Anoka Conservation District

January 2021

Comprehensive Natural Resources Stewardship Plan

2021-2030

Conserving and Enhancing the Soil, Water, and Ecological Resources of Anoka County since 1946

ANOKA CONSERVATION DISTRICT

www.AnokaSWCD.org

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MESSAGE FROM THE BOARD

The word "Anoka" has special meaning in both the Anishinabe and the Dakota languages, honoring the two rivers (Rum and Mississippi) so valued as sacred and integral to the indigenous way of life. We, as the Anoka Conservation District (ACD), have been challenged to re-examine our relationship with nature; to become stewards rather than managers - available to all in a sensitive, inclusive, diverse and holistic way.

Our work at ACD is based upon the best available science and technology we can invest in for our dedicated staff. Under the leadership of our manager, Chris Lord, the ACD staff is recognized for innovation, plain hard work, and ethical practices. In our valuable work, our staff is our greatest asset. In this ten-year Comprehensive Plan, we introduce a precedent setting Implementation Matrix. The Matrix organizes our foundational resources in a way that makes challenges and solutions accessible. It will be an efficient, cost effective, holistic tool for many years.

The ACD Board of Supervisors invites you to look at the plan, and to be sure to celebrate the natural resources of Anoka County. As you and your family enjoy the rivers, lakes, open spaces, parks, backyards, native plants and animals join us in remembering and honoring the peoples who lived here and passed on such a rich heritage. You might consider adopting one conservation practice, which would help preserve this heritage into the future.

Figure 1: 2020 ACD Board of Supervisors (left to right: Glenda Meixell, Jim Lindahl, Steve Laitinen, Mary Jo Truchon, Sharon LeMay)

Steve Laitinen, District 1

Jim Lindahl, District 2

Glenda Meixell, District 3

Mary Jo Truchon, District 4

Sharon LeMay, District 5

ACKNOWLEDGMENTS

INDIGENOUS LANDS

Anoka Conservation District acknowledges that indigenous peoples and nations, including the Očhéthi Šakówiŋ, Anishinabewaki, and Wahpekute have stewarded through generations the lands and waterways of what is now Anoka County. We honor and respect the storied history that exists between these peoples and nations and this land.

COMPREHENSIVE PLAN CONTRIBUTORS

Thank you to all parties who contributed to the content and production of this plan. Heartfelt gratitude is extended to our implementation partners, who are too numerous to list and span all levels of government as wells as the private sector. Without them, this rewarding work would be overwhelming.

Technical Advisory Committees

Partner	Organization	Surface Water	Ecological Resources	Ground-water	Soil
Glenn Fuchs	Anoka County Parks Dept.		X		
Jason Law	City of Andover	X			
Brian Kraabel	City of Andover			X	
Kameron Kytonen	City of Andover		X		
Todd Haas	City of Andover				X
Ben Gutknecht	City of Columbus		X		
Rachel Workin	City of Fridley	X	X		
Marty Asleson	City of Lino Lakes		X		X
Tim Kelly	Coon Creek Watershed District	X		X	X
Justine Dauphinais	Coon Creek Watershed District	X			
Jason Husveth	Critical Connections Ecological Services		X		
Emily Resseger	Metropolitan Council	X	X		
Lanya Ross	Metropolitan Council			X	
Brett Eidem	Mississippi WMO	X	X		
Ben Meyer	MN Board of Water and Soil Resources	X	X		X
Dan Fabian	MN Board of Water and Soil Resources	X		X	X
Jason Spiegel	MN Dept. of Natural Resources	X			
Joe Richter	MN Dept. of Natural Resources			X	
Kelly Pharis	MN Dept. of Natural Resources		X		
Lauren Sampedro	Rice Creek Watershed District	X			
Catherine Nester	Rice Creek Watershed District			X	
Patrick Hughs	Rice Creek Watershed District		X		
John Crellin	USDA Natural Resources Conservation Service				X
Yara Gonzalez	USDA Natural Resources Conservation Service				X

Elected Officials – Initial Input Event

County Commissioners: Braastad, Gamache, Look, Schulte, West

State Legislators: Senators:Newton Representatives: Bernardy, Koegel, Kunesh-Podein

ACD Supervisors: Laitinen, LeMay, Lindahl, Meixell, Truchon

TERMS

MN Natural Resource Profession Acronyms

AGENCIES

State

BWSR: Board of Water and Soil Resources
CWC: Clean Water Council
DNR: Department of Natural Resources
DOER: Department of Employee Relations
LCCMR: Legislative Citizens Commission on Minnesota Resources
LSOHC: Lessard-Sams Outdoor Heritage Council
MDA: Minnesota Department of Agriculture
MDH: Minnesota Department of Health
MES: Minnesota Extension Service
MGS: Minnesota Geological Service
MPCA: Minnesota Pollution Control Agency
OWM: Office of Waste Management
SPA: State Planning Agency

Federal

ACE: Army Corps of Engineers
FSA: Farm Service Agency
EPA: Environmental Protection Agency
NRCS: Natural Resources Conservation Service
RC&D: Resource Conservation and Development
RECD: Rural Economic and Community Development
USDA: United States Department of Agriculture
USFWS: United States Fish and Wildlife Service
USGS: United States Geological Survey

Local and Regional

JPB: Joint Powers Board
LGU: Local Government Unit
MCD: Metro Conservation Districts
RDC: Regional Development Commission
SWCD: Soil and Water Conservation District
WD: Watershed District
WMO: Watershed Management Organization

ASSOCIATIONS

State

AMC: Association of Minnesota Counties
AMWRAP: Association of Minnesota Water Resources Administrators and Planners
MACDE: Minnesota Association of Conservation District Employees
MACPZA: Minnesota Association of County Planning and Zoning Administrators
MARC&D: Minnesota Association of Resource Conservation and Development
MASWCD: Minnesota Association of Soil and Water Conservation Districts
MAWD: Minnesota Association of Watershed Districts
MLA: Minnesota Lakes Association
MLMF: Minnesota Association of Lake Management Federation

National

NACD: National Association of Conservation Districts
NWF: National Wildlife Federation
SWCS: Soil and Water Conservation Society

PROGRAMS

State

BBR: Biennial Budget Request
CLMP: Citizens Lake Monitoring Program
CLWP: Comprehensive Local Water Planning
CREP: Conservation Reserve Enhancement Program
CWF: Clean Water Fund
CWP: Clean Water Partnership
FDR: Flood Damage Reduction
LAP: Lake Assessment Program
MAWQCP: Minnesota Agricultural Water Quality Certification Program
MFIP: Minnesota Forestry Improvement Program
MS4: Municipal Separate Storm Sewer System
NPDES: National Pollutant Discharge Elimination System
NPEAP: Nonpoint Engineering Assistance Program
OHF: Outdoor Heritage Fund
PFM: Private Forestry Management
PWP: Permanent Wetlands Preserve
RIM: Reinvest in Minnesota
SCS: State Cost-Share Program
SSTS: Subsurface Sewage Treatment System
SWPPP: Stormwater Pollution Prevention Plan
TMDL: Total Maximum Daily Load (federal mandate to state)
WCA: Wetland Conservation Act
WRAPP: Watershed Restoration and Protection Plan
WRAPS: Watershed Restoration and Protection Strategy

Federal

CRP: Conservation Reserve Program
ECP: Emergency Conservation Reserve
EQIP: Environmental Quality Improvement Program
FEMA: Federal Emergency Management Act
WRP: Wetland Reserve Program

GLOSSARY

Planning Terms

The following terms are listed in order of occurance in the planning process.
Resource: foundational natural resources for ACD: Soil, Surface Water, Groundwater, and Ecological Resources
Benefit: intrinsic and societal benefits provided by resources
Goal: maintain, restore, or enhance benefits provided by resources
Priority: ranked resource, goal, or objective
Threat: outside force acting on a resource that compromises the resources ability to provide benefits
Objective: remediation or abatement of a threat to resource benefits
Strategy: general means of achieving an objective
Program: A grouping of actions related to one topic (e.g. streambank stabilization consult, design, installation management, outreach, maintenance and evaluation)
Service: a category of action (e.g. monitor, inventory, engage)
Action: detailed activity description to implement a strategy, which when combined with a target audience, location, problem and measurable outcome, is sufficient to develop project work plans and budgets that can be used to secure implementation funding
Asset: Support (political, public, agency), capacity (staff, funding, expertise, technology), awareness (science, planning, and literacy about issues by public, elected officials, and community leaders), and jurisdiction (geography, statutory) are all needed to move forward with implementation
Obstacle: Lack of an asset needed for implementation
Effectiveness: an assessment of how well an action will advance a strategy to achieve an objective
Investment: an assessment of the amount of staff, materials, and funds needed to complete an action
Return on investment (ROI): a ratio of action effectiveness to investment
Target: the focus of actions on audiences, locations, and/or problems

Measurable outcome: a quantifiable description of the desired results from actions

Natural Resource Stewardship Terms

Abate: stop from getting worse
Best Management Practice (BMP): a widely accepted means of cost-effectively pursuing a natural resource stewardship goal
Detention: slow the movement of a target constituent
Enhance: improve the natural resource
Maintain: keep current functional or benefit levels
Practice: an annually implemented activity (e.g. use of cover crops)
Project: a BMP that has a useful life of several years
Remediate: correct or repair the underlying problem (remedy)
Restore: process of returning damaged or destroyed areas to natural habitats with ecological functions
Retention: stop the movement of a target constituent

Implementation Services

Advocate: work with policy makers to remove regulatory obstacles or to adopt and implement improved standards
Analyze: characterize conditions and trends in resource quality, quantity and distribution based on foundational data
Consult: provide site-specific project assessment, survey, guidance, and design
Engage: provide target audiences information, interaction, and/or participation opportunities to encourage the implementation of proven approaches
Evaluate: ascertain the effectiveness of BMPs that have previously been installed through field observation, monitoring and analysis
Fund: financially support all or a portion of the cost of implementing projects and practices
Guide: guide landowners with natural resource regulatory violations to achieve compliance
Inspect: review properties to verify compliance with natural resource regulations
Inventory: collect and compile geospatial data on natural resource quality, quantity and distribution
Maintain: attend to the annual upkeep of BMPs to ensure they continue to provide designed benefits for their planned useful life
Manage: attend to all aspects of project installation oversight on behalf of landowners
Monitor: collect and compile physical, chemical and biological data on natural resource quality, quantity and distribution
Protect: secure development rights to properties through fee title, conservation easement, or other means
Regulate: assist with the preparation of revised ordinances to improve natural resource stewardship
Strategize: conduct planning to develop strategies for achieving goals
Supply: provide access to conservation equipment and materials

Other Terms

Anthropogenic toxins: toxic substance of human origin such as pesticides, disinfectants, heavy metals, and other hazardous waste
Biogeochemical functions: the complex recurrent pathways of elements and compounds as they move through and are influence by the physical and biological features of the environment
In situ: regarding the location of an item or action being on site or on location, in its original setting

EXECUTIVE SUMMARY

The **Vision** of Anoka Conservation District (ACD) is:

Strong partnerships. Innovative solutions. Healthy environments.

◊◊◊◊◊◊◊◊◊

ACD's **Mission** is to holistically conserve and enhance Anoka County's natural resources for the benefit of current and future generations through partnerships and innovation.

Anoka County has exceptional natural resources to conserve and enhance for the enjoyment and benefit of current and future generations.

- 30% of our land area is wetland, teeming with wildlife
- Home to more ranked pristine ecosystems than any other metro county
- Supports 30 recreational and 98 natural environment lakes
- Offers 2 recreational rivers and hundreds of miles of creeks and streams
- Home to 95 federal and state listed rare species (16% of all MN listed species)
- Multiple aquifers of clean drinking water
- Unparalleled access to public outdoor recreation spaces for a metro county (WMA, SNAs, county and city parks)

This 2021-2030 plan lays out strategies to work toward ACD's vision and mission by prioritizing **soil**, **surface water, groundwater, and ecological resources.** By developing a method to rank all potential activities against each in terms of **return on investment** (ROI), ACD is able to optimize the utilization of finite technical, financial, and human resources to maximize positive outcomes over the coming decade.

The plan was developed and refined in collaboration with many entities through convened technical advisory committees. Through this process, sixteen natural resource benefits and related goals were identified and ranked. Twenty-seven threats to resource benefits were identified as well. Following that, ACD staff and supervisors took the reins to populate the ROI Matrix and complete the plan narrative.

The action wheel below highlights the keystone initiatives ACD plans to pursue for our soil, surface water, groundwater, ecological, and community resources for 2021 through 2030. These will inform actions in ACD annual plans over the coming decade.

At year-end, ACD will reflect on our performance in each of the action categories over the past year and award a 'grade' to each. The resultant 'report card' will provide a transparent method of measuring progress toward goals and benefits to Anoka County residents.

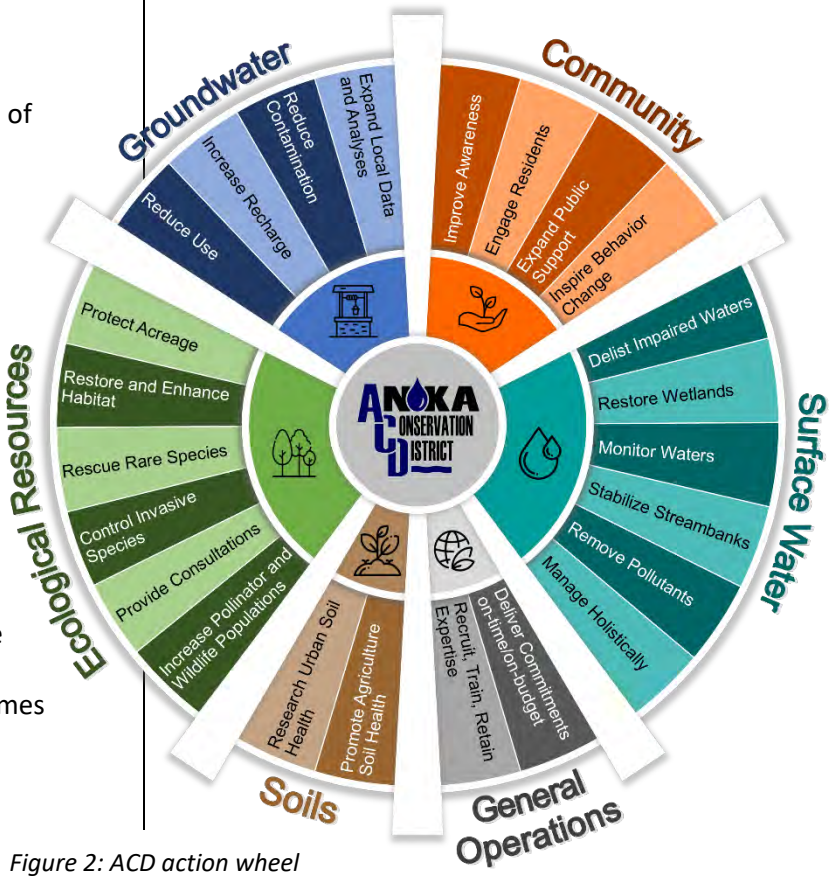


Figure 2: ACD action wheel

INTRODUCTION

SWCD Responsibilities and Authorities[1]

Soil and Water Conservation Policy

Soil and Water Conservation Districts are authorized under Minnesota Statutes Chapter 103C known as the Soil and Water Conservation District Law. Soil and water conservation policy of the state (103A.206) is to encourage land occupiers to conserve soil, water, and the natural resources they support through the implementation of practices that:
(1) control or prevent erosion and sedimentation;
(2) ensure continued soil productivity;
(3) protect water quality;
(4) prevent impairment of dams and reservoirs;
(5) reduce damages caused by floods;
(6) preserve wildlife;
(7) protect the tax base; and
(8) protect public lands and waters.

Soil and Water Conservation District Authority

In order to carry out its mission, ACD has several powers granted in law. The following excerpts paraphrase those authorities. SWCDs may do the following:

- resource surveys;
- soil and water conservation measures with landowner consent;
- provide conservation equipment and supplies;
- construct, install, improve, maintain, and operate conservation structures;
- comprehensive and annual planning;
- acquire land for conservation projects; and
- work in cooperation with the local, state, and federal government on conservation projects.

Soil and Water Conservation District Duties

In addition to any other duty prescribed by law, soil and water conservation districts must:
(1) provide technical and financial assistance to landowners;
(2) provide technical assistance to implement the Soil Erosion Law (103F.401 to 103F.48);
(3) serve on technical evaluation panels to implement wetland laws (103G.2242);
(4) administer the Reinvest in Minnesota program (103F.515);
(5) administer elements of the Wetland Conservation Act (103G.221 to 103G.2375);
(6) participate in water planning and implementation (103B);
(7) participate in the comprehensive watershed management planning program (103B.801);
(8) participate in disaster response efforts (12A);
(9) provide technical recommendations to the Department of Natural Resources on general permit applications (103G.301);
(10) implement the agricultural water quality certification program (17.9891 to 17.993);
(11) provide technical assistance for the agricultural land preservation program under (40A);
(12) maintain compliance with section (15.99) of deadlines for agency action;

[1] A more complete version is presented in the Appendix.

About ACD

Organizational History

Formed in 1946 by petition of Anoka County residents, Anoka Conservation District pursues the objectives of Minnesota's Soil and Water Conservation Policy by working with public and private landowners to address natural resource stewardship challenges. During the 20th century, Anoka County rapidly developed from rural to suburban. Consequently, ACD's priority goals, objectives and strategies have shifted from addressing agricultural issues with practices like grassed waterways and conservation tillage, to urban issues with efforts such as open space planning, urban streambank stabilization, and stormwater treatment retrofits.

Vision Statement

Strong partnerships - Innovative solutions - Healthy environments

Mission Statement

ACD's mission is to holistically conserve and enhance Anoka County's natural resources for the benefit of current and future generations through partnerships and innovation.

Guiding Principles and Strategies

- Focus on long-term resource sustainability
- Make informed and ethical decisions
- Promote cost-effective and efficient resource stewardship
- Collaborate with both public and private sectors
- Utilize technology to achieve efficiency and enhance work products
- Keep natural resource issues visible in Anoka County
- Retain highly qualified, knowledgeable staff
- Seize opportunity and adapt to changing needs
- Develop diverse programs, partners, and funding sources
- Manage natural resources at efficient and effective geographic scales
- Engage the citizenry through outreach to encourage natural resource stewardship
- Consider the economic, social and environmental costs and benefits of our actions

Organizational Structure

Supervisors and Staff

ACD has a board of five supervisors with a variety of expertise elected to staggered four-year terms representing population-based districts. The Board of Supervisors determines ACD's priority goals and objectives and charges staff with developing the programs and services necessary to address those priorities. Each Supervisor serves on multiple internal and external committees to oversee ACD operations and partnerships.

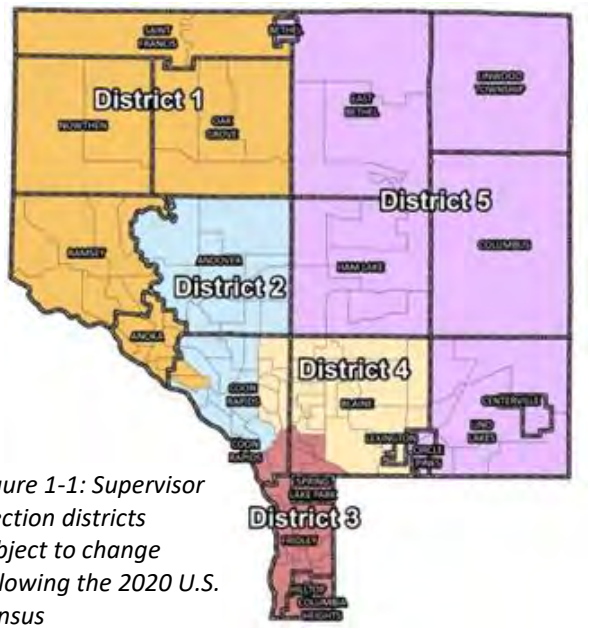


Figure 1-1: Supervisor election districts subject to change following the 2020 U.S. Census

"Never doubt that a small group of thoughtful committed citizens can change the world; indeed, it is the only thing that ever has."

Margaret Mead

Staff attends to the daily activities designed to achieve the goals and objectives set by the Board of Supervisors.

ACD Organizational Hierarchy

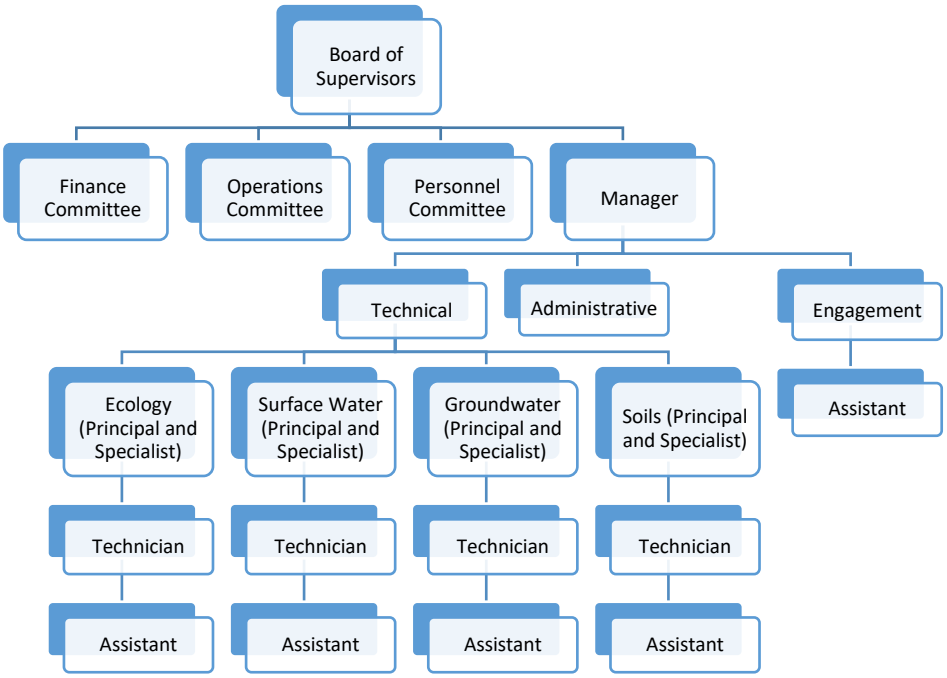


Figure 1-2: ACD organizational hierarchy

Serving the Community

Working with the Public

Over 78% of Anoka County is privately owned and over 350,000 residents call Anoka County home. Effective natural resource stewardship requires that we actively collaborate with those who live, work and play in Anoka County, whether or not they own land. ACD enlists the public to assist with natural resource stewardship by offering the following services:

- Technical assistance – providing project design and installation management.
- Financial assistance – securing, allocating and administering grant funding to install conservation projects.
- Regulatory assistance – providing guidance to help keep landowners out of regulatory harm's way with regard to several federal and state laws.
- Outreach and engagement – providing information resources and opportunities to assist with community efforts to improve our natural resources.

Working with Local Government Entities

Natural resources valued by Anoka County residents require collaborative stewardship by entities with varying jurisdictions within and across city, county and watershed boundaries. It is important that ACD remains continually engaged with each entity to;

- avoid duplication,
- maximize efficiencies,
- capitalize on common interests,
- direct limited financial and staff resources to the most cost-effective approaches, and
- apply stewardship strategies at a scale most appropriate to meet identified goals and objectives.

Within Anoka County, county departments, watershed districts, watershed management organizations, and cities are vital partners in natural resource stewardship planning and implementation.

