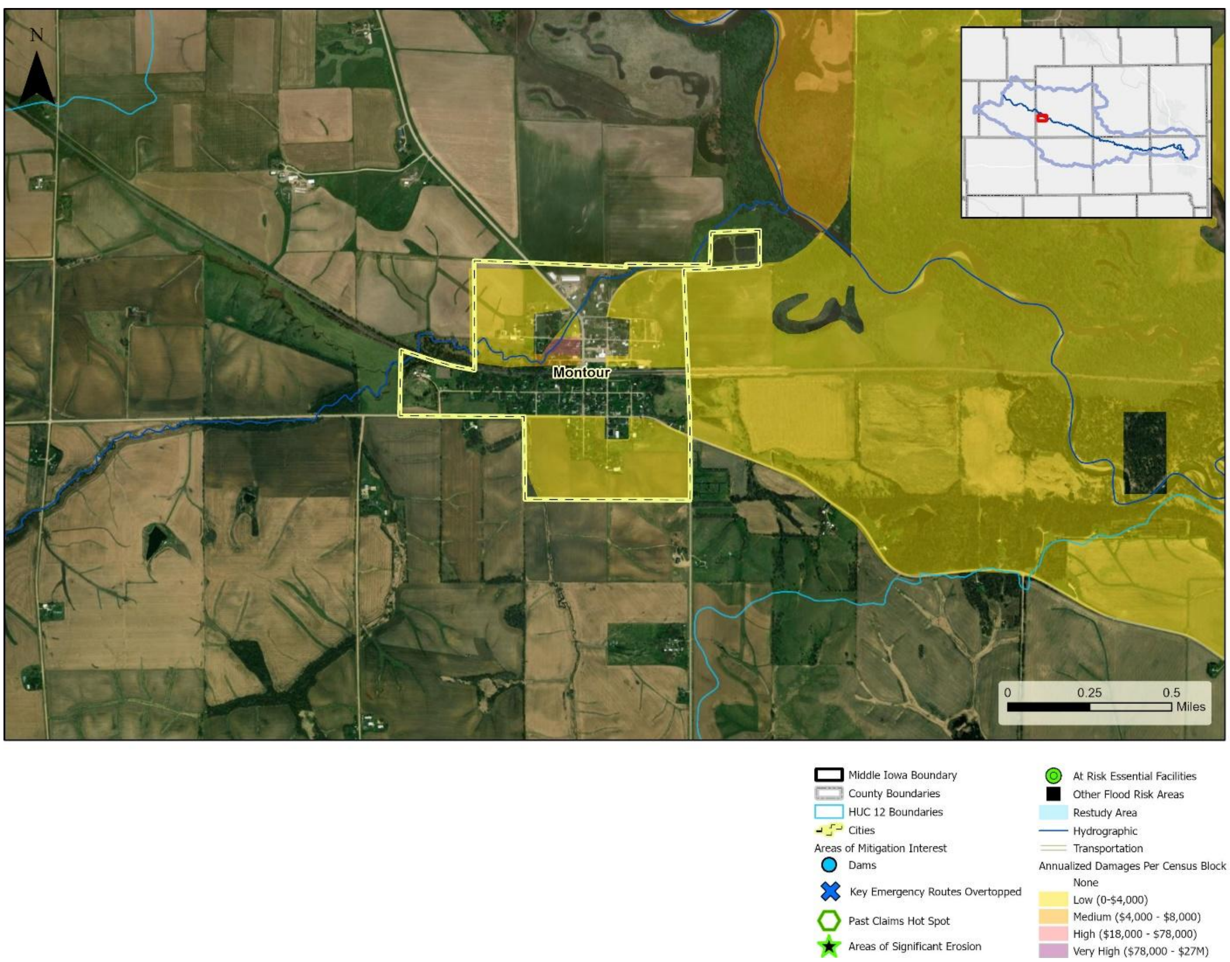


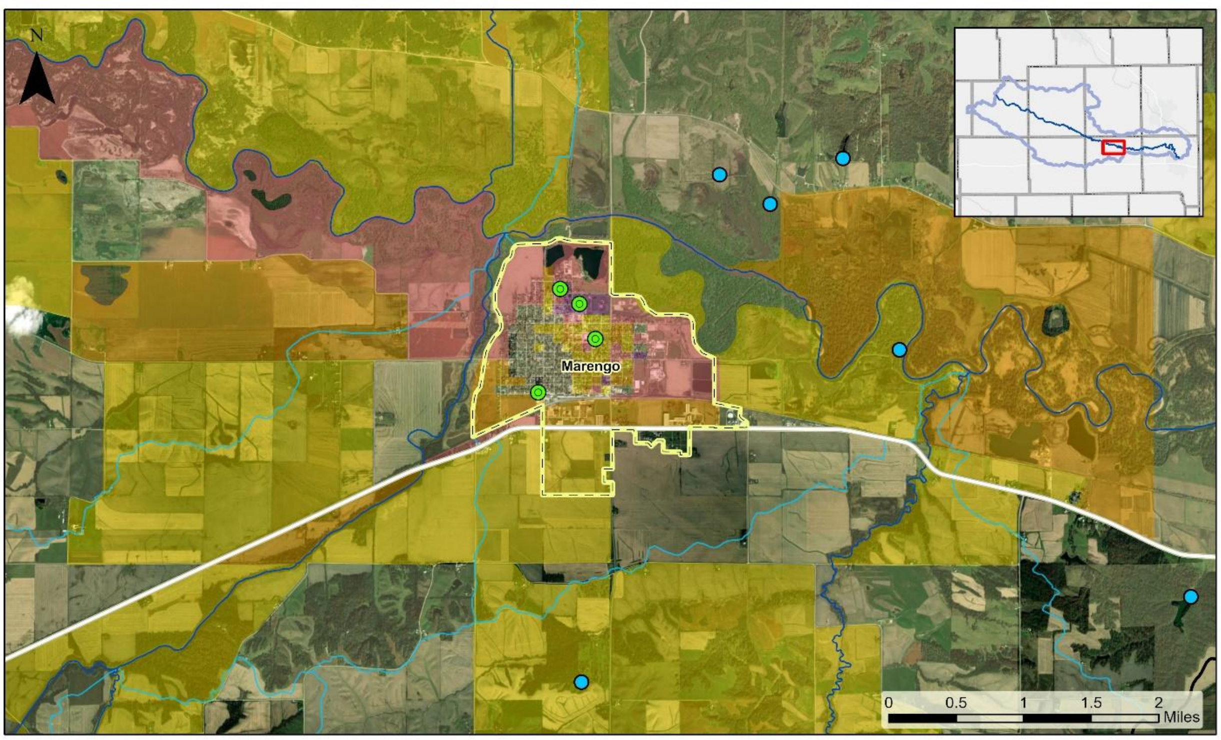
Figure 5-6. Flood Risk Map for Montour area

Marengo

Marengo is located in Iowa County just south of the Iowa River and has a population of about 2,400. Numerous essential facilities are at risk of flooding, including a hospital, two schools, and wastewater treatment facility (Figure 5-7).

Flash flooding is frequent in the city, with 15 flash floods reported between 1999 and 2018 according to the MJHMP. These floods make up half the flash floods reported in the entire county. No deaths or injuries were reported for flash flood events in Marengo, but there was $1.36 million in property damage reported across the entire area affected by the hazard events. Of all property damage, $750,000 occurred during one flash flood event that involved Marengo and Ladora in June 2007.

The City included flood control (levee) and storm water system improvements, as well as the acquisition, relocation, elevation, and/or demolition of flood prone properties in the MJHMP action plan.



Community Name	Type	Info	Notes
City of Marengo	At Risk Essential Facilities	Marengo Memorial Hospital is located within the mapped flood hazard area.	
City of Marengo	At Risk Essential Facilities	Iowa Valley Jr-Sr High School is located within the mapped flood hazard area.	Some schools are used as emergency operations centers and/or shelters during and after natural disasters.
City of Marengo	At Risk Essential Facilities	Iowa Valley Elementary School is located within the mapped flood hazard area.	Some schools are used as emergency operations centers and/or shelters during and after natural disasters.
City of Marengo	At Risk Essential Facilities	Marengo Water Supply wastewater treatment facility is located within the mapped flood hazard area.	Impairment of flooded community wastewater treatment facilities could cause significant problems to individuals or communities.

Middle Iowa Boundary
County Boundaries
HUC 12 Boundaries
Cities
Areas of Mitigation Interest
Dams
Key Emergency Routes Overtopped
Past Claims Hot Spot
Areas of Significant Erosion
At Risk Essential Facilities
Other Flood Risk Areas
Restudy Area
Hydrographic
Transportation
Annualized Damages Per Census Block
None
Low (0-$4,000)
Medium ($4,000 - $8,000)
High ($18,000 - $78,000)
Very High ($78,000 - $27M)

Figure 5-7. Flood risk map for Marengo.

Tama

The city of Tama, population over 3,000, is just north of the Iowa River and east of Deer Creek. Tama has high annualized damages and the Tama Wastewater Treatment Facility is within the flood hazard area (Figure 5-8). The city has a levee built in 1995 to protect the community from a 1% annual chance flood, and there are two pumps in the dike that the City uses to pump water and bypass sewers if flooding occurs. Post-levee construction, no homes have been severely damaged by floods.

The Tama County Hazard Mitigation Plan Committee that participated in the most recent MJHMP recalled at least 7 flash flood events in Tama between 1996 and 2020. The city experienced some flash flooding problems near the levee during major rain events and prolonged wet weather. The city reports residential basements are impacted by flash flooding, downtown has minor road flooding, and major flooding in 2008 left debris in city wells.

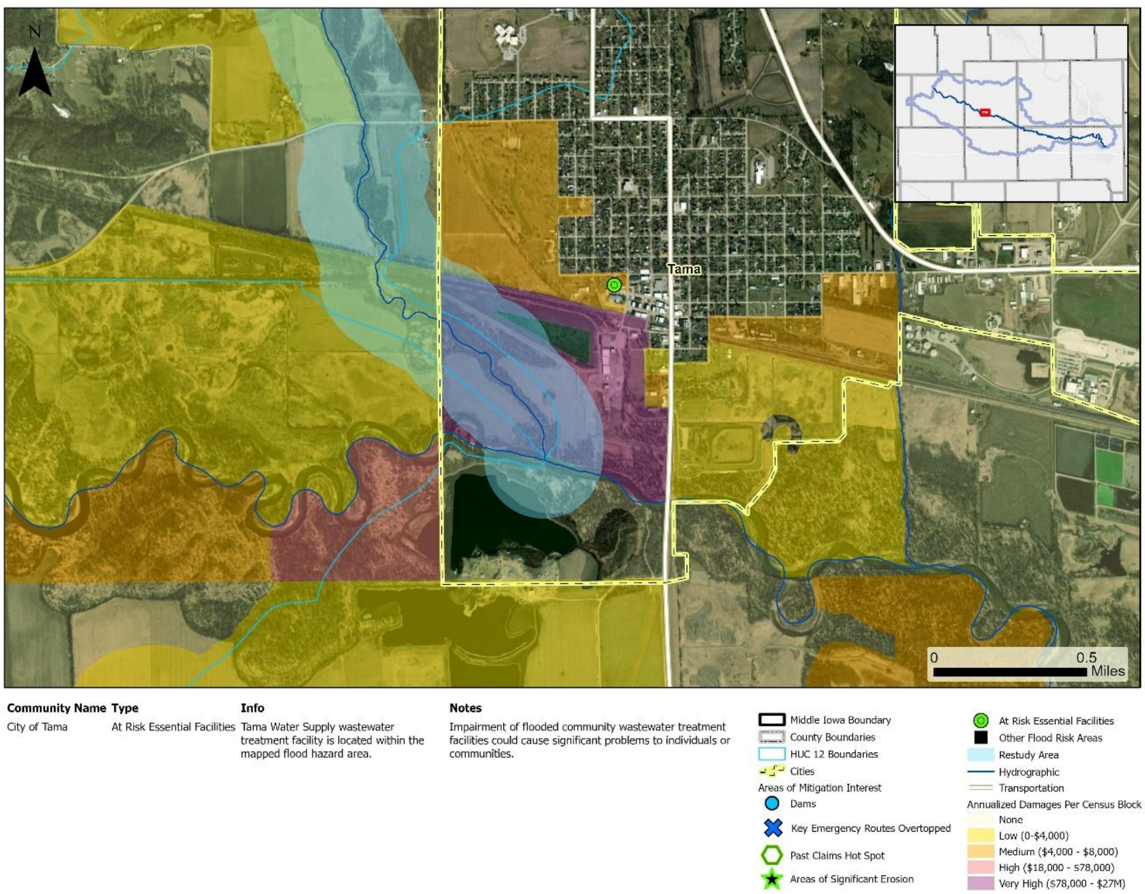


Figure 5-8. Flood Risk Map of Tama.

Walford

Walford is a small but growing community that lies primarily in Benton County, with a small portion on the western edge in Linn County. It participated in the Benton County MJHMP and is eligible for HMA funding through that plan. The only flood-related item in Walford's action plan was flood-proofing private property and public infrastructure, but no specific mitigations measures were described. Walford was consulted during the development of the Linn County MJHMP, but chose not to add mitigation strategies at that time.

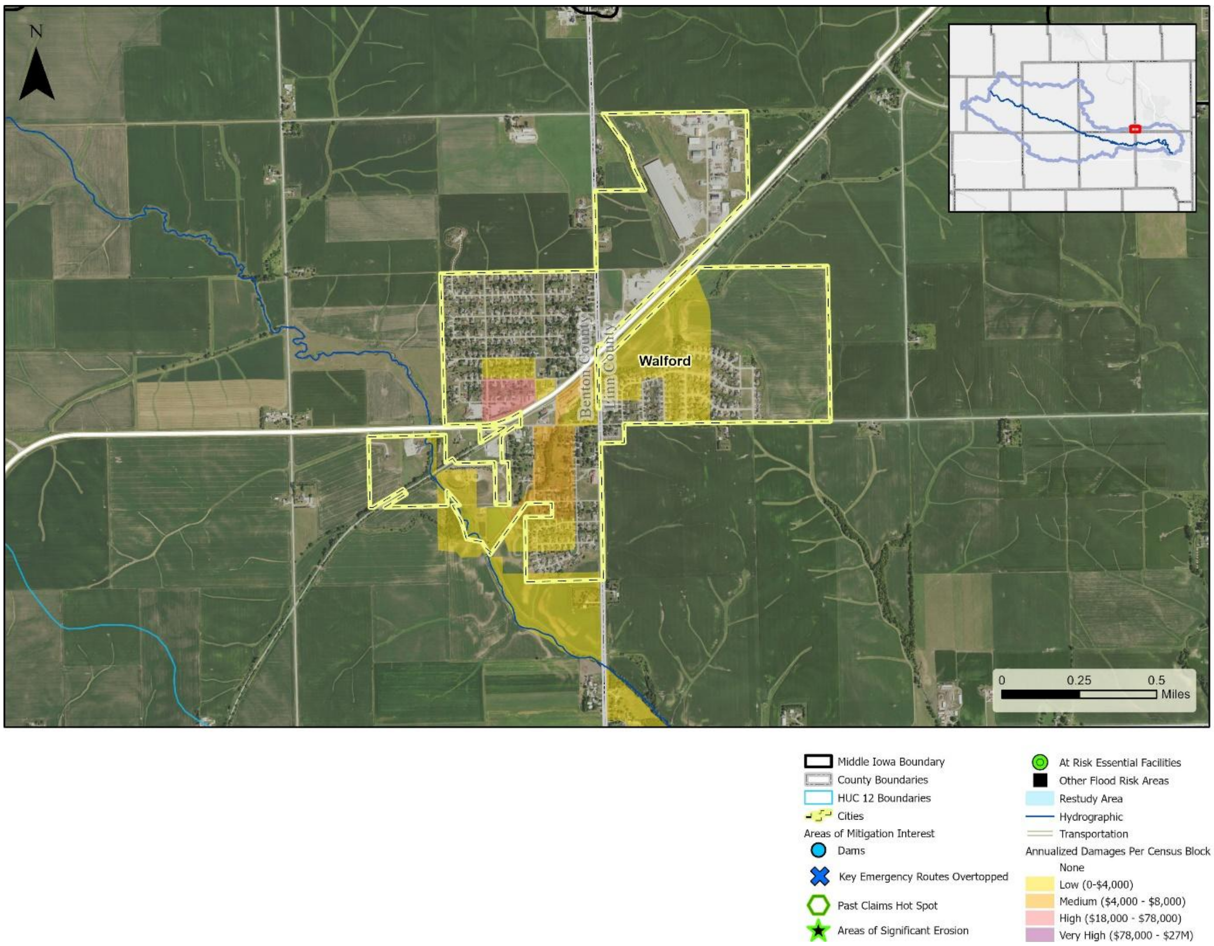


Figure 5-9. Flood Risk Map of Walford

Priority Case Studies

The cities of Chelsea, Montour, and Tama have the highest risk of flooding in Tama County, according to the MJHMP. Marengo (in Iowa County) is protected by a levee, but experiences interior drainage problems and would incur severe damages if there were a levee failure. Current status of the Marengo levee is uncertain – if it is not in compliance a levee improvement project would be warranted – and internal drainage could be improved.

Of these communities, Chelsea, Tama, and Marengo have the most specific flood mitigation actions described in their respective MJHMPs. This puts them in the best position to be eligible for the Help CUT Flooding program, which provides technical assistance and a path towards potential FEMA funding. Therefore, this plan lays out application information for recommended Case Studies communities of Chelsea, Tama, and Marengo.

Case Study 1: Chelsea

Table 5-1 lays out information asked of applicants to the Help CUT Flooding program, making the application a simple undertaking.