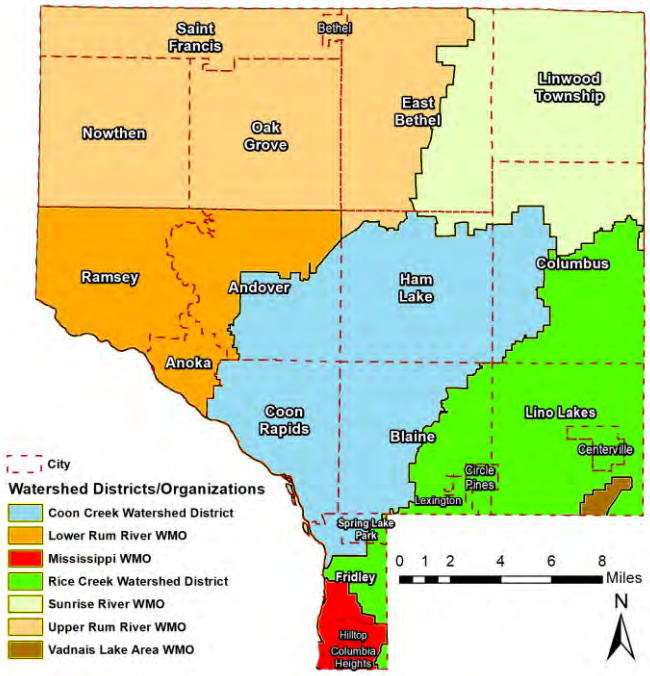


Figure 1-3: Watershed entities in Anoka County

About this Plan

Planning Context

The 10-Year Comprehensive Plan works in coordination with several other plans and work products to guide ACD's activities in the coming decade. Because monitoring, inventory, and analyses are continuously improving our understanding of the ever-changing environment and how best to manage it, the comprehensive plan, while based in the science of natural resource stewardship, is not intended to present the science.

Rather, the comprehensive plan provides the broad framework and sets broad priorities, goals, objectives, and strategies. Annual plans identify specific and targeted actions to pursue (projects, programs, and activities) in the coming year to meet the goals in the Comprehensive Plan by optimizing the allocation of available technical, human, and financial resources. The scientific foundation for these efforts exists in myriad work products developed both in-house and by partner agencies. These scientific analyses diagnose the nature of problems and identify solutions. Some analyses go as far as ranking potential solutions by cost-effectiveness, thereby facilitating targeted implementation.

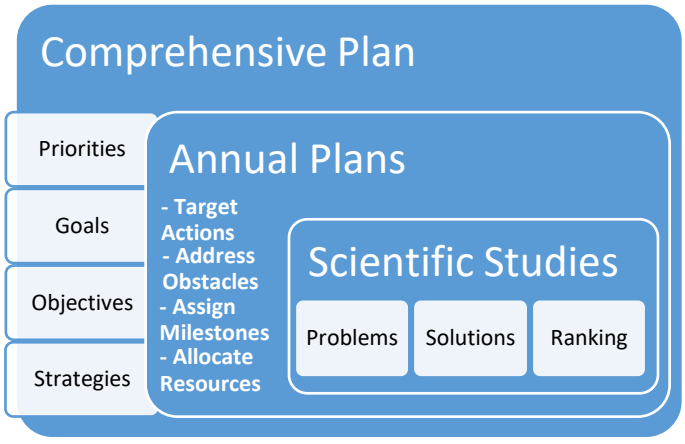


Figure 1-4: Plan context

Whole Plan and Incorporation by Reference

The whole plan consists of this narrative in combination with ACD's return on investment matrix, which is in spreadsheet format.

While the goals, objectives, and strategies in this plan are expected to remain stable for the coming decade, albeit subject to formal amendment, the programs and actions should be considered a "living document" that will be annually modified during the annual planning process. This is necessary to account for changing needs, seize opportunities, incorporate improved technologies and techniques, adjust for implementation schedules, and account for the activities of implementing partners.

To incorporate actionable tactics into this comprehensive plan as quickly and efficiently as possible, as ACD's Board of Supervisors adopts other plans, the implementation portions of those plans that cover Anoka County are incorporated by reference into this comprehensive plan. Anticipated plan adoptions include:

"A goal without a plan is just a wish."

Antoine de Saint Exupéry

- ACD's 2021-2030 annual plans
- Rum River Comprehensive Watershed Management Plan 2021
- Lower St. Croix Comprehensive Watershed Management Plan 2020

ACD will coordinate our implementation actions to complement the efforts of implementation partners including but not limited to:

- Coon Creek Watershed District
- Lower Rum River WMO
- Mississippi River WMO
- Rice Creek Watershed District
- Sunrise River WMO
- Upper Rum River WMO
- Vadnais Lake Area WMO

Planning Process

This plan exceeds the requirements of the Minnesota Board of Water and Soil Resources (BWSR) by adhering as much as practicable to the planning requirements contained in MN Stat. Chapter 8410: Metropolitan Surface Water Management Act. To this end, the following planning processes were followed:

- Plan review agencies were invited to share written comments during a 60-day window of opportunity;
- Technical advisory committees (TACs) were established and convened for each of four natural resource topics: soils, surface water, groundwater, and ecological resources. The TACs provided insight into the benefits that these resources provide, what threatens those benefits, and strategies to address those threats;
- An initial planning meeting was held to receive and review stakeholder input;
- A kickoff event was held to solicit input from state and county elected officials that represent constituents within Anoka County;
- Workshops were held for ACD Board and staff that were open to the public to review and discuss plan priorities and objectives;
- Public input gathered during the 25 by 25 Community Waters Sessions was considered; and
- The plan has been filed with the U.S. Department of Agriculture to qualify ACD to receive assistance from the Natural Resources Conservation Service.

If provided a path to BWSR Board approval, this plan will be subjected to required review and approval processes.

…PROGRAMS AND ACTIONS SHOULD BE CONSIDERED A "LIVING DOCUMENT" THAT WILL BE ANNUALLY MODIFIED…

Planning Strategy

The planning process involved varied stakeholders at each step as appropriate to address topics from the broadest to narrowest. Input was used to construct a comprehensive planning matrix. The matrix informs every aspect of this comprehensive plan and will be the foundation for developing annual plans. This strategy produced a plan that cohesively and holistically addresses how to pursue cost-effectively, the maintenance and restoration of foundational natural resources and their benefits through prioritized goals, objectives and strategies.

Table 1-1: Strategic planning process

Plan Level	Step	Outcome	Contributor
Comprehensive Plan	Identify foundational natural resources	**Soil**, **Water** (surface water and groundwater), and **Biota** (flora and fauna)	ACD Board
	Identify benefits of natural resources	Comprehensive listing of benefits received from foundational natural resources, the maintenance or improvement of which becomes the **Goals**	ACD Board, ACD Staff, and TAC with consideration agency, public (25 by 25), and elected official input
	Identify priorities for ACD	Rank-order listing of identified goals	
	Identify threats to priority goals	Comprehensive list of threats to prioritized goals, the neutralization or remediation of which becomes the **Objectives**	
	Identify strategies to remediate and abate threats/ achieve objectives	Comprehensive list of strategies to achieve objectives	Senior ACD staff.
Both Plans	Identify actions to implement strategies	Comprehensive list of actions to achieve strategies with associated effectiveness and investment to determine relative return on investment (ROI)	ACD staff with Board review and approval
	Identify obstacles to take action	Determination of where a lack of support, capacity, awareness, or jurisdiction will inhibit taking the identified action	
	Identify actions to address obstacles	Comprehensive list of actions to remove obstacle to implementation	
	Develop principles for targeting actions	Principles and criteria to guide decisions on where specifically to target actions	
Annual Plan	Identify targeted natural resources	List of natural resources to target for action within a specific timeframe	ACD staff with TAC and Agency input to ensure coordination with other plans
	Identify short and long-term condition milestones for target resources	Objective and measurable outcome milestones for target natural resources	
	Complete jurisdictional gap analysis	Identification of the optimal lead entity to implement actions	
	Identify most effective actions to take	List of actions for ACD to achieve milestones for target natural resources with consideration of ROI	ACD staff with Board review and approval
	Allocate assets to implement actions	Detailed budget indicating the annual allocation of staff, financial and technical resources	

NATURAL RESOURCE STEWARDSHIP

Natural Resource Stewardship Philosophy

Holistic resource stewardship is central to the structure and content of this plan. In the purest sense, water is nothing more than a simple compound. Soil is aggregate minerals and inert matter. Combine just those two, and you have mud. Enter the living landscape: soil microbes, trees, mammals, fungi, arachnids, wildflowers, birds, grasses, fish, algae, arthropods, mussels, sedges, nematodes, aquatic plants, reptiles, shrubs, bacteria, amphibians, insects, and humans. All of these life forms interacting with the soil, water and landforms in the environment create dynamic ecosystems that rely on complex cycling of nutrients, water, energy, gases, and minerals. To manage any of these well, they must be considered in the context of the ecosystem of which they are a part and the cycles to which they contribute.

When possible, managing systems is much preferred over managing individual features. If large systems can be kept intact, the component features are likely to take care of themselves. Managing an entire system is seldom practical, but there are systems within systems and so it is often possible to focus efforts on a sub-system. It is ACD's philosophy to manage the largest practicable system to achieve district goals. Even our best efforts can fall short. System complexity is sometimes so high that it is nearly impossible for us to consider all aspects in our work and we never know when we are overlooking a critical component until evaluating the project after completion.

Environmental and Ecological Services

Ecology is the study of the relationship between the living components of the landscape and their physical environment. Soil, water, landforms, and biota provide invaluable services that not only improve our quality of life, but make life possible. Many of these benefits are intrinsic and occur naturally while others must be extracted from natural resources by humans. Excess extraction results in depletion, and a loss of intrinsic benefits. For example, a tree sequesters carbon to temper climate change, takes up and neutralizes toxins, provides food and shelter for wildlife, holds soils in place, provides shelter from winds, cuts energy costs with cooling shade, and produces oxygen to breath. Left alone, the tree will continue to provide these benefits. It can also provide sap for syrup, fuel wood, lumber, pulp, mulch, and compost. The latter list requires active extraction. Some benefits are provided by environmental factors (physical landscape) and others by ecological components. With perfect knowledge we could put a price on the value of these benefits. Lacking that, we can intuit their value, knowing that some of the greatest environmental and ecological services come in the form of prevented or lessened harm.

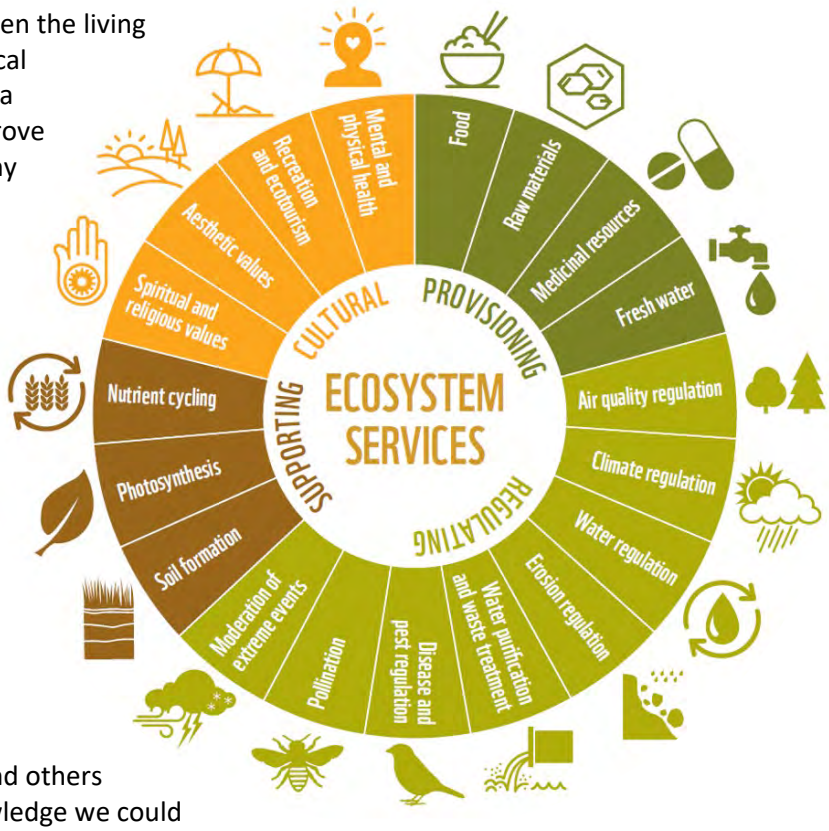


Figure 2-1: Ecosystem services (World Wildlife Fund, 2016)

Resource Priorities and Benefits

Natural resources in Minnesota are managed by a layered network of partners that include federal, state, regional, county, watershed, and municipal levels of entities. A flow chart prepared by Washington Conservation District in the Appendix illustrates how complex water resource governance is, and that doesn't include soil and biotic resource stewardship.

Throughout the planning process, all questions of priority were viewed through the lens of ACD's role in holistic natural resource stewardship in Anoka County and the region, as opposed to the role of partner implementing entities. Both the foundational natural resources and the benefits they provide were prioritized. Foundational natural resources listed in order of priority are Surface Water, Biota, Groundwater, and Soils. The prioritization of benefits directly informs the list of prioritized goals, because the goals are to sustain and restore priority benefits. The following figure presents the priority foundational resources listed left to right, with the related benefits listed for each. The number in parentheses is the rank of the benefit relative to all of the priority benefits. There are sixteen total, with several tied rankings, 1 being the highest.

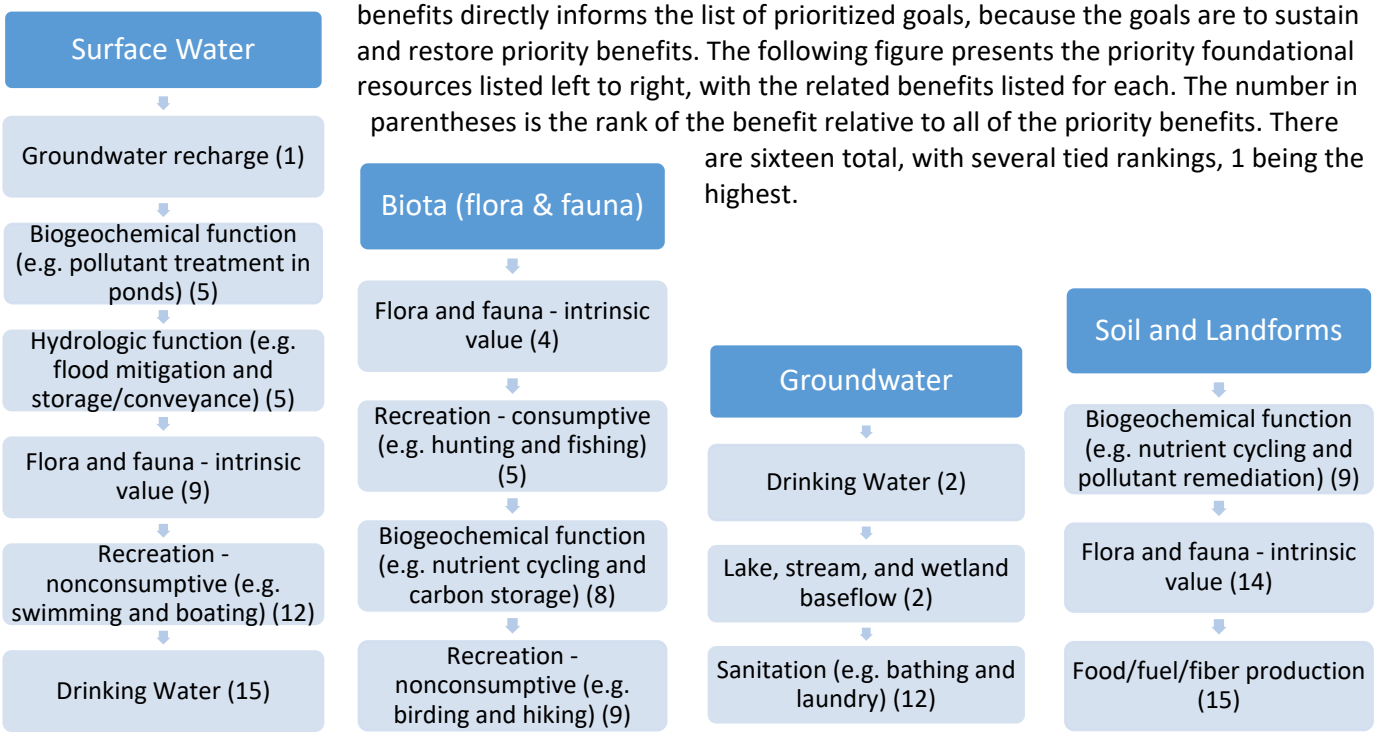


Figure 2-2: Resource and benefits priorities

THROUGHOUT THE PLANNING PROCESS, ALL QUESTIONS OF PRIORITY WERE VIEWED THROUGH THE LENS OF ACD'S ROLE IN HOLISTIC NATURAL RESOURCE STEWARDSHIP IN ANOKA COUNTY AND THE REGION, AS OPPOSED TO THE ROLE OF PARTNER IMPLEMENTING ENTITIES.

ACD Resource Stewardship Strategy

Effective implementation utilizes an adaptive management approach, continually incorporating lessons learned from recent successes and failures, and drawing upon the most current scientific insights. Adaptive management also considers cumulative impacts of our work and the work of partners, emerging issues, and changing environmental circumstances. Effectively employing this approach is one reason that implementation details are best left to annual plans of work as opposed to comprehensive plans.

It is critical to guard against the impulse to cycle back to data collection, analysis and planning too often or to stay there for too long. Seeking perfect knowledge before daring to act is a sure way to get nothing done.

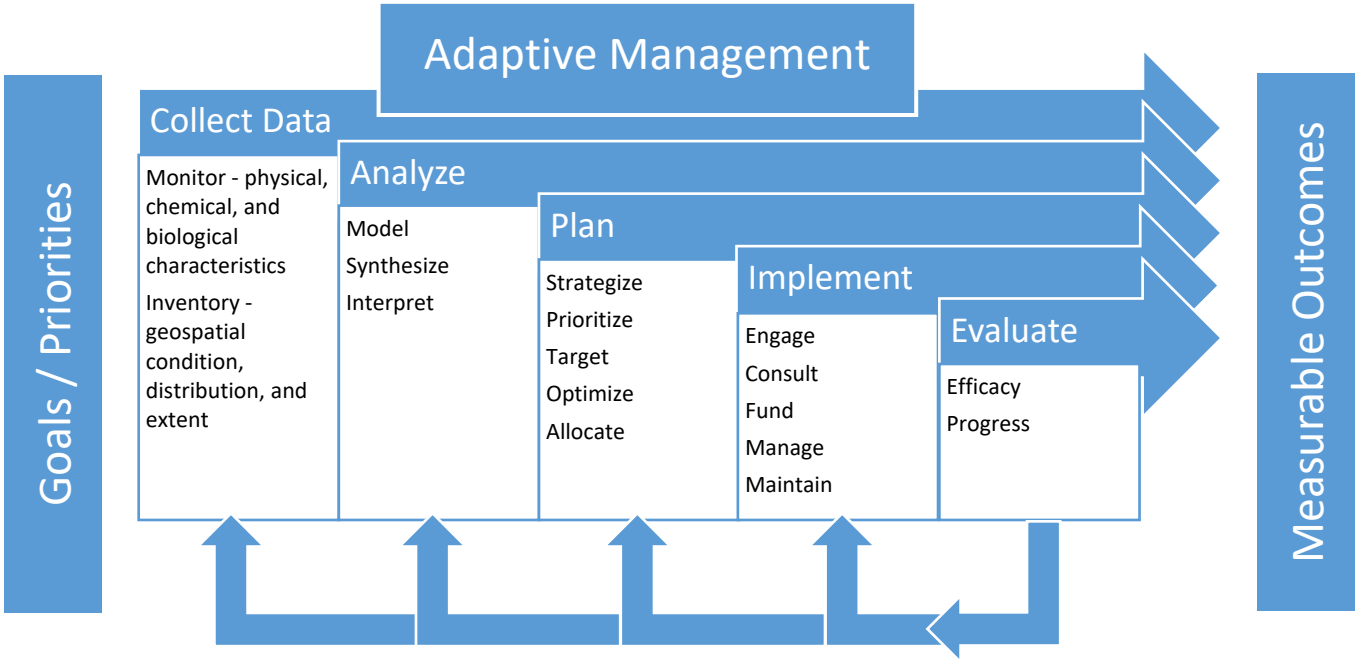


Figure 2-3: Adaptive management

"Whatever there be of progress in life comes not through adaptation, but through daring."

Henry Miller

Service Prioritization

While natural resource prioritization and goal setting is a policy decision, the pursuit of identified goals is a scientific endeavor. Available staff and financial resources limit the number and magnitude of actions that can be taken in a year. To vet potential actions during the annual planning process, prioritization of services (action types) is helpful. Not all actions equally achieve natural resource stewardship objectives. Listed in order of priority, the following table presents ACD's preferred services. Although implementation projects are generally preferred, considering other criteria, any action has the potential to rank highly. Furthermore, prevention is preferred over remediation.

Table 2-1: Service prioritization

Service (action type)	Rationale	Score
Protect: secure development rights to properties through fee title, conservation easement, or other means	Perpetual benefits for all resources, targeted geographic scope, complex and expensive to achieve	10
Fund: provide funding to cover all or a portion of the cost of implementing projects and practices	Immediate measurable impact for extended and predictable duration, remediation instead of prevention	9
Regulate: assist with the preparation of revised ordinances to improve natural resource stewardship	Landuse controls have the potential to prevent degradation, large scale benefits to multiple resources, hard to measure prevention	8
Guide: guide landowners with natural resource regulatory violations to achieve compliance	Corrective action taken at landowner's expense, long-term benefits, easy to measure	7
Manage: manage all aspects of project installation oversight on behalf of landowners	Project installation management can be daunting for landowners to engage in directly. Having a third party committed to project success often addresses a critical obstacle to taking action.	7
Consult: provide site-specific project assessment, survey, guidance, and design	Site assessment and project design are beyond the capability of more property owners. Providing this service to clarify a vision and estimate costs is a needed step toward project installation.	6
Maintain: attend to the annual upkeep of BMPs to ensure they continue to provide designed benefits for their planned useful life	Continued benefits at a marginal cost compared to new project construction	6
Analyze: characterize conditions and trends in resource quality, quantity and distribution based on foundational data	Identifies and ranks projects for future implementation	4
Evaluate: ascertain the effectiveness of BMPs that have previously been install through field observation, monitoring and analysis	Learns from project performance to refine future project design	3
Inspect: review properties to verify compliance with natural resource regulations	May identify resource degradation subject to regulatory controls	3
Inventory: collect and compile geospatial data on natural resource quality, quantity and distribution	Provides insight into geospatial resource characteristics to fuel analysis	3
Monitor: collect and compile physical, chemical and biological data on natural resource quality, quantity and distribution	Provides insight into temporal resource characteristics to fuel analysis	3
Strategize: conduct planning to develop strategies for achieving goals	Develops implementation strategies to achieve boarder goals and objectives	2
Advocate: work with policy makers to remove regulatory obstacles or to adopt and implement improved standards	May involve a significant effort and has potential for significant benefit, but only if adoption and implementation of resultant work product occurs	1
Engage: provide information, interaction and/or participation opportunity to encourage the implementation of proven approaches	Diffuse benefits in very small increments that are hard to track or measure but have the potential for significant long-term shifts in public behavior norms	1
Supply: provide access to conservation equipment and materials	Makes securing the correct type of equipment or supplies easier for landowners	1

Project Selection Prioritization

Criteria in the following table are considered when selecting implementation projects to pursue during the annual planning process. Each criterion can apply to a project to varying degrees and is subject to change over time. The selection aids in determining if a project is better or worse than other available options at the time of consideration. Because the vetting process doesn't determine if a project meets a defined threshold, it is more intuitive than objective.

Table 2-2: Implementation project criteria

Criteria	Consideration
Optimal lead entity	ACD defers projects to optimal entities that are prepared to take the lead
Priority of resource benefited	Higher priority target resources preferred
Magnitude of benefit to the target resource	Large benefits to target resource preferred
Duration of benefit	Longer benefit durations preferred
Speed of benefit	Quickly realized benefits preferred
Cost of the project	Lower cost project per unit benefit preferred (include all design, management, installation, and maintenance costs)
Multiple benefits to resource	Projects that provide multiple benefits to the target resource are preferred
Multiple resources benefited	Projects that benefit multiple priority resources are preferred
Project readiness	Ready projects with obstacles abated are preferred
Project support	Projects with broad public, political and financial support are preferred

Collaboration

As noted earlier, collaboration is the cornerstone of a successful natural resource stewardship strategy. The following tables present select examples of ACD strategies that are advanced through collaborative efforts. Each table is for a different geographic scale. This presentation is also designed to illustrate the importance of managing natural resources at an optimum scale, which varies from multi-county initiatives to minor watersheds.