Table 5-1. Help CUT Flooding information for Chelsea

Help CUT Flooding Application questions	Chelsea Responses
Name	Chelsea
What is flooding ?	☒ Roads
	☒ Businesses
	☒ Homes
	☐ Other ______________________________
What areas are flooding?	See Figure 5-3
How frequently is the area inundated?	☐ More frequently than the 5-year event
	☒ More frequently than the 10-year event
	☐ More frequently than the 25-year event
What solutions have been considered?	Buyouts, culvert maintenance and additions, and levee construction
Any other background of the flood issue?	Several repetitive loss properties have been bought out or raised. Following devastating 1993 flooding there was a proposal to move the entire city to higher elevation. This was unsuccessful and Chelsea residents opposed it.
What kind of technical assistance is desired (non-monetary)?	Detailed modeling, proposal of feasible solutions, alternative analyses

Help CUT Flooding Application questions	Chelsea Responses
If your local Hazard Mitigation Plan lists a mitigation action that addresses this issue, what is that action?	☐ Plan lists no mitigation action
	☐ Do not know if addressed in Plan
	☒ Other
Suggest a mitigation action to address the issue	Buyouts, culvert maintenance and additions, and levee construction
What completion time frame do you expect for actions?	☒ 1-3 years
	☐ 3-5 years
	☐ 5-8 years
	☐ 8+ years
	☐ Not yet known
What do you expect is the likely benefit of this action compared to its cost?	☒ Low (levee construction)
	☐ Medium
	☒ High (culvert maintenance)
	☐ Not yet known
List potential funding sources for this action	City general funds, FEMA Hazard Mitigation Assistance, US Army Corps of Engineers (USACE), City of Chelsea local options sale tax
Who are potential partners to implement the action?	Region 6 Planning Commission, FEMA, Iowa Homeland Security and Emergency Management, DNR, USACE
What is the priority of this action as compared to other mitigation actions in the community?	☐ Low
	☒ Medium
	☐ High
	☐ Not yet known
What position of department in the jurisdiction would be responsible for implementing the action?	City Council

Case Study 2: Tama

Table 5-2. Help CUT Flooding in Tama

Help CUT Flooding Application questions	Tama Responses
Name	Tama
What is flooding ?	☒ Roads
	☒ Businesses
	☐ Homes
	☒ Other: Water Treatment Facility

Help CUT Flooding Application questions	Tama Responses
What areas are flooding?	See Figure 5-8
How frequently is the area inundated?	☐ More frequently than the 5-year event ☒ More frequently than the 10-year event ☐ More frequently than the 25-year event
What solutions have been considered?	Purchase of a generator for dike pumps
Any other background of the flood issue?	Tama has very high annualized damages ($300,000). There are utilities in the floodplain.
What kind of technical assistance is desired (non-monetary)?	Detailed modeling, proposal of feasible solutions, alternative analyses
If your local Hazard Mitigation Plan lists a mitigation action that addresses this issue, what is that action?	☐ Plan lists no mitigation action ☐ Do not know if addressed in Plan ☒ Other
Suggest a mitigation action to address the issue	Purchase of a generator for dike / levee pumps, and dike, pump, and drainage improvements
What completion time frame do you expect for actions?	☐ 1-3 years ☐ 3-5 years ☐ 5-8 years ☐ 8+ years ☒ Not yet known
What do you expect is the likely benefit of this action compared to its cost?	☐ Low ☒ Medium (drainage improvements) ☒ High (generator) ☐ Not yet known
List potential funding sources for this action	City utility revenue, City property tax, FEMA Hazard Mitigation Assistance, State Revolving Fund loan
Who are potential partners to implement the action?	Tama County SWCD, FEMA, Iowa Homeland Security and Emergency Management, DNR
What is the priority of this action as compared to other mitigation actions in the community?	☐ Low ☒ Medium ☐ High ☐ Not yet known
What position of department in the jurisdiction would be responsible for implementing the action?	City Council, Tama Sewer Department

Case Study 3: Marengo

Table 5-3. Help CUT Flooding in Marengo

Help CUT Flooding Application questions	Marengo Responses
Name	Marengo
What is flooding ?	☒ Roads
	☒ Businesses
	☒ Homes
	☒ Other: <u>Schools, hospital, water treatment facility</u>
What areas are flooding?	See Figure 5-7
How frequently is the area inundated?	☐ More frequently than the 5-year event
	☒ More frequently than the 10-year event
	☐ More frequently than the 25-year event
What solutions have been considered?	Buyouts, culvert maintenance and additions, and levee construction
Any other background of the flood issue?	Marengo has high annualized damages and utilities in the floodplain
What kind of technical assistance is desired (non-monetary)?	Detailed modeling, proposal of feasible solutions, alternative analyses
If your local Hazard Mitigation Plan lists a mitigation action that addresses this issue, what is that action?	☐ Plan lists no mitigation action
	☐ Do not know if addressed in Plan
	☒ Other
Suggest a mitigation action to address the issue	Improve levee to increase flood control, improve stormwater system, buyout / acquire flood-prone properties, obtain a generator for pump stations
What completion time frame do you expect for actions?	☒ 1-3 years
	☐ 3-5 years
	☐ 5-8 years
	☐ 8+ years
	☐ Not yet known
What do you expect is the likely benefit of this action compared to its cost?	☐ Low
	☐ Medium
	☐ High
	☒ Not yet known
List potential funding sources for this action	City general funds, FEMA Hazard Mitigation Assistance, DNR, State Revolving Fund Loan
Who are potential partners to implement the action?	Iowa County SWCD, FEMA, Iowa Homeland Security and Emergency Management, DNR, USACE

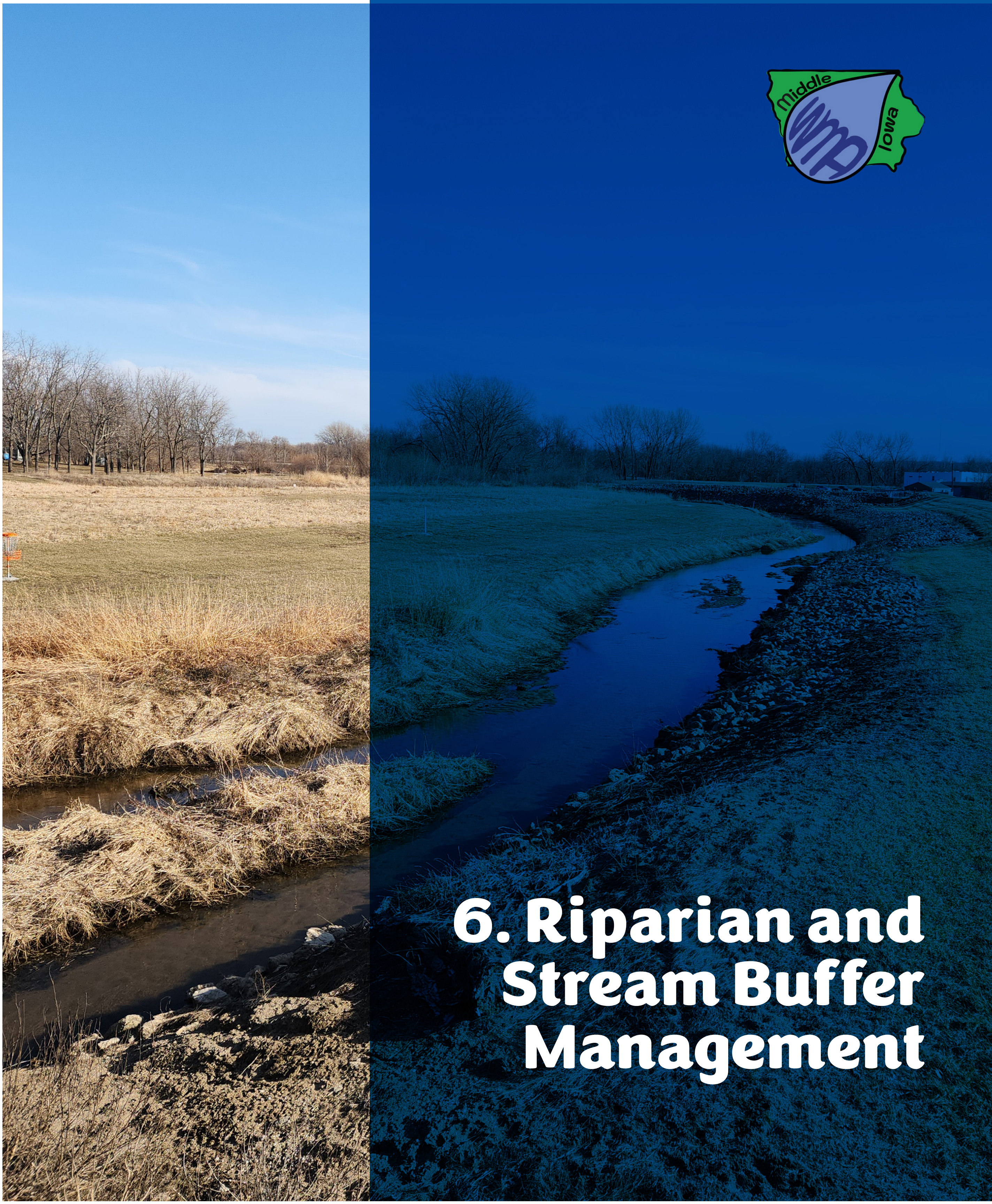
Help CUT Flooding Application questions	Marengo Responses
What is the priority of this action as compared to other mitigation actions in the community?	☒ Low ☐ Medium ☐ High ☐ Not yet known
What position of department in the jurisdiction would be responsible for implementing the action?	City Council

Potential Mitigation Assistance

There are other sources of federal funding available for communities beyond the Help CUT Flooding program. Example programs are in Table 5-4.

Table 5-4. Example federal funding programs that could be used to address flooding

Agency	Program	Note
Federal Emergency Management Agency (FEMA)	Hazard Mitigation Grant Program (HMGP)	Only available post-Presidential disaster declaration
	Flood Mitigation Assistance (FMA) program	Available for flood mitigation of buildings insured through the National Flood Insurance Program
	Building Resilient Infrastructure and Communities (BRIC)	Current program status is uncertain
USDA	Watershed and Flood Prevention Operations Program (WFPO)	Must benefit agricultural communities – feasibility and support in Iowa is uncertain
Department of Housing and Urban Development (HUD)	Community Development Block Grant (CDBG) Disaster Recovery Grant Funds	Only available post-Presidential disaster declaration
Iowa Homeland Security and Emergency Management (HSEM)	Help CUT Flooding (also referred to as Real-Time Technical Assistance) Program	Offers free technical assistance to pinpoint local causes of floods and specific mitigation measures to reduce flood impacts – can lead to successful grant applications from FEMA



6. Riparian and Stream Buffer Management

Section 6. Riparian and Stream Buffer Management Plan

The Middle Iowa River corridor has many valuable riparian resources, some of which have been protected, others have high potential for restoration, and many have or could potentially have a beneficial impact to water quantity and quality within the Middle Iowa Watershed. This Riparian and Stream Buffer Management Plan is split into four distinct sections, each with a focus on one aspect of riparian habitat and water quantity/quality management:

- **Linear connectivity** along the Iowa River
- Lateral **floodplain connectivity**
- **Oxbow restoration/protection** potential
- **Streambank stabilization** and/or restoration

The Plan also identifies water storage and riparian management goals within the **Riparian Focus Area**- the riparian corridor within the 500-year floodplain of the Iowa River.

Process

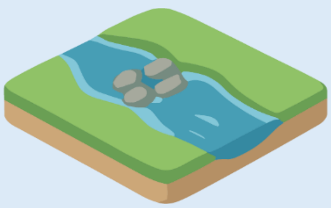
Local knowledge from conservation experts, data provided by The Nature Conservancy, and GIS analysis were used to locate areas along the major streams and rivers of the watershed for conservation and management projects. Focus was placed on increasing lateral and longitudinal connectivity within the defined riparian corridor and locating areas where conservation and management practices can be implemented to increase landscape water storage, improve water quality, and reduce streambank erosion.

Existing publicly owned lands were reviewed to find areas where greenspace opportunities and contiguous aquatic and terrestrial habitat could be increased. Expanding contiguous conservation land will likely have habitat and social benefits (e.g., nesting habitat, recreational opportunities, etc.) and increase educational opportunities, however these benefits are not explicitly addressed as part of this Riparian and Stream Buffer Management Plan.

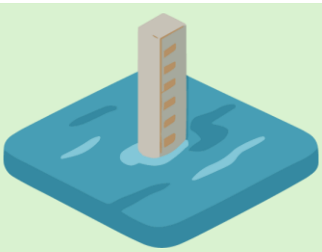
Potential riparian and wetland practice locations were identified and prioritized using geospatial data. The GIS analysis provided objective rationale for planning decisions and evaluated the feasibility of potential projects. Water quantity benefits (storage volume) were estimated for potential oxbow and wetland projects, allowing those projects to be prioritized based on water quantity or quality benefits. This quantification will also prove helpful for future funding opportunities, such as the Google program seeking water storage projects to offset water use from data centers. Finally, areas of excessive streambank erosion were highlighted within the riparian corridor to help locate and prioritize areas for streambank stabilization efforts.

Outcomes

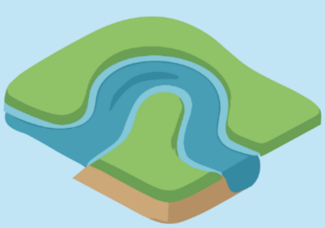
The Riparian and Stream Buffer Management Plan for the Middle Iowa Watershed outlines a comprehensive strategy to protect, restore, and enhance the ecological integrity of the Iowa River corridor. The plan emphasizes improving linear and lateral connectivity, restoring oxbow wetlands, and stabilizing streambanks to improve water quality, support biodiversity, and increase climate resilience.



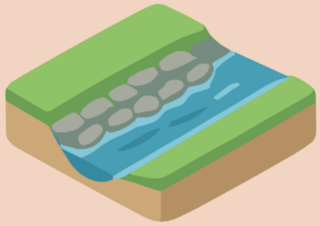
Linear Connectivity will be addressed through the removal or modification of lowhead dams and channel obstructions to facilitate fish passage and recreational use. The plan highlights four dams along the Iowa River, including two defunct structures in Marshalltown and Tama, and ongoing efforts by the Amana Society, Inc. to remove or modify the Millrace Diversion Dam. Restoring the freshwater resilient connected networks in the central portion of the watershed is a key goal, ensuring that the riparian areas remain resilient to weather extremes and changing hydrology. The plan also calls for a 5% increase in publicly owned conservation land to improve habitat continuity. Additional conservation land strategically obtained in the eastern half of the watershed could readily and dramatically increase contiguous habitat. However, increasing conservation area in the fragmented upstream (western) portion of the watershed should not be overlooked.



Floodplain Connectivity is another major focus of this plan, with the overall goal to restore natural hydrologic interactions between the river and its floodplain. The focus area for this Riparian and Stream Buffer Management Plan includes extensive acreage within the 2, 5, and 10-year floodplains, offering significant opportunities for water storage and water quality improvement. Priority areas for floodplain restoration include sites in Marshall, Iowa, and Johnson counties, as well as lands owned by the Amana Society, Inc. Projects in these areas could help to enhance climate resilience and ecological function across the watershed.



Oxbow Protection / Restoration is identified as a high-impact strategy for increasing water storage, improving water quality through sediment and nutrient reduction, and increasing habitat diversity. The plan notes the presence of hundreds of oxbows within the focus area with a selection of those prioritized based on a number of factors including proximity to the river, elevation above the river, land use, etc. These efforts aim to reconnect oxbows to the river during flood events, supporting multiple conservation goals.



Finally, **Streambank Stabilization** is also emphasized to reduce erosion, protect infrastructure, and improve water quality.

Together, these four focused efforts form an integrated approach to riparian management that supports water quality improvements, climate resiliency, habitat improvement, and community well-being.

Purpose and Goals

This plan aims to present methods and opportunities to protect, restore, and increase connectivity of riparian areas and the ecological resources and unique habitats they provide. The section of the Iowa River within the Middle Iowa Watershed contains many oxbow wetlands, forested wetlands, nesting and roosting sites for eagles, and habitat for other wildlife that thrive in the natural environment along the river corridor.

Through the creation of this plan, many areas where longitudinal and lateral connectivity can be increased were located, feasible restoration projects were proposed, and management strategies and outcomes looking toward the future are presented. During the data analysis, resilience to potential extreme events and climate trends was also considered to provide the best possible options to improve the stream corridor area. The outcome of this Riparian and Stream Buffer Management Plan is an integrated section of the overall comprehensive watershed management plan which can also function as a useful stand-alone document that can be easily incorporated into future plans or proposals.

Streambank, Source: Houston Engineering

Area of Analysis

For the purpose of this plan, the Iowa River riparian corridor was defined as the 500-year floodplain, with many of the larger tributaries excluded from the analysis. This focused efforts to the main corridor of the Iowa River. Throughout the Riparian and Stream Buffer Management Plan, this area will be referred to as the **Riparian Focus Area** (Figure 6-1).

This Plan further targets management efforts within the Riparian Focus to the Riparian Corridor and the Greenway Corridor. The Greenway Corridor refers to land in the focus area that is set aside for the purpose of conservation, and the Riparian / River Corridor is the rest of the non-publicly managed land.

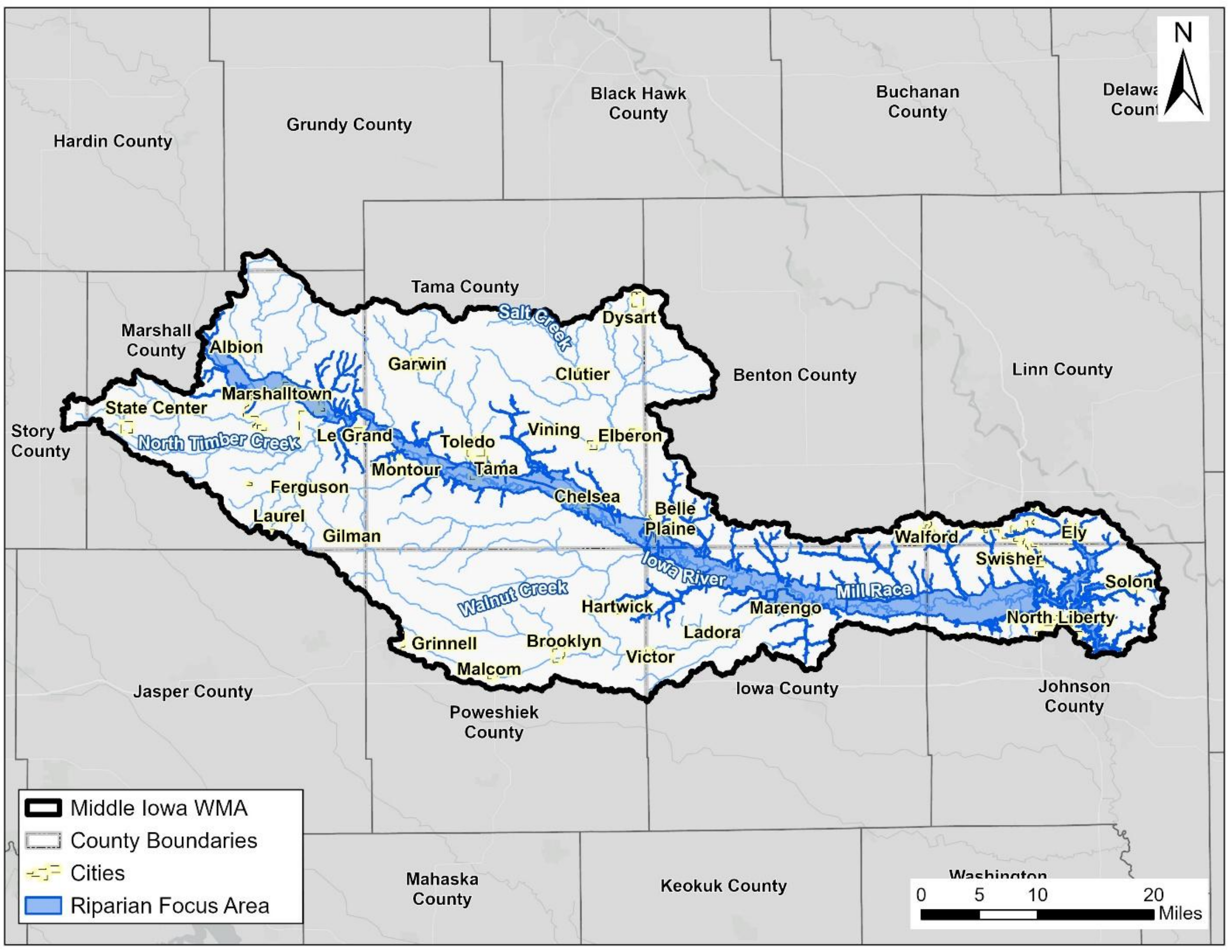
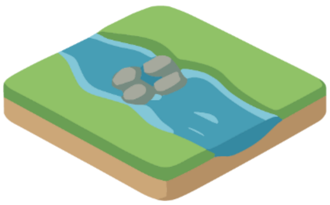


Figure 6-1. Riparian Focus Area of the Riparian and Stream Buffer Management Plan

Linear Connectivity Along the Corridor

Introduction



Linear connectivity is fundamental to the ecological integrity of a river system, as it ensures the uninterrupted flow of water, sediments, nutrients, and organisms throughout the watershed. This continuous connection supports the natural processes that shape river channels, maintain water quality, and sustain diverse habitats along the riparian corridor. Additionally, contiguous riparian corridors are ecologically diverse and can provide outstanding wildlife habitat. When linear connectivity is intact, the river and it's floodplain can function as a dynamic system that responds to seasonal and annual changes, distributes resources efficiently through the watershed, and supports both aquatic and terrestrial life.