Table 2-3: Multi-county/regional collaboration

Strategy	Scale	Partners
Ecological restoration	Anoka Sand Plain	Anoka Sand Plain Partnership, State of MN Agencies, Metro Conservation Network, Non-Profits, County and Municipal Parks Departments
Infiltration retention - groundwater recharge	Recharge areas for each of the major metro aquifers.	Land use authorities within as-yet-to-be-identified groundwater stewardship areas, Soil and Water Conservation Districts, Watershed Districts, Counties, Met Council, State of MN
Aquatic and terrestrial invasive species management	Varying scales as appropriate for the species of concern	State of MN Agencies, municipal weed inspectors, USDA NRCS, County and Municipal Departments

Table 2-4: County-wide collaboration

Strategy	Scale	Partners
Monitoring surface and ground water quality and quantity	Anoka County	Watershed Districts, Water Management Organizations, MN DNR, Metropolitan Council, MN PCA
Advise on surface water regulation compliance - Wetland Conservation Act	Anoka County	Wetland Conservation Act LGUs, BWSR, MN DNR, US ACE
Land protection – preserve wildlife corridors, rare species, critical groundwater recharge areas, etc.	Anoka County	Land use authorities throughout Anoka County, County Departments, State of MN

Table 2-5: Major watershed level collaboration

Strategy	Scale	Partners
Provide leadership and expertise to implement strategies that result from the completion of Watershed Restoration and Protection reports, Total Maximum Daily Load reports and Stormwater Retrofit Analyses in collaboration with partners throughout the major watersheds.	Rum River	Lower Rum River WMO, Upper Rum River WMO, County water planners and SWCDs from Mille Lacs Lake to the Mississippi River, Municipalities throughout the watershed
	Lower St. Croix	Sunrise River WMO, County water planners and SWCDs from Isanti, Pine, Chisago and Washington Counties, other government entities throughout the watershed
	Mississippi Metro	Rice Creek Watershed District, Coon Creek Watershed District, Mississippi WMO, Hennepin Co. Env. Services, Ramsey Conservation Dept., Municipalities throughout the watershed

Table 2-6: Minor watershed level collaboration

Strategy	Scale	Partners
Coordinate water resource monitoring, catchment level water quality modeling and BMP opportunity identification, and implementation of BMPs in accordance with approved water plans	Upper Rum River	Upper Rum River WMO, Lake George Improvement District, Cities (St. Francis, Nowthen, Oak Grove, East Bethel, Bethel)
	Lower Rum River	Lower Rum River WMO, Cities (Ramsey, Anoka, Andover)
	Sunrise River	Sunrise River WMO, Lake Associations (Martin Lake, Linwood Lake, Coon Lake), Cities (East Bethel, Linwood, Columbus)
	Coon Creek	Coon Creek Watershed District, Lake Associations (Ham Lake, Crooked Lake), Cities (Ham Lake, Columbus, Andover, Blaine, Coon Rapids, Fridley, Spring Lake Park)
	Rice Creek	Rice Creek Watershed District, Lake Associations (Golden Lake), Cities (Columbus, Blaine, Fridley, Lino Lakes, Circle Pines, Lexington, Centerville)
	Mississippi	Mississippi WMO, Cities (Fridley, Columbia Heights, Hilltop)

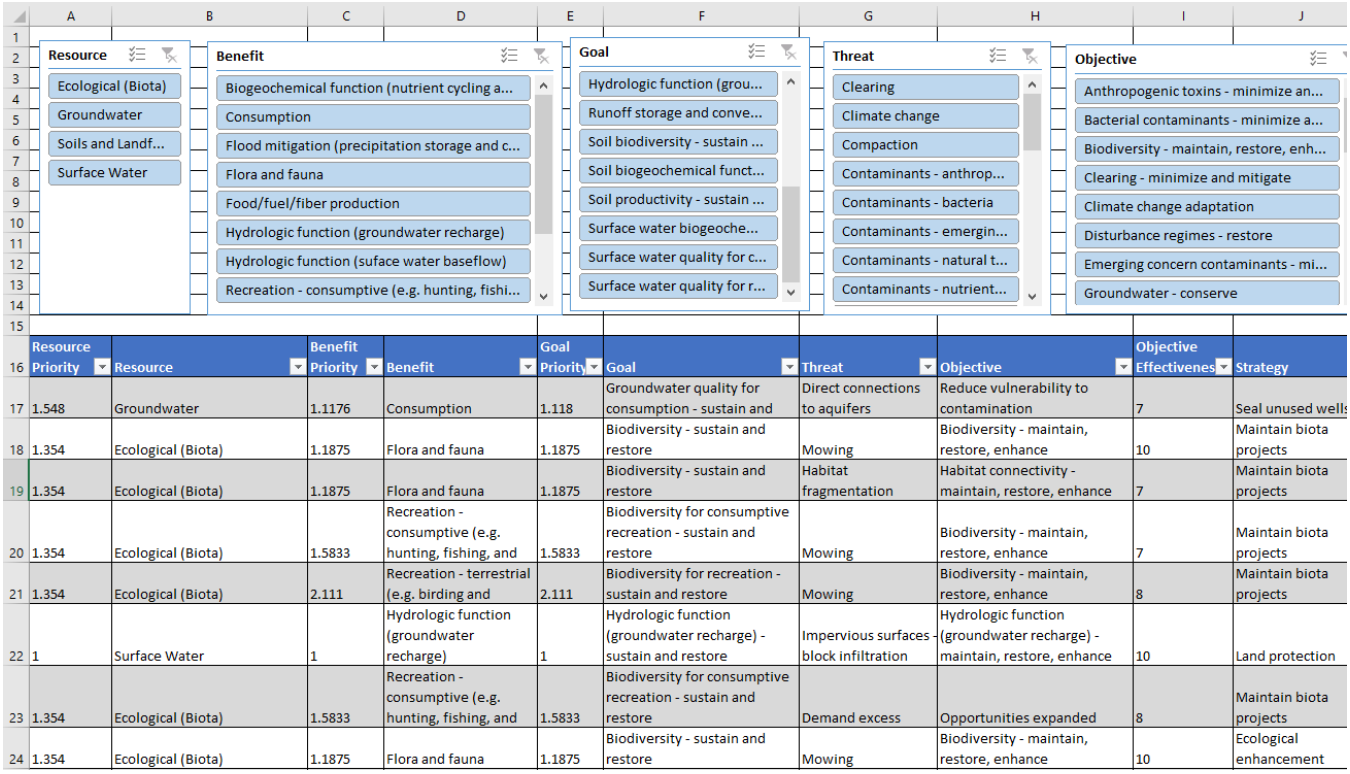
Lead Partner

Beyond managing resources at the optimum scale with the right partners, it's critical for the optimum partner to function as the lead. Generally, ACD serves as the lead for projects in the Anoka County portions of the Rum River and Lower St. Croix watersheds, and a support capacity elsewhere unless requested to lead a project by partners in other areas. We also serve as the lead for projects that cross watershed boundaries or deal primarily with ecological or soil resources.

ACTION PLANNING MATRIX

ACD created a matrix to facilitate natural resource stewardship planning and implementation. 'The Matrix', as referenced, identifies the objectives and strategies to achieve goals for foundational natural resources. Although planning to the strategy level is sufficient for comprehensive planning, The Matrix also identifies programs and actions to facilitate annual plan preparation. During the annual planning process, The Matrix will be populated with data on targeting, measureable outcomes, and time of implementation.

The matrix is both a tool and part of the plan. This approach provides ACD supervisors, staff and the public with a means to sift through and rearrange nearly 300 actions, each achieving multiple strategies, each of which accomplish several objectives, which in turn make progress on multiple goals, to benefit multiple resources. Most plans present this information in a series of static tables that are replete with redundancy and nearly impossible to logically track. Matrix users can readily query from nearly 3,000 natural resource stewardship permutations to answer questions regarding any combination of resources, benefits, goals, threats, objectives, strategies, programs, services, and actions. Figure 2-4 shows a small corner of the matrix.



	Resource Priority	Resource	Benefit Priority	Benefit	Goal Priority	Goal	Threat	Objective	Objective Effectiveness	Strategy
17	1.548	Groundwater	1.1176	Consumption	1.118	Groundwater quality for consumption - sustain and	Direct connections to aquifers	Reduce vulnerability to contamination	7	Seal unused wells
18	1.354	Ecological (Biota)	1.1875	Flora and fauna	1.1875	Biodiversity - sustain and restore	Mowing	Biodiversity - maintain, restore, enhance	10	Maintain biota projects
19	1.354	Ecological (Biota)	1.1875	Flora and fauna	1.1875	Biodiversity - sustain and restore	Habitat fragmentation	Habitat connectivity - maintain, restore, enhance	7	Maintain biota projects
20	1.354	Ecological (Biota)	1.5833	Recreation - consumptive (e.g. hunting, fishing, and	1.5833	Biodiversity for consumptive recreation - sustain and restore	Mowing	Biodiversity - maintain, restore, enhance	7	Maintain biota projects
21	1.354	Ecological (Biota)	2.111	Recreation - terrestrial (e.g. birding and	2.111	Biodiversity for recreation - sustain and restore	Mowing	Biodiversity - maintain, restore, enhance	8	Maintain biota projects
22	1	Surface Water	1	Hydrologic function (groundwater recharge)	1	Hydrologic function (groundwater recharge) - sustain and restore	Impervious surfaces - block infiltration	Hydrologic function (groundwater recharge) - maintain, restore, enhance	10	Land protection
23	1.354	Ecological (Biota)	1.5833	Recreation - consumptive (e.g. hunting, fishing, and	1.5833	Biodiversity for consumptive recreation - sustain and restore	Demand excess	Opportunities expanded	8	Maintain biota projects
24	1.354	Ecological (Biota)	1.1875	Flora and fauna	1.1875	Biodiversity - sustain and restore	Mowing	Biodiversity - maintain, restore, enhance	10	Ecological enhancement

Figure 2-4: The Matrix

Using 'The Matrix' to Answer Questions

The examples below illustrate the power of embodying a portion of the plan in the form of a matrix instead of a document. Pivot tables were used to answer the following questions in under a minute. It is said that knowledge is having the right answer, but it takes wisdom to ask the right question. The Matrix is just a tool and is only as user as the practitioner.

Question: What activities would be most effective to address bacteria contamination in surface waters, not including monitoring, inventory, analysis, and planning?

Table 2-7: Matrix query for programs to address bacterial contamination in surface water

Program and Activity	% of Total ROI
Drinking water protection	**42.75%**
Septic system failure - guide	26.14%
Septic system compliance - inspect	11.20%
Septic system maintenance - promote	3.73%
Septic system upgrade - fund	1.68%
Shore and bank BMPs	**34.72%**
Shoreland and riparian buffer - maintain	16.80%
Shoreland and riparian buffer - cost share	5.04%
Shoreland and riparian buffer install - manage	3.92%
Shoreland and riparian buffer - design	3.36%
Shoreland and riparian buffer - promote	2.80%
Shoreland and riparian buffer - evaluate	2.80%
Buffer law implementation	**9.33%**
Buffer law violation compliance - guide	6.53%
Buffer law compliance - inspect	2.80%
Agricultural BMPs	**7.70%**
Ag. waste system - promote	7.70%
Targeted pollutant management	**5.49%**
Pet waste management - promote	2.80%
Biochar filter - fund	2.69%

Question: What resource benefits are impacted most by ditching?

Table 2-8: Matrix query to identify resource benefits impacted by ditching

Surface Water	**77.22%**
Hydrologic function (groundwater recharge)	32.97%
Flood mitigation (precipitation storage and conveyance)	20.82%
Biogeochemical function (nutrient cycling and pollutant remediation)	15.62%
Flora and fauna	7.81%
Ecological (Biota)	**20.53%**
Recreation - consumptive (e.g. hunting, fishing, and foraging)	7.15%
Biogeochemical function (nutrient cycling and pollutant remediation)	7.05%
Recreation - terrestrial (e.g. birding and hiking)	5.36%
Flora and fauna	0.97%
Groundwater	**2.12%**
Hydrologic function (suface water baseflow)	1.17%
Consumption	0.68%
Sanitation (e.g. bathing, laundry)	0.27%
Soils and Landforms	**0.13%**
Biogeochemical function (nutrient cycling and pollutant remediation)	0.09%
Flora and fauna	0.05%

Using 'The Matrix' to Compare Implementation Alternatives

One of the most powerful elements of The Matrix is the incorporation of return on investment (ROI). In the simplest terms, ROI presents how much benefit is received per unit of investment. Determining ROI requires a calculation for benefit and one for investment.

Determining Relative Effectiveness as a Surrogate for Benefit

Prioritization numbers and coefficients of effectiveness were added to The Matrix at several levels. Based on rank-choice voting, prioritized rankings were created for resources, benefits, and goals. Coefficients of effectiveness on a scale of 1 to 10 with ten being the best, were added to answer the following questions: "Relative to other objectives, how effective is an objective at reaching a goal?"; "Relative to other actions, how effective is an action at achieving an objective?"; and "Relative to other services, how effective is a service at achieving a goal?" The product of service, action and objective effectiveness coefficients is divided by the product of benefit and resource priority rank to calculate a weighted effectiveness for every permutation of every action in The Matrix.

Calculating Investment

For each action, a base unit of activity was identified (e.g. 100 ft. riverbank stabilization, 250 sq. ft. bioinfiltration basin) and an average investment was entered to list the number of hours by employee class and the direct expenses associated with that action. With hourly rates, total annual cost was calculated. The years to completion and effective life of each action were entered to determine an annual amortized investment.

Returning an ROI

Finally, the annual weighted effectiveness was divided by the annual amortized investment to provide an ROI unique to every one of the nearly 3,000 action permutations in The Matrix. Table 2-9 presents the top strategies according to the percentage of total available ROI. The vetting process eliminated 60% of the potential strategies but shows that the 40% remaining will achieve nearly 95% of the total ROI. Utilizing this tool to inform comprehensive and annual plans of work not only optimizes the allocation of limited assets, but also ensure that annual plans are fully integrated with, and stem from, the foundation provided by the comprehensive plan.

BEST LAID PLANS

This plan is our witching rod. Instead of pointing the way to hidden stores of water beneath the ground, it points us in a sound direction and sets us on our way to do the most we can with what we have. Our success or failure hinges not on how accurate our predictions are, how clever our spreadsheets are designed, or how thorough our analysis is. None of that matters if we fail to build and foster relationships. Success is about people.

Success starts with the guidance of a dedicated elected Board of Supervisors who give of themselves without thought of personal gain. Their policy is set in motion by a staff of talented and dedicated professionals who embrace a philosophy of stewardship, not only of our natural resources, but also of the public trust and funding bestowed on us. Partnerships with other local and state agencies are invaluable. So is the confidence we share with state agency staff and officials as well as state legislators. Of course the taxpayers make it all possible with funding. All of this sets the stage for success and provides the needed capacity to get the job done, but does not guarantee success.

The keystone of the process is partnership with landowners and residents willing to take action on their properties or in their lives to make a difference. If all of the political, financial, and technical assets mentioned above were limited to working on public land, we'd be confined to under 22% of the county, most of which is wetland. As an entity that doesn't wield regulatory powers, success can only be achieved through collaboration over mutually beneficial actions.

Table 2-9: ROI of top overall strategies by resource

Strategy	Ecological (Biota)	Groundwater	Soils and Landforms	Surface Water	Grand Total
Land protection	13.89%	5.37%	0.15%	7.73%	**27.13%**
Maintain biota projects	11.17%	0.04%	0.01%	0.23%	**11.46%**
Ecological enhancement	8.42%	0.25%	0.08%	0.00%	**8.75%**
Maintain surface water projects	0.50%	0.65%	0.05%	3.32%	**4.51%**
Nutrient remediation	0.88%	0.73%	0.15%	2.64%	**4.39%**
Seal unused wells	0.00%	3.64%	0.00%	0.00%	**3.64%**
Infiltration enhancement	0.00%	1.54%	0.00%	1.96%	**3.50%**
Evaluate biota projects	2.97%	0.02%	0.03%	0.34%	**3.35%**
Sediment remediation	0.00%	0.00%	0.00%	2.97%	**2.97%**
Infiltration retention	0.00%	0.27%	0.01%	2.54%	**2.81%**
Aquatic invasive plant management	1.84%	0.00%	0.00%	0.65%	**2.48%**
Ditch abandonment	0.46%	0.35%	0.07%	1.43%	**2.32%**
Inspect for surface water regulation	0.73%	0.13%	0.03%	1.19%	**2.08%**
Analyze soil and landform data	0.59%	0.19%	0.21%	0.82%	**1.82%**
Ecological restoration	1.61%	0.00%	0.02%	0.14%	**1.76%**
Evaluate surface water projects	0.16%	0.26%	0.01%	0.82%	**1.25%**
Storage retention	0.00%	0.00%	0.00%	1.25%	**1.25%**
Nutrient inputs minimized	0.23%	0.26%	0.00%	0.54%	**1.02%**
Analyze surface water data	0.14%	0.05%	0.00%	0.79%	**0.97%**
Reduce groundwater waste	0.36%	0.44%	0.00%	0.12%	**0.92%**
Sediment inputs minimized	0.00%	0.00%	0.00%	0.88%	**0.88%**
Advise on surface water regulation compliance	0.23%	0.05%	0.01%	0.54%	**0.84%**
Ditch reconfiguration	0.16%	0.00%	0.00%	0.66%	**0.82%**
Inspect surface water projects	0.11%	0.05%	0.01%	0.64%	**0.81%**
Terrestrial invasive plant management	0.70%	0.00%	0.02%	0.00%	**0.72%**
Analyze biotic data	0.57%	0.00%	0.01%	0.09%	**0.67%**
Aquatic invasive animal management	0.42%	0.00%	0.00%	0.25%	**0.67%**
Strategize biota management	0.43%	0.00%	0.00%	0.04%	**0.48%**
Analyze groundwater data	0.00%	0.37%	0.00%	0.00%	**0.37%**
Reduce new impervious surfaces	0.05%	0.13%	0.01%	0.17%	**0.37%**
Vetted Total	**46.62%**	**14.79%**	**0.88%**	**32.75%**	**95.01%**

Implementation Progress toward the Last Plan

A survey of ACD supervisors and staff on the progress made toward the goals of the prior plan returned the following.

Table 2-10: Progress toward goals survey results

Resource Priority	Goal	No, or minimal, progress		Made Progress		Completed		Uncertain		If insufficient progress was made, why? ($, time, expertise, public support, authority)
		Sup	Staff	Sup	Staff	Sup	Staff	Sup	Staff	
Water Quality	Maintain high quality surface waters			4	6	1			2	
	Improve impaired surface waters			2	7	2			1	
	Protect drinking water	1	5	2	1				2	$(3), Expertise(3), Authority(4), Regional Issue
Water Quantity	Stop long-term aquifer depletion and where possible replenish aquifer levels	3	4	2	1				2	$(2), Expertise(3), Authority(4), No Defined Effort
	Control stormwater runoff and the resultant erosion			4	8	1				
	Reduce localized flooding and related damage		4	4	2	1			2	$(2), Authority(3), Scale too large
Natural Habitats	Preserve and enhance ecological diversity in Anoka County	2		1	7	1		1		$, Time, Development Pressure
	Maintain ecological corridors and systems to support indigenous wildlife	2	1	1	6	1		1	1	$, Time, Development Pressure
Wetlands	Achieve no net loss in, and where possible improve, the quality and quantity of wetlands	1	1	1	5	2	1	1	1	$, Time, Development Pressure
Soils	Maintain and enhance soil health	4	6	1					2	$(2), Priority(3), Limited Ag (3), Expertise(2), Opportunity, Time, Not Engaged

ACD's 2015-2019 Comprehensive Plan included a top projects list. Below is the status of those projects as of the end of 2020. Many projects were completed that were not on the list but that emerged as cost-effective opportunities during the course of implementing the plan. Some of the projects were implemented by partners.

Table 2-11: Top projects implementation status

Project	Description	% Complete
Ditch 20 Wetland Restoration Feasibility	Determine the feasibility of implementing a wetland hydrologic restoration project to improve water quality downstream	100
Lake George Diagnostic	Complete a lakeshed diagnostic study to determine the cause of recent downward trends in water quality	100
Rum River Bank Stability Inventory	Inventory riverbank stability along the Rum River to identify potential erosion remediation projects	100
Anoka Lakes In-Lake Treatment Feasibility	Prepare feasibility analyses for the cost-effectiveness of treating lakes throughout Anoka County with Alum or other in-lake treatment method	0
Mississippi River Bank Stabilization	Provide cost share funding to stabilize active erosion of Mississippi River banks	25
Rum River Bank Stabilization	Provide cost share funding to stabilize active erosion of Rum River banks	25
Ditch 20 Wetland Restoration	Restore hydrology to a large wetland complex upstream of Typo Lake or install other BMPs to reduce dissolved phosphorus loads to the Typo-Martin chain of lakes and the St. Croix River	Infeasible
Linwood Lakeshore Restoration	Provide cost share funding to stabilize active erosion of Linwood Lake shoreland	20
Rum River WRAP Retrofits	Install projects identified in the Rum River WRAPS	10
Groundwater Conservation Initiative	Develop groundwater conservation education, outreach and cost share initiative	50
Rice Lake Retrofits	Install RL-6 rain gardens and Centennial High School retrofits	0
Sand Creek Retrofits	Install SC-4 rain gardens	100
Woodcrest Retrofits	Install WC-4 and WC-7 rain gardens	100
Lower Coon Creek Retrofits	Install LCC-25 & LCC-12 ponds, LCC-13 rain gardens and infiltration area	0
Golden Lake Retrofits	Install GL-4 rain gardens and pond	0
Oak Glen Creek Retrofits	Install OGC-3 rain gardens	0
Moore Lake Retrofits	Install rain gardens	0
Springbrook Retrofits	Install IESF benches and rain gardens downstream of nature center	100
Stonybrook Retrofits	Install large infiltration basins, rain garden network, ST-4 pond	0
Pleasure Creek Retrofits	Install IESF benches and rain gardens downstream of RR tracks	100
Lake George Retrofits	Install water quality improvement BMPs identified as priorities in Lake George SRA	25
Lake George Outlet	Repair or replace the weir that maintains water levels in Lake George	100

ACD's projects and activities are available in several formats. Projects and analyses can be located on ACD's project map where all projects completed and underway are featured.

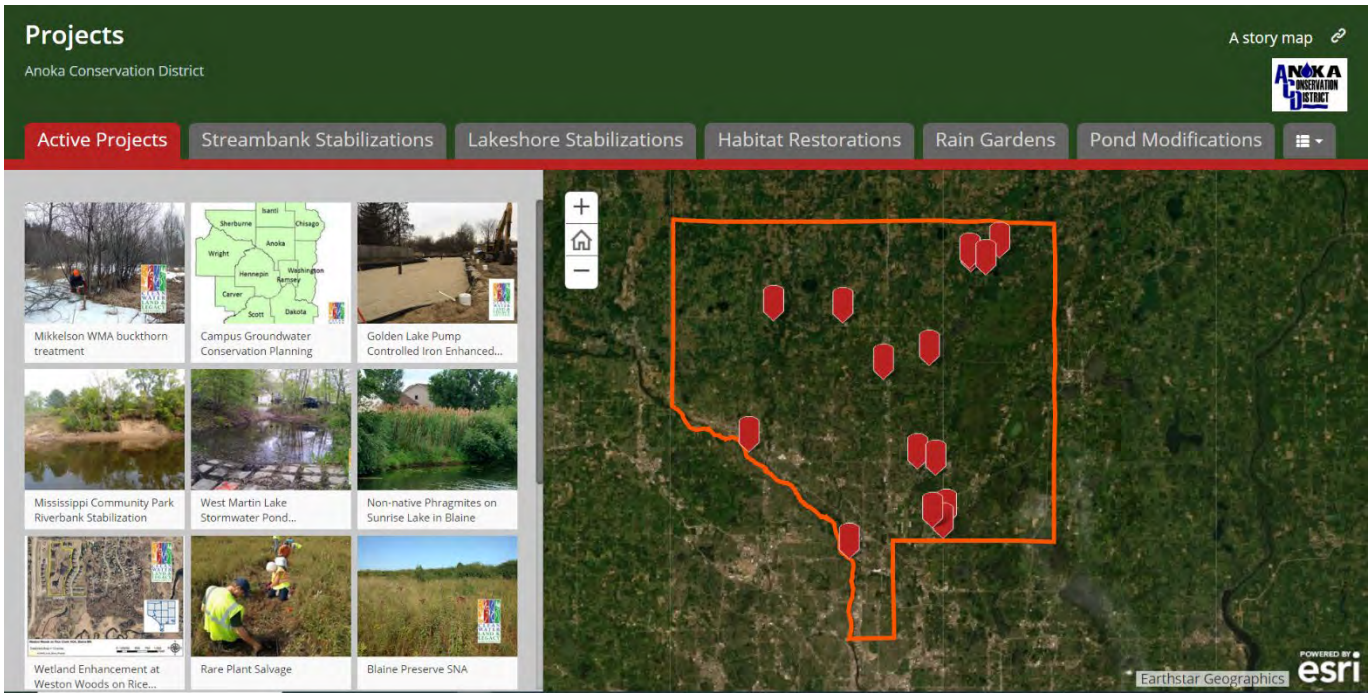


Figure 2-5: Online project access interface

For a more comprehensive look at the progress made in any given year, ACD's annual reports are a good source of information. Annual reports are available specifically for ACD's outreach efforts as well as our water resource monitoring, analysis and stewardship.