One of the most critical aspects of linear connectivity within a river system is its role in enabling the movement of aquatic species upstream and down. Many fish and other aquatic organisms depend on access to different parts of a river system at different times of year to maintain healthy populations. **Barriers like dams, weirs, and poorly designed culverts can block this movement, fragment habitats, and lead to population declines.** Restoring connectivity through fish ladders, dam removals or modifications, or bypass channels helps reestablish these vital pathways and supports biodiversity throughout the watershed.

Beyond ecological benefits, linear connectivity also enhances a river's resilience to environmental stressors. Connected rivers are better able to absorb and recover from disturbances such as floods, droughts, and pollution. They facilitate the natural transport of sediments that reinforce riverbanks and nourish downstream ecosystems, including floodplains and deltas. For human communities, maintaining or restoring linear connectivity can improve water quality, reduce flood risks, and support sustainable fisheries and recreation. In essence, a connected river is a healthy river—capable of sustaining both nature and people over the long term.

Improving linear connectivity in rivers involves restoring the natural flow characteristics and removing barriers that disrupt the movement of water, sediments, and aquatic life. One effective approach is the removal of obsolete dams and the installation of fish ladders, bypass channels, or rock arch rapids where dams or obstructions must remain, allowing species to migrate freely. Replacing undersized or poorly designed culverts with structures that mimic natural streambeds also helps reconnect fragmented habitats. Reestablishing access to floodplains by modifying levees and channelized sections enhances ecological diversity and resilience. These efforts, when guided by watershed-scale planning and long-term monitoring, can revitalize river ecosystems, support biodiversity, and strengthen the ecosystem services that rivers provide to surrounding communities.

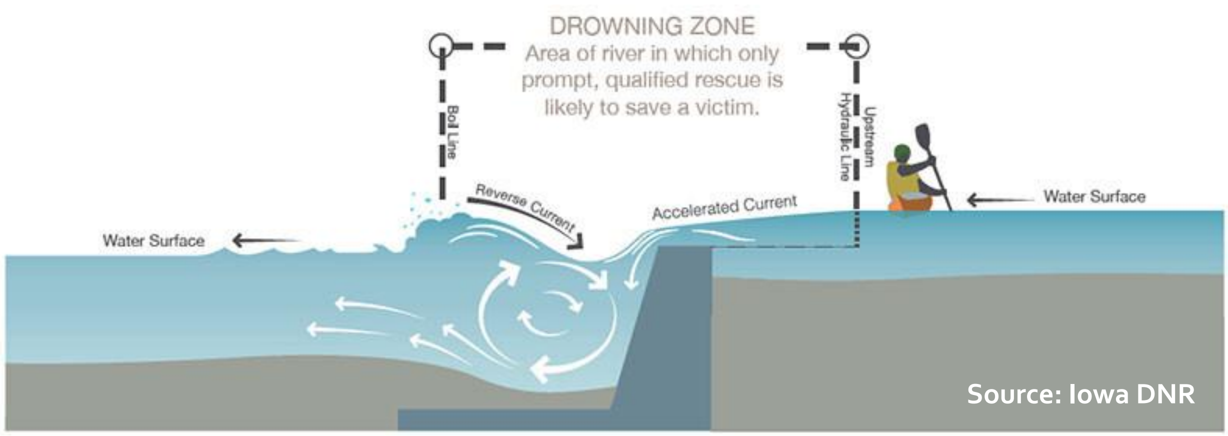
Resource Conditions

Linear connectivity of the Iowa River within the Riparian Focus Area of the Middle Iowa Watershed is quite high, with very few obstructions to aquatic animals or humans recreating within the river corridor. There are also extensive networks of public conservation land along the extent of the river.

River Corridor: Dams

There are sixteen dams within the defined Riparian Focus Area found in the DNR Dam Inventory (Figure 6-2). Most of these dams form ponds or wetlands and are not barriers to river corridor connectivity. Linear connectivity is more impacted by inline dams on the river. This plan focuses on in-river obstructions and does not prioritize removal of earthen dams that create beneficial lakes, ponds, or wetlands.

Lowhead dams in streams and rivers create hazardous conditions that can lead to drowning. The drop in the water surface across such an obstruction creates hydraulic conditions that can trap objects, including the best of swimmers.



Aside from the Coralville Reservoir Dam, there is only one inline, lowhead dam along the Iowa River that resides in the Riparian Focus Area and the DNR's Dam Inventory – the Amana Mill Race Diversion Dam. However, there are four additional obstructions in the Focus Area that aren't in the DNR's inventory. Two of the four obstructions have fallen into disrepair and are no longer functional or providing their intended use (Table 6-1). One of the structures is not on the Iowa River but at the downstream end of the Amana Mill Race where the historic mill was located.

Table 6-1. Dams and/or obstructions found in the Middle Iowa River (downstream to upstream)

Name	Location	Description
Amana Mill Dam	Amana, Iowa Google Maps	Mill dam located at the downstream end of the Mill Race. Source: www.iowawhitewater.org
Amana Mill Race Diversion Dam	Between Amana and Marengo Google Maps	Diversion constructed in 1919 to divert water into the Amana Mill Race. In DNR Inventory. Sources: DNR Lowhead Dam Inventory, www.iowawhitewater.org
Tama Hydraulic Diversion Dam	Meskwaki Settlement Google Maps	Former diversion dam for Tama Hydraulic Power. Deteriorated and not functional. Source: iowawhitewater.org
Sanitary District (Riverview Park) Rock Dam	Marshalltown, Iowa Google Maps	Rock dam constructed near the Water Pollution Control Plant. iowawww.whitewater.org
Marshalltown Center Street Dam	Marshalltown, Iowa Google Maps	Former dam to create ponded water for ice production in winter. Deteriorated and not functional. Source: iowawhitewater.org

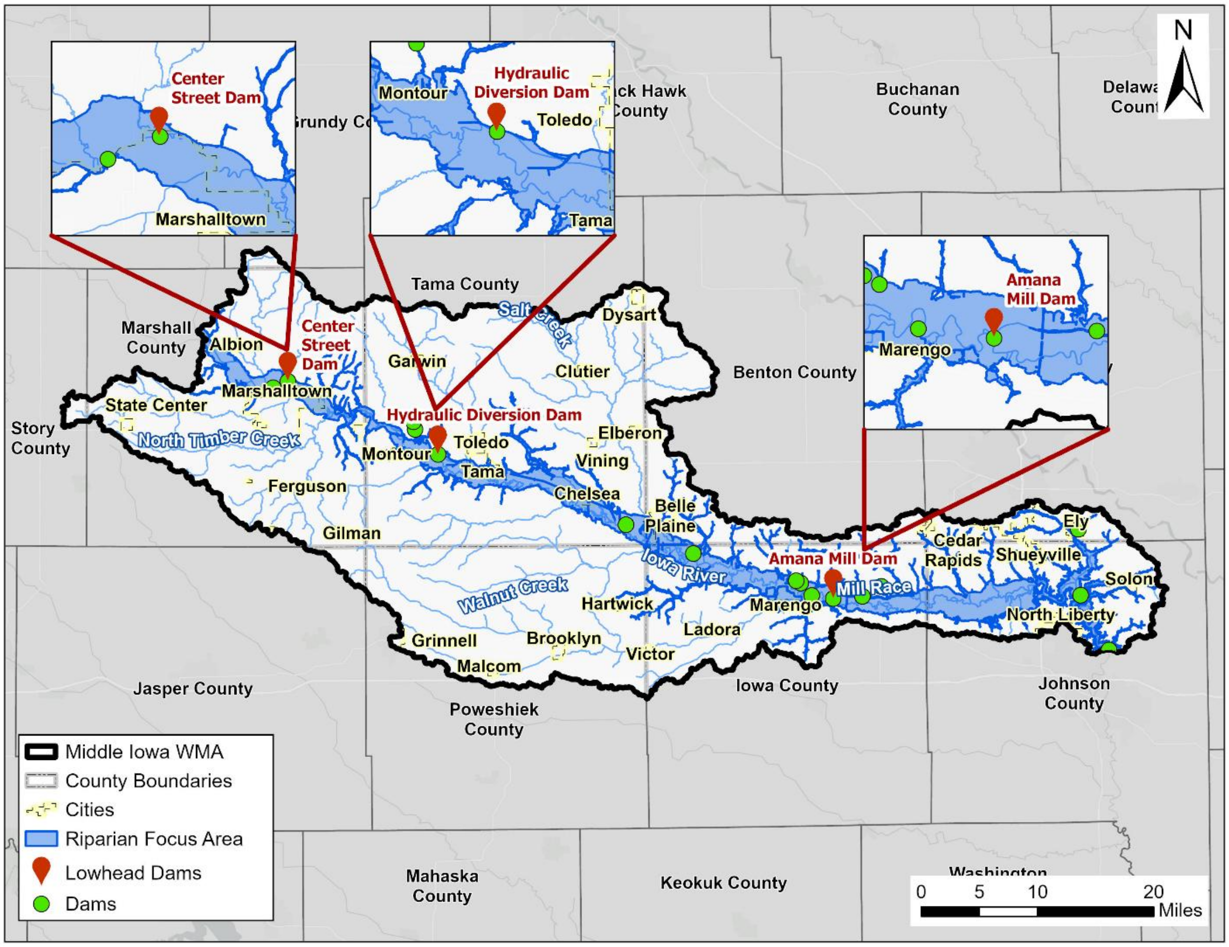
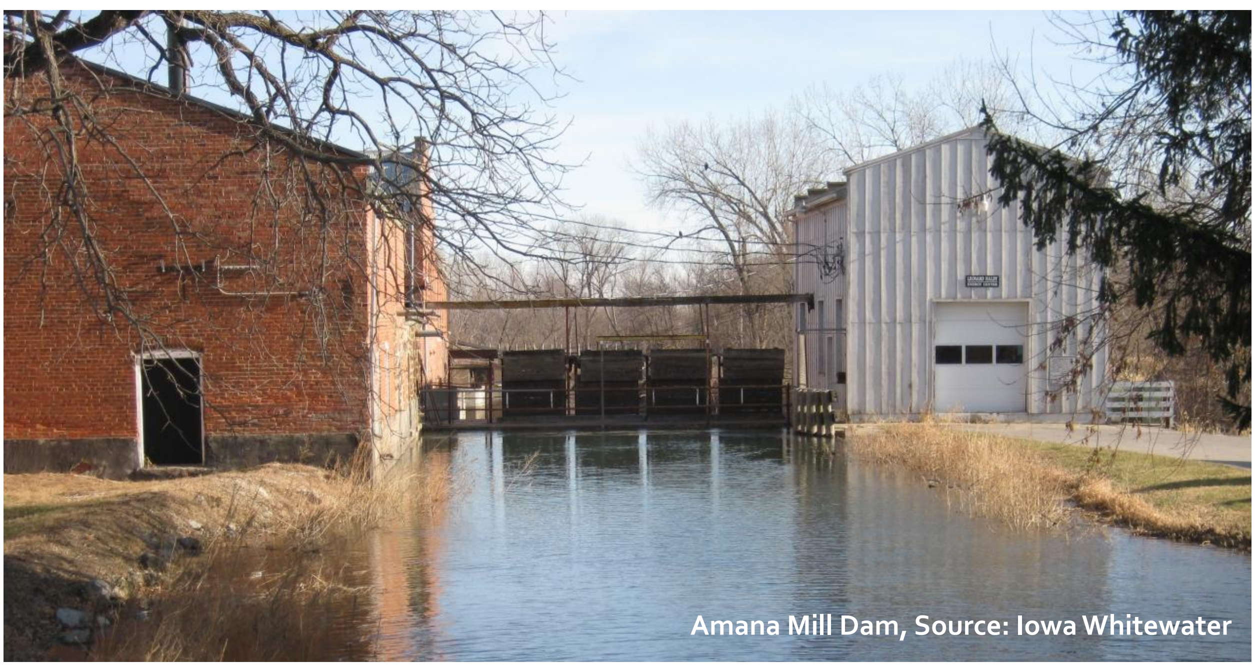


Figure 6-2. Dams in the Middle Iowa Watershed



Amana Mill Dam, Source: Iowa Whitewater

Greenway Corridor: Public Land

Within the Riparian Focus Area there are approximately 46,500 acres of public land set aside with the purpose of conservation and recreation (Figure 6-3). That accounts for 43.7% of the total Riparian Focus Area. Much of the conservation and recreation land is contiguous, however there are still gaps between conservation areas that could be filled, and much of the conservation and recreation land is toward the lower (eastern) portion of the watershed. Conservation and recreation land in the upstream (western) portion of the watershed is quite fragmented.

In addition to the public land that has already been set aside for conservation, private entities such as the Amana Society, Inc. have shown a commitment to conservation efforts within the riparian corridor. Including the private land owned by the Amana Society, Inc. there are very few gaps in conservation land and contiguous habitat along nearly 145 river kilometers (90 miles) of the Iowa River.

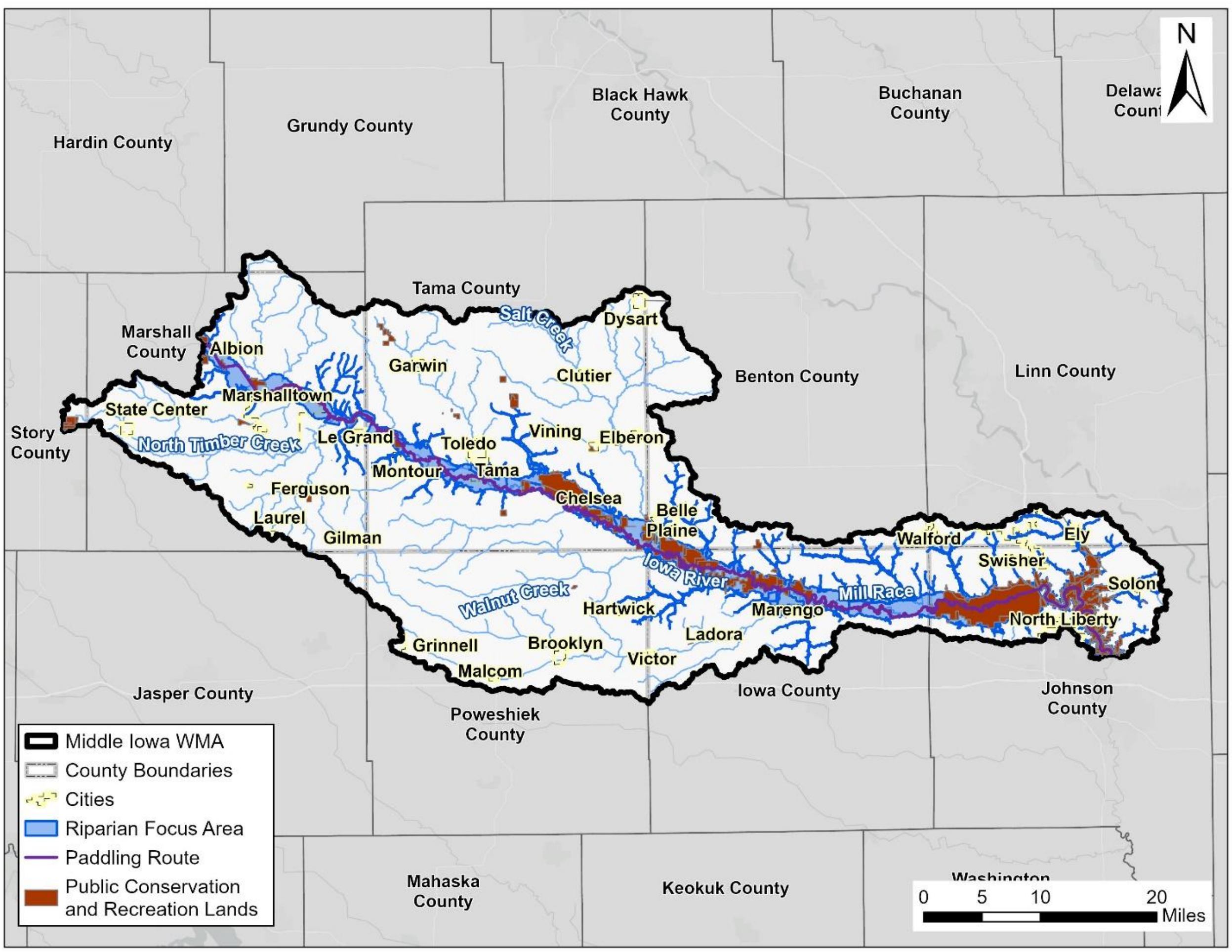


Figure 6-3. Public and recreational land in the Riparian Focus Area

Goals and Objectives

Upstream to downstream connectivity within the river and along the riparian corridor is not only important to ensure habitat access and continuity, but also for water quantity management, water quality protection, and recreational opportunities. This section of the Riparian and Stream Buffer Management Plan will highlight areas where terrestrial and aquatic lateral connectivity can be increased within the Riparian Focus Area.

River Corridor

The long-term goal for maintaining and/or restoring linear connectivity within this section of the Iowa River is to ensure unbroken access to all reaches of the river for aquatic organisms and also for recreational use within the river.

Removal or modification of dams and obstructions within the river will promote fish passage through the corridor, provide recreational use of the river, and reduce safety risks for paddlers and other river users. **One objective in this plan's Riparian Management Goal is to remove or modify two lowhead dams in the Iowa River.** Opportunities to modify these dams will require engaging dam owners, local entities/partners, and the DNR. The United States Fish and Wildlife Service (USFWS) has a National Fish Passage Program that can provide technical and financial assistance (https://www.fws.gov/program/national-fish-passage) for potential projects.

Freshwater Resilient and Connected Networks (FRCNs; Figure 6-4), established by The Nature Conservancy, represent freshwater systems that have characteristics that provide resilience to climate change, or could provide resilience if managed in certain ways to restore a specific physical factor (e.g. flow regime, connectivity, etc.). Maintaining and improving the FRCNs throughout the river corridor will strengthen physical, biological, and chemical connections within the river. Maintaining or restoring the functional networks among the interconnected river systems within the Riparian Focus Area will improve habitat connectivity and strengthen climate resilience throughout the watershed.