Effectiveness of Past Efforts

When engaging in a planning process, it is valuable to reflect upon the activities and approaches that proved successful and unsuccessful over the last planning and implementation period. Following is a listing developed from a joint workshop of staff and supervisors along with input from the TAC and elected officials.

Successes

- Focus on customer service
- Model project benefits
- ID BMPS using subwatershed analysis
- Target BMP promotion
- Design BMPs in-house
- Consider cost-benefit for all projects
- Focus on project installation and serving as a project manager
- Make multi-partner grants happen
- Lead regional grant funded projects through Metro Conservation Districts
- Coordinate large scale projects
- Work across boundaries
- Create high quality work products
- Create a highly productive work place
- Advance the practice of conservation
- Commit to long-term project success
- Adapt to changing needs and opportunities
- Maintain highly trained staff
- Promote national Rain Guardian sales to fund local conservation efforts
- Purchase office headquarters and assume role as landlord
- Enhance work products and efficiency with new technologies
- Affect state policy and procedures through advocacy
- Develop and implement comprehensive outreach and engagement strategy
- Empower and motivate other SWCDs
- Engage stakeholders monthly

Improvements Needed

- Soil health program
- Rewild lawns program
- Sustainably grown foods
- Groundwater recharge
- Cross-training in-house and with other SWCDs
- Evaluate BMP effectiveness
- Long-term maintenance funding
- Open space planning and protection
- Stable, sufficient funding through county or via statutory funding authority
- Engage northern cities to improve development standards and processes

Assets for Implementation

Effective planning works to ensure critical assets for implementation success are in place. The following table identifies those assets, which, if absent, become an obstacle to successful implementation. Financial, technical, and staff capacity are the most commonly considered assets. Equally important to long-term success are support, awareness, and jurisdiction. Lack of literacy about complex natural resource stewardship topics, not only on the part of the public, but also on the part community leaders and public officials, is often cited as one of the most challenging obstacles to successful implementation. Ultimately, finite assets must be judiciously allocated to implementation activities in a way that optimizes outcomes.

Table 2-12: Implementation assets

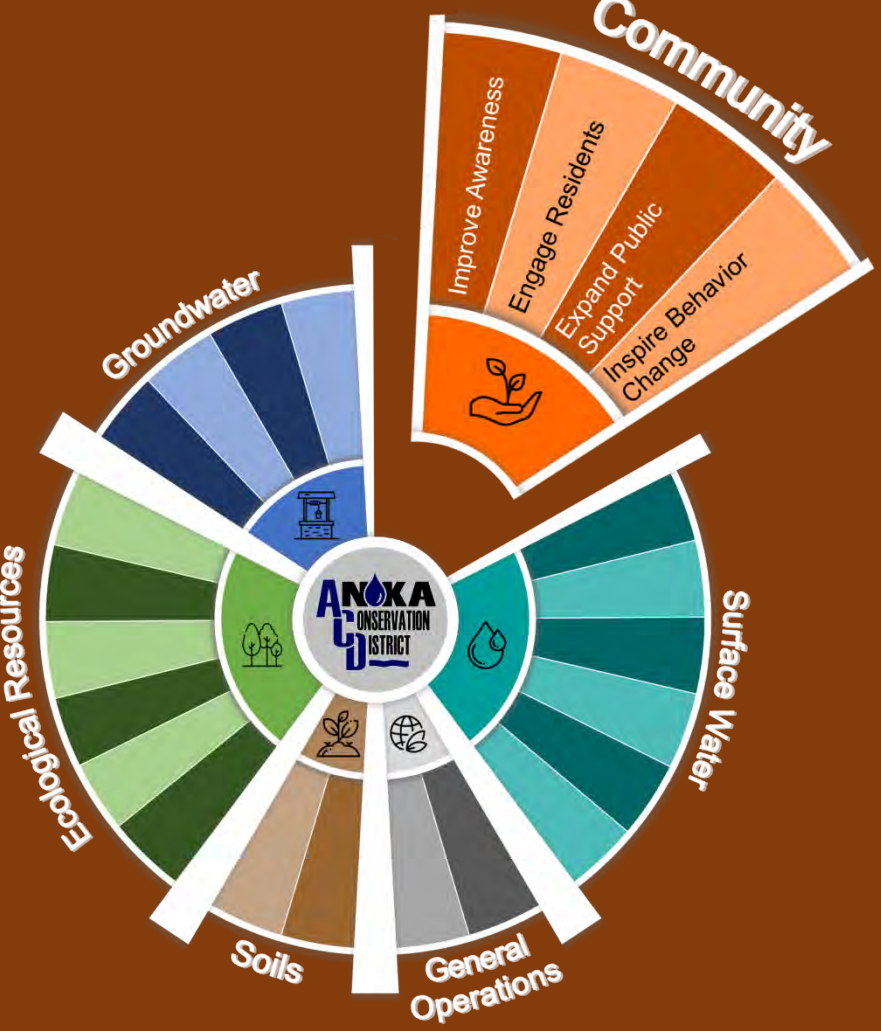
Category	Asset	Methods to secure asset
Support	Political support	Outreach and engagement, environmental valuation
	Agency support	Partnerships and collaboration
	Public support	Outreach and engagement, environmental valuation
	Trust	Transparency, accountability, competence, personal relationships, accessibility, motivations, customer service, reliability, innovative, visibility
Capacity	Financial	Levy authority, grants, Rain Guardian sales, contracts for services, County allocation
	Expertise	$, training, recruitment, competitive compensation, office culture
	Equipment/Technology	$, equipment sharing with other entities,
	Staff Time	$, seasonal staff, volunteers, public engagement,
Awareness (information and understanding)	Science – what, where, how to be effective?	$, monitor, inventory, analysis
	Public literacy	Outreach and engagement, environmental valuation
	Community leader literacy	Outreach and engagement, environmental valuation
	Elected and appointed official literacy	Outreach and engagement, environmental valuation
	Planning	$, comprehensive, strategic, annual, and natural resource stewardship plans
Jurisdiction	Land use authority	Collaboration/partnering
	Laws/Regulations/Ordinances/Standards	Collaboration/partnering, legislative adjustment (e.g. plumbing code and ditch law)
	Geography/Scale	Collaboration/partnering

Chapter 3

Our Community.

The Anoka Conservation District will take measureable steps to involve and engage the residents of Anoka County to be stewards of our natural resources now and in the future.

Our 2021-2030 Keystone Community Endeavors Are:



Chapter 3 Contents

OUR COMMUNITY INTRODUCTION

The community of people who live, work, and recreate in Anoka County is a resource we must engage just as we work to be good stewards of our soil, water, and ecological communities. Through outreach and engagement with the public, we can minimize current issues, prevent further harm from occurring, and remediate problems that have already been created. Harnessing the power of community to further our goals of natural resource stewardship outlined in this plan is critical to the continued success of ACD's programs and initiatives.

OVERARCHING COMMUNITY ENGAGEMENT GOALS

Outreach and community engagement efforts are key to all priorities within this plan and are often the first step to ensure our projects are successful. Community outreach is the primary vehicle for sharing our mission, values, and conservation goals with the residents of Anoka County. Without sustained outreach and engagement efforts, we risk operating in a vacuum without the input or support of our communities. This would be an uphill battle. In contrast, by engaging our communities early and often, we will be better equipped to effectively manage our natural resources. In addition, we will recruit a bigger and more powerful constituency of environmental advocates, a larger number and availability of participants in programs, a more diverse range of partners in installing new projects, and greater organizational trust from the community. Through outreach, we build a community of like-minded and engaged individuals that will advocate for and support our work.

Promotion and outreach efforts are often a prerequisite for the programs designed to achieve goals outlined in the following resource sections. Through outreach and engagement work, all resource goals are benefited (Figure 3-1).

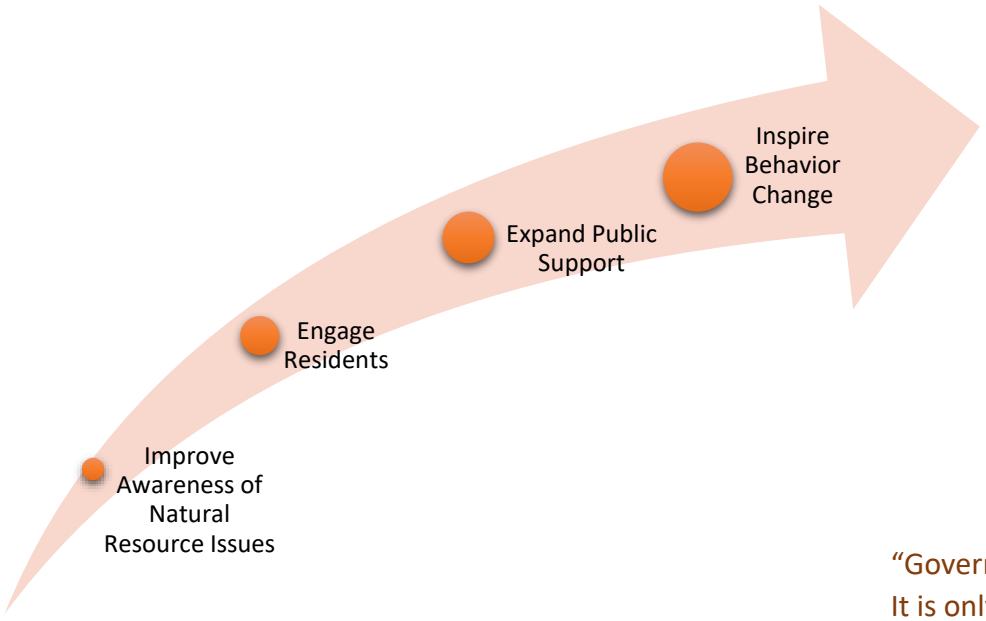


Figure 3-1: Goals of outreach and engagement

"Government is only an idea. It is only individual people who can make a difference."

ACD Supervisor Mary Jo Truchon

Desired Future Condition

In the future, we envision a county where our communities are aware of, interested in, and take actions to protect and improve the vital natural resources in our area. Through outreach, engagement, and equitable distribution of ACD's work throughout the county, we hope to build a community of like-minded and engaged stewards of the environment no matter whether they live, work, or recreate in Anoka County. We desire to instill conservation values in the future generations so the work of environmental organizations is recognized as essential and is thus supported through environmentally-minded policies that enable conservation work to continue.

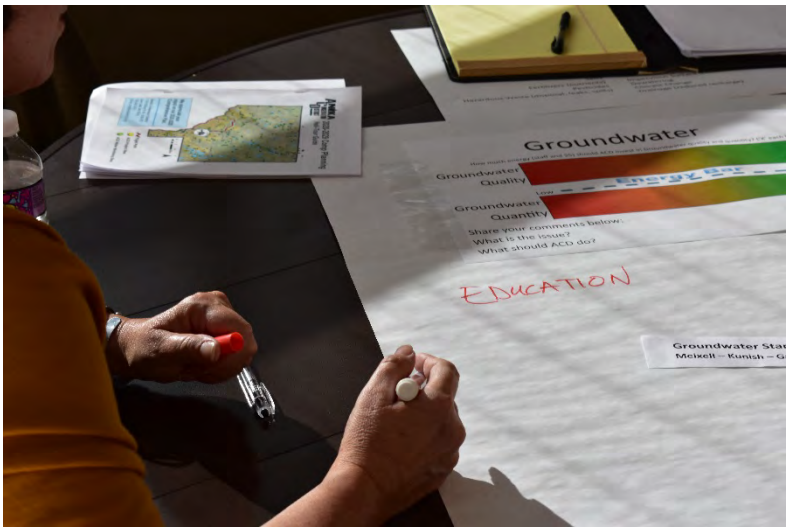


Figure 3-2: Education highlighted at comprehensive planning kick-off event in 2018

COMMUNITY INVENTORY AND CONDITION

Community Engagement Overview

Outreach and engagement efforts within our communities are essential. The potential cumulative impact of using effective outreach to empower 350,000 Anoka County residents to create positive environmental change is enormous. While we may not be able to easily quantify the benefits of our outreach efforts in the short term, we can take comfort in knowing that future generations will enjoy the fruits of our efforts and become leaders in conservation. For many of the programs and projects within this plan to succeed, they must be built on a foundation of outreach and public engagement. Below are some of the major benefits of outreach and engagement work.

Effective outreach and engagement serves to foster among the residents of Anoka County an appreciation for and a sense of stewardship toward the natural resources of Anoka County.

Public Involvement and Understanding

Our community members are often huge assets and supporters of our work. However, it's understandable that as we all go about our lives, the small periodic missteps of hundreds of thousands of people can accumulate into large natural resources problems. While we can engineer our way out of most problems, those same problems are likely to recur without the support of our constituency. Recruiting our community members to be advocates and environmental stewards through increased understanding of the issues we are working to combat and increased ability to make environmentally conscious behavior changes will improve our environment and quality of life.

Support for Large-Scale Projects and Programs

Outreach can drive broad-based public support for large-scale projects and programs, which is critical to be successful. Creating community trust from the outset is a way to navigate around barriers and build an active and engaged public. In addition, by engaging local elected and appointed officials and community leaders in our projects

and programs from the beginning, we will create advocates and political support that will lead to additional benefits in the future.

Landowner Buy-In

Building relationships with landowners results in a greater number of potential project partners with whom to install conservation practices. With much of our work being installed on private property, landowner support is critical. Highlighting the mutual benefits of our work is a good way to build support and buy-in. When a landowner can relate the benefits of the conservation practice to their own values, they are more likely to maintain the project for the long-term and recommend ACD as a project partner to others.

Widespread Conservation Ethic

The benefits of outreach and engagement manifest in ways that are difficult to quantify. The results we see are long-term, which is why the benefits of outreach can be hard to measure. At its core, all outreach work is done in an effort to create a widespread conservation mindset so that when the youth of today become landowners themselves, they are eager to work with future SWCD staff and supervisors, who will thank us for the investment we put into outreach today. In this way, we keep the momentum of our work going and plan for the future.

Outreach and engagement work is often less costly than other natural resource stewardship efforts and the measurable impact can be more ambiguous while still producing widespread and long-lasting benefits. For relatively minimal effort, staff time, and financial resources, community outreach can produce the foundation of environmentally interested and engaged residents who will go on to be lifelong stewards of the conservation practices we work to implement. Seeing these benefits over a short time scale is sometimes unrealistic. We will, however, begin to see the value of outreach in the ease or difficulty of pursuing our other goals and projects. By staying relevant and actively engaging with our communities, we are constantly recruiting lifelong stewards of our land and water. These efforts are never "one and done." Rather, they are constant, repeated, and integral to our work in natural resource stewardship. Our work to engage with the public is a constant push toward innovation in natural resource stewardship, and this is why investment in outreach and engagement efforts today matters for future generations.

Anoka County Demographics

Understanding the landscape of human communities in which we work is critical to accomplishing the goals laid out in this plan. Anoka County's natural resource base supports a rapidly growing population of over 350,000 people in an area of 273,450 acres. The southern panhandle of the county is densely or moderately urbanized with homes and places to work. Suburban homes with larger lots are expanding north in the county as development pressures increase. The remaining portion of the county supports scattered agriculture and open space, including extensive county and

DIVERSITY IN CONSERVATION

To ensure diversity, equity, and inclusion are authentically integrated into the work of the Anoka Conservation District, all staff and supervisors will take ownership of and be active participants in the process. The work will be ongoing and iterative. Throughout, ACD will seek feedback from our diverse communities and encourage and enable input so we can better serve our constituents.

In our future work in this realm, we will focus on these principles:

1. Be Purposeful
2. Be Authentic
3. Be Impactful
4. Share Responsibility

For more information, see section titled "Diversity, Equity, and Inclusion in Conservation Work."

city park systems and vast areas of state wildlife management areas. Natural resources are close to home for Anoka County residents.

Anoka County is the 4th most populous county in Minnesota. The MN State Demographic Center provides updated data on population, age diversity, ethnicity and race diversity, cultural diversity, non-English languages spoken, internet access, land ownership, and many more demographic parameters for every city and county in Minnesota (Minnesota State Demographic Center, 2020). Prior to launching an outreach and engagement campaign, it is important to understand the context of the diverse audiences with whom we work so that our programs and projects can be as effective as possible. Often, our "go-to" methods of engaging the public work well for certain demographics, while leaving the needs of others unmet. We can work to engage a greater diversity of cultures and audiences in Anoka County by diversifying our outreach tools and being innovative in how we reimagine our engagement methods. Modifying our outreach strategies and tools to target specific audience segments is an important first step when designing an outreach and engagement program. For further discussion on audience prioritization and targeting, see section titled "Audience Targeting."

Maps and Graphs

Anoka County's non-white population is projected to grow more rapidly than Anoka County's white population (Figure 3-3). This means that our county is becoming increasingly diverse, both racially and ethnically, and culturally and economically. The MN State Demographic Center predicts that the non-white population in Anoka County will increase from 17.5% in 2020 to nearly 23% in 2035 with the most significant demographic change happening in the cities of Fridley, Hilltop, Columbia Heights, and Spring Lake Park (Minnesota State Demographic Center, 2020). In addition, across all ethnic and racial groups except for American Indian, the percent population change in Anoka County is equal to or greater than the percent population change in Minnesota as a whole (Figure 3-4). It is important to note that tracking percent change in racial diversity is only one way to observe the changing demographics of Anoka County. Cultural diversity, country of origin, language spoken, and many other factors are also important to consider when designing and implementing outreach and engagement campaigns that will be relevant to various audiences.

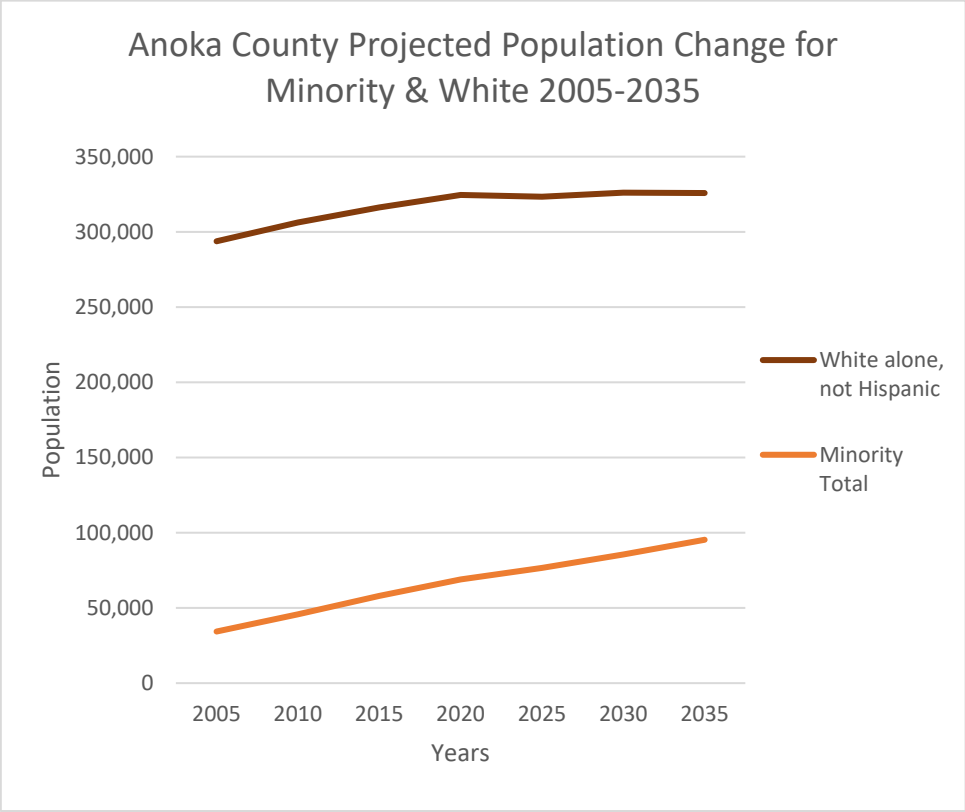
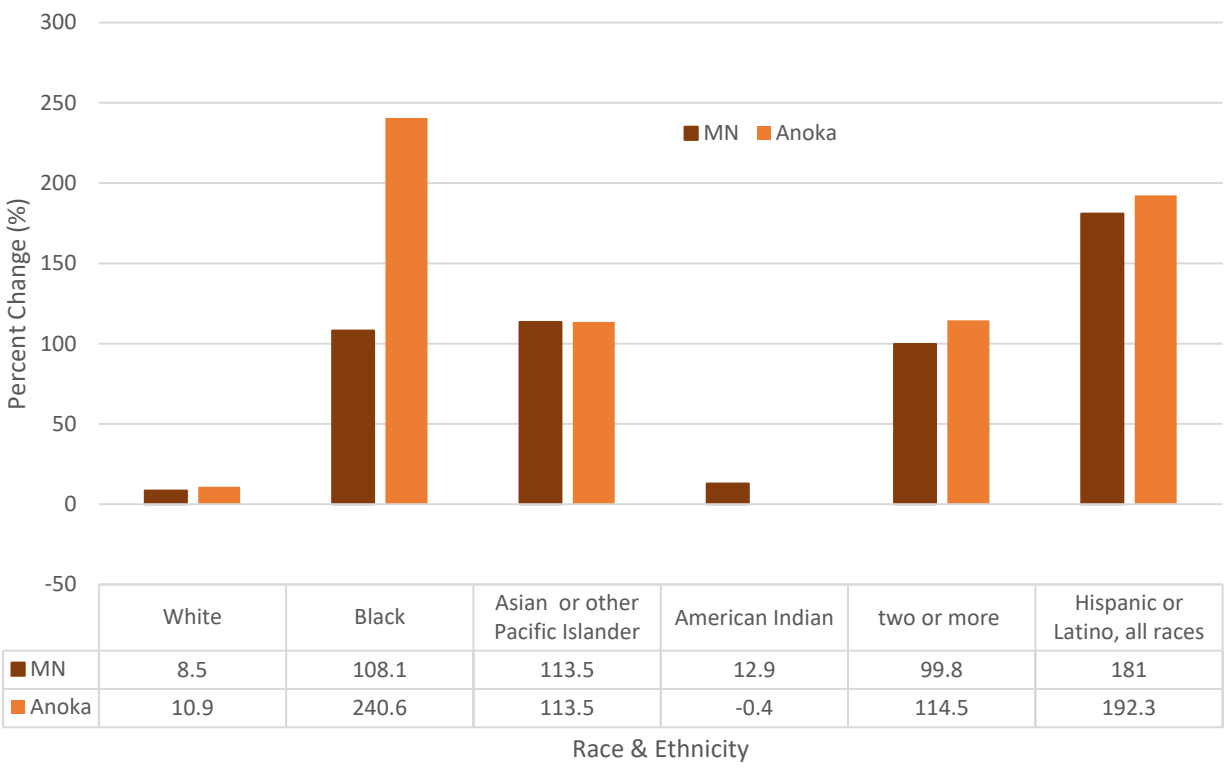


Figure 3-3: Anoka County projected population change for minority & white 2005-2035 (Minnesota State Demographic Center, 2020)

"If you want to go quickly, go alone. If you want to go far, go together."