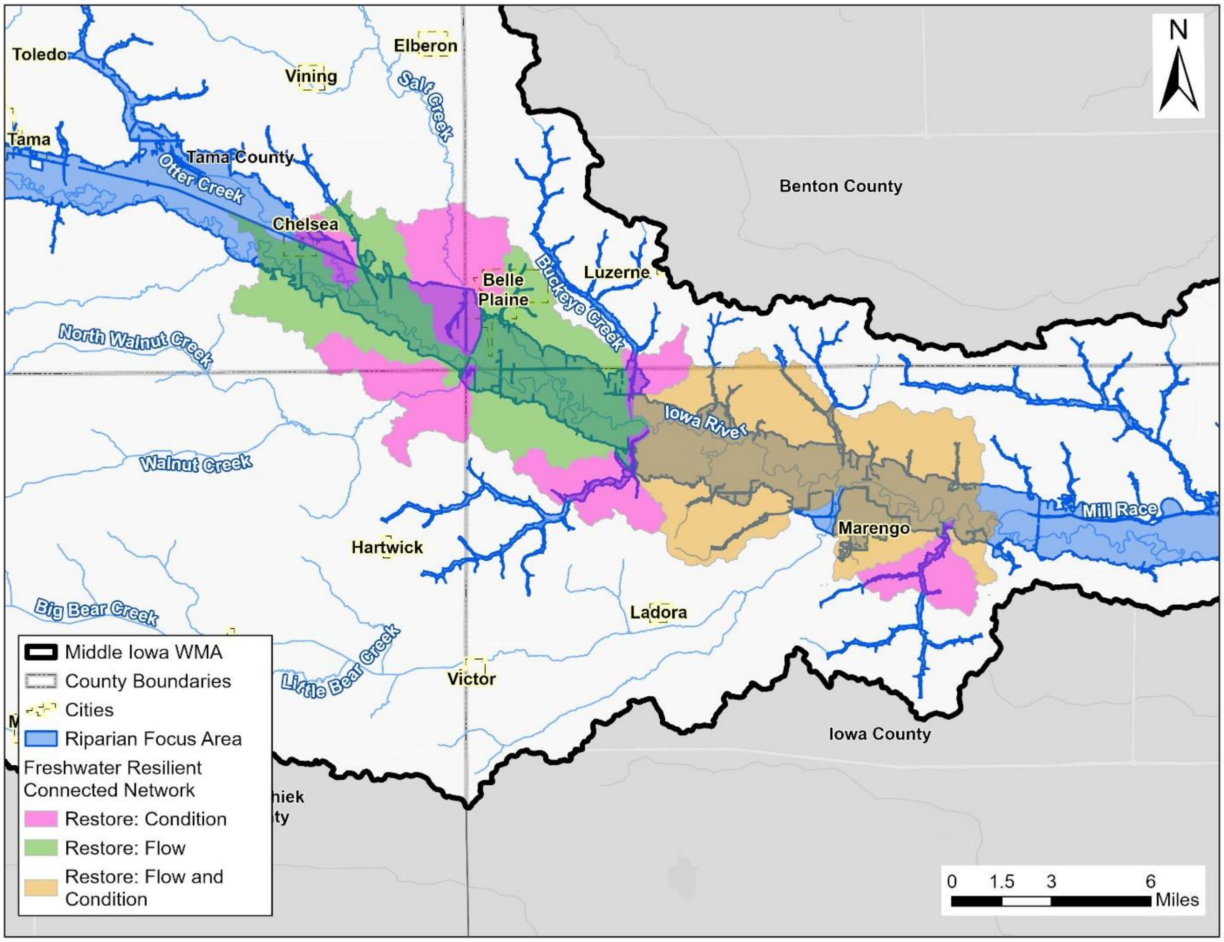


Figure 6-4. Freshwater Resilient and Connected Networks (TNC, 2025)

Greenway Corridor

Bordering the Iowa River is the riparian zone which serves as a vital bridge between the aquatic and terrestrial ecosystems throughout the watershed. Within this greenway corridor, increasing contiguous conservation and recreation land is an important way to ensure habitat strength, climate resilience, and recreational opportunities.

One objective in this plan's Riparian Management Goal is a 5% increase in publicly owned and managed conservation land in the Riparian Focus Area, equating to roughly 2,300 additional acres. If placed in strategic locations, that additional land could lead to a tremendous area of contiguous conservation land and habitat.

Potential Project Areas

Potential project areas listed below represent locations where further review may be beneficial to determine existing functionality and feasibility of conservation projects and practices.

River Corridor

Dams near Marshalltown

The Center Street Bridge lowhead dam in Marshalltown may cause dangerous conditions below the dam at average streamflow conditions. A modification project would likely need to be led by the City's Public Works Department, as it may impact the Center Street bridge, other public infrastructure, traffic, and other city operations. Similarly, the Sanitation District (Riverview Park) rock dam just downstream to the north of the Water Pollution Control Plant was likely constructed to protect sewer infrastructure. Iowa Whitewater suggests on its webpage that this dam may allow some fish passage and portage for recreational passage. Therefore, the Sanitation District dam, while it could be improved as part of a River Trail, may be a lower priority location at this time.

Tama Hydraulic Diversion Dam

The remains of the Tama Hydraulic Diversion Dam are located approximately one mile upstream of the Tama County Highway E49 bridge. This dam is severely deteriorated and has created areas of rubble and debris within the river. From an engineering and construction standpoint, this obstruction may be less expensive to remove, but removal may not provide as much benefit as removal of dams that completely span the river channel.

Amana Mill Race Diversion Dam

Finally, the Amana Society, Inc. owns the Amana Mill Race Diversion Dam, which diverts water into the Mill Race. The Amana Mill Dam is located at the downstream end of the Mill Race, just before it re-enters the Iowa River. Modification of these dams will need to be done with consideration of the impacts on water levels in the Iowa River and the Mill Race. It may be necessary to keep water elevations upstream of the dams at the current level. This can be accomplished while providing fish passage and reduced safety risk by modifying the dams with rock arch rapids, fish ladders, or other methods. Amana Society, Inc. has had conversations with the Iowa DNR to remove this dam, but a plan and funding have been slow to develop. Amana Society, Inc. does not qualify for many common grant programs due to their status as a private entity. Possible grant opportunities they may be eligible for include Rural Energy for America Program (REAP) and Regional Conservation Partnership Program (RCPP). It's possible that with WMA partnership/sponsorship, additional paths to funding may exist.

Greenway Corridor

Although there are large, contiguous areas of conservation and recreation land within the Riparian Focus Area, there are locations where investments and land acquisition may lead to rapid increases in contiguous habitat and recreation opportunities. To support the overall goal of greenway corridor connectivity, several county conservation boards have committed to a focus on land acquisition. For consideration, additional land to be set aside or purchased for conservation must be adjacent to existing public conservation lands.

Johnson County Land Acquisition and Protection

The Johnson County Conservation Board currently owns three parcels of land, one of which is partially within the Riparian Focus Area. The Williams Prairie Preserve is owned by the conservation board and is surrounded by neighboring parcels that are currently owned by a single entity. Land use within those neighboring parcels appears to be a combination of row crop agriculture and natural grassland and forest. Acquisition of land surrounding the Williams Prairie Preserve, particularly the parcel(s) to the north could connect those conservation lands with the Jerry Quinlan WMA to the north, creating a contiguous connection between the two conservation areas and expand the conservation area within the Riparian Focus Area.

Marshall County Land Acquisition and Protection

Marshall County currently owns eight locations within the Riparian Focus Area. These consist of county parks (Sand Lake, Mag Holland Access Area, Three Bridges, Timmons Grove North and South), a State preserve (Marietta Sand Prairie), and wildlife management areas (Arney Bend, Stewart Bird Sanctuary). Many of these locations are separated by large tracts of land, so opportunities for connecting any of these areas to create larger contiguous areas are minimal. However, the State of Iowa owns much of the land between Arney Bend Wildlife area and Marietta Sand Prairie State Preserve which be set aside for additional conservation use. Similarly, The Marshalltown City Board of Waterworks Trustees owns much of the land between the Iowa River WMA (owned by Marshall County) and the Steward Bird Sanctuary.

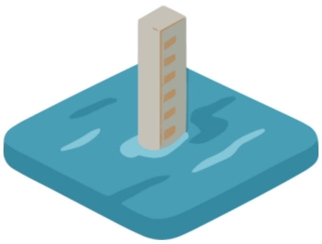
Tama County Land Acquisition and Protection

The areas within the southeast Tama County and northwest Iowa County that contain parts of the Riparian Focus Area do already have a considerable amount of conservation land present. However, some gaps do exist and could be prioritized for additional land purchases.

Opportunities in Johnson, Marshall, and Tama Counties can be found throughout the watershed and should be prioritized based on potential expansion of contiguous habitat, feasibility of water storage locations, and opportunities for water quality projects.

Floodplain Connectivity

Introduction



Reestablishing a river's access to its floodplain is crucial for restoring natural hydrologic cycles and enhancing ecological resilience. Floodplains serve as vital extensions of river systems, absorbing excess water during high-flow events and reducing the severity of downstream flooding. When rivers are confined by levees or are channelized, they lose the ability to spread out and interact with surrounding landscape. This disconnection not only increases flood risks but also disrupts the natural recharge of groundwater and the deposition of nutrient-rich sediments that support fertile soils and diverse plant life.

Reconnecting rivers to their floodplains creates dynamic habitats that support a wide range of species. Seasonal flooding rejuvenates wetlands, nourishes riparian vegetation, and provides spawning and nursery grounds for fish and amphibians. Birds, mammals, and insects also benefit from the diverse habitats created by fluctuating water levels. These biologically rich zones act as biodiversity hotspots, helping to maintain healthy populations and ecological balance across the entire watershed.

Beyond environmental benefits, floodplain restoration offers significant advantages for human communities. It improves water quality by allowing natural filtration of pollutants through soil and vegetation, and it enhances recreational opportunities like fishing, birdwatching, and hiking. Restored floodplains can also dampen the impacts of climate change by increasing landscape adaptability to extreme weather events. By reestablishing this vital connection, we not only restore natural ecosystems but also invest in long-term sustainability and resilience for both nature and people.

Improving floodplain connectivity in rivers involves restoring the natural interactions between rivers and their surrounding landscapes, which have often been severed by levees, dams, and channelization. One effective strategy is to remove or modify artificial barriers that prevent rivers from overflowing into their floodplains during high-flow events. Additionally, protecting and rehabilitating riparian zones with native vegetation enhances the ecological function of floodplains, allowing them to absorb water, filter pollutants, and support diverse wildlife. These efforts not only revitalize ecosystems but also reduce flood risks and improve water quality, making floodplain restoration a win-win for both nature and communities.

Resource Conditions

The defined Riparian Focus Area within the Middle Iowa Watershed contains most of the 500-year floodplain along the mainstem of the Iowa River. Different flow conditions will inundate different areas on the landscape, which can have an impact on water quality and flow conditions in the river.

The Riparian Focus Area covers 106,501 acres within the watershed. Within it, the 2-, 5-, and 10-year floodplains cover 53,272 acres, 89,385, acres, and 103,999 acres, respectively (Figure 6-5). This provides a tremendous opportunity for water storage and water quality projects within the floodplain.

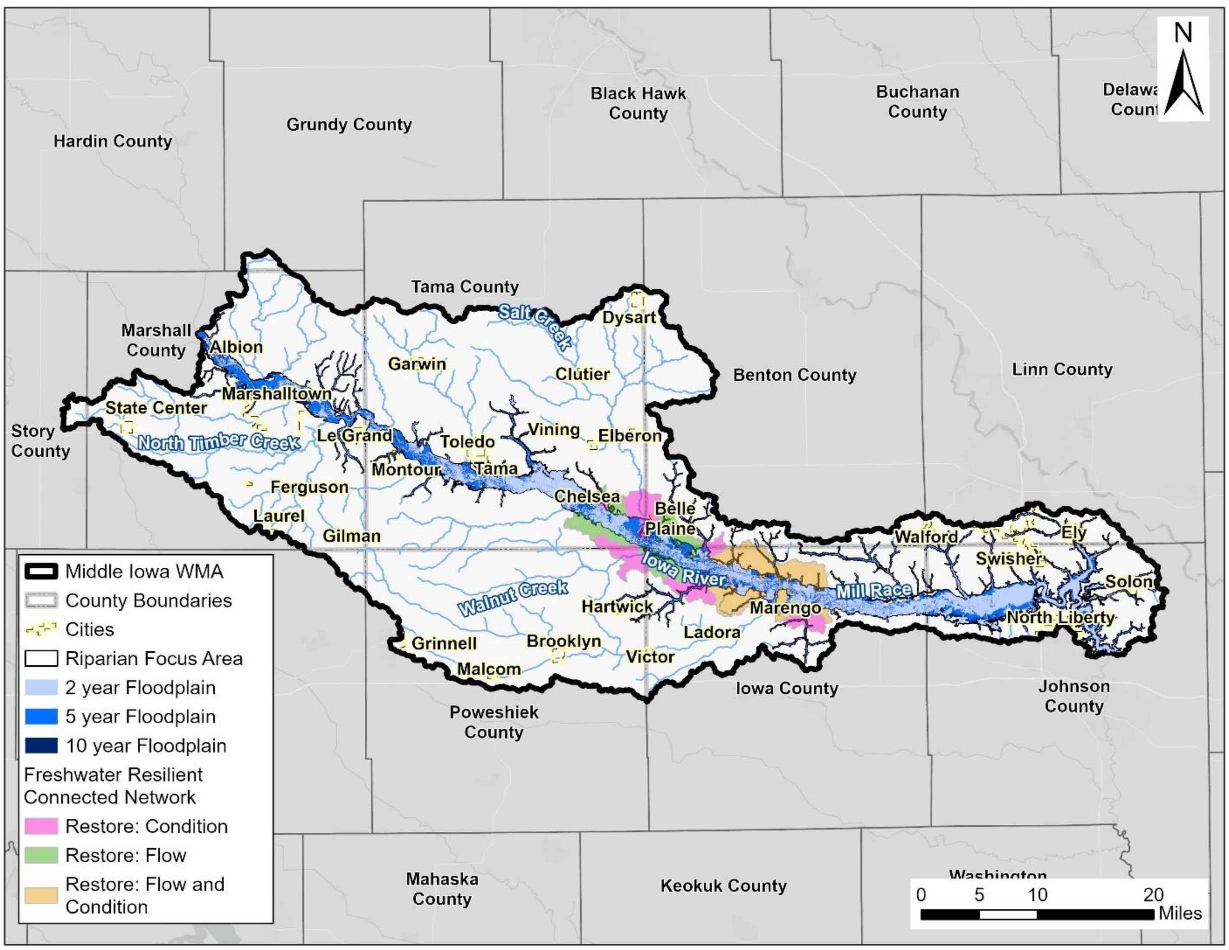


Figure 6-5. Floodplains and Freshwater Resilient and Connected Networks

Goals and Objectives

The benefits of storing water on the landscape are far reaching. From stabilizing hydrograph fluctuations and helping to buffer extreme climate events and reduce or prevent flooding, to reducing sediment and nutrient loading within the stream network, restoring and enhancing floodplain connections will be a priority. Increasing water storage and treatment locations within and beyond the 2-, 5-, and 10-year floodplains will be a focus of these efforts within the Riparian Focus Area.

Particular focus will be given to areas defined by by FRCNs (Figure 6-4, Figure 6-5). The areas of FRCNs within the Middle Iowa Watershed are currently classified as "restore" and will require some effort to improve the condition, specifically returning flow conditions to a more natural state, defragmenting the floodplain and habitat, and improving water quality. Over the 10 years of this plan, improving two or more FRCN areas so that when they are reevaluated, they fall under the "protect" classification should be an achievable goal, considering other activities that are planned throughout the watershed (e.g. oxbow restoration, streambank stabilization, etc.).

Potential Project Areas

Conservation members and stakeholders in the watershed have provided local information to help prioritize possible locations for future projects and conservation efforts that will increase floodplain connectivity, improve water quality, and restore natural flow conditions.

Marshall County

Within Marshall County, many areas along the Iowa River become inundated, or have the potential to store water during times of high flow in the river. For instance, the Stanley Mill area, Timmons Grove North WMA, Timmons Grove South County Park, and Mann Wetlands (east/adjacent to Timmons Grove North WMA) should be considered as prime locations to store and treat water from the Iowa River. Also upstream from Marshalltown, IA, the Iowa River WMA, Winter Bottoms (south side of the river across from the Iowa River WMA), and Stewart Bird Sanctuary provide existing lands where conservation and water storage projects could be implemented or installed. The Bill Ernst Outdoor Training Facility also lies in the Iowa River floodplain and could be another location for wetland creation/restoration or where water storage ponds could be installed, however this would be limited to the low-lying areas along the Iowa River and contributing tributary (Burnett Creek).

Freshwater Resilient and Connected Networks

The Nature Conservancy has defined locations of FRCNs within the Middle Iowa Watershed. Large areas within the FRCNs are part of the 5-year floodplain but are not part of the 2-year floodplain. These areas may provide opportunities for water storage and treatment projects (e.g. wetland or oxbow restoration) and help work toward FRCN goals. Connecting portions of the 5-year floodplain to the Iowa River to increase the frequency of interaction between the river and the floodplain could have significant water quality benefits and also reduce rapid fluctuations in water level during storms.

Amana Society, Inc. Land

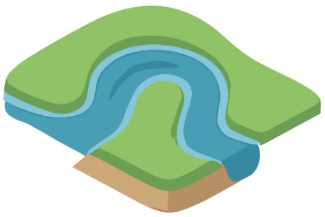
The Amana Society, Inc. owns approximately 26,000 acres primarily within Iowa County and, although a private entity, has shown great interest in conservation projects and water storage. Much of their acreage is within the Riparian Focus Area and the western side of the property is part of the most downstream FRCN. They already have several locations prioritized for wetland improvement, oxbow restoration, or other water quality projects. Projects could help make progress toward multiple goals simultaneously. However, finding funding opportunities that the Amana Society is eligible for may be challenging due to their private status.

Johnson County

Johnson County has a large contiguous area of public conservation land within the Riparian Focus Area, most of which is owned by the US Army Corps of Engineers. This provides opportunities for several large projects. Large areas in the Jerry Quinlan WMA are part of the 10-, 50-, and 100-year floodplains but are not part of the 2- or 5-year floodplain. Creating connections between the river and those areas could allow for the creation of wetlands or provide storage locations to capture flow during 2- or 5-year flood events.

Oxbow Restoration and Protection

Introduction



Oxbow wetlands are vital features within river floodplains, formed when a meandering river cuts off one of its bends, leaving behind a crescent-shaped body of water. These waterbodies serve as long-lasting aquatic habitats that support a wide range of biodiversity, including fish, amphibians, birds, and aquatic plants. Because they are often isolated from the main river channel, oxbow wetlands provide calm, nutrient-rich environments ideal for breeding, feeding, and shelter. Their presence enhances the ecological complexity of floodplains, creating a variety of habitats that contribute to the overall health and resilience of the river system.

Beyond their ecological value, oxbows play a significant role in floodplain hydrology and sediment dynamics. During high-flow events, oxbows act as natural storage basins, holding excess water and reducing downstream flood risks. They also trap sediments and organic matter, which helps maintain water quality and stabilize surrounding landscapes. Oxbow wetlands are also particularly effective at storing sediment-associated pollutants like heavy metals, phosphorus, and polychlorinated biphenyls (PCBs), making them important off-channel "filters" that help mitigate contamination in the river system.

In addition to their environmental functions, oxbows offer recreational and educational benefits. They can serve as areas for fishing, birdwatching, and nature exploration. Their unique formation and evolution also provide opportunities for scientific study, helping researchers understand river dynamics, sediment transport, and floodplain ecology. By preserving and restoring oxbow wetlands, we not only protect critical habitats but also strengthen the natural infrastructure that supports both ecological and human well-being.