African Proverb



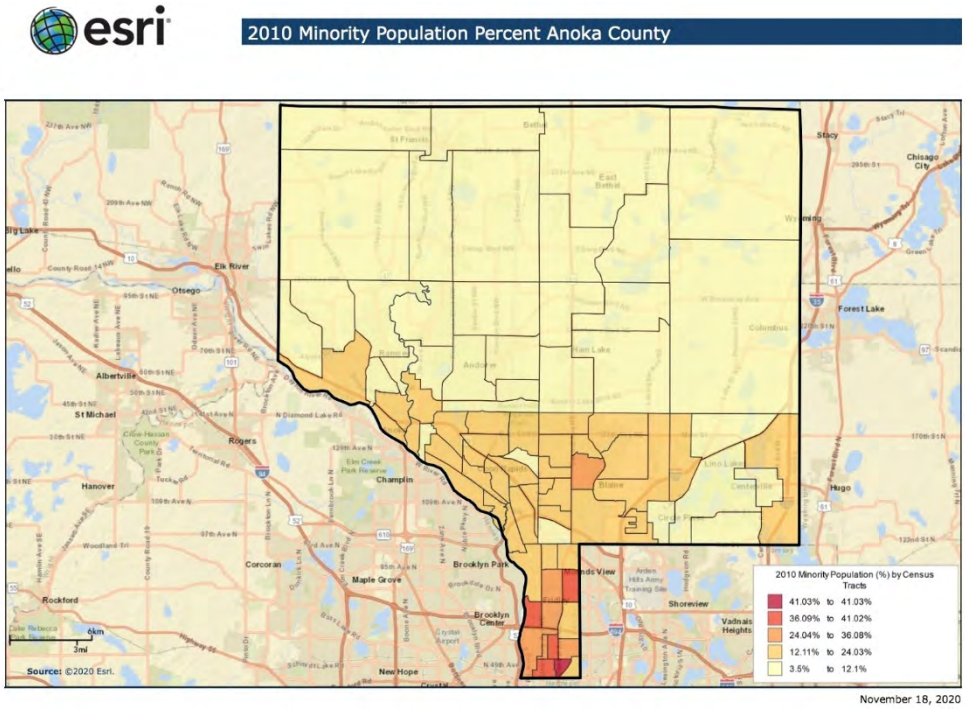
	White	Black	Asian or other Pacific Islander	American Indian	two or more	Hispanic or Latino, all races
MN	8.5	108.1	113.5	12.9	99.8	181
Anoka	10.9	240.6	113.5	-0.4	114.5	192.3

Figure 3-4: Projected percent population change 2005-2035 (Minnesota State Demographic Center, 2020)

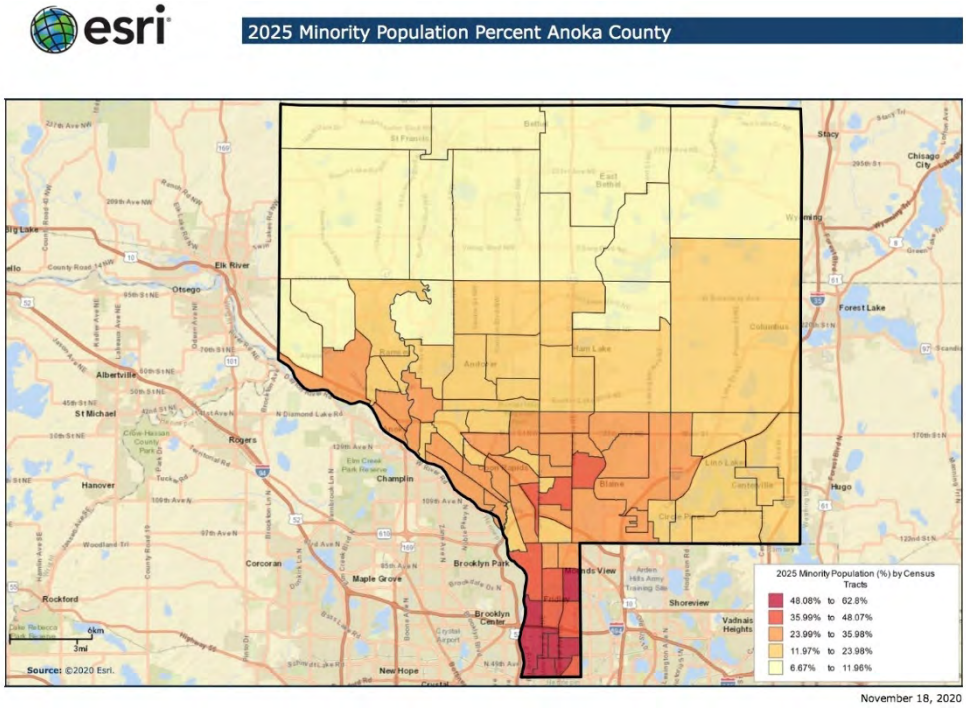
TRACKING PERCENT CHANGE IN RACIAL DIVERSITY IS ONLY ONE WAY TO OBSERVE THE CHANGING DEMOGRAPHICS OF ANOKA COUNTY. CULTURAL DIVERSITY, COUNTRY OF ORIGIN, LANGUAGE SPOKEN, AND MANY OTHER FACTORS ARE ALSO IMPORTANT TO CONSIDER WHEN DESIGNING AND IMPLEMENTING OUTREACH AND ENGAGEMENT CAMPAIGNS THAT WILL BE RELEVANT TO VARIOUS AUDIENCES.

The following maps depict minority population percent in Anoka County in 2010 (Map 3-1) versus projected minority population in 2025 (Map 3-2). From these maps, it is clear that Anoka County will continue to become more diverse in the future, and diverse communities will continue to spread into traditionally more suburban and rural parts of the county.

Map 3-1: 2010 minority population percent in Anoka County



Map 3-2: 2025 projected minority population percent in Anoka County



Nature and Extent of High Priority Problems

Through outreach and engagement, we can minimize current issues, prevent further harm from occurring, and remediate problems that have already been created. Our community is a powerful force when directed to positive environmental action.

Natural resource problems are presented in the following chapters. This section focuses on challenges specifically associated with public outreach and engagement.

Natural Resource Issues are Complex and Interconnected

Communicating about environmental and natural resource issues is complicated because many of the concepts are complex and not intuitively logical to someone without specific training on the topic. In addition, natural resources are all interrelated, though we have the tendency to separate them in our minds and when communicating to the public. This creates confusion and is not effective in filling knowledge gaps.

In outreach and engagement work, we need to focus on communicating the issues clearly and in terminology understandable by the audience we are addressing. We should carefully craft our messaging to highlight the interconnectedness of our natural resources and bridge any knowledge gaps. We can do this by explaining the chain of events that leads from the action to the outcome, using metaphors and stories, and framing the issue in a way that will resonate with the audience so they become invested.

Limited Time and Resources

Outreach and engagement work is only one of many important aspects of natural resource management. There is limited staff time and limited resources that need to be considered when conducting outreach and engagement campaigns. There are 350,000 people in Anoka County. One full time employee can offer just under 21.5 seconds per person in a year, assuming the employee foregoes all paid time off. It is not reasonable to assume our outreach efforts will reach every person in the county and impact them in a meaningful way. Prioritization of our messaging and effective audience targeting is critical to ensure that the limited time and resources dedicated to outreach and engagement work are well spent and create the most net good. In addition, the pace of change including in land use, property values, development pressure, and demographics all complicate outreach targeting and materials. Prioritizing outreach methods and tools that are broadly accessible and can withstand the test of time will help alleviate some of these challenges.

Lack of Individual Investment

Care for the environment and personal investment in natural resources is not necessarily the top priority of a majority of residents. Understandably, other personal and social issues will take precedence over natural resource management for a large number of our constituents. This fact is not something we seek to change, but simply something to be aware of as we do outreach and engagement work with our communities. Communicating natural resource problems with a focus on how the solutions align with the values of our audiences is a way to create personal investment in the issue.

In this same vein, we must realize that it is almost always impossible to track a problem back to its source. This results in little risk of personal loss due to being environmentally careless. Problems created upstream are often shouldered by people downstream or future generations. In outreach, we must create that link from how our poor choices today will impact ourselves and our communities in the future. Tying these cause and effect narratives to the values of our audience rather than our own values is critical for success. In addition, we must consider the differences in how different cultures and demographics of people interact with and care for the environment. Concepts and practices like hunting and fishing seasons and limits, recycling, stormwater treatment, lawn irrigation, and street sweeping, to name a few, can be unfamiliar to some audiences. These

differences of personal investment are not issues for us to solve, merely facts to consider as we frame our messaging and engage our audiences in ways that will resonate with their values.

Emerging Issues

Amid all of these factors, there are several emerging issues in the realm of outreach and engagement that deserve special consideration.

Diversity, Equity, and Inclusion in Conservation Work

Diversity, equity, and inclusion are crucial foundations to any organization and especially conservation or environmental organizations working directly within communities. In order to best represent and serve the community of Anoka County, the Anoka Conservation District should prioritize diversity, equity, and inclusion (DEI) both in internal ACD operations as well as in external events and engagement with the public.

To further ACD's goal to prioritize diversity, equity, and inclusion in conservation work, we will develop a Diversity, Equity, and Inclusion Plan including specific action steps for ACD to take in the immediate and long term future. In addition to developing a DEI Plan for internal and external ACD operations and interactions with the public, we will also:

- Search for corporate funding to cover match requirements so financially strained residents of Anoka County may benefit from ACD's programs;
- Reach out to previously unserved and underserved communities in Anoka County to learn how we might collaborate with them to achieve conservation objectives through programs that are aligned with their cultural and personal values and priorities. By making the time to listen and learn, we can build programs that are valued by underserved communities and beneficial for the environment; and
- Seek out grants and programs that align with ACD's natural resource goals that are designed to build bridges with previously unserved and underserved communities.

Creating Environmentally Beneficial Social Norms

Much of the current focus in outreach and engagement work is on increasing public awareness. Knowing what to do, how to do it and why to do it, doesn't necessarily translate into actually doing it. Outreach and engagement work should prioritize behavior change campaigns that examine the barriers and benefits of environmentally-conscious actions and advocate their adoption using proven behavior change methodology such as the Community Based Social Marketing framework (McKenzie-Mohr, 2011) and others as outlined in "Influencing Conservation Action: What Research Says About Environmental Literacy, Behavior, and Conservation Results" (National Audubon Society, 2013). This work will require a high degree of feedback to understand community needs, barriers, and values so that

CREATING A SOCIAL MOVEMENT

Creating widespread behavior change for the benefit of natural resources is an ongoing effort. One environmentally focused social movement that is picking up steam in the seven-county metro area is the Adopt-a-Drain program. With over 7,500 drain adopters as of January 2021, the social movement is growing rapidly in large part due to the effective behavior change messaging and easily visible collective impact shared by volunteers on social media and on the www.Adopt-a-Drain.org website.

The program is effective in changing behavior because it utilizes several of the strategies outlined in Table 3-1 including:

- Targeting a straightforward behavior
- Utilizing personal commitments
- Providing clear procedural information on the action
- Advertising strong social norms
- Using effective peer influence
- Offering incentives
- Providing feedback on results and number of participants
- Profiling success stories that resonate with people's values

engagement work is as effective in changing behavior as possible. Regular community surveys and focus groups should be conducted to keep up with the county's changing demographics and environmental knowledge and behaviors.

COMMUNITY ENGAGEMENT STRATEGIES

IMPROVE AWARENESS AND INFORMATION ACCESS

Often, the first and easiest tool in our outreach tool belt is providing information to the public in a way that improves awareness and knowledge of natural resource issues. Before we take action or make a positive behavior change for the benefit of natural resources, we need to be aware of the issues.

The key to information sharing is to go where our audience is and ensure the message is being shared with the community in a variety of ways. Doing so will increase the likelihood of our information reaching its target. This also increases the likelihood that our target audience will be motivated to act based on multiple encounters with the information we provide.

Some examples of information sharing include: brochures, displays, booths at community events, presentations, articles in blogs or newsletters, websites, social media, and other online tools such as StoryMaps. Utilizing a suite of these methods will be more effective than using only a few.

TRANSPARENCY BUILDS TRUST

Through all outreach efforts, we increase our transparency as an organization and build trust as a knowledgeable authority in the community, while at the same time increasing awareness and sharing information with the public. We are trusted to share appropriate conservation-minded knowledge and actions with our constituents that leads to positive behavior changes.

Political and public support along with public trust are assets to our work. We are able to build these assets through targeted outreach campaigns. Neglected, they can quickly turn into barriers to our work. Boosting awareness of conservation issues through outreach and engagement improves the environmental literacy of the public and elected leaders, and leads to the continued success of our programs and projects.

See section titled "Community Outreach and Engagement Accomplishments" for a detailed summary of all past and present engagement efforts.

INSPIRE ACTION AND BEHAVIOR CHANGE

Beyond increased awareness and knowledge, outreach and engagement work drives pro-environmental behavior change so that we can rest assured that residents are acting in our mutual interests rather than unwittingly working at cross-purposes. We can always accomplish more when we work together. Having a base of over 350,000 interested and engaged residents working for the benefit of our shared natural resources will make all other goals contained in this plan easier to achieve.

We can recruit the population to adopt conservation-minded behaviors by moving people from simple awareness to action. There are numerous models of behavior change and each has its own merits and downfalls. For a summary of the work that has been done on influencing conservation action, see "Influencing Conservation Action: What Research Says About Environmental Literacy, Behavior, and Conservation Results" (National Audubon Society, 2013).

From Martha Monroe's 2003 article "Two Avenues for Encouraging Conservation Behaviors," the following list of strategies (Table 3-1) describe how to move people toward specific conservation behaviors (Monroe, 2003).

Table 3-1: Strategies for driving adoption of specific conservation behaviors (Monroe, 2003).

Strategies for Driving Adoption of Specific Conservation Behaviors
Identify the behavior and the target audience
Understand the barriers and benefits that resonate with that audience
Ask people to make a commitment to undertake the behavior
Reduce the barriers to the behavior
Provide vivid, meaningful procedural information about the action
Remind people of the ways the action conforms to their view of themselves
Advertise appropriate social norms that complement the behavior
Ask people to practice the behavior with the safety and support of a peer group
Show people how easy the behavior is and what the consequences of their actions will be
Offer small incentives to encourage people to start the behavior
Remind people how satisfying they find participating in the behavior
Provide feedback on the progress being made based on the number of people conducting the action
Profile success stories and opinion leaders who have adopted the behavior

METHODS OF OUTREACH AND ENGAGEMENT

ACD's community engagement efforts generally fall into three categories based on whether the purpose is to impart knowledge, build community, or prompt action. It is important to note that these activity types are not mutually exclusive and one often leads to or assists another. Below is a brief overview of the types of outreach efforts that would fall into each of the three categories.

Information – Producing a physical or digital resource with the goal of increasing knowledge or awareness of a topic. Informational resources may include displays, brochures, websites, or videos and are designed to be long-lasting and easy to disseminate. Results can be reported as number of new resources created.

Outreach – Attending or hosting informational events or presentations where face-to-face contact is achieved, but follow-up to determine if a behavior change was initiated is not feasible. Examples include tabling at events, hosting workshops/trainings, and giving presentations/tours. Results can be reported as number of events attended or hosted and number of people contacted at each event.

Engagement – Creating opportunities for the public to take action or change their behavior for the benefit of natural resource health. Engagement efforts create tangible, on-the-ground benefits to natural resources and promote community action and environmental stewardship. Examples include participating in community clean-up events, adopting a storm drain, installing a rain garden, stabilizing a riverbank, and creating a personal conservation plan. Results can be reported as number of people taking action or changing their behavior and, when possible, measurable impacts to natural resources.

Community Outreach and Engagement Accomplishments

The Anoka Conservation District utilizes a variety of outreach and engagement tools to achieve our goals. An outline is included below.

Ensuring our outreach and communication materials are representative of the diverse cultural and ethnic communities we serve is a critical first step to building trust and developing diverse partnerships.

Website

ACD manages several websites including one about the ACD (www.AnokaSWCD.org), one that serves as an informational and marketing tool for the ACD patented Rain Guardian pretreatment chamber (www.RainGuardian.biz), one for the Lower Rum River WMO (www.LRRWMO.org), one for the Upper Rum River WMO (www.URRWMO.org), and one for the Sunrise River WMO (www.SRWMO.org). Website design and maintenance is all completed in-house by ACD staff. The sites include current events, policies, reports, board actions, financials, and information on technical, financial, and educational assistance programs and services.

Project Story Map

An ArcGIS Project Story Map interface is housed on the ACD website (www.AnokaSWCD.org), which features ongoing and completed projects, inventories, and analyses.

Project Profile Sheets

For each project installation that ACD is an active partner in, we prepare a project profile. Project profiles include images of the project site before and after installation, benefits received, expenses incurred, and partners with corresponding cash and in-kind contributions to the project. All project profiles are available online and linked to their corresponding project in the Project Story Map.

Blog and e-Newsletter

In 2019, ACD launched a weblog and quarterly electronic newsletter as new outreach tools to engage with the public. Past blog articles (www.anokaswcd.org/blog) and issues of our e-Newsletter (www.anokaswcd.org/educational/enewsletter-archives) can be found on our website.

Monthly ACD Snapshots

Every month, ACD produces a Snapshot document highlighting recent project highlights and other organizational updates. This document is sent to local elected officials to keep them abreast of ACD activities.

ACD Annual Report

Yearly, ACD produces an Annual Report showcasing major projects of the past year. All previous Annual Reports are available on ACD's website: www.anokaswcd.org/about-us/administrative-reports

Videos

ACD staff have developed videos on a variety of topics, all of which can be found on www.AnokaSWCD.org and on our YouTube page. ACD also collaborated with several partners to co-produce a series of animated videos on conservation topics including groundwater and lakeshore stewardship. www.youtube.com/user/AnokaSWCD/videos

Figure 3-5: Ramsey Elementary School 4th grade class views "Our Groundwater Connection"

Social Media

ACD manages a Facebook page for regular communication with the public (www.facebook.com/AnokaConservationDistrict). ACD staff manage the page and monitor interactions regularly.

Online Conservation Resource Library

ACD staff curate an online library of conservation resources including flyers, brochures, videos, and guides available for download by anyone with access to the internet: www.anokaswcd.org/index.php/educational/conservation-resource-library

Newspaper and Newsletter Articles

ACD frequently submits articles to the local newspapers to promote programs and services and to educate the public on topics related the natural resource stewardship.

Media Communications

When asked, ACD staff participate in media interviews for local television and city cable channels or online content. These opportunities are used to promote ACD's programs and services as well as to engage with the public and inform residents of ACD as a local resource.

Brochures and Tabletop Displays

ACD developed a series of brochures and tabletop displays covering many natural resources topics that are all available for use by our partners (Table 3-2). The displays are used throughout the year at many events attended or hosted by ACD staff. The brochures and displays are regularly used by partner organizations as well.

Table 3-2: ACD tabletop displays and brochures

Topic	Brochure	Display
Lakeshore Restoration: Enhancing water quality and habitat on your shore	x	x
Riverbank Stabilization: Understanding water flow and managing erosion	x	x
Backyard Habitat: Attracting wildlife to your property	x	x
Water-Smart: Conserving water at home	x	x
Rain Gardens: Treating runoff at the source	x	x
Wetlands: Benefitting wildlife and people.	x	x
Stormwater Management: Improving water quality and reducing runoff	x	x
Groundwater: Protecting drinking water for generations to come	x	x
Native Plants: Restoring habitat for local wildlife	x	x
Threats to our Natural Resources		x
Land Protection: Establishing a legacy		x
Soil Health (US Dept. of Ag. NRCS design)		x
Invasive Species: Combating a threat to native ecosystems		x
Ecosystem Health: Improving landscapes by increasing diversity		x

Targeted Outreach

ACD regularly conducts targeted outreach campaigns that involve specific, previously identified properties and locations. These efforts include sending targeted mailings, conducting neighborhood door knocking, and sending exclusive event invitations to collaborate with owners of specific properties to complete conservation projects.

Events/Workshops/Presentations/Tours

ACD partners with cities and watershed districts to provide information on conservation topics at events, workshops, presentations, and tours. These events are tailored to the audience and range from 'how-to' workshops for landowners to implement projects at home, to highly technical presentations to other professionals in the natural resources stewardship field. The conservation actions promoted at each distinct event are tailored to the location and targeted audience, and typically highlight individual and community conservation actions and behaviors as well as provide informational resources and opportunities for skill-building.

Figure 3-6: Full house at a well and septic maintenance training in East Bethel in 2019

Professional Training

ACD staff are regularly asked to provide professional training internally for fellow ACD staff members and externally for other natural resource professionals from counties, soil and water conservation districts, and watershed districts throughout the 11-county metro.

Classroom Engagement

ACD staff regularly partner with school groups to engage students in natural resource management and environmental stewardship. Classroom engagement activities may include field trips, in-class visits, virtual presentations, or materials provided to teachers.

Figure 3-7: Aquatic invasive species lesson in a 5th grade classroom in Columbia Heights

Public Officials Outreach

ACD has implemented an outreach campaign to keep public officials in Anoka County better informed of ACD's activities. As projects are being developed and installed or implemented, ACD staff will provide email updates with brief descriptions, photos, and links to important information to county commissioners, state legislators, city officials, and ACD supervisors. These project highlights are also captured in Monthly ACD Snapshots that are sent to local elected officials and other stakeholders.

Day at the Capitol

In most years, ACD supervisors and staff spend time visiting with legislators regarding natural resource issues in Anoka County. During the legislative session in particular, ACD will often organize a Day at the Capitol whereby we meet with as many of our elected representatives as possible to promote the highest priority issues for the ACD Board of Supervisors.

Staff and Supervisor Training

In order to provide high quality service, the Board of Supervisors is committed to retaining highly skilled staff. ACD offers staff continuing education opportunities through professional workshops, conferences, and purchase of software, books, and other materials. In addition, staff are regularly asked to provide training internally to other ACD staff members in an effort to expanding ACD's technical capacity by creating redundancy in skillsets.

Outreach to Local Government Units

Local Government Unit (LGU) officials and staff routinely make important decisions about land use and land stewardship that can have lasting effects on natural resource quality, quantity, and distribution. It is in the mutual interest of ACD and LGUs to implement approaches that accommodate growth, minimize capital investments, and efficiently deliver public services, while maintaining the quality and quantity of water and other natural resources. Natural resources play a critical role in the areas of recreation, flood control, water treatment and conveyance, energy, ecology, food production, commercial and industrial processes, consumption, and aesthetics. ACD is uniquely qualified to assist LGUs to consider natural resources during the decision making process by providing updated monitoring and inventory data, and by addressing inquiries about the often complex physical, chemical, and biological natural resource interactions that may influence LGU decisions.

Collaboration with Partner Organizations

In addition to local city and watershed district partners, ACD also collaborates with partners throughout the metro including the Metro Watershed Partners, Blue Thumb, Anoka County Task Force, Anoka County 4H, Anoka County Master Gardeners, UMN Extension, volunteer groups, scout troops, local schools and universities, lake associations, and others. We welcome any partnerships that foster shared goals.

Anoka County Water Resource Outreach Collaborative

ACD serves as the host site for the Anoka County Water Resource Outreach Collaborative (WROC) Coordinator. WROC is a partnership formed in 2018 to implement a comprehensive water outreach and engagement program for watershed and city partners. The goal is to augment and enhance the outreach programming of its partners, inform communities about issues affecting local waterbodies and groundwater resources, and engage people in activities and behavior changes that will help protect and improve the health of these water resources. See WROC Annual Reports on our website here: www.anokaswcd.org/educational/water-resource-outreach-collaborative

Figure 3-8: In 2019, WROC engaged 6927 people through outreach events, presentations, and workshops.

Building authentic relationships with diverse community partners should be a focus of future outreach efforts and engagement campaigns. Following guidance from within the community is critical to building long-lasting trust. Engaging diverse audiences through existing groups in Anoka County, such as the Transformative Circle in Coon Rapids, diverse centers of faith, cultural centers, libraries, League of Women Voters and more, will prove to be a worthwhile investment in securing future project partners.

TARGETING

Audience Targeting

Beyond prioritizing engagement strategies and actions, outreach work must be tailored to target audiences. When considering audiences to target with outreach and engagement efforts, we always need to consider the value of reaching a specific audience in both the short and long term. For example, making a connection with one landowner who manages a large acreage of land will have a large immediate benefit because that landowner has the opportunity to make pro-environmental choices in how to manage their land. However, while reaching a classroom of students with a specific outreach message is less likely to result in immediate benefit to our natural resources, the effort may produce a large number of environmental stewards that will become the decision makers and landowners of tomorrow. In this example, both audiences are valuable to reach for different reasons.