Restoring oxbow wetlands involves reestablishing their hydrologic connection to the main river channel and improving surrounding habitat conditions. This can be achieved by removing natural or artificial barriers like levees or berms that isolate the oxbow and/or creating diversion features to increase connectivity, allowing seasonal flooding to replenish water levels and nutrients. Excavation may be used to deepen or reshape the oxbow to enhance water retention and ecological function. Planting native vegetation along the shoreline helps stabilize banks, filter runoff, and create habitat for wildlife. These restoration efforts not only improve biodiversity and water quality but also strengthen the overall resilience of the river floodplain system.

Resource Conditions

The Riparian Focus Area contains hundreds or even thousands of oxbow wetlands or abandoned stream channels which could hold and treat additional surface water if reconnected with the river (Figure 6-6). Some locations are near the current river channel while others may be a mile or more from the river. Determining the best sites for consideration will need to account for many factors including distance from the current channel, elevation within the floodplain in comparison to river elevation, and a number of other factors.

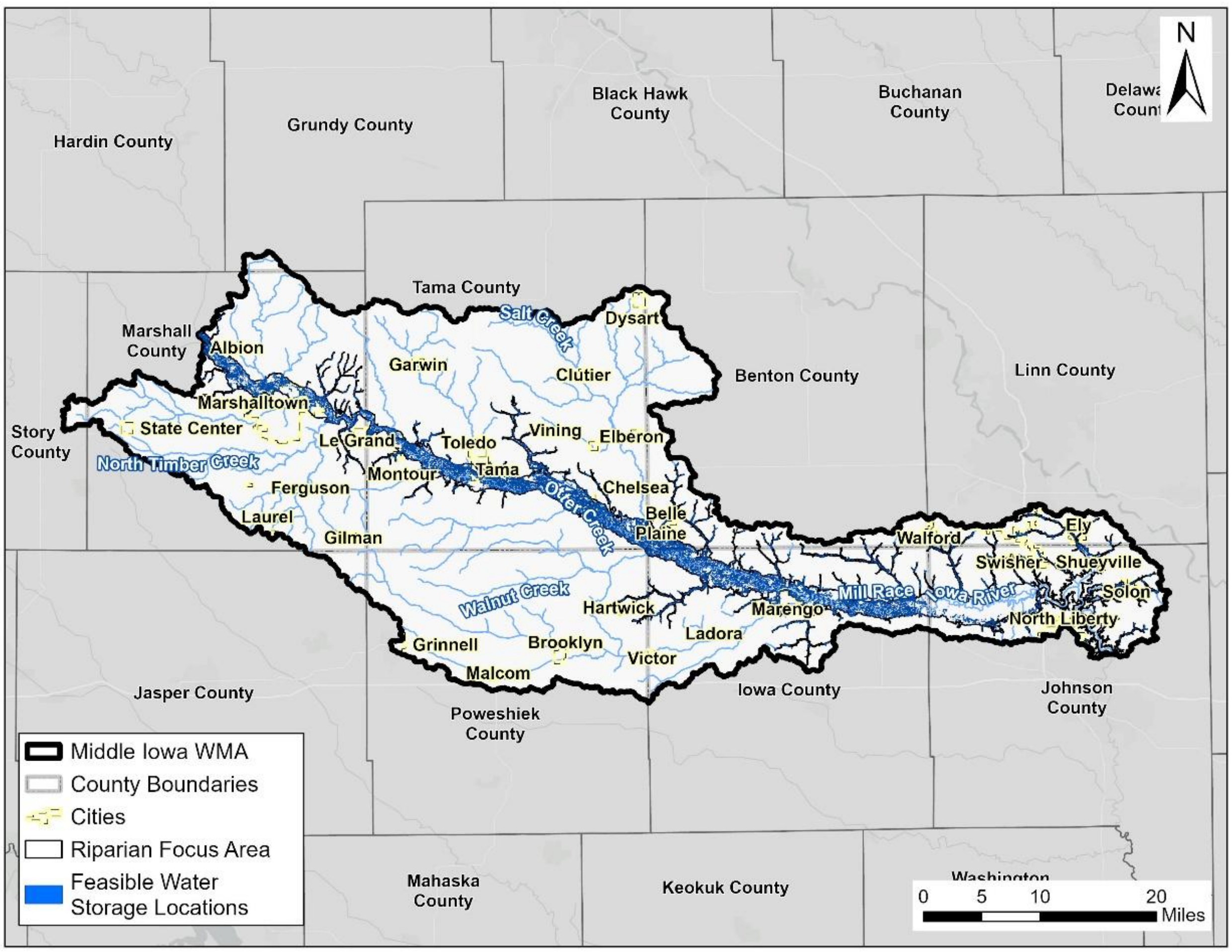


Figure 6-6. Oxbow restoration and water storage locations

Goals and Objectives

There is such a large number of potential oxbows that could be restored and/or reconnected with the river that it is impractical to consider all locations for restoration efforts. Finding select oxbow locations that could be reconnected to the Iowa River, either continually or during two- or five-year flood events, focuses efforts and would work toward multiple goals simultaneously. Connecting these smaller flood events to oxbows would increase the river's natural floodplain functions and provide climate resilience in the form of temporary water storage, and also provide water quality benefits in the form of sediment and nutrient trapping.

One objective in this plan's Flooding Goal is to construct, restore, or improve four major oxbows or riparian wetlands to allow for at least 3,265 acre-feet of additional surface water storage during stormflow conditions within the Iowa River. This assumes four of the largest prioritized wetlands or oxbows (provided below) are selected and constructed or modified to retain an additional six feet of surface water.

Potential Project Areas

A number of criteria were used to select the locations that are the most practical to consider for oxbow restoration or wetland creation/improvement. Each possible location was evaluated for possible storage volume, drainage area to the location, volume of water delivered to the location from the landscape during different storm events, distance from the main channel of the Iowa River, surface area and the land use types that would be inundated if the location flooded, land ownership, etc. These criteria were used to rank and prioritize locations for further analysis.

Oxbow Projects Locations (Appendix H)

An example of a possible oxbow or water storage location is presented below in Figure 6-7. See **Appendix H** for a complete map series of potential wetland restoration/storage opportunities. Also presented within the map series is the potential volumetric water benefit (maximum annual infiltration volume) of each of the oxbow or wetland locations, a required calculation for certain grant opportunities such as the Google Data Centers Water Efficiency and Quality: Infrastructure Projects opportunity.

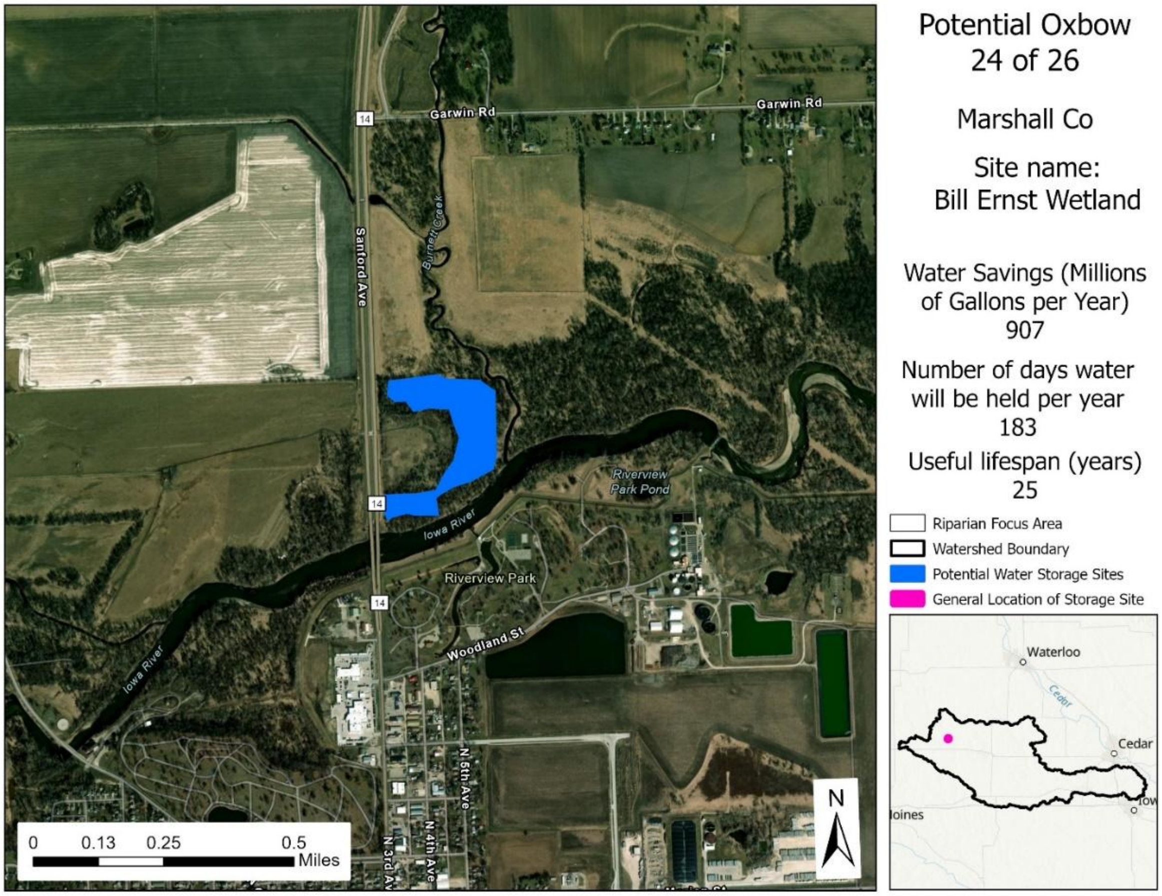
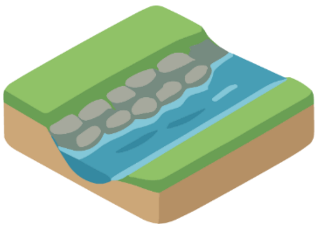


Figure 6-7. Example water storage location.

Stream Restoration and Streambank Stabilization

Introduction



Streambank stabilization is essential for protecting the physical integrity of river and stream systems, especially in areas prone to erosion. When streambanks erode excessively, they can cause the loss of valuable land, damage infrastructure, and alter the natural course of waterways. Stabilization techniques help reinforce banks and maintain channel stability. By preventing erosion, these projects or management practices preserve the shape and flow of streams, reducing the risk of flooding and sediment build up downstream.

Beyond physical protection, streambank stabilization plays a critical role in improving water quality. Eroding banks release sediments and pollutants into the water, which can smother aquatic habitats and degrade drinking water sources. Stabilized banks, especially those using vegetative methods, act as natural filters that trap sediments and absorb nutrients before they enter the stream. This not only benefits aquatic ecosystems but also helps make progress toward state and local water quality goals.

Ecologically, stabilized streambanks enhance habitat quality for fish, amphibians, and riparian wildlife. Techniques that incorporate native vegetation and natural materials help promote biodiversity. Once established, these areas will once again provide shelter, breeding grounds, and food sources for a variety of species, contributing to the overall health of the watershed. Well-designed stabilization projects can be aesthetically pleasing and offer recreational opportunities, making them valuable assets for both conservation and community engagement.

Streambank stabilization methods are designed to prevent erosion, protect water quality, and maintain the structural integrity of stream channels. These techniques range from hard engineering solutions like riprap placed along the bank to armor the land surface to softer, more sustainable approaches such as bioengineering. Bioengineering methods include planting deep-rooted native vegetation, installing live stakes, and using erosion control blankets to reinforce banks while promoting habitat growth. In areas with severe erosion, structural supports like retaining walls or gabions may be necessary, but combining them with natural elements often yields better ecological outcomes. Choosing the right method depends on site conditions, stream dynamics, and long-term restoration goals.

Resource Conditions

Erosion of sediment from the landscape is a normal process that naturally happens when a river is in equilibrium with the surrounding environment. Surface sediment runoff, streambank erosion, and streambed sediment movement can be a part of a healthy ecosystem. However, changes to land use and management, alteration of stream morphology, or increases in streamflow due to surface and subsurface drainage or increased storm intensity can create conditions that lead to rates of erosion that are greater than normal.

Streambank erosion in Iowa, Source: Iowa State University

On an annual basis, most noticeable erosion takes place in areas of concentrated water flow. Whether those areas are along the landscape surface in the form of gullies or are in the stream channel as streambank sloughing, large amounts of sediment can be moved into the main channel of the Iowa River.

Goals and Objectives

The overall goal in this plan is to find areas of excessive erosion and implement management and conservation practices to armor the soils surface, stabilize streambanks and prevent or reduce excessive sediment movement to the Iowa River or its tributaries.

An analysis of elevation change over a 12-year period was used to help find locations of elevated erosion. **One objective in this plan's Riparian Management Goal is to implement 10 projects to stabilize banks and reduce erosion.** Working at this pace could provide a significant local and downstream reduction in sediment (and simultaneously reduce nutrients like phosphorus that may be associated with the sediment).

Potential Project Areas

To locate areas of excessive erosion, LiDAR-based elevation data from 2020 was compared to equivalent elevation data from 2008. Areas where the elevation decreased more than 1.5 meters (~5 feet) were highlighted as locations of elevated erosion, and areas where the elevation decreased by greater than 3 meters (~10 feet) were classified as having excessive erosion. Areas of excessive erosion are mapped in Figure 6-8.

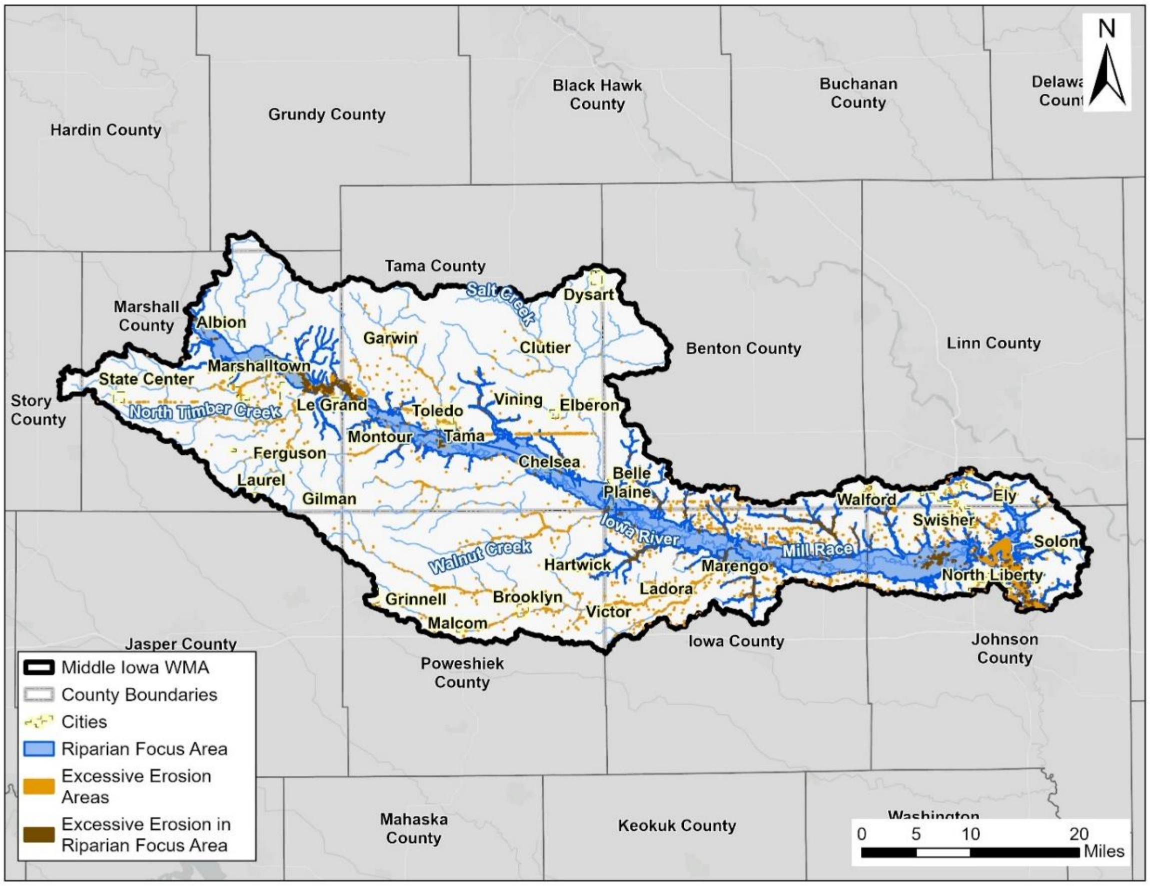


Figure 6-8. Excessive Erosion Areas

The LiDAR analysis provided a number of general areas with elevated or excessive erosion. There were far too many to highlight all of them, and many locations will require on-the-ground confirmation. Cursory streambank erosion surveys (RASCAL assessments) could be conducted in streams identified in Table 6-2 to determine specific priority areas to focus efforts and target actions.

Table 6-2. Streambank erosion survey sites

Location	County	Notes
Honey Creek	Iowa	
Hilton Creek	Iowa	
Big Bear Creek	Iowa	Small reach evaluated near Marengo, IA
Price Creek	Iowa	Including the tributary that runs parallel to V Ave. (to 110th St.)
Buckeye Creek	Benton	
Plum Creek	Johnson	
Coralville Reservoir shoreline	Johnson	

More localized areas of erosion have been mapped for review. An example of a possible streambank restoration and/or gully stabilization location is presented in Figure 6-9. See **Appendix I** for a complete map series of high erosion streambanks.

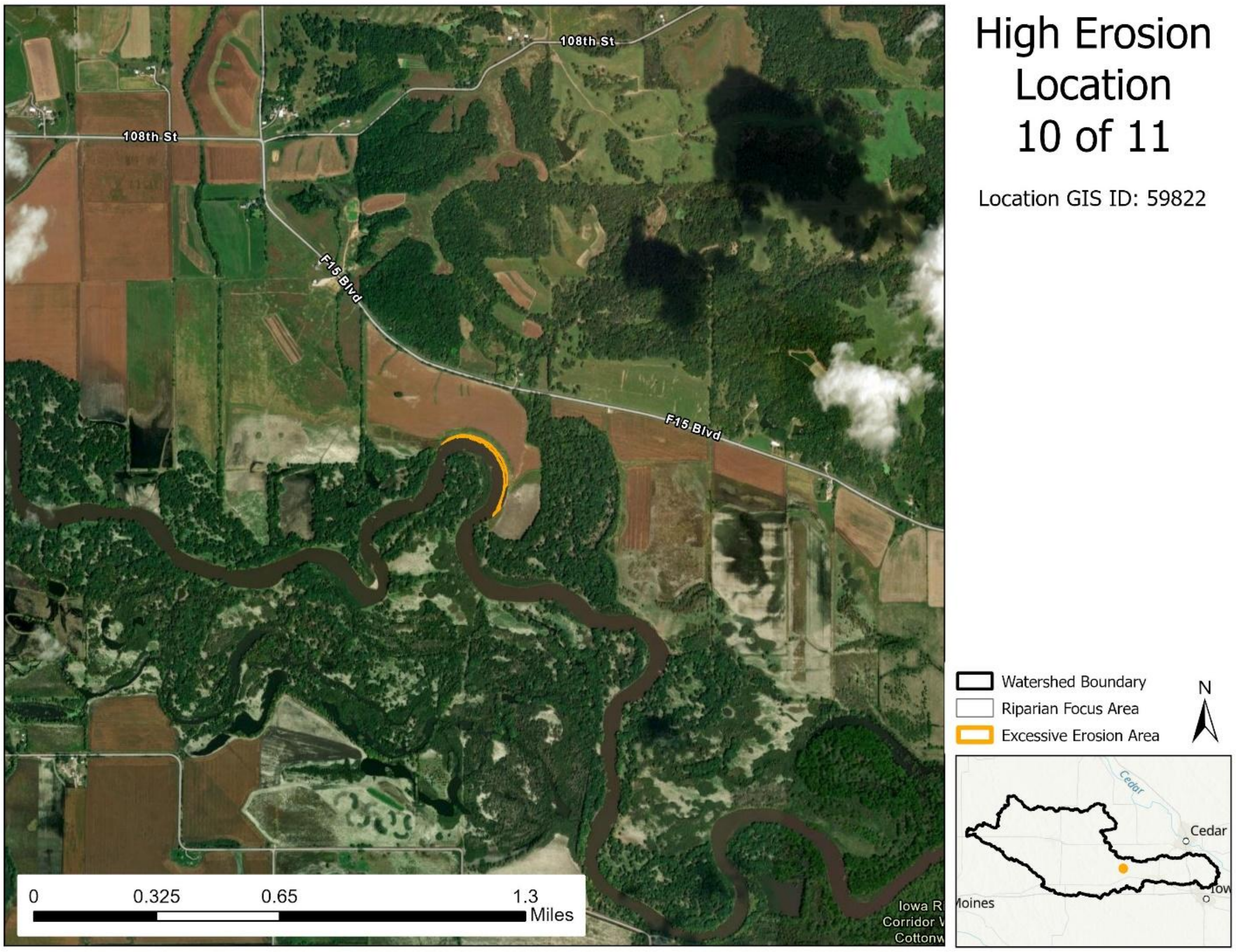


Figure 6-9. Example streambank restoration location.

Potential Locations in Addition to Appendix I

Of note are other areas that were called out as priority locations by stakeholders and local watershed managers. Although primarily outside of the Riparian Focus Area, Linn Creek, which runs through Marshalltown, IA is also experiencing excessive erosion, particularly to the west of the two golf courses. Additionally, near East Amana, IA, a stream to the east of town is eroding and threatening the historic Brown Cemetery. These areas could also be considered for prioritization due to local importance.

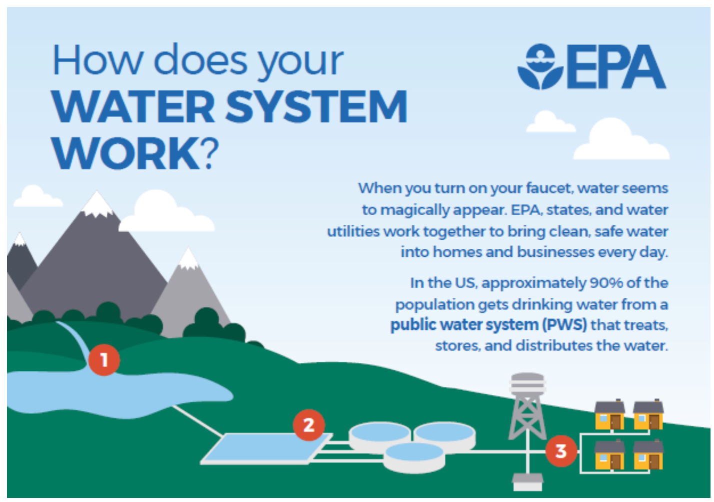
7. Source Water Protection

Section 7. Source Water Protection

"Source water" is a term used to refer to drinking water in the environment prior to being withdrawn and distributed as drinking water. Iowa is engaged in source water protection to prevent drinking water contamination and ensure quality drinking water supplies for consumers.

Drinking Water in the Middle Iowa Watershed

Most residents of the Middle Iowa Watershed obtain drinking water from groundwater aquifers. Residents in developed areas rely on public water supply systems for drinking water infrastructure and delivery, while rural residents may depend on private wells. A public water supply provides water for at least 25 people at least 60 days a year or has at least 15 service connections. The most common type, Community Public Water Supplies (CWS) is a year-round service (e.g. a city). A non-transient non-community public water supply serves the same people but not year-round, such as at a school or factory. A transient non-community public water supply serves different people, for example at a restaurant or park.



There are 17 CWS in the watershed, and 11 cities without their own supply purchase drinking water from the suppliers such as the Poweshiek Water Association or the Iowa Regional Utilities Commission. Drinking water quality is regularly monitored as required by the Safe Drinking Water Act. The public can view information on their CWS from the Drinking Water Portal: https://programs.iowadnr.gov/iowadrinkingwater

Cedar Rapids

While central Cedar Rapids is outside the watershed, the city spills into the Middle Iowa Watershed and it is therefore relevant to note that the City of Cedar Rapids utilizes shallow groundwater influenced by surface water for drinking water. The City withdraws water from an alluvial aquifer hydrologically connected to the Cedar River.

Source Water Protection Program

Iowa DNR runs a Source Water Protection Program. Communities are not required to join this program but it is highly encouraged. Source Water Protection involves managing activities that occur on land that recharges source water aquifers to prevent pollution. It is preferred to prevent contamination from occurring rather than treat contaminated drinking water.

DNR's Source Water Protection Program has three phases:

- Phase I Assessment: DNR completes a source water assessment which describes the system's active wells, delineates a source water protection area, identifies susceptibility to contamination, and lists known contaminant sources
- Source Water Protection Plan (Phase II): Once Phase I is complete, a Source Water Protection Plan is done. This takes the information gathered in Phase I and develops a plan to protect drinking water. This is also known as Wellhead Protection
- Implementation: Implementation of the Source Water Protection Plan

The 17 CWS in the Middle Iowa Watershed that are engaged in Source Water Protection efforts are shown in Table 7-1. Of these, 12 have continued onto a Source Water Protection Plan and 5 CWS have not yet completed a Phase II inventory. All completed plans in the watershed are 12-25 years old. Only Tama Water Supply has a recent Phase II (2019).

Table 7-1. Community Water Supplies in the Watershed

Community Water Supply	Phase I	Phase II
Albion Water Department	2024	2000
Belle Plaine Water Department	2014	2013
Cedar Rapids Water Department	2019	2013
Coralville Municipal Water System	2014	2012
Ely Water Supply	2019	
Grinnell Water Department	2014	2005*
Ladora Water Supply	2017	
Marengo Water Supply	2014	
Marshalltown Water Works	2018	2005*
North Liberty Water Supply	2018	2004*
Poweshiek Water Association	2015	2005*
Solon Water Department	2018	2005
State Center Municipal Water Department	2014	2000
Tama Water Supply	2018	2019
Toledo Water Supply	2018	
Victor Municipal Water Department	2019	2005
West Well (Walford)	2019	

*approval date posted online but no document is provided

Capture Zone Protection

Through Phase I of Source Water Protection planning, Iowa DNR protect groundwater through the development of 'capture zones.' Land activities can impact groundwater supplies, and part of source water protection is managing what occurs in zones that recharge these supplies. Hydrologic and geologic information is considered to determine the 'capture zone' in which contaminants on land could travel into the groundwater supply. The capture zones within the Middle Iowa Watershed are summarized in Figure 7-1. Capture zones are delineated for the 2-, 5-, and 10-year modeled time of travel zones. Without site-specific information, a general capture zone of 2,500 feet around an active well is assumed.

While groundwater in general is well protected from surface contamination, some subsurface layers prevent movement of contaminants more than others. Susceptibility is determined by:

- Highly susceptible: less than 25 feet confining layer thickness
- Susceptible: 25 to 50 feet confining layer thickness
- Slightly susceptible: 51 to 100 feet confining layer thickness
- Low susceptibility: more than 100 feet confining layer thickness

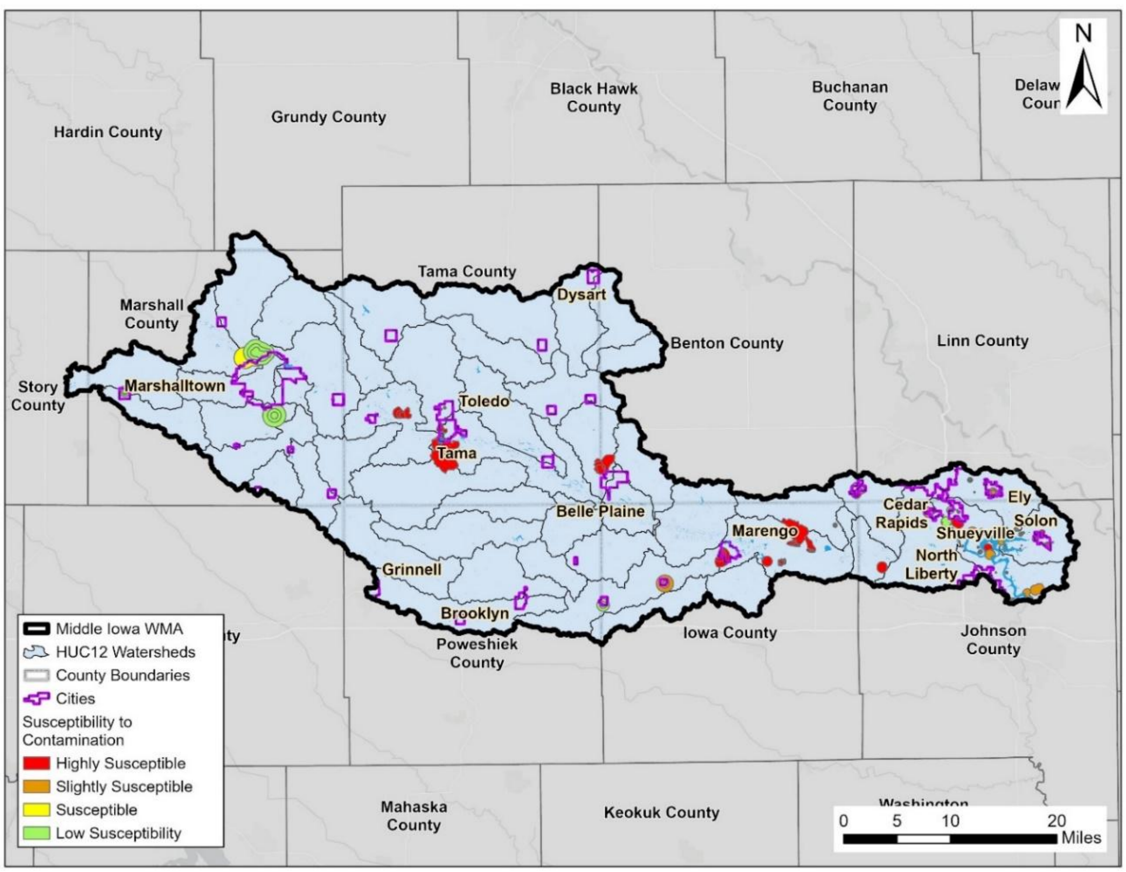


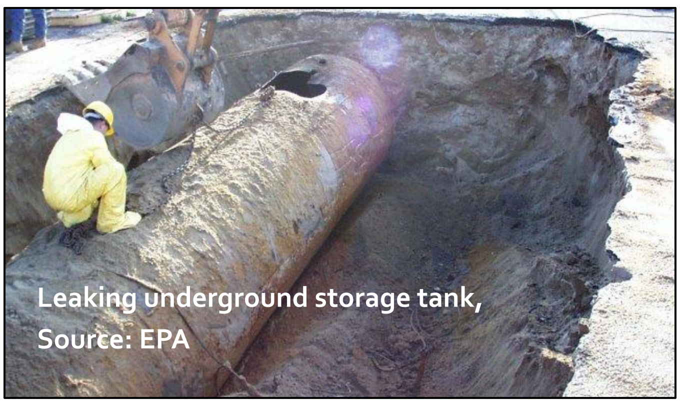
Figure 7-1. Groundwater Capture Zones and susceptibility to contamination

Potential Contaminants

Sources

Source water can be contaminated by human activities or natural sources. There are over 150 active source water wells in the Middle Iowa Watershed, of which 61 are determined to be highly susceptible to contamination (DNR, 2023a).

Iowa DNR maintains an inventory of sites that have the potential to contaminate source water. There are approximately 4,600 potential contaminant sites in the Middle Iowa Watershed (DNR, 2025c). Of these, over 50% are land application sites (i.e. application of manure / sludge generally for fertilizer), 13% are underground storage tanks, 9% are sites of a hazardous substance incident, and 5% are underground storage tanks that have leaked. Other sites include categories such as chemical storage sites, CAFOs, cemeteries, and wastewater outfalls. Some of these sites and historic spills can be viewed on the Field Office Compliance Database: https://programs.iowadnr. gov/focomp



Leaking underground storage tank,
Source: EPA

Land application,
Source: Iowa DNR

Potential contaminant sources inventoried by the Iowa DNR are shown in Figure 7-2. Sites are spread throughout the watershed, but concentrated around Marshalltown and the eastern side of the Middle Iowa Watershed. Most are not rated, but 8% are assigned an aquifer susceptibility rating. Ultimately, 4% of sites have aquifers susceptible or highly susceptible to contamination. Particular attention is paid to these sites.

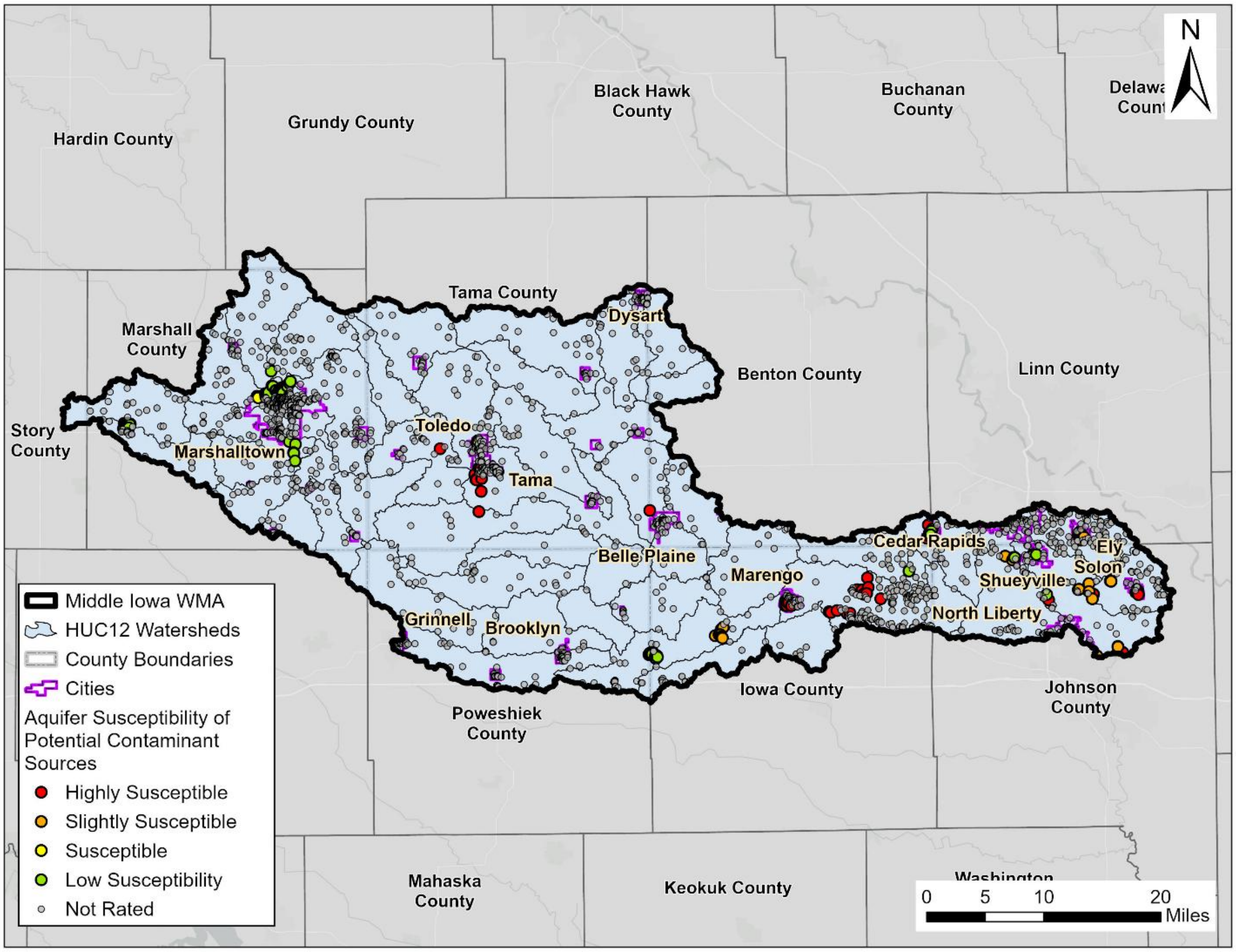


Figure 7-2. Potential Contaminant Sources

Nitrate

Nitrate contamination is more likely in shallow wells, poorly maintained wells, or wells near contaminant sources. Nitrate is applied to the landscape via sources such as agricultural or urban fertilizer, feedlots, leaking septic systems, and wastewater treatment plants. Elevated nitrate in drinking water is linked to negative health outcomes such as cancer. Of particular concern is that infants are more susceptible to nitrate than adults, and formula-fed infants with contaminated well water can suffer from methemoglobinemia, or blue-baby syndrome, in which nitrate lowers blood oxygen. If nitrate in drinking water reaches elevated levels, CWS may install nitrate treatment systems which are very expensive.

PFAS

PFAS (per- and polyfluoroalkyl substances) are a class of chemicals of emerging concern. PFAS were developed as Teflon, and expanded for use in clothing, waterproof materials, food packaging, fire-fighting foam, and more. Now, concern over the presence and impacts of PFAS have been growing as they are nicknamed 'forever chemicals' due to resistance to degradation and presence throughout the world in air, water, and soil. While there is still uncertainty regarding the impact PFAS have on health, they have been linked to cancer and other adverse health outcomes.

PFAS presence in drinking water have been an issue across the United States and within the Middle Iowa Watershed. The City of Tama has issued drinking water health advisories regarding PFAS detection. The City is investigating removal of PFAS in treatment filters and drilling new wells. Iowa DNR maintains a PFAS detection dashboard, available at: https://experience.arcgis.com/experience/b04e0e828a974e6e8962e47895ebb520

Monitoring

Community Public Water Supplies regularly monitor drinking water for contaminants to comply with the Safe Drinking Water Act. It is important for private well owners to conduct their own testing. Iowans may be eligible for free well testing through the Private Well Grants Program administered by county health departments. DNR recommends that private well owners test bacteria and nitrates annually and arsenic and manganese every three years. Wells may need additional testing if there is a new taste or odor, the well is damaged, there was a nearby hazardous spill, or the well was flooded. If well water has contaminants above guidance levels, there are options to remove them through treatment such as reverse osmosis or filters.

8. Implementation Strategies and Action Plan

Section 8. Implementation Schedule

The implementation schedule ties together each section of the Middle Iowa Watershed plan to create a concise list of actions plan partners will engage in during implementation. Actions contained in this section are designed to address watershed issues identified in Section 3 and meet goals listed in Section 4. Actions will be targeted within priority subwatersheds (Section 4 and **Appendices D-G**) or watershed-wide when applicable.