"We are all just people."

ACD Supervisor Mary Jo Truchon

In addition, the time and resources needed to engage with different audience segments will vary greatly. Considering the benefit gained by reaching different audiences is critical. Land is privately owned across most of Anoka County, so the energy needed to engage with landowners is a valuable investment. On publicly owned lands, engaging with volunteers to manage and enhance that resource can also create a large suite of benefits. Residents or visitors to Anoka County who are highly connected to or live in close proximity to high priority natural resources should be targeted as well, considering the great benefit or detriment they could impart on the resource. Community leaders, business owners, service providers, faith leaders, teachers, Homeowner's Associations, realtors, and developers among others are also valuable to engage because they have the opportunity to spread conservation messages further than we can alone as well as influence conservation actions within their own work and spheres of influence. Further, the return on investment of educating those who are purposefully or negligently causing harm to our natural resources will be greater than the return on investment of educating those who are already minimizing their negative environmental impact. However, reaching the latter group is still valuable as they are likely to spread our message to others and act as environmental stewards in the county.

WHEN TARGETING AUDIENCES, THERE IS A WIDE VARIETY OF FACTORS TO CONSIDER. THE PRIORITY MESSAGES AND OUTREACH METHODS USED FOR EACH AUDIENCE TYPE WILL BE DIFFERENT. IMPLEMENTING A DIVERSITY OF OUTREACH TOOLS TO REACH A DIVERSE RANGE OF AUDIENCES IS CRITICAL TO CREATING WIDESPREAD CHANGE.

When targeting audiences, there is a wide variety of factors to consider. The priority messages and outreach methods used for each audience type will be different. Implementing a diversity of outreach tools to reach a diverse range of audiences is critical to creating widespread change. Consider the list of audiences in Figure 3-9 as a starting point.

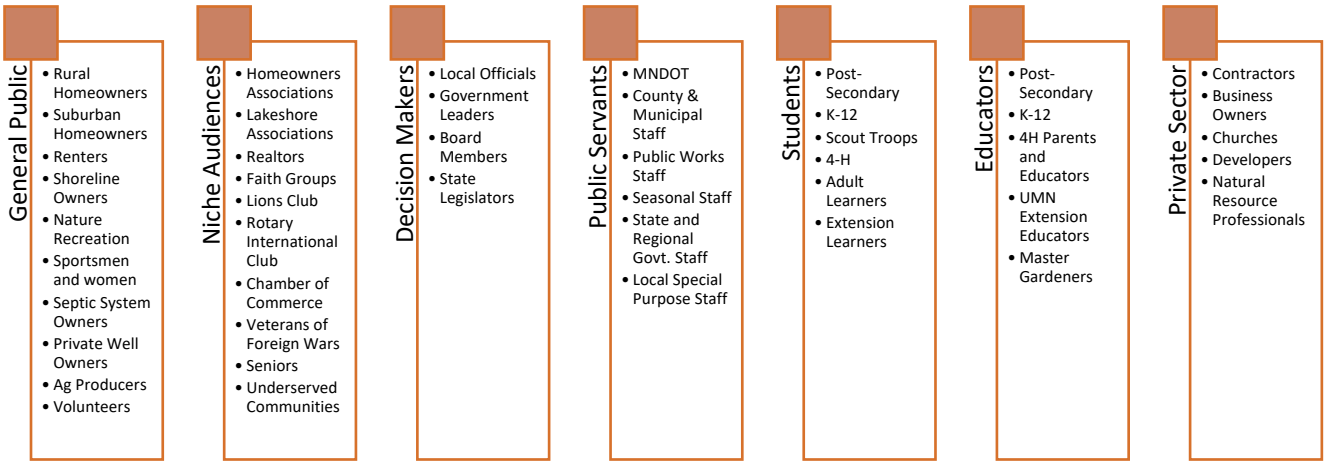


Figure 3-9: Audience segments

IMPLEMENTATION

Community outreach and engagement is an integral part of most programs and projects at ACD. For this reason, community engagement programs span all four resources: surface water, ecological (biota), groundwater, and soils. ACD will engage our community through programs that provide the greatest return on investment (ROI). The top priority programs are summarized below, and more specifically, Table 3-3 details the ROI of each program to promote according to the benefited resource. The programs listed below and in Table 3-3 cumulatively achieve 95.88% of the ROI for promotion activities. A table detailing the actions within each program is presented at the end of this chapter (Table 3-5). Specific tasks will be presented in ACD's annual plans.

Table 3-3: Community engagement programs sorted by ROI by resource

Programs to promote	Ecological (Biota)	Groundwater	Soils and Landforms	Surface Water	**ROI by % of total**
Agricultural BMP	8.90%	3.01%	3.00%	4.31%	19.22%
Land protection	4.74%	1.78%	0.51%	3.65%	10.66%
Groundwater quantity	3.96%	4.84%	0.00%	1.72%	10.53%
Aquatic invasive species	6.33%	0.00%	0.00%	3.71%	10.04%
Bioinfiltration	0.44%	2.57%	0.13%	4.93%	8.07%
Household hazardous waste	3.70%	2.33%	0.71%	0.76%	7.50%
Terrestrial invasive species	4.19%	0.00%	0.08%	0.00%	4.27%
Wetland restoration	1.32%	0.32%	0.07%	1.30%	3.01%
Pollinator habitat	2.68%	0.00%	0.17%	0.00%	2.85%
Smart salting	2.21%	0.00%	0.03%	0.29%	2.53%
Habitat restoration	1.49%	0.60%	0.29%	0.15%	2.52%
Street sweeping promotion	0.22%	0.25%	0.00%	1.55%	2.02%
Biofiltration	0.00%	0.00%	0.00%	1.70%	1.70%
Water softener upgrade	0.93%	0.38%	0.18%	0.10%	1.58%
Integrated pest management	0.93%	0.38%	0.18%	0.10%	1.58%

Programs to promote	Ecological (Biota)	Groundwater	Soils and Landforms	Surface Water	**ROI by % of total**
Habitat enhancement	1.50%	0.00%	0.00%	0.00%	1.50%
Drinking water protection	0.00%	1.42%	0.00%	0.00%	1.42%
Roadsides for wildlife	1.33%	0.00%	0.00%	0.00%	1.33%
Shoreland and riparian buffer	0.33%	0.12%	0.03%	0.83%	1.31%
Adopt a drain	0.14%	0.16%	0.00%	0.89%	1.18%
Septic system	0.18%	0.27%	0.00%	0.59%	1.04%
Vetted sum	45.51%	18.43%	5.36%	26.58%	**95.88%**

Agricultural BMP

Promotion of agricultural best management practices including agriculture conservation programs, agriculture nutrient management, agricultural waste systems, conservation grazing, conservation tillage, cover crops, crop rotation, organic agriculture, permaculture, precision agriculture, and strip cropping will primarily benefit ecological resources, and will also benefit surface water, groundwater, and soils. It will be critical to partner across county boundaries to effectively address this outreach need.

Land Protection

Protecting land through promotion of agricultural land retirement and restoration programs and conservation easements on parcels exhibiting exceptional ecological condition or that are in a critical wildlife corridor will benefit ecological resources and surface water, and to a lesser degree, groundwater, and soils. Involvement of the landowner whose high quality property is to be placed in the conservation easement is critical for success. Engagement with the county board and the city where the parcel is located is required to authorize purchase of the land. Special consideration should also be focused on outreach to private parcels surrounding these conservation easements as they are in priority locations.

Groundwater Quantity

Promoting residential WaterSmart appliances, smart irrigation practices, water efficient landscaping, and water-wise lawnscapes will primarily benefit groundwater, followed by ecological resources, and surface water. Homeowners, business owners, Homeowner's Associations, landscape companies and contractors, and landlords should be targeted for outreach. Messaging should include financial savings of reduced water use along with the natural resource benefits.

Half of the potable groundwater used in Anoka County in the summer goes to lawn watering. Reducing this overuse is a priority for future behavior change initiatives.

Aquatic Invasive Species (AIS)

Promotion of aquatic invasive animal and plant early detection and control will benefit ecological resources and surface water. Targeted audiences should include lakeshore owners, Lake Associations, and people who recreate on the water including boaters and fishermen and women. Priority messages should include degradation of the native biological communities of the waterbody as well as the financial burden of removing an infestation of AIS. Prevention is key.

Bioinfiltration

Promoting bioinfiltration practices will primarily benefit surface water, followed by groundwater, and to a lesser degree, ecological resources and soils. Bioinfiltration practices should be installed in highly targeted locations to

provide the most benefit to waterbodies. Outreach should target the landowner of those properties as well as neighbors and others who would encounter the site often including landscapers.

Household Hazardous Waste

Promotion of household hazardous waste collection days and household hazardous waste management will benefit ecological resources and groundwater, and to a lesser degree, surface water and soils. Cities and the county should be engaged in planning and hosting hazardous waste collection days and residents and others who handle household hazardous waste should be targeted with outreach to use the service.

Terrestrial Invasive Species

Promoting terrestrial invasive animal and plant early detection and control will primarily benefit ecological resources and minimally benefit soils. Targeted audiences should include landowners, especially those in or near high quality habitat. Priority messages should include degradation of the native biological communities as well as the financial burden of removing an infestation of terrestrial invasive species once they are established.

Wetland Restoration

Wetland restoration promotion will benefit ecological resources and surface water, followed by groundwater and soils. Landowners whose properties include areas of wetland or who are near to adjacent wetland should be targeted for outreach. Messaging should include the multiple connected natural resource benefits provided by wetlands and highlight the value of the resource that are in alignment with the values of the audience.

Pollinator Habitat

Promotion of pollinator habitat programs such as lawns to gardens, Lawns to Legumes, and other pollinator garden projects will primarily benefit ecological resources and minimally benefit soils. These programs often focus on small scale projects suitable for a private lot, so landowners of small and large parcels should be targeted. In addition, businesses, Homeowner's Associations, apartment complexes, and assisted care facilities, among others, could also benefit from these project installations. Priority messaging should include ecological enhancement as well as benefits of pollinators including addressing food scarcity concerns.

ANIMATED VIDEOS

We strive to create an environmentally literate community through a variety of outreach methods. One of the most successful methods we have used in recent years is the production of animated videos on various conservation topics.

The benefits of using animation are numerous. First, using animation allows us to create a stylized model of how a system interacts that is simple enough for the average person to understand while still being able to convey key information. Second, animation is able to convey a great deal more information than narration alone in a relatively short time. Third, the highly visual nature of animation allows it to be enjoyed by a diverse range of audiences including youth, elected officials, people who are deaf, and even those whose first language is not English. And finally, all online content, including videos, are long-lasting, durable, and easily shareable sources of information that can be used for many years to come. In the age of the internet, it is critical to create outreach resources that can be accessed in a wide variety of ways, shared easily across numerous websites, and provide educational value for a long time.

Habitat Restoration

Habitat restoration promotion primarily benefits ecological resources and marginally benefits surface water and soils. Targeting landowners of large parcels and properties in or near ecologically significant areas or wildlife corridors will be most beneficial.

Smart Salting

Promoting smart salting practices benefits ecological resources followed by groundwater, soils, and surface water. City Public Works staff, salt contractors, businesses, landlords, private residents, and other property managers should be targeted with information about smart salting including proper technique, proper selection of deicing materials, proper timing of application, alternatives to using deicing salt, safety considerations, best practices for application, and the impact of chloride on natural habitats, especially waterbodies.

Street Sweeping Promotion

Street sweeping promotion benefits surface water primarily and ecological resources and groundwater marginally. Cities should be engaged in any discussions of street sweeping, but residents should also be informed of the practice and how it serves to limit the amount of pollution entering local waters. Residents can be engaged through messaging about proper yard waste disposal and individual actions such as the Adopt-a-Drain program.

Biofiltration

Promotion of biofiltration practices will benefit surface water. Biofiltration practices should be installed in highly targeted locations to provide the most benefit to waterbodies. Outreach should target the landowner of those properties as well as neighbors and others who would encounter the site often including landscapers. In addition, the multiple benefits of the practice should be highlighted.

Water Softener Upgrade

Promoting water softener upgrades benefits all four resources. Homeowners and landlords should be the primary target audience for messages about upgrading water softeners to more efficient units that monitor the water use of the residence.

LAWNS TO LEGUMES: A CASE STUDY

Lawns to Legumes is a statewide program created to provide money and technical assistance to convert residential lawns into pollinator habitat in support of the Rusty patched bumblebee and other at-risk pollinators.

In Anoka County, the Anoka Conservation District and our partners developed a Demonstration Neighborhood of more than 39 properties along the Mississippi and Rum River corridor. Each of these relatively small projects taken together provide a large collective benefit to ecological resources by extending the range of pollinators and creating a corridor of pollinator-friendly habitat on private properties.

By working together through the collective action and behavior change of a large group of like-minded people, the impact of the Lawns to Legumes Demonstration Neighborhood project in Anoka County is greater than it would have been otherwise.

Integrated Pest Management (IPM)

Promoting integrated pest management practices benefits all four resources. IPM is used to manage pest damage economically, and with the least possible hazard to people, property, and the environment. The approach can be applied to both agricultural and non-agricultural settings, so the target audiences include farmers and ranchers, as well as landowners and home gardeners.

Habitat Enhancement

Promotion of backyard habitat enhancement benefits ecological resources. As with the promotion of pollinator habitat, these programs often focus on small scale projects suitable for a private lot. Homeowners, businesses, Homeowner's Associations, apartment complexes, and assisted care facilities, among others, can benefit from

these project installations. Priority messaging should include ecological enhancement as well as benefits of pollinators including addressing food scarcity concerns.

Drinking Water Protection

Promoting home water filters benefits the drinking water protection goal for groundwater. Messaging should include mention of personal health and safety, especially for specific audiences such as families with young children. Promotion of water testing, especially for homes using water from a private well, is also important.

Roadsides for Wildlife

Promotion of roadsides for wildlife benefits ecological resources. During development and redevelopment, promoting alternative roadside vegetation can be a priority message. It will be critical to present information about the ecological benefits of the practice alongside discussion of road and pedestrian safety concerns.

Shoreline and Riparian Buffer

Shoreline and riparian buffer promotion benefits surface water primarily, followed by ecological resources, groundwater, and soils. Lakeshore and riverbank owners along with Lake Associations should be the primary target audience for promoting these practices. Messaging should include benefits of the practice for the waterbody as well as for the landowner. Installations should always consider landowner preferences and maintenance ability.

Adopt-a-Drain

Promoting the Adopt-a-Drain program benefits surface water, groundwater, and ecological resources. Urban and suburban residents who live in areas with storm sewers are the target audience for this program, though anyone across the state of Minnesota can participate. Messaging should highlight the benefit of many individual actions to produce large collective improvement of local water quality. In addition, messaging about reducing flooding risk, especially in susceptible areas, is another angle to engage program participants.

Septic System

Septic system maintenance promotion benefits surface water, groundwater, and ecological resources. The target audience for proper septic system maintenance and inspection is those homeowners with septic systems, especially those near a high priority water body.

THROUGH OUTREACH AND ENGAGEMENT, WE CAN MINIMIZE CURRENT ISSUES, PREVENT FURTHER HARM FROM OCCURRING, AND REMEDIATE PROBLEMS THAT HAVE ALREADY BEEN CREATED. OUR COMMUNITY IS A POWERFUL FORCE WHEN DIRECTED TO POSITIVE ENVIRONMENTAL ACTION.

MEASUREABLE OUTCOMES ANTICIPATED

"I alone cannot change the world, but I can cast a stone across the waters to create many ripples."

Mother Teresa

Measuring the success of outreach activities is not a simple task because the results are often not immediately evident. To determine if an outreach campaign is successful, we measure a number of aspects of the campaign including the number of new outreach materials produced, the reach of those outreach materials, the number of outreach events attended and hosted, the number of people reached through online and in person events, the number of people who make a pledge to take pro-environmental actions, the number of hours contributed by volunteers, and any measurable impacts to natural resources such as pounds of phosphorus prevented from entering a waterbody or acres of land area treated for invasive species. Each outreach campaign will necessarily track a different suite of metrics based on the goal of the campaign.

In general, outreach campaigns will incorporate a variety of tools and methods that can be measured including:

- Informational materials such as reports, brochures, flyers, and pamphlets;
- Outreach materials such as displays and interactive models for use at events;
- Articles written for publication in local newspapers, newsletters, and online;
- Videos and other online media such as StoryMaps, photos, and databases;
- Workshops, trainings, presentations, tours, and other engagement events hosted or attended; and
- Individuals and organizations engaged in conservation actions through behavior change campaigns.

UNMET IMPLEMENTATION NEEDS AND ASSETS

Through the process of developing this Comprehensive Plan and in discussion with partners throughout Anoka County, several gaps in outreach were identified that deserve special mention here.

Gaps in Outreach as Identified by Technical Advisory Committees:

- Produce new outreach materials, specifically:
    - Informational documents on groundwater and surface water interaction
    - Maps of high value water and ecological resources for public awareness
    - General groundwater protection information specific to Anoka County's geology
    - Greater focus on outreach and education about water softeners and well testing
- Continue to lobby for levy authority, and conduct outreach to partners to raise awareness of need to fund conservation locally; and
- Focus on high priority locations in the county including:
    - Areas facing development pressure
    - Areas in close proximity to high priority waters or ecological resources

Community engagement serves as a priority method for securing the assets we need to effectively do the work set out in this plan. Through outreach, we build political, agency, and public support, build community trust, enhance staff capacity through volunteerism, and bolster the environmental literacy of the public, community leaders, and elected officials. When lacking, these assets are barriers to effectively implementing an outreach program. Table 3-4 depicts the assets that are enhanced through robust outreach and engagement.

Table 3-4: Assets that are enhanced through outreach and engagement (in bold)

Category	Asset
Support	**Political support**
	Agency support
	Public support
	Trust
Capacity	Financial
	Expertise
	Equipment/Technology
	Staff Time
Awareness (information and understanding)	Science – what, where, how to be effective?
	Public literacy
	Community leader literacy
	Elected and appointed official literacy
	Planning
Jurisdiction	Land use authority
	Laws/Regulations/Ordinances/Standards
	Geography/Scale

THROUGH OUTREACH, WE BUILD POLITICAL, AGENCY, AND PUBLIC SUPPORT, BUILD COMMUNITY TRUST, ENHANCE STAFF CAPACITY THROUGH VOLUNTEERISM, AND BOLSTER THE ENVIRONMENTAL LITERACY OF THE PUBLIC, COMMUNITY LEADERS, AND ELECTED OFFICIALS.

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COMMUNITY RESOURCE ACTION TABLE BY ROI

Table 3-5: Programs and associated actions by resource

Programs and actions to promote	Ecological (Biota)	Ground-water	Soils and Landforms	Surface Water	**ROI by % of total**
Agricultural BMP	**8.90%**	**3.01%**	**3.00%**	**4.31%**	**19.21%**
Ag. conservation program - promote	0.81%	0.40%	0.14%	1.87%	3.22%
Ag. nutrient management - promote	0.13%	0.15%	0.00%	0.32%	0.60%
Ag. waste system - promote	0.75%	0.47%	0.15%	1.09%	2.45%
Conservation grazing - promote	0.51%	0.00%	0.00%	0.00%	0.51%
Conservation tillage - promote	0.00%	0.00%	0.75%	0.38%	1.14%
Cover crop - promote	0.23%	0.93%	0.47%	0.38%	2.01%
Crop rotation - promote	0.23%	0.00%	0.09%	0.00%	0.32%
Organic agriculture - promote	3.27%	0.68%	0.65%	0.17%	4.77%
Permaculture - promote	1.59%	0.00%	0.42%	0.00%	2.02%
Precision ag. - promote	0.93%	0.38%	0.18%	0.10%	1.58%
Strip cropping - promote	0.46%	0.00%	0.14%	0.00%	0.60%
Land Protection	**4.74%**	**1.78%**	**0.51%**	**3.65%**	**10.67%**
Ag. land retirement and restoration program - promote	1.45%	0.35%	0.47%	1.63%	3.90%
Conservation easement - promote	3.29%	1.43%	0.04%	2.01%	6.77%
Groundwater quantity	**3.96%**	**4.84%**	**0.00%**	**1.72%**	**10.52%**
Residential WaterSmart appliances/fixtures and practices - promote	0.68%	0.83%	0.00%	0.23%	1.74%
Smart irrigation - promote	0.95%	1.16%	0.00%	0.33%	2.43%
Water efficient landscaping - promote	1.08%	1.32%	0.00%	0.37%	2.78%
Water-wise lawnscape - promote	1.26%	1.53%	0.00%	0.79%	3.58%
Aquatic invasive species	**6.33%**	**0.00%**	**0.00%**	**3.71%**	**10.04%**
Aquatic invasive animal control - promote	1.58%	0.00%	0.00%	0.93%	2.51%
Aquatic invasive animal early detection - promote	1.58%	0.00%	0.00%	0.93%	2.51%
Aquatic invasive plant control - promote	1.58%	0.00%	0.00%	0.93%	2.51%
Aquatic invasive plant early detection - promote	1.58%	0.00%	0.00%	0.93%	2.51%
Bioinfiltration	**0.44%**	**2.57%**	**0.13%**	**4.93%**	**8.07%**
Bioinfiltration - promote	0.44%	2.57%	0.13%	4.93%	8.07%
Household hazardous waste	**3.70%**	**2.33%**	**0.71%**	**0.76%**	**7.50%**
Household hazardous waste collection days - promote	2.40%	1.51%	0.46%	0.49%	4.86%
Household hazardous waste management - promote	1.30%	0.82%	0.25%	0.27%	2.64%
Terrestrial invasive species	**4.19%**	**0.00%**	**0.08%**	**0.00%**	**4.27%**
Terrestrial invasive animal control - promote	0.99%	0.00%	0.02%	0.00%	1.01%
Terrestrial invasive animal early detection - promote	0.99%	0.00%	0.00%	0.00%	0.99%
Terrestrial invasive plant control - promote	0.83%	0.00%	0.02%	0.00%	0.85%
Terrestrial invasive plant early detection - promote	1.38%	0.00%	0.03%	0.00%	1.42%
Wetland restoration	**1.32%**	**0.32%**	**0.07%**	**1.30%**	**3.01%**
Wetland restoration - promote	1.32%	0.32%	0.07%	1.30%	3.01%
Pollinator habitat	**2.68%**	**0.00%**	**0.17%**	**0.00%**	**2.85%**
Lawns to gardens - promote	0.94%	0.00%	0.11%	0.00%	1.05%