Implementation Schedule Overview

The implementation schedule contains the following information:

- Action and Description: Describes each action
- Outputs: Defines extent of the action (e.g., number of projects)
- Focus Areas: Describes where in the watershed the action will be targeted
- Progress Towards Goals: Identifies the goal objective each action addresses (Section 4). Most actions will directly address an objective but indirectly make progress towards multiple goal objectives
- Entities Responsible for Implementation: Lists partner(s) that will take lead on implementing
- Cost: Estimates cost of implementing the action

Targeting implementation is essential to effectively work in an area as large as the Middle Iowa Watershed. As such, this plan's Implementation Schedule is organized into two scales:

- Priority Subwatershed Implementation Schedules (Table 8-1 through Table 8-4)
- Watershed-wide Implementation Schedule (Table 8-5)

Otter Creek Lake, Source: Travel Iowa

Priority Subwatershed Implementation Schedules

The Priority Subwatershed Implementation Schedules will be introduced in this section first, followed by an overview of watershed-wide efforts.

Implementing conservation, restoration, and management practices is not a new effort in the watershed. This plan seeks to build on existing conservation action landowners and local resource staff have been engaged in for decades. A snapshot of water quality and soil health actions is captured by the Iowa BMP Mapping Project. Existing BMPs within each priority subwatershed are summarized in each priority subwatershed plan (**Appendix D-G**).

As discussed in Section 4 and summarized in **Appendix C**, four subwatersheds were selected as priorities for implementation (Figure 8-1). As such, each subwatershed has its own implementation schedule:

- Asher Creek (Table 8-1)
- Hilton Creek (Table 8-2)
- South Branch Salt Creek (Table 8-3)
- Stoney Creek - Big Bear Creek (Table 8-4)

Included within each implementation schedule are a series of agricultural conservation practices and BMPs. These projects are planned within these priority subwatersheds to make progress towards INRS goals. They are informed by an implementation modeling scenario, consisting of 1,741 BMPs that are estimated to collectively reduce phosphorus loading by 15% (or 16,575 lbs/yr), nitrogen loading by 10% (or 142,796 lbs/yr), and sediment loading by 17% (9,554 tons/yr) from existing loads. Additionally ponds, WASCOBs, or wetlands are estimated to add 1,475 ac-ft of water storage. More information about this implementation modeling scenario, including field scale maps of potential conservation practices and BMPs, are found in **Appendices D-G**.

Iowa River Riparian Area, Source: Houston Engineering

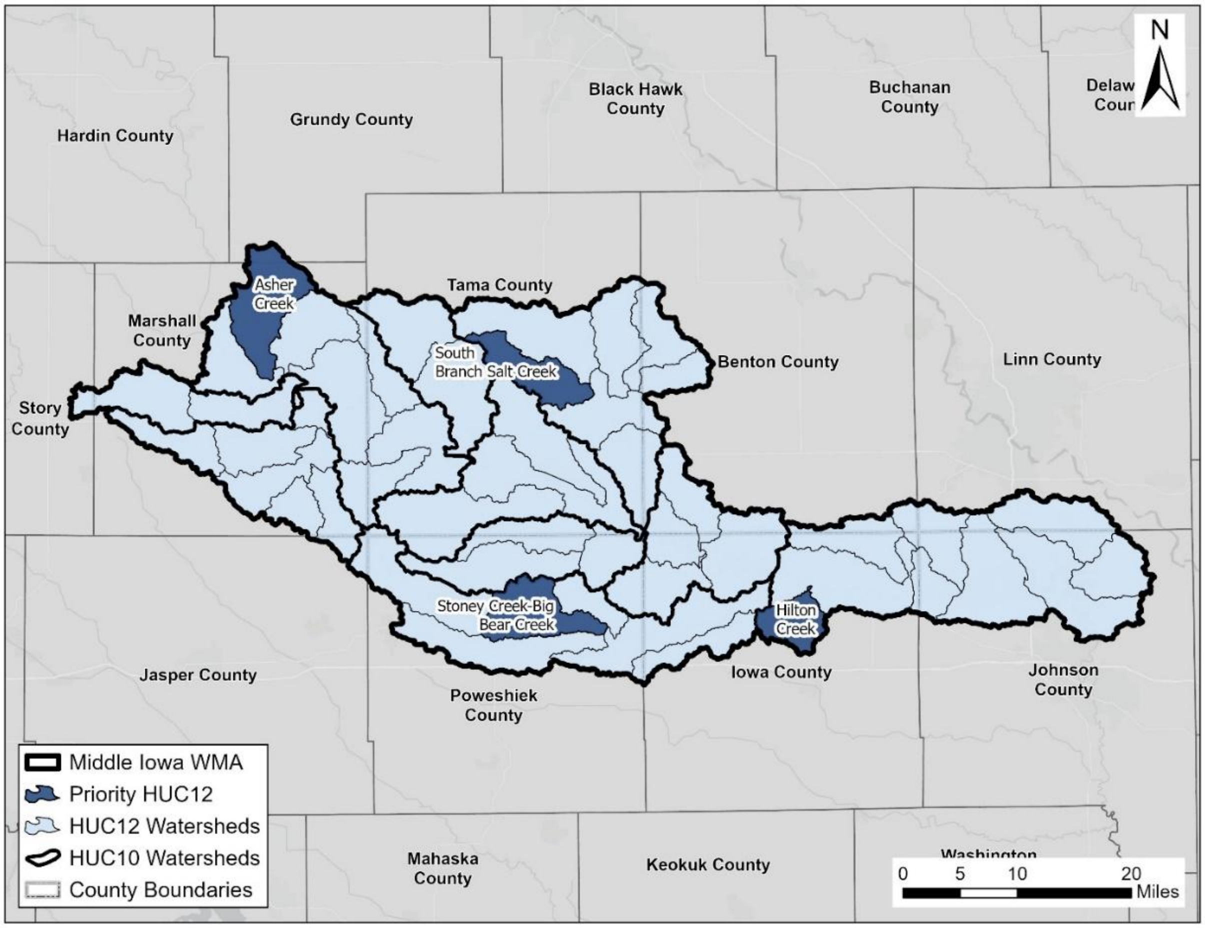


Figure 8-1. Subwatersheds summarized by the Priority Subwatershed Implementation Schedules

Table 8-1. Asher Creek Implementation Schedule

BMP / Conservation Practice	Focus Areas	Output	Outcome	Responsible Entity	Timeline	10-Year Cost
Grassed Waterway	Nitrogen and Phosphorus Hot Spots	183 waterways	583 tons sed/yr 1306 lbs TP/yr 13,207 lbs TN/yr	SWCDs, NRCS, IDALS	10 years	$2,916,489
Saturated Buffer	N/A	0 buffers	0 tons sed/yr 0 lbs TP/yr 0 lbs TN/yr	SWCDs, NRCS, IDALS	10 years	$0
Riparian Buffer	N/A	0 buffers	0 tons sed/yr 0 lbs TP/yr 0 lbs TN/yr	SWCDs, NRCS, IDALS	10 years	$0
Pond / WASCOB	Nitrogen and Phosphorus Hot Spots	2 WASCOBs	490 tons sed/yr 1,441 lbs TP/yr 11,057 lbs TN/yr 6 ac-ft	SWCDs, NRCS, IDALS	10 years	$9,000
Nutrient Reduction Wetland	Nitrogen and Phosphorus Hot Spots	11 nutrient reduction wetlands	1,186 tons sed/yr 2,885 lbs TP/yr 15,548 lbs TN/yr 230 ac-ft	SWCDs, NRCS, IDALS	10 years	$493,416
Contour Buffer Strips	Nitrogen and Phosphorus Hot Spots	4 buffer strips	42 tons sed/yr 95 lbs TP/yr 1,671 lbs TN/yr	SWCDs, NRCS, IDALS	10 years	$4,736
Cover Crops - Rye	Nitrogen and Phosphorus Hot Spots	14 rye cover crop fields	619 tons sed/yr 1,073 lbs TP/yr 13,815 lbs TN/yr	SWCDs, NRCS, IDALS	10 years	$68,580
Drainage Water Management	Nitrogen and Phosphorus Hot Spots	1 drainage water management practice	0 tons sed/yr 186 lbs TP/yr 1,863 lbs TN/yr	SWCDs, NRCS, IDALS	10 years	$86
Denitrifying Bioreactor	Nitrogen and Phosphorus Hot Spots	3 denitrifying bioreactors	0 tons sed/yr 189 lbs TP/yr 1,970 lbs TN/yr	SWCDs, NRCS, IDALS	10 years	$411,816
	Total	218 BMPs	2,919 tons sed/yr 7,175 lbs TP/yr 59,132 lbs TN/yr 236 ac-ft	N/A	N/A	$3,904,123

Table 8-2. Hilton Creek Implementation Schedule

BMP / Conservation Practice	Focus Areas	Output	Outcome	Responsible Entity	Timeline	10-Year Cost
Grassed Waterway	Nitrogen and Phosphorus Hot Spots	47 waterways	112 tons sed/yr 135 lbs TP/yr 1,032 lbs TN/yr	SWCDs, NRCS, IDALS	10 years	$749,044
Saturated Buffer	N/A	4 buffers	126 tons sed/yr 130 lbs TP/yr 2,530 lbs TN/yr	SWCDs, NRCS, IDALS	10 years	$32,800
Riparian Buffer	N/A	4 buffers	604 tons sed/yr 538 lbs TP/yr 5,401 lbs TN/yr	SWCDs, NRCS, IDALS	10 years	$2,804
Pond / WASCOB	Nitrogen and Phosphorus Hot Spots	277 WASCOBs	113 tons sed/yr 142 lbs TP/yr 1,134 lbs TN/yr 308 ac-ft	SWCDs, NRCS, IDALS	10 years	$1,246,500
Nutrient Reduction Wetland	Nitrogen and Phosphorus Hot Spots	2 nutrient reduction wetlands	232 tons sed/yr 252 lbs TP/yr 1,258 lbs TN/yr 30 ac-ft	SWCDs, NRCS, IDALS	10 years	$89,712
Contour Buffer Strips	Nitrogen and Phosphorus Hot Spots	4 buffer strips	128 tons sed/yr 173 lbs TP/yr 1,182 lbs TN/yr	SWCDs, NRCS, IDALS	10 years	$4,736
Cover Crops - Rye	Nitrogen and Phosphorus Hot Spots	6 rye cover crop fields	616 tons sed/yr 612 lbs TP/yr 4,853 lbs TN/yr	SWCDs, NRCS, IDALS	10 years	$29,391
Drainage Water Management	Nitrogen and Phosphorus Hot Spots	3 drainage water management practices	0 tons sed/yr 111 lbs TP/yr 923 lbs TN/yr	SWCDs, NRCS, IDALS	10 years	$257
Denitrifying Bioreactor	Nitrogen and Phosphorus Hot Spots	5 denitrifying bioreactors	0 tons sed/yr 138 lbs TP/yr 1,052 lbs TN/yr	SWCDs, NRCS, IDALS	10 years	$686,360
	Total	352 BMPs	1,933 tons sed/yr 2,233 lbs TP/yr 19,366 lbs TN/yr 338 ac-ft	N/A	N/A	$2,841,604

Table 8-3. South Branch Salt Creek Implementation Schedule

BMP / Conservation Practice	Focus Areas	Output	Outcome	Responsible Entity	Timeline	10-Year Cost
Grassed Waterway	Nitrogen and Phosphorus Hot Spots	153 waterways	245 tons sed/yr 378 lbs TP/yr 2,898 lbs TN/yr	SWCDs, NRCS, IDALS	10 years	$2,438,376
Saturated Buffer	N/A	1 buffer	79 tons sed/yr 164 lbs TP/yr 2,184 lbs TN/yr	SWCDs, NRCS, IDALS	10 years	$8,200
Riparian Buffer	N/A	1 buffer	254 tons sed/yr 269 lbs TP/yr 2,857 lbs TN/yr	SWCDs, NRCS, IDALS	10 years	$701
Pond / WASCOB	Nitrogen and Phosphorus Hot Spots	213 WASCOBs	93 tons sed/yr 188 lbs TP/yr 1,219 lbs TN/yr 262 ac-ft	SWCDs, NRCS, IDALS	10 years	$958,500
Nutrient Reduction Wetland	Nitrogen and Phosphorus Hot Spots	1 nutrient reduction wetland	171 tons sed/yr 382 lbs TP/yr 1,470 lbs TN/yr 22 ac-ft	SWCDs, NRCS, IDALS	10 years	$44,856
Contour Buffer Strips	Nitrogen and Phosphorus Hot Spots	12 buffer strips	214 tons sed/yr 251 lbs TP/yr 4,771 lbs TN/yr	SWCDs, NRCS, IDALS	10 years	$14,208
Cover Crops - Rye	Nitrogen and Phosphorus Hot Spots	10 rye cover crop fields	480 tons sed/yr 416 lbs TP/yr 5,928 lbs TN/yr	SWCDs, NRCS, IDALS	10 years	$48,986
Drainage Water Management	Nitrogen and Phosphorus Hot Spots	17 drainage water management practices	0 tons sed/yr 938 lbs TP/yr 5,410 lbs TN/yr	SWCDs, NRCS, IDALS	10 years	$1,454
Denitrifying Bioreactor	Nitrogen and Phosphorus Hot Spots	5 denitrifying bioreactors	0 tons sed/yr 211 lbs TP/yr 1,337 lbs TN/yr	SWCDs, NRCS, IDALS	10 years	$686,360
	Total	413 BMPs	1,535 tons sed/yr 3,199 lbs TP/yr 28,074 lbs TN/yr 284 ac-ft	N/A	N/A	$4,201,641

Table 8-4. Stoney Creek-Big Bear Creek Implementation Schedule

BMP / Conservation Practice	Focus Areas	Output	Outcome	Responsible Entity	Timeline	10-Year Cost
Grassed Waterway	Nitrogen and Phosphorus Hot Spots	249 waterways	719 tons sed/yr 835 lbs TP/yr 7,252 lbs TN/yr	SWCDs, NRCS, IDALS	10 years	$3,968,338
Saturated Buffer	N/A	2 buffers	127 tons sed/yr 170 lbs TP/yr 3,064 lbs TN/yr	SWCDs, NRCS, IDALS	10 years	$16,400
Riparian Buffer	N/A	2 buffers	292 tons sed/yr 208 lbs TP/yr 1,857 lbs TN/yr	SWCDs, NRCS, IDALS	10 years	$1,402
Pond / WASCOB	Nitrogen and Phosphorus Hot Spots	484 WASCOBs	227 tons sed/yr 350 lbs TP/yr 2,627 lbs TN/yr 617 ac-ft	SWCDs, NRCS, IDALS	10 years	$2,178,000
Nutrient Reduction Wetland	Nitrogen and Phosphorus Hot Spots	0 nutrient reduction wetlands	0 tons sed/yr 0 lbs TP/yr 0 lbs TN/yr 0 ac-ft	SWCDs, NRCS, IDALS	10 years	$0
Contour Buffer Strips	Nitrogen and Phosphorus Hot Spots	3 buffer strips	474 tons sed/yr 630 lbs TP/yr 8,139 lbs TN/yr	SWCDs, NRCS, IDALS	10 years	$3,552
Cover Crops - Rye	Nitrogen and Phosphorus Hot Spots	14 rye cover crop fields	1,317 tons sed/yr 1,574 lbs TP/yr 12,254 lbs TN/yr	SWCDs, NRCS, IDALS	10 years	$68,580
Drainage Water Management	Nitrogen and Phosphorus Hot Spots	2 drainage water management practices	0 tons sed/yr 160 lbs TP/yr 784 lbs TN/yr	SWCDs, NRCS, IDALS	10 years	$171
Denitrifying Bioreactor	Nitrogen and Phosphorus Hot Spots	2 denitrifying bioreactors	0 tons sed/yr 41 lbs TP/yr 247 lbs TN/yr	SWCDs, NRCS, IDALS	10 years	$274,544
	Total	758 BMPs	3,157 tons sed/yr 3,968 lbs TP/yr 36,224 lbs TN/yr 617 ac-ft	N/A	N/A	$6,510,987

Watershed-Wide Implementation Schedule

In addition to the priority subwatersheds, this plan includes an implementation schedule for implementing actions across the entire Middle Iowa Watershed. The watershed-wide implementation schedule (Table 8-5) is divided into five categories:

- Agricultural and Landscape
- Streams, Lakes, and Wetlands
- Urban
- Education and Engagement
- Data Gathering

Agricultural Implementation

A large component of the Agricultural and Landscape category consists of the implementation of agricultural BMPs and conservation practices. These practices listed in the watershed-wide implementation schedule are a culmination of the four priority subwatershed implementation schedules (Tables 8-1 through 8-4).

Implementation in the Riparian Focus Area

Plan partners are especially focused on flooding and riparian management, as summarized in watershed case studies (Section 5) and the Riparian and Stream Buffer Management Plan (Section 6). Actions discussed in the Riparian and Stream Buffer Management Plan are also incorporated into the implementation schedule, with focus on the Riparian Focus Area (Figure 8-2). More details are found in the Riparian and Stream Buffer Management Plan (Section 6).