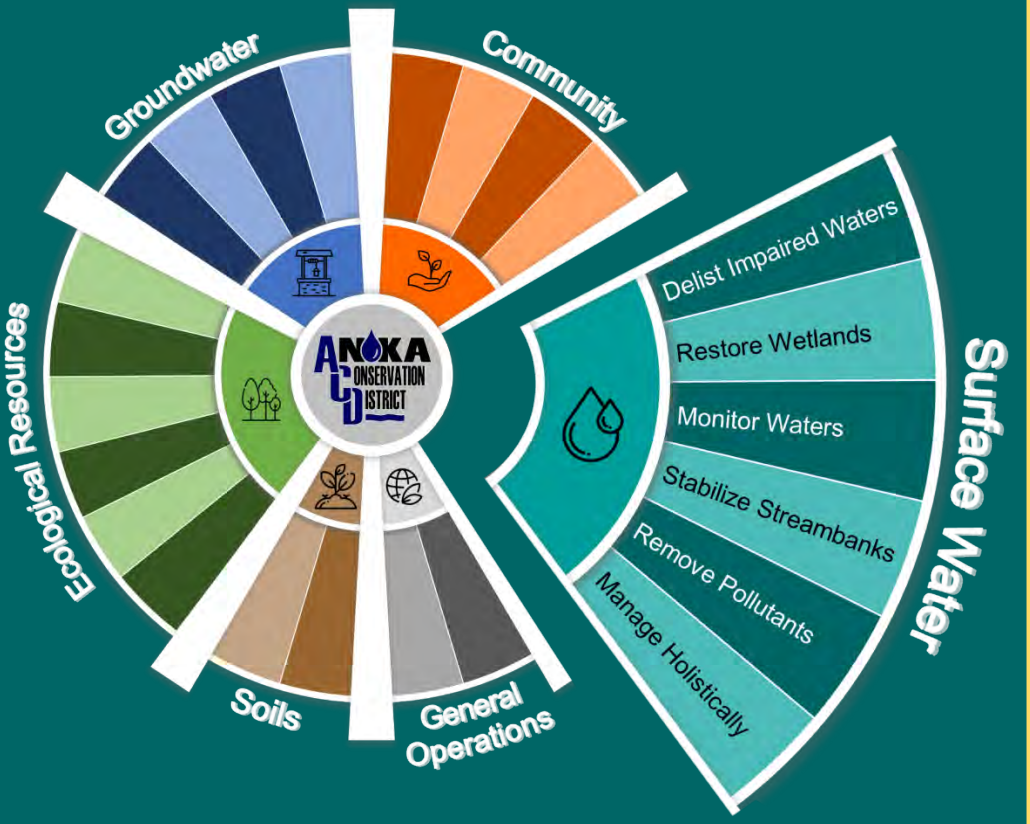
Programs and actions to promote	Ecological (Biota)	Ground-water	Soils and Landforms	Surface Water	**ROI by % of total**
Lawns to legumes - promote	0.47%	0.00%	0.06%	0.00%	0.53%
Pollinator garden - promote	1.27%	0.00%	0.00%	0.00%	1.27%
Habitat restoration	**2.21%**	**0.00%**	**0.03%**	**0.29%**	**2.53%**
Habitat restoration - promote	2.21%	0.00%	0.03%	0.29%	2.53%
Smart salting	**1.49%**	**0.60%**	**0.29%**	**0.15%**	**2.53%**
Smart salting - promote	1.49%	0.60%	0.29%	0.15%	2.53%
Street sweeping promotion	**0.22%**	**0.25%**	**0.00%**	**1.55%**	**2.02%**
Street sweeping - promote	0.22%	0.25%	0.00%	1.55%	2.02%
Biofiltration	**0.00%**	**0.00%**	**0.00%**	**1.70%**	**1.70%**
Biofiltration - promote	0.00%	0.00%	0.00%	1.70%	1.70%
Water softener upgrade	**0.93%**	**0.38%**	**0.18%**	**0.10%**	**1.58%**
Water softener upgrade - promote	0.93%	0.38%	0.18%	0.10%	1.58%
Integrated pest management	**0.93%**	**0.38%**	**0.18%**	**0.10%**	**1.58%**
Integrated pest management - promote	0.93%	0.38%	0.18%	0.10%	1.58%
Habitat enhancement	**1.50%**	**0.00%**	**0.00%**	**0.00%**	**1.50%**
Backyard habitat enhancement - promote	1.50%	0.00%	0.00%	0.00%	1.50%
Drinking water protection	**0.00%**	**1.42%**	**0.00%**	**0.00%**	**1.42%**
Home water filter - promote	0.00%	1.42%	0.00%	0.00%	1.42%
Roadsides for wildlife	**1.33%**	**0.00%**	**0.00%**	**0.00%**	**1.33%**
Roadsides for wildlife - promote	1.33%	0.00%	0.00%	0.00%	1.33%
Shoreland and riparian buffer	**0.33%**	**0.12%**	**0.03%**	**0.83%**	**1.31%**
Shoreland and riparian buffer - promote	0.33%	0.12%	0.03%	0.83%	1.31%
Adopt a drain	**0.14%**	**0.16%**	**0.00%**	**0.89%**	**1.18%**
Adopt a drain - promote	0.14%	0.16%	0.00%	0.89%	1.18%
Septic system	**0.18%**	**0.27%**	**0.00%**	**0.59%**	**1.04%**
Septic system maintenance - promote	0.18%	0.27%	0.00%	0.59%	1.04%

Chapter 4

Our Surface Water.

The Anoka Conservation District will take measureable steps to conserve and enhance the quantity and quality of Anoka County's groundwater resource.

Our 2021-2030 Keystone Surface Water Endeavors Are:



Chapter 4 Contents

SURFACE WATER FOUNDATION

Anoka County is covered by surface water i.e. streams, lakes, and wetlands. In fact, 30% of the county is covered by one of these surface water features. Compared to other natural resources, surface water is often at the forefront of natural resource stewardship. There are entities at all levels of government that manage surface waters. Most of these entities are focused on managing a particular subset of water resources, or managing a broader array of resources but only when triggered by a permit application. Others still, are limited to working on public lands or are limited to addressing a subset of natural resource problems.

ACD's niche is to work with willing private property owners to implement water quality improvement projects and practices. We serve as a technical resource for local government units as well to assist them when they are addressing water resource issues. By implementing a centralized water resource monitoring program, we are able to keep our finger on the pulse of our lakes and rivers and keep our partners apprised of noteworthy developments. Additionally, while other entities often focus on managing surface water as a standalone resource, ACD manages surface water holistically with all natural resources in Anoka County. These natural resources are grouped into four major categories: surface water, biota, groundwater, and soils.

WHY IS SURFACE WATER IMPORTANT?

The importance of water simply can't be overstated. Of the four major resources managed by ACD, surface water ranks as the most important. The benefits of quality surface water stewardship to the residents and visitors of Anoka County can be hard to quantify, but can generally be categorized as follows:

- Hydrologic function (groundwater recharge)
- Flood mitigation (precipitation storage and conveyance)
- Biogeochemical function (nutrient cycling and pollutant remediation)
- Flora and fauna
- Recreation - water (e.g. swimming and boating)
- Consumption

Maintaining and restoring surface water resources for the continuity of these benefits in Anoka County are the priorities of this plan.

SURFACE WATER GOALS AND DESIRED FUTURE CONDITION

The goals for surface water stewardship by ACD are aimed at maintaining the benefits identified above. Each goal pertains to one benefit, with each benefit having one or two goals. Eight goals were identified to guide work towards maintaining surface water benefits, which is half of the total goals identified to maintain the benefits of all four major resource types. Table 4-1 shows the six surface water benefits and eight related goals listed in order of priority.

"Water is the driving force of all nature."

Leonardo Da Vinci

Table 4-1: Surface water benefits and goals

Hydrologic function (groundwater recharge)
Hydrologic function (groundwater recharge) - sustain and restore
Flood mitigation (precipitation storage and conveyance)
Runoff storage and conveyance - sustain and restore
Biogeochemical function (nutrient cycling and pollutant remediation)
Surface water biogeochemical functions - sustain and restore
Flora and fauna
Biodiversity - sustain and restore
Recreation - water (e.g. swimming and boating)
Biodiversity for recreation - sustain and restore
Surface water quality for recreation - sustain and restore
Consumption
Groundwater quality for consumption - sustain and restore
Surface water quality for consumption - sustain and restore

Surface Water Goals

Hydrologic Function (Groundwater recharge)

In Anoka County, surface water resources are the surficial groundwater table exposed. Our high groundwater table and highly permeable soils are to thank for our amazing surface water resources. Shallow groundwater keeps our lakes and wetlands full and feeds baseflow to our streams and rivers, even during dry spells. Expansive lake and wetland basins in turn capture and slow precipitation and give it the opportunity to soak into the landscape and recharge groundwater. Map 4-1 shows the surface water/groundwater connectivity throughout Anoka County. As we add impervious surface to the landscape and direct stormwater runoff through pipes to low lying areas, we short-circuit the ability for precipitation to recharge the surficial groundwater.

Groundwater Quality for Consumption

Because surface water and groundwater are interconnected, surface water quality has the potential to impact groundwater quality, which is the primary source of drinking water in Anoka County. Several soluble contaminants such as nitrate and chloride are harmless in low concentrations but slowly accumulate over time to exceed safe consumption standards. There are also contaminants of emerging concern such as hormones for which there are no sound management strategies.

Biodiversity (intrinsic value)

Clean water is essential for all life, and life is intrinsically valuable. Toxic spills that result in fish and wildlife fatality can grab headlines, but there are surface water contaminants that slowly and quietly accumulate to wreak havoc on other native plants and animals. For example, modest or invisible water chemistry changes can affect sensitive aquatic wildlife, such as amphibians. Changes to hydrology can eliminate wild rice beds. Excess sediment can smother critical fish spawning habitat or rare mussels. By managing for clean water we can benefit the entire array of species that rely on them.

CLEAN WATER IS ESSENTIAL FOR ALL LIFE, AND LIFE IS INTRINSICALLY VALUABLE.

SURFACE WATER PARTNERSHIPS

There are seven local watershed entities that cover Anoka County. ACD partners with each of these entities in different ways, but we especially work closely with those four whose watersheds lie entirely within the county:

- Coon Creek Watershed District
- Lower Rum River Watershed Management Organization
- Sunrise River Watershed Management Organization
- Upper Rum River Watershed Management Organization

ACD partners with these entities to monitor our shared surface waters, conduct subwatershed analyses, and implement cost-effective projects to improve and protect water quality.

We also partner with Anoka County to implement projects on the Rum River to protect this highly valued recreational resource and the publicly accessible lands that border it.

Figure 4-1: Ribbon cutting at Cedar Creek Conservation Area Rum River stabilization project- 2015

Runoff Storage and Conveyance

As much as water is a valuable asset, too much of it in the wrong place at the wrong time can have disastrous consequences. Water resource managers must strike a delicate balance that keeps as much water on the landscape as we can without it leading to flooding or erosion problems. Keeping water on the landscape not only helps recharge our groundwater and refill our surface waters, but it also helps prevent downstream flooding.

Surface Water Biogeochemical Functions

Biogeochemical functions are natural processes that cycle minerals, nutrients, and other compounds in ways that make the good constituents available for consumption by plants and animals while the bad contaminants are broken down and stored where they can do harm. These complex processes are happening all around us and make life possible. Managing to maintain health ecosystems is the best way to keep biogeochemical functions working for us.

Biodiversity for Recreation

Outdoor recreation often has biodiversity at its center. Hunting, fishing, and wildlife watching are examples. These recreational activities are enjoyed by many and have thriving industries that support broader natural resources conservation. There is a tight interdependency between recreation, biodiversity, habitat, and surface waters. With effective stewardship of surface water, we can contribute to quality outdoor recreation.

Surface Water Quality for Recreation

Clean and clear lakes and rivers entice us to recreate. Water that is dirty, smelly, or blooming with algae is a discouragement. Lakes and rivers are ecosystems and need nutrients, plants, invertebrates, and animals to be healthy. While we don't want our lakes looking like pea soup, we also don't want them looking like swimming pools.

We are fortunate to have abundant opportunities to recreationally hunt, fish, or forage from the landscape in Anoka County even though it isn't necessary for survival. Surface water plays an integral role in determining the prevalence, location, and abundance of the plants and animals that we consume from the natural environment.

Surface Water Quality for Consumption

Surface water is the drinking water source for about 4% of Anoka County. However, more than 60% of Anoka County surface water enters the Mississippi River just upstream of drinking water intakes for the Twin Cities Metropolitan Area (TCMA). There are even more users of Mississippi River downstream of the TCMA. Ultimately, all of Anoka County drains to the Mississippi River. The millions of people between Anoka County and the Gulf of Mexico that rely on the Mississippi as their sole drinking water source are counting on us to do our part to protect the water that starts in, or flows through, Anoka County before it reaches their taps.

Surface Water Objectives

Objectives to achieve each of the eight surface water goals are shown in Table 4-2 which provides a high-level view of ACD's direction. Based on a return on investment analysis, the objectives for each goal are listed in order from highest to lowest. The objectives shown achieve 100% of the total calculated return on investment. Objectives repeat because they achieve multiple goals. Also, many objectives directly relate to the other resources (i.e. groundwater, biota, and soils) because they are all interconnected and interdependent. Viewing the subsequent strategies and actions provides a clearer perspective on what this means in terms of workload. That content is presented in the 'Implementation' section.

Table 4-2: Surface water objectives by goal and ROI

Objective	Biodiversity - sustain and restore	Biodiversity for recreation - sustain and restore	Groundwater quality for consumption - sustain and restore	Hydrologic function (groundwater recharge) - sustain and restore	Runoff storage and conveyance - sustain and restore	Surface water biogeochemical functions - sustain and restore	Surface water quality for consumption - sustain and restore	Surface water quality for recreation - sustain and restore	Grand Total
Sediment - minimize and remediate	3.88%	0.00%	0.00%	0.00%	1.33%	9.04%	0.00%	5.97%	20.22%
Hydrologic function (groundwater recharge) - maintain, restore, enhance				16.30%					16.30%
Nutrients - minimize and remediate	1.88%	0.00%	0.00%	0.00%	0.00%	8.23%	0.00%	5.30%	15.40%
Natural storage and infiltration - maintain, restore, enhance				9.30%	4.72%			0.23%	14.26%
Hydrologic regimes - restore	0.90%	0.00%	0.00%	4.58%	2.62%	1.68%	0.00%	0.00%	9.78%
Hydrologic function (retention, detention and conveyance) - maintain, restore, enhance					8.87%				8.87%
Biodiversity - maintain, restore, enhance	4.66%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	4.66%
Invasive species - control	1.69%					1.09%		0.72%	3.50%
Anthropogenic toxins - minimize and remediate	1.17%	0.00%	0.00%	0.00%	0.22%	0.86%	0.03%	0.31%	2.59%
Bacterial contaminants - minimize and remediate	0.03%					0.09%		1.19%	1.31%
Clearing - minimize and mitigate	1.21%	0.00%	0.00%	0.07%	0.00%	0.00%	0.00%	0.00%	1.28%
Hydrologic connectivity - maintain, restore, enhance	0.24%			0.05%	0.51%				0.80%
Impervious surfaces - minimize and mitigate	0.02%	0.00%	0.00%	0.00%	0.42%	0.00%	0.00%	0.00%	0.44%
Groundwater - conserve	0.27%							0.10%	0.37%
Stormwater runoff quality - improve	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.11%	0.11%
Opportunities expanded		0.05%			0.00%				0.06%
Climate change adaptation	0.02%	0.00%	0.00%	0.00%	0.00%	0.03%	0.00%	0.00%	0.05%
Emerging concern contaminants - minimize and remediate			0.01%						0.01%

SURFACE WATER INVENTORY AND CONDITION

INVENTORY

While reading this inventory, refer to maps in the back of this chapter.

Lakes

Anoka County has 128 water bodies larger than MN DNR's 10-acre threshold to be considered a lake. Fifty-four of these are greater than 50 acres and vary widely in terms of morphology, use, and land use setting. Approximately 30 of our lakes are accessible by public access, and 18 are highly utilized for recreation. Individual lakes range in surface area from the 10 to 1,481 acres. Most lakes in Anoka County are considered shallow lakes, meaning they do not exceed a maximum depth of 15 feet, or ≥80% of the lake area is shallow enough to support root aquatic vegetation (Minnesota Rules Chapter 7050.0150, 2017)

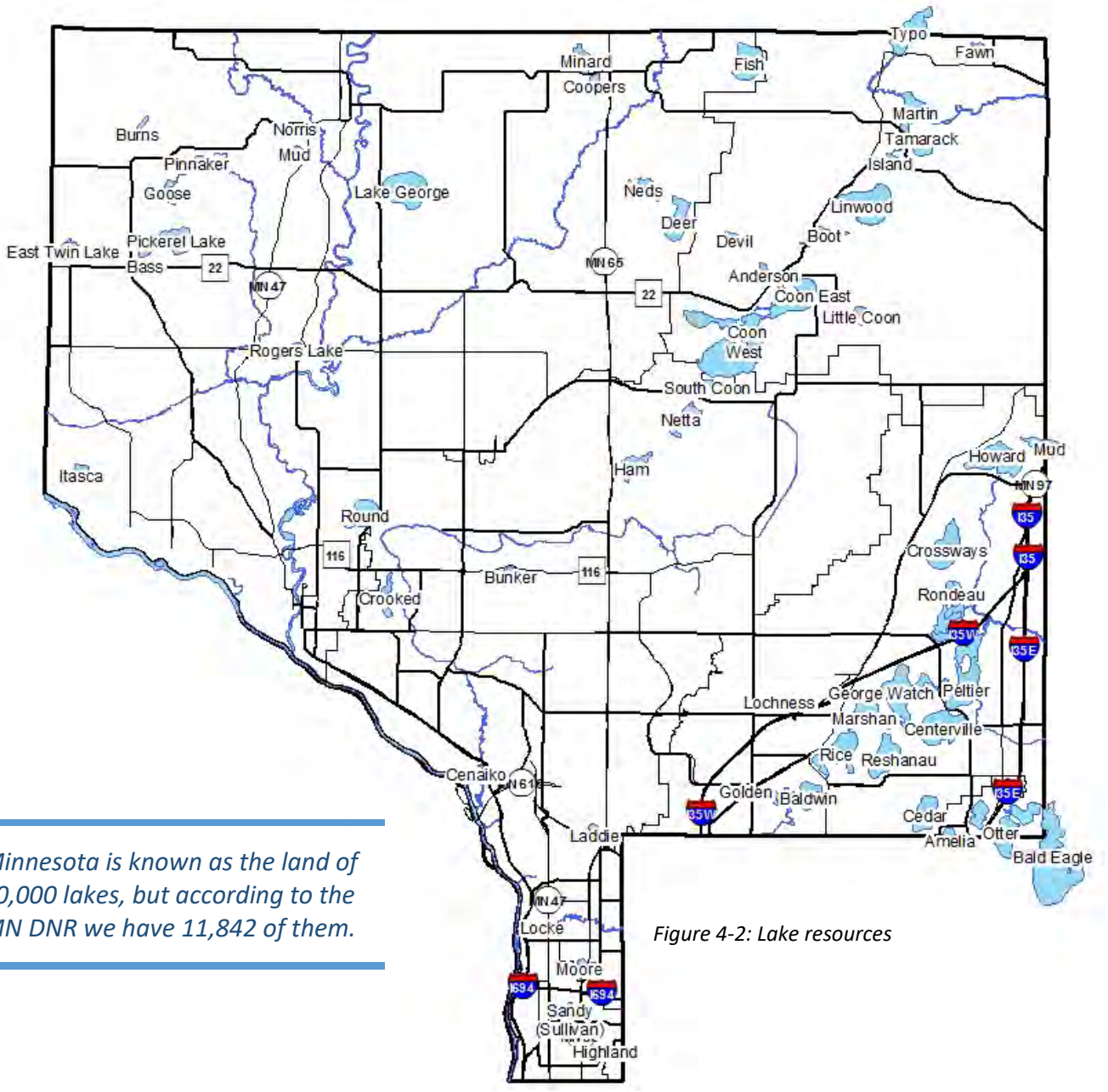


Figure 4-2: Lake resources

Minnesota is known as the land of 10,000 lakes, but according to the MN DNR we have 11,842 of them.

Rivers

The streams and rivers of Anoka County are part of three major watersheds that each cover a portion of the county: Mississippi River - Twin Cities (45%), Rum River (39%), and Lower St. Croix River (16%). The portion of each of these three major watersheds that intersects Anoka County only represents a small percentage the total area of each watershed covers. These three major watersheds are further divided into 50 minor watersheds as shown in Figure 4-3. Ultimately, all of the water that flows through Anoka County joins the Mississippi River.

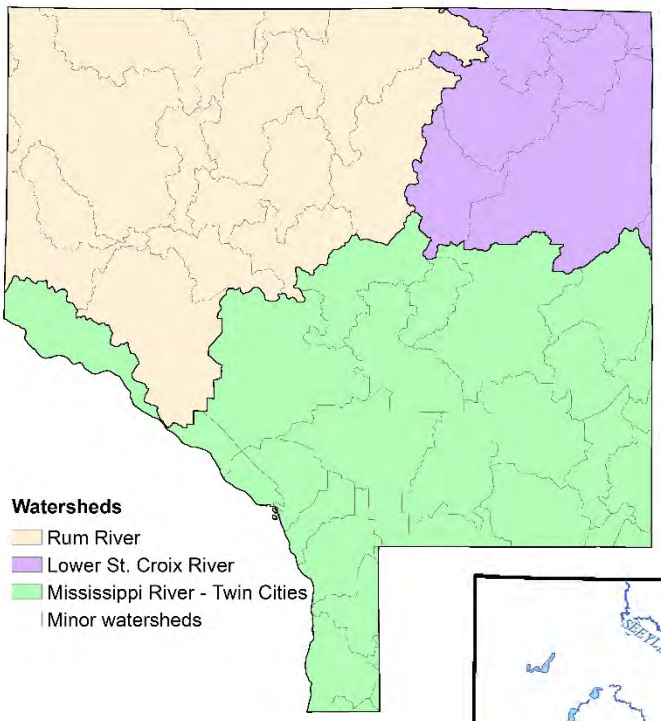


Figure 4-3: Major watersheds in Anoka County

Anoka County has 12 named streams and rivers for a combined 130 miles of public water channel. There are also almost 600 miles of public and private ditches that were dug in the early 1900's. The two largest rivers that flow through Anoka County are the Rum River and the Mississippi River. Thereafter, Coon Creek, Rice Creek and the Sunrise River cover most of the county. The remaining areas drain to streams with low annual discharge. Most of these streams also experience little elevation change throughout their drainage areas. This low gradient causes many of the ditch systems to accumulate large amounts of silt over time.

ULTIMATELY, ALL OF THE WATER THAT FLOWS THROUGH ANOKA COUNTY JOINS THE MISSISSIPPI RIVER

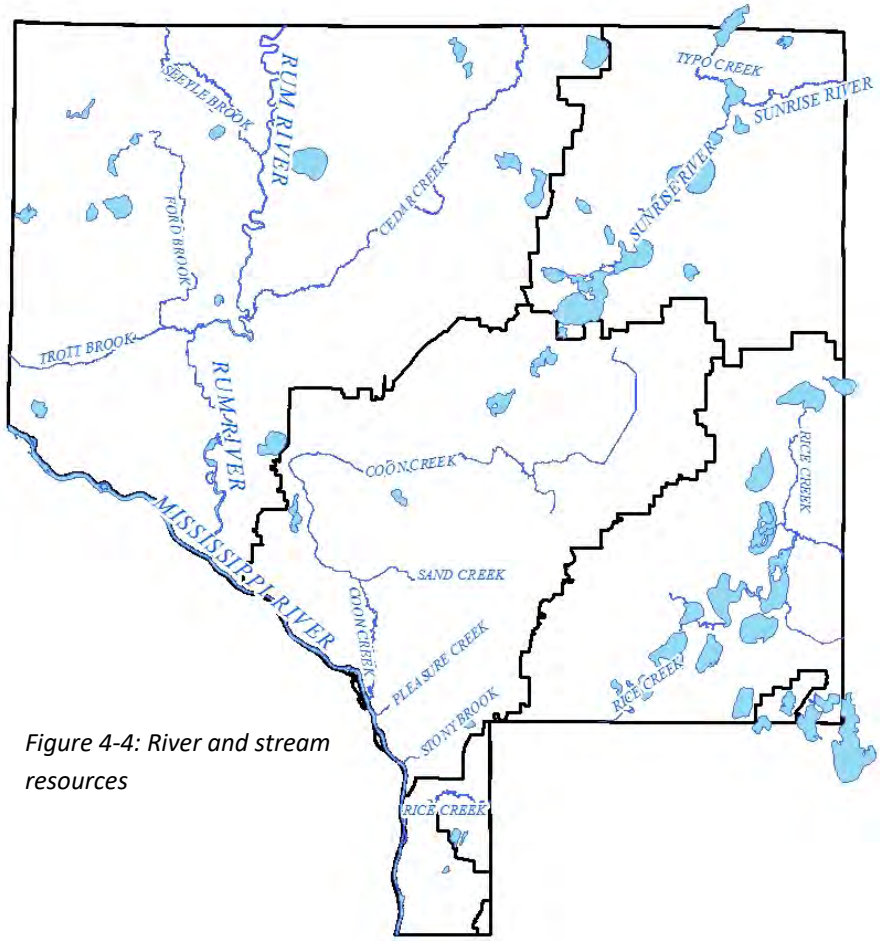


Figure 4-4: River and stream resources

Wetlands

Anoka County is rich in wetland resources with nearly 30% (74,685 acres) of our land area covered in wetland. Anoka County is also unique in the seven county metro area as the only county with more than 50% of its original wetland acreage intact. Figure 4-5 is the National Wetland Inventory and shows wetlands that fall under MN Department of Natural Resources (DNR) jurisdiction in dark blue and those that fall under the jurisdiction of the Wetland Conservation Act in green. Lakes are included under DNR jurisdiction.