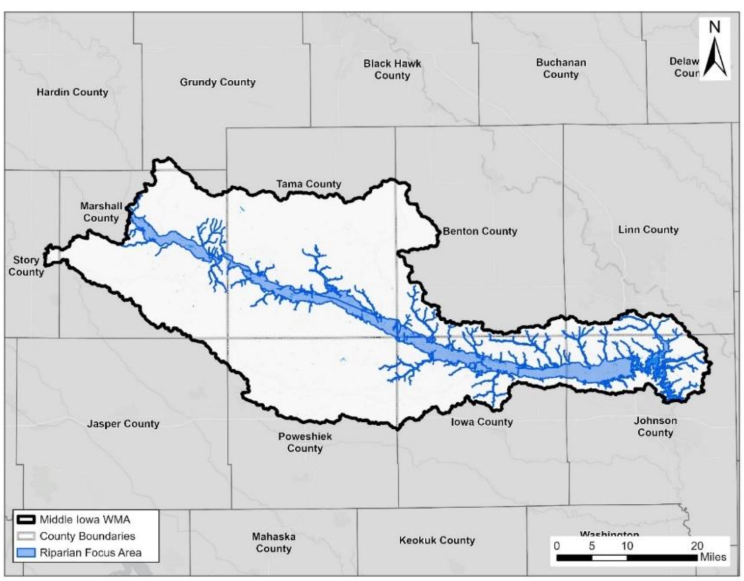


Figure 8-2. Riparian Focus Area

Table 8-5. Watershed-Wide Implementation Schedule

Action	Description	10-Year Output	Focus Area	Progress Towards Goals	Entities Responsible for Implementation	Estimated Cost
Agricultural and Landscape						
Agricultural BMPs and Conservation Practices (Table 8-1 - Table 8-4)	Adoption of soil health practices such as cover crops, nutrient management plans, grassed waterways Implementation of BMPs such as WASCOBs, drainage water management, etc.	1,741 BMPs, 16,575 lbs/yr TP, 142,796 lbs/yr TN, 9,544 tons/yr sediment 1,475 ac-ft storage	Priority Subwatersheds	Objectives 1.1, 1.2 Progress made towards objectives 1.3, 1.4, 1.5	SWCDs, IDALS, NRCS	$17,458,355
Land and Habitat Protection	Land protection through easements or acquisitions with wildlife, pollinator, and water storage benefits	2,300 acres	Figure 8-2 Riparian Focus Area	Objective 3.4	SWCDs, IDALS, Counties	$5,750,000
Lakes, Streams, and Wetlands						
Streambank Inventory	Identify areas of riparian erosion	Inventory completed on 3 stream reaches	Figure 8-2 Riparian Focus Area	Objective 3.1	SWCDs, Counties, IDALS	$45,000
Streambank Restoration & Stabilization	Stabilize or enhance streambanks through engineered solutions such as stream restorations or natural approaches such as native plantings, bank enforcement	10 projects	Figure 8-2 Riparian Focus Area	Objective 3.3	SWCDs, Counties, IDALS, NRCS	$2,500,000
Dam Removal	Remove two lowhead dams/obstructions on the Iowa River	2 removals	Figure 8-2 Riparian Focus Area	Objectives 3.2 and 3.6	Counties, IDALS	$2,000,000
Wetland Restoration	Construct, restore, or improve wetlands, referably oxbow wetlands	4 projects, 3,265 ac-ft wetland storage	FRCNs in Riparian Focus Area	Objectives 2.2 and 2.3	SWCDs, DNR, NRCS	$800,000

Action	Description	10-Year Output	Focus Area	Progress Towards Goals	Entities Responsible for Implementation	Estimated Cost
Riparian Buffer Ordinance	Discussion at the county level of the possibility of implementing a riparian buffer ordinance	Ongoing local county board meetings	Watershed-wide	Objective 3.5	Counties	N/A
Urban						
Stormwater Projects	Implementation of stormwater BMPs including rain gardens or bioretention basins	10 projects, 165 ac-ft storage	Developed Areas	Objective 2.4	Cities	$540,000
Help CUT Flooding	Apply for the Help CUT Flooding program for flood mitigation	3 applications to the program	Chelsea, Tama, Marengo	Objective 2.1, 2.2, 2.3	Cities	N/A
Education and Engagement						
Hire Watershed Coordinator	Hire PT or FT coordinator to lead landowner and partner engagement, develop grant applications, etc.	10 years	Watershed-wide	All objectives	MIWMA Members	$1,000,000
MIWMA Network Analysis	MIWMA members discuss the network of partners in the MIWMA and outside of it to learn about programs, policies, funding, and resources from each other	Ongoing, 10 lunch and learns	Watershed-wide	All objectives	MIWMA Members	$5,000
AIS	Hold AIS education events to reduce the spread of invasives	3 events	Watershed-wide	Objective 4.4	SWCDs, Counties	$12,000
Flood Outreach	Distribute educational flood-related material through social media or mailings	10 materials	Figure 8-2 Riparian Focus Area	Objective 2.5	SWCDs, Counties	$20,000

Action	Description	10-Year Output	Focus Area	Progress Towards Goals	Entities Responsible for Implementation	Estimated Cost
General Education and Outreach	Hold field days, demonstration projects, workshops, or events for increased education regarding soil health, watershed management, and drinking water protection	20 events	Watershed-wide	Objective 4.4	SWCDs	$100,000
Watershed Management	Continued partnership amongst the MIWMA entities and relationship-building to grow the MIWMA network for watershed plan implementation	Annual MIWMA meeting	N/A	Objectives 4.2 and 4.3	SWCDs, Counties, Cities	Not estimated
Data Gathering						
Funding Opportunities	Identify opportunities to fund oxbow wetland restorations	4 projects funded	Figure 8-2 Riparian Focus Area	Objectives 3.1 and 2.2	SWCDs, Counties	$10,000
Source Water Protection	Develop Phase II Source Water Protection Plans for all CWS in the watershed	5 Phase II Assessments completed	Ely, Ladora, Marengo, Toledo, and Walford See Table 7-1	Objective 4.5	Cities, Counties, DNR	$100,000
Flooding Feasibility Studies	Feasibility studies to evaluate locations to target for water storage/flood mitigation efforts. Cost share through Help CUT Flooding program.	2 studies	Figure 8-2 Riparian Focus Area	Objective 2.1	SWCDs, Counties	$100,000
Flooded Land Inventory	Create an inventory of productive land with a history of flooding	1 inventory	Figure 8-2 Riparian Focus Area	Objective 2.6	SWCDs	$5,000
Surface Water Monitoring	Continued monitoring efforts for nutrients, bacteria, sediment, and impairment designations, and identification of opportunities for more detailed monitoring	Ongoing programs	Watershed-wide	Objective 4.1	Watershed Coordinator, DNR, SWCDs, Counties, USGS	$100,000

Cost

The estimated cost of watershed-wide implementation over the 10-year planning period is approximately $30,428,355 (Table 8-6). Plan partners acknowledge this plan is ambitious and partner funding will be necessary to implement many actions in addition to state funding.

Table 8-6. Estimated Implementation Schedule Cost

Implementation Group	Estimated Cost
Agricultural and Landscape	$23,208,355
Lakes, Streams, and Wetlands	$5,345,000
Urban	$540,000
Education and Engagement (includes coordinator)	$1,137,000
Data Gathering	$315,000
Total	**$30,545,355**

Funding

DNR provides grants to create comprehensive water quality management plans like this one, but DNR does not directly provide funding to implement the plan. The MIWMA network includes local entities that can each utilize their own funding sources and relationships with other counties, SWCDs, cities, or organizations to find plan funding. Funding opportunities that have been historically used in Iowa for watershed funding are considered in Table 8-7, with the potential implementation action group they could apply to.

Table 8-7. Potential funding opportunities by implementation group

Funding Opportunity	Agricultural and Landscape	Lakes, Streams, and Wetlands	Urban	Education and Outreach	Data Gathering
DNR Lake Restoration Program, Section 319, IDALS		X			
DNR Monitoring Programs (Section 319)		X			X
DNR Conservation Education Program				X	
IDALS Resource Enhancement and Protection Program (REAP)	X	X		X	
IDALS Water Quality Initiative (WQI)		X	X		
County and SWCD programs	X	X		X	X

Planning partners note that federal funding is uncertain, yet there are still avenues for federal partnership in Iowa when local priorities align with agency priorities. Potential funding avenues by agency are listed in Figure 8-3.

NRCS

- Conservation Innovation Grant
- Conservation Stewardship Program
- Regional Conservation Partnership
- Environmental Quality Inventives Program
- Agicultural Conservation Easement Program

FSA/USDA

- Conservation Resrve Program
- Farmable Wetlands Program
- Grasslands Reserve Program
- Wetland Reserve Program
- Source Water Protection Program

USFWS

- Partners for Fish and Wildlife Program
- Grassland or Wetland Easements
- National Fish Passage Program

FEMA

- Hazard Mitigation Grant Program
- Pre-Disaster Mitigation
- Flood Mitigation Assistance
- Risk Mapping, Assessment, and Planning

EPA

- Water Pollution Control Program Grants
- State Revolving Fund
- Drinking Water State Revolving Fund
- Section 319 Grant Program

NACD

- Technical Assistance Grants

Figure 8-3. Potential federal funding opportunities

Implementation Partners

Watershed management is a collaborative effort amongst the many local, state, and federal organizations working in the watershed. Entities listed in Table 8-5 are responsible for implementing one or implementation items are listed below, but many other partners may assist.

- SWCDs
- IDALS
- Counties
- County Conservation Boards
- Cities
- NRCS
- DNR

SWCDs, Counties, and Cities in the MIWMA are the main implementation leads and each action includes at least one MIWMA member. SWCDs are legal subdivisions of state government managed by an elected board. They work closely with counties, NRCS, and IDALS to educate landowners on environmental issues and opportunities, connect landowners with technical assistance and funding, and implement conservation practices. SWCDs manage a variety of programs focused on agricultural conservation, water quality and soil health improvement, and can help secure and align funding for projects. They frequently work with landowners and agricultural producers to help provide cost-share for conservation projects and management practices.

County Conservation Boards are tasked with "acquiring, developing, maintaining, and making available to the inhabitants of the county public museums, parks, preserves, parkways, playground, recreational centers, county forests, wildlife and other conservation areas, and to promote and preserve the health and general welfare of the people, to encourage the orderly development and conservation the natural resources and cultivate good citizenship by providing adequate programs of public recreation." (https://www.mycountyparks.org/about.html).

County Conservation Boards invest time and resources to promote and provide local outdoor and natural resource conservation education, and in many counties administer/assist with the county's roadside vegetation management programs. Many counties manage aquatic resources such as lakes, ponds, streams, and other natural ecosystems that rely on and benefit water resources.

There are many other agencies, organizations, and centers that may be of assistance during implementation. MIWMA is interested in fostering existing partnerships and building new relationships within Iowa. Example organizations the MIWMA may collaborate with during implementation are shown in Figure 8-4, but this is not an all-inclusive list.

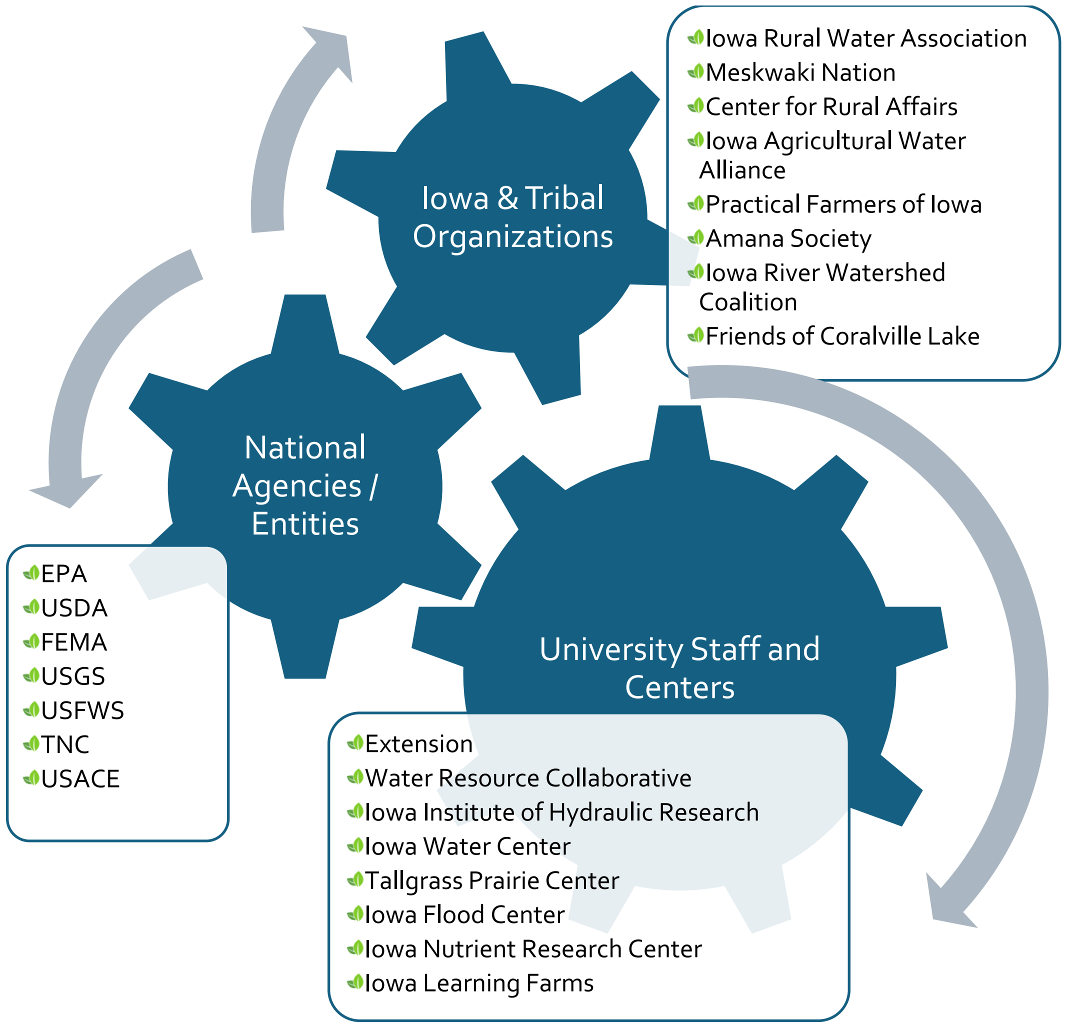


Figure 8-4. Potential partnering organizations

Assessment and Evaluation

The MIWMA is responsible for annual work planning to execute the implementation schedule. This entails coordination with MIWMA members and other potential collaborators to seek funding. MIWMA is still a relatively new organization, and staff should be selected to be responsible for CWQMP implementation roles. A five-year plan evaluation will be done to assess how well the CWQMP is serving the MIWMA, what progress towards goals has been achieved, and the extent to which implementation actions have been completed or are in progress. This plan may be amended and renewed in future years to continue to be a functional plan to guide watershed management in the Middle Iowa Watershed.

9. Stakeholder Engagement and Education Plan

Section 9. Stakeholder Engagement and Education Plan

The final section of this plan reviews stakeholder collaboration during plan development and describes how stakeholders and watershed residents will be involved in plan implementation. The Education and Engagement aspect of implementation is included in Section 8. These actions are further discussed in this section.

A useful CWQMP builds on watershed partnerships, stakeholder collaborations, and resident support.

Stakeholder Role in Plan Development

MIWMA members met quarterly in 2024 and 2025 to develop this plan. Member cities, counties, and SWCDs provided input on plan issues, goals, and actions. MIWMA members engaged with members of the public and other stakeholders during plan development- see Section 1 for an overview of public events that informed plan development. Partner organization priorities were voiced by member entities that share these priorities.

Stakeholder Role in Plan Implementation

Key partners the MIWMA plans to partner with during implementation include:

- The Amana Society
- The Meskwaki Nation-led Iowa River Watershed coalition
- Friends of Coralville Lake

These organizations have been historic leaders in water quality improvement and watershed education and are expected to be important partners during implementation.

The Meskwaki Nation has sampled the Iowa River for two decades, and was a leader in forming the Iowa River Watershed Coalition in 2019. The tribe monitors, protects, and improves local water resources. They have developed their own water quality standards to protect surface water.

Engagement and Education Plan

Implementation efforts will continue the work started by MIWMA in engaging partners and residents to understand water quality. Table 8-5 includes implementation items for this CWQMP. Included in Table 8-5 is the Education and Outreach action group. These actions are further described here to discuss the role and benefits of outreach activities.

One of the main drives for establishing WMAs is to promote, foster, and maintain water and natural resource management discussions across member jurisdictions. Ongoing collaboration between MIWMA member agencies will occur through quarterly WMA meetings, but over time, these collaborations should occur "organically" as these organizations go about their everyday roles and responsibilities. Examples of desired communication and coordination include things like:

- Discussion of policies and approaches to land use, zoning, stormwater and floodplain management across cities and counties
- Shared resources, tools, and methods for emergency and disaster response
- Joint funding initiatives between entities to leverage matching funds, economies of scale, and available resources

Additionally, the MIWMA should identify and empower member leaders to be actively engaged with other WMAs across the state, both as part of the Statewide WMA meeting and informally throughout the year. Activities could include delegating a MIWMA member to a leadership/volunteer role at the statewide level and attending other WMA meetings around the state to share lessons learned, discover resources, and advocate collectively for watershed-based approaches.


Stock photo

Table 9-1. Engagement and Education Actions, from Table 8-5

Action	Description	10-Year Output	Focus Area	Progress towards Goals	Entities Responsible for Implementation	Estimated Cost
Hire Watershed Coordinator	Hire PT or FT coordinator to lead landowner and partner engagement, develop grant applications, etc.	10 years	Watershed-wide	All objectives	MIWMA Members	$1,000,000
MIWMA Network Analysis	MIWMA members discuss the network of partners in the MIWMA and outside of it to learn about programs, policies, funding, and resources from each other	Ongoing, 10 lunch and learns	Watershed-wide	All objectives	MIWMA Members	$5,000
AIS	Hold AIS education events to reduce the spread of invasives	3 events	Watershed-wide	Objective 4.4	SWCDs, Counties	$12,000
Flood Outreach	Distribute educational flood-related material through social media or mailings	10 materials	Figure 8-2 Riparian Focus Area	Objective 2.5	SWCDs, Counties	$20,000
General Education and Outreach	Hold field days, demonstration projects, workshops, or events for increased education regarding soil health, watershed management, and drinking water protection	20 events	Watershed-wide	Objective 4.4	SWCDs	$100,000
Watershed Management	Continued partnership amongst the MIWMA entities and relationship-building to grow the MIWMA network for watershed plan implementation	Quarterly MIWMA meetings	N/A	Objectives 4.2 and 4.3	SWCDs, Counties, Cities	Not estimated
Statewide WMA Collaboration	Develop and maintain a visible connection with statewide WMAs to share lessons learned and advocate for watershed-based approaches.	Statewide WMA Meetings; attending other WMA meetings	Statewide	Objectives 4.2 and 4.3	MIWMA member delegates	Not estimated

Implementation Actions

The seven implementation actions planned to educate residents and conduct watershed outreach include over 33 activities. The Education and Outreach activities are essential support for the rest of plan implementation. CWQMP actions are voluntary and depend on willing landowners for implementation. A watershed with a strong environmental education is more easily able to make progress in watershed projects.

Watershed Coordination, Management, and Collaboration

A watershed coordinator will assist MIWMA in achieving CWQMP goals. As discussed on page 9-2, the MIWMA (and coordinator) will work to collaborate within the MIWMA and with partners. The watershed coordinator can investigate opportunities for expanding water quality monitoring in the watershed.

AIS Events

AIS activities can include workshops to identify invasive species or boat launch stations to educate boat owners on their presence. Overall AIS efforts seek to prevent the spread of existing AIS in the watershed, 2) mitigate the impacts of AIS to recreation and habitat, and 3) prevent new AIS from entering the watershed.

Education and Outreach: General Events and Flooding Outreach

Twenty general events and 10 materials are planned during implementation. The materials output relates specifically to flooding. Materials could include social media posts, mailings, news articles, etc. The MIWMA can collaborate with organizations such as the Iowa Flood Center for messaging.

Photo: Conservation Reserve Plot field day, Source: Marshall SWCD

Photo: Heartland cover crop event, Source: IDALS

Photo: Soil Health event, Source: Tama SWCD

General watershed events will be held and should cover topics of urban stormwater management, drinking water quality and protection, and agricultural conservation practices. These can be workshops, listening sessions, field days, demonstrations plots, or general events. Events should be targeted towards a range of audiences, including youth, landowners, and producers. SWCDs have a great track record of outreach events and will be leaders in implementing watershed education events.

Watershed Management

The MIWMA is interested in hiring a watershed coordinator to make plan implementation a success. Additionally, the MIWMA is actively looking for additional watershed partners to join the WMA and bolster the organization's efforts in watershed management. Existing members will identify strategies for increased participation at annual meetings and seek opportunities for networking in the Middle Iowa Watershed. Eligible entities are listed in Table 9-2.

Table 9-2. Eligible MIWMA entities

Counties and SWCDs	Cities		
Benton	Albion	Gilman	Montour
Grundy	Belle Plaine	Grand	North Liberty
Iowa	Brooklyn	Grinnell	Shueyville
Jasper	Cedar Rapids	Hartwick	Solon
Johnson	Chelsea	Haverhill	State Center
Linn	Clutier	Ladora	Swisher
Marshall	Coralville	Laurel	Tama
Poweshiek	Dysart	Le Grand	Tama
Story	Elberon	Luzerne	Toledo
Tama	Ely	Malcom	Victor
	Ferguson	Marengo	Vining
	Garwin	Marshall	Walford

The MIWMA built a website during plan development to inform on the Middle Iowa Watershed CWQMP and the MIWMA. Meeting minutes, plan implementation progress, and project success stories will be shared on the website.

Click on the MIWMA logo to be linked to the website.