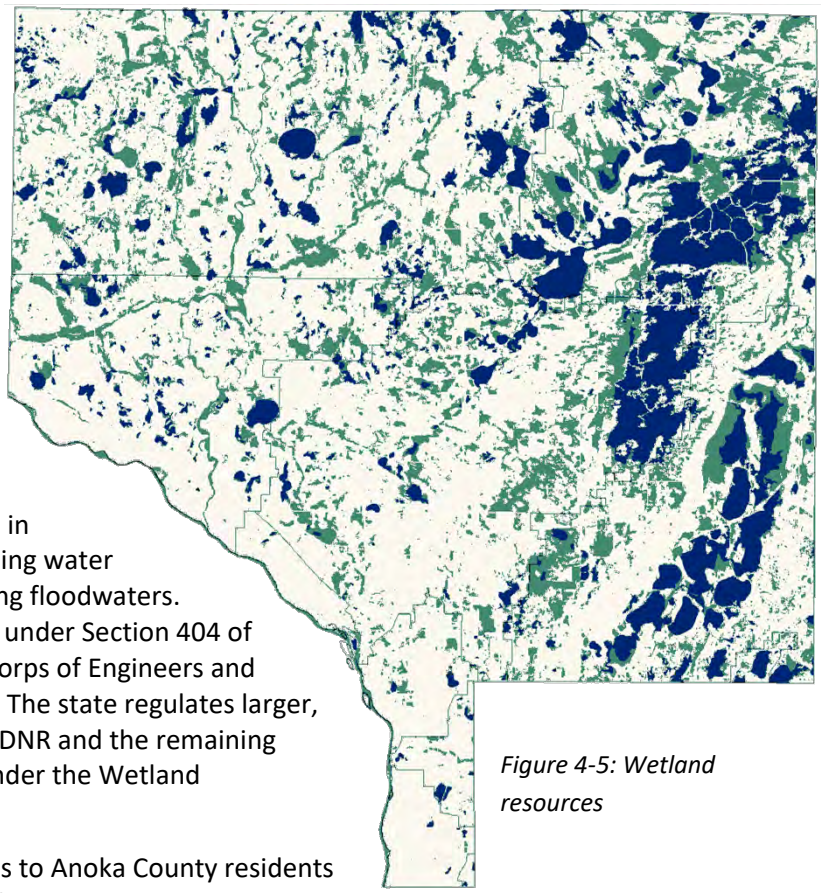


Figure 4-5: Wetland resources

Wetlands have many regulatory protections in recognition of the role they play in maintaining water quality in our lakes and rivers and attenuating floodwaters. The federal government regulates wetlands under Section 404 of the Clean Water Act through the US Army Corps of Engineers and through Swampbuster on agricultural lands. The state regulates larger, permanently ponded wetlands through the DNR and the remaining wetlands through local government units under the Wetland Conservation Act of 1991.

Wetlands provide many functions and values to Anoka County residents including water quality, flood control, wildlife habitat, and open space. Utilizing wetland characteristics to assimilate nutrients, trap sediment, and attenuate flood waters can result in degradation of the wetland's ecology. Resource managers must balance the quality of the wetland against the benefits it can provide under active use. Wetland quality and position in the landscape are routinely considered by ACD staff when making stewardship recommendations.

To preserve and enhance wetland functions and values in the county, ACD supports activities that avoid direct and indirect impacts, restore wetlands for flood control and water quality treatment, provide buffer strips around wetlands basins, replace losses in the same watershed or where most needed, avoid impacts to natural community wetlands, and restore wetland plant communities for habitat.

Map 4-2 shows the surface water features of Anoka County.

Nature and Extent of High Priority Problems

ACD annually prepares an extensive Water Resources Almanac that presents annual water resource condition, long-term trends, and recommended action. Almanacs are available at https://www.anokaswcd.org/technical-support/reports.html. This section presents summary information and conclusions from those report.

Water Quality

Impaired Waters

The State of Minnesota maintains and periodically updates a list of impaired waters. That list is available on the MN Pollution Control Agency website. Map 4-3 shows the impaired waters listed in Anoka County as of 2018. As of the time of writing of this plan 15 Anoka County streams and 16 lakes have nutrient impairments, and one lake (Silver) is impaired for excess chloride. Delisting of impaired lakes and preventing additional impairments is a priority. Twelve lakes and the Rum River are impaired for mercury in fish tissue, which causes concern for human consumption. This impairment is difficult to manage at a local or even state level because the primary source of mercury is atmospheric deposition that has its origins in other states or even other countries. It is not a priority for ACD efforts.

Water Quality Trends

Water quality trends and degree of impairment are an important consideration in our stewardship prioritization. In-depth analyses of water quality and trends can be found in the annual Anoka Water Almanacs.

Rivers and streams

Because streams are linear features that stretch many miles, analysis of water quality change has to be considered over both time and space. Streams often have declining water quality moving downstream as they drain more urbanized portions of their watersheds. Streams with watersheds that are highly urbanized or heavily ditched to maintain agriculture, are often impaired for excess nutrients and bacteria, as well as poor biotic communities. The Rum River, which flows through Anoka County from north to south, degrades in the quality of its water as its watershed transitions from predominately undeveloped natural landscapes and large lot residential development north of Anoka County to more urbanized areas with increased stormwater input within Anoka County. Coon Creek on the other hand degrades quickly in the northern reaches of its watershed that are heavily ditched and farmed, but that degradation does not continue downstream through the more urbanized portions of the watershed where stormwater management is rigorous and effective.

Water quality in streams can also change over time as land use practices and stormwater management in the watershed change. In general, the water quality of the five primary streams in Anoka County is stable or improving for total phosphorus (TP) and total suspended solids (TSS) over the past 20 years. These have been the primary target pollutants for stormwater management efforts and watershed projects over this time period, and it appears that efforts to reduce are having a quantifiable effect. Table 4-3 shows the trends for these streams for all samples collected over the past 20 years at consistently monitored sites. It also shows the water quality impairments listed for each of the streams.

While trends appear to be moving in the right direction over time for phosphorus and TSS, many impairments for *E. coli*, aquatic biota, and mercury in fish tissue remain in place. These impairments are much harder to manage for, but some are coming to the forefront of watershed planning and project installation. Projects being installed by the Coon Creek Watershed District in particular are incorporating biochar filters for bacteria remediation and re-meandering straightened stream channels for aquatic habitat enhancement. These types of projects have not been as common in the past, but are the next steps in holistically managing watershed inputs in an effort to fully delist impaired streams.

Table 4-3: Stream water quality and trends

Stream	Channel in Anoka Co. (miles)	Last Year Monitored	Phosphorus Average (ug/L)	Phos. Trend	TSS Average (mg/L)	TSS trend	Impairment
Coon Creek	26.7	2020	130	+	19.9	+	E. coli, Invert Bio
Mississippi River*	21.2	2020	100.8	=	17.2	=	Nutrients, FC, PCB-F, Hg-Fish
Rice Creek**	12.5	2019	113.9	=	14.3	=	E. coli, Invert Bio, Fish Bio
Rum River	26.4	2019	94.1	+	8.2	=	Hg-Fish
Sunrise River	5.2	2020	69.4	=	15.3	=	Invert Bio, Fish Bio

Data
Only past 20 years of data included
March-October samples
* Sampled by Met Council
** Sampled by RCWD

Trend
= Indicates no trend
+ Indicates improving trend (decrease) in concentrations
- Indicates worsening trend (increase) in concentrations

Impairment
Invert Bio = Invertebrate biota
Fish Bio = Fish biota
FC = Fecal coliform bacteria
PCB-F = PCBs in fish tissue
Hg-F = Mercury in fish tissue

Lakes

Lakes throughout Anoka County range from A to F for letter grades based on eutrophication standards and the metro-area lake grading system developed by the Metropolitan Council. The nature of the grade for a lake in any particular setting is very lake specific and cannot be determined by things like development in the watershed or around the lake. For example, Laddie Lake in a highly urbanized area of Blaine and Spring Lake Park consistently achieves A and B letter grades, while Typo Lake in the very rural area of Linwood township with little development consistently receives F letter grades. Conversely, Highland and Sullivan lakes in a very urbanized area of Columbia Heights consistently score in the D and F ranges, while East Twin Lake in rural Nowthen achieves A grades. Table 4-4 shows the water quality of lakes monitored in Anoka County over the past decade as well as trends for total phosphorus and chlorophyll-a concentrations.

In general, more lakes are improving in water quality than declining. This is likely due to a number of factors including:

- Increased regulation for stormwater quality draining to lakes,
- Implementation of targeted watershed projects aimed at improving lake health,
- In-lake projects like carp management and alum treatment having very immediate effects on nutrient concentrations and water clarity, and
- Increased knowledge and stewardship by lakeshore owners

While this trend is positive, the recent water quality grades in Table 4-4 show that a significant need remains. We will continue to make the improvement of lake water quality a focus of our efforts over the coming decade and beyond.

LAKESHORE RESTORATION

Lakeshore restorations eliminate the most direct source of sediment to a lake and enhance riparian habitat. They also empower lakeshore owners to make a difference on their lake.

Figure 4-6: Restored lakeshores

Table 4-4: Lake water quality of sampled lakes

Lake	Acres	Last Year Monitored	Phosphorus Average (ug/L)	Recent Grade	Phos. Trend	Chl-a (Algae) Average (ug/L)	Chl-a trend
Boot	92	2019	43.3	C	n/a	6.6	n/a
Cenaiko	31	2020	13.0	A	n/a	2.7	n/a
Centerville*	472	2019	58.0	C	-	33.0	-
Coon East	412	2018	19.4	A	+	6.7	+
Coon West	1092	2018	21.4	A	n/a	6.9	n/a
Crooked	115	2020	23.6	A	+	9.7	+
East Twin	97	2017	21.7	A	=	3.9	+
Fawn	50	2019	17.1	A	=	4.0	=
George Watch*	486	2018	155.0	F	=	52.0	=
Golden*	59	2019	33.0	C	+	9.0	+
Ham	177	2020	21.7	A	+	9.2	+
Highland	15	2019	190.2	F	n/a	139.8	n/a
Howard*	433	2019	64.0	C	=	19.0	=
Laddie	67	2020	23.6	B	=	7.6	=
George	470	2020	20.0	A	-	8.0	=
Linwood	559	2018	34.4	C	=	20.2	=
Locke*	23	2019	115.0	D	=	24.0	=
Martin	218	2020	57.0	C	=	31.4	=
Moore, East*	28	2019	58.0	C	n/a	25.0	n/a
Moore, West*	68	2018	23.0	B	n/a	7.0	n/a
Netta	162	2019	21.8	A	+	3.5	+
Peltier*	574	2019	145.0	D	+	43.0	=
Pickerel	236	2014	16.4	A	n/a	1.6	n/a
Rice*	442	2019	196.0	F	=	65.0	=
Round	253	2019	22.7	A	=	5.1	=
Spring*	47	2019	35.0	C	=	5.0	=
Sullivan	13	2019	105.0	D	n/a	47.8	n/a
Sunfish/Grass	35	2018	33.2	B	n/a	8.1	n/a
Sunrise	159	2019	39.1	B	n/a	21.0	n/a
Typo	280	2020	220.0	F	=	73.5	=

* Sampled by RCWD

Grade

Grade is determined by the most recent summer-average for phosphorus. The scale used to assign grades is the same used by Metropolitan Council.

Phosphorus Trend

+ Indicates improving trend (decrease) in phosphorus

- Indicates worsening trend (increase) in phosphorus

= Indicates no trend

Aquatic Invasive Species (AIS)

Aquatic Invasive Species (AIS) are a constant threat to surface waters that continues to loom larger as the list of invading species grows along with the list of infested waters. AIS negatively affect native plants and animals through direct competition, they can actively degrade water quality, and many are a hindrance to recreation. A full and current list of infested waters is available on the MN DNR website.

The list of invasive species already observed in Anoka County waterways includes:

- Eurasian watermilfoil,
- Curly-leaf pondweed,
- Purple loosestrife,
- Flowering rush,
- Common carp,
- Chinese mystery snails,
- Banded mystery snails,
- Rusty crayfish, and
- Zebra mussel.

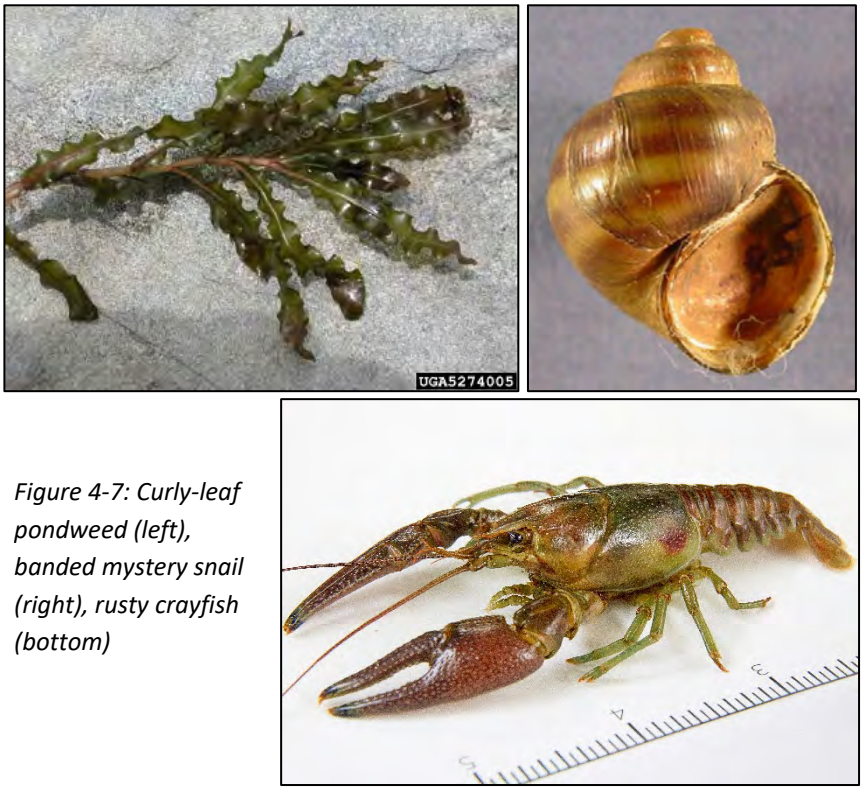


Figure 4-7: Curly-leaf pondweed (left), banded mystery snail (right), rusty crayfish (bottom)

While this list may appear extensive, the reality is this list is a small subset of the invasive species currently being spread throughout Minnesota waterways. The effort to combat this spread is ongoing, and designed to delay the spread until biological controls can be developed. Biological controls are the best long term solution to keep invasive species in check. In the meantime, resisting the slow march of invaders is akin to taking precautions while waiting for a vaccine to be developed. Anoka County is the lead entity in charge of preventing the spread of new AIS into waterways. They focus on lakes and rivers with boat launches that are heavily utilized.

Eurasian milfoil and curly-leaf pondweed are the most prominent problems. Currently, 13 lakes in Anoka County are listed for infestations of Eurasian milfoil. Curly-leaf pondweed is also present in numerous lakes in Anoka County, and often the two plants co-exist. Both of these invaders grow fast and large and tend to create floating mats that shade out other species and create a nuisance for boaters. Recent DNA analysis shows that Eurasian milfoil is also hybridizing with native milfoils, causing additional complication for identification, mapping, and treatment of the invasive plant. Curly-leaf pondweed is best known for extracting nutrients out of the lakebed, dying back early and releasing all of those nutrients into the water in early summer to feed algae blooms.

Common carp are present in most Anoka County lakes, but only appear to be causing issues in a couple. Shallow lakes in particular are susceptible to the negative impacts of carp because carp stir up the bottom while uprooting vegetation. These fish are also very inefficient consumers meaning they deposit large amounts of nutrients back into the water. This leads to shallow lakes that are extremely murky with little vegetation and high nutrients. Lakes in eastern Anoka County are especially impacted by carp infestations.

Hydrology

Water Volume and Rate

Impervious surfaces, channelized waterways, and stormwater conveyance systems move more water at a faster rate than a natural landscape would. Additionally, increasingly intense rain events increase stormwater runoff.

Increased rates and volumes of water exert more erosive energy on the outside bend of riverbanks. Failing riverbanks threaten infrastructure and lower property values while diminishing water quality. Management of stormwater in developed setting should focus on capturing and retaining as much water as possible as close as possible to where it falls.

Even with increased precipitation, Anoka County experiences little flooding due to the high infiltration rate of our native sandy soils and large wetland complexes that attenuate stormwater. Localized flooding occurs in some developed areas that have undersized stormwater conveyance systems. Larger rivers occasionally spill over into their floodplains, but most infrastructure is outside of the flood zone and rarely damaged.

Wetland Loss

Minnesota has lost approximately half of its wetlands since European settlement, and Anoka County is no exception. Historically, losses were primarily from drainage ditches and limited subsurface tiles for agricultural purposes. As Anoka County continued to be developed, the losses shifted to filling for roadway, residential, and commercial construction. Post 1991, losses were stemmed by the Wetland Conservation Act which requires 2:1 replacement. Threats to remaining wetlands in Anoka County are increased demand for housing and continued development, degradation from lack of or altered hydrology, and invasive vegetation (e.g. reed canary grass, glossy buckthorn).

Shoreland Stewardship

Lakeshore development and clearing is a significant stressor on Anoka County waterbodies. Shoreline inventories on developed lakes have shown that around many such lakes, 60% or more of shorelines are developed, and turf grass is often 25% or more of the shoreline cover type. Such disturbance results in habitat loss, loss of vegetated buffers to filter runoff, and shoreline erosion.

Addressing shoreline stewardship problems requires a variety of approaches. Stewardship must balance the recreational and aesthetic desires of lakeshore property owners with the health of the waterbody. Most shorelines are privately owned, so there are thousands of individual land managers responsible for stewardship. Working with these owners can include outreach and education as well as on-the-ground project support.

Emerging Issues

Climate change

Climate change can have several impacts to surface waters. First, our area is experiencing more frequent and intense rainfalls, sometimes termed mega-storms. In part, this is evidenced by updates to precipitation probability statistics generated by state and federal agencies. Secondly, warmer winters may result in different timing and intensities of spring snowmelt runoff. Finally, warmer ambient temperatures may have resounding effects on water chemistry, biogeochemical functions, and ecology.

Chloride in surface water

Many local waterbodies have shown an increasing trend in chlorides, and chloride concentration is correlated with road density. As Anoka County continues to be developed, chlorides will likely be a growing concern. Excess chlorides can affect aquatic life. Chlorides can come from multiple sources, but road deicing salts and water softener discharge are often two of the largest in most areas. Because chlorides persist and do not break down in the environment, prevention is key.

Development and Redevelopment of Shorelines

Many lakeshore areas that are ideal for homes have been developed already. Now, there is pressure to develop less-than-ideal lakeshore parcels or waterbodies that are shallow and not well suited to recreation, yet owners often carry high expectations for recreational use. Attempts to make these waterbodies and their shorelines recreationally accessible can result in legal or illegal conversion of shoreline and near-shore habitats. Conversion of small cabins to large year-round homes can create denser shoreline development with additional impervious surfaces. Often, further development of shorelines results in less aquatic and riparian vegetation and habitat.

Contaminants of Emerging Concern

The effects of some chemicals and pharmaceuticals in the environment are poorly understood and may have significant negative impacts on surface waters and aquatic biota. For example, a study conducted by the USGS on major river systems throughout the U.S., including the Mississippi River in Minnesota, found intersex fish (primarily bass) in all portions of the country except Alaska. In most cases, these intersex fish were males that had developed female reproductive cells (Hinck, 2009). These chemicals may originate from land runoff or from wastewater (certain contaminants may not be adequately removed by wastewater treatment). The persistence of these contaminants in waterways overtime may have lasting, albeit currently unknown, effects on the human population as well.

Threats to Surface Water Benefits

Table 4-5 shows the threats to surface water benefits as ranked by the Matrix by return on investment. Addressing any individual threat will have benefits for multiple resource types.

Table 4-5: Threats to surface water benefits

Threats	**Biogeochemical function (nutrient cycling and pollutant remediation)**	**Consumption**	**Flood mitigation (precipitation storage and convevance)**	**Flora and fauna**	**Hydrologic function (groundwater recharge)**	**Recreation - water (e.g. swimming and boating)**	**Grand Total**
Contaminants - sediment	9.04%	0.00%	1.33%	3.88%	0.00%	5.97%	20.22%
Impervious surfaces - block infiltration	0.00%	0.00%	0.00%	0.00%	15.68%	0.00%	15.68%
Contaminants - nutrient excess	8.14%	0.00%	0.00%	1.88%	0.00%	5.30%	15.32%
Grading	0.00%	0.00%	4.72%	0.00%	9.30%	0.23%	14.26%
Impervious surfaces - increase runoff	0.00%	0.00%	8.90%	0.00%	0.00%	0.00%	8.90%
Ditching	1.68%	0.00%	2.24%	0.84%	4.10%	0.00%	8.86%
Impervious surfaces - replace biota	0.00%	0.00%	0.00%	4.66%	0.00%	0.00%	4.66%
Invasive species	1.09%	0.00%	0.00%	1.69%	0.00%	0.72%	3.50%
Contaminants - anthropogenic toxins	0.95%	0.03%	0.22%	1.17%	0.00%	0.31%	2.68%
Hydrologic regime altered	0.00%	0.00%	0.65%	0.06%	0.89%	0.00%	1.59%
Contaminants - bacteria	0.09%	0.00%	0.00%	0.03%	0.00%	1.19%	1.31%
Clearing	0.00%	0.00%	0.00%	1.21%	0.07%	0.00%	1.28%
Hydrologic barrier	0.00%	0.00%	0.62%	0.24%	0.08%	0.00%	0.95%
Groundwater withdrawal	0.00%	0.00%	0.00%	0.27%	0.00%	0.10%	0.37%
Climate change	0.03%	0.00%	0.00%	0.02%	0.18%	0.00%	0.23%
Impervious surfaces - contamination	0.00%	0.00%	0.00%	0.02%	0.00%	0.11%	0.13%
Demand excess	0.00%	0.00%	0.00%	0.00%	0.00%	0.05%	0.06%
Contaminants - emerging concern	0.00%	0.01%	0.00%	0.00%	0.00%	0.00%	0.01%
Grand Total	**21.02%**	**0.04%**	**18.70%**	**15.95%**	**30.29%**	**13.99%**	**100.00%**

SURFACE WATER STEWARDSHIP STRATEGIES

ACCOMPLISHMENTS FROM THE LAST PLAN

Of the four resource types managed by ACD, surface water received the most focus, funding, and effort under our previous plan. Figure 4-8 shows a couple of surface water projects implemented during the previous plan. Since 2015, ACD's accomplishments toward surface water goals have included:

- Monitored >65 sites on lakes and streams for water quality (see Map 4-4: Monitoring sites).
- Monitored stream hydrology and developed rating curves across the county.
- Monitored a network of >20 reference wetland continuous level logging stations.
- Managed a network of volunteers monitoring lake levels and precipitation throughout the year.
- Conducted or contributed to 12+ Total Maximum Daily Load (TMDL) studies.
- Subwatershed analysis, BMP modeling, and project ranking in eight high priority subwatersheds.
- Contributed to Watershed Restoration and Protection Strategies (WRAPS) reports for the Rum River and Sunrise River watersheds.
- Installed, designed, and/or funded >70 surface water BMPs including shoreline restorations, streambank stabilizations, curb-cut rain gardens, iron-enhanced sand filters, pond modifications, carp barriers and removals, and others.
- Conducted annual outreach and education aimed at target audiences including shoreline property owners, public officials, and others.
- Implemented the Wetland Conservation Act
- Implemented the State Buffer Law.

Figure 4-8: Top to bottom: carp harvest, lakeshore restoration, streambank stabilization

PRIORITIZATION

Using The Matrix, we can prioritize programs to achieve surface water goals with considering return on investment (ROI). Twenty-three programs were identified as contributing to the achievement the surface water objectives. By querying for programs that achieve 93% of the total ROI, we reduce the list to ten. Table 4-6 below shows the high ROI priority program list and the ROI achieved for each goal as well as the cumulative ROI achieved for all surface water goals. A detailed list of actions indicating the type of work to prioritize under each program and the return on investment for each of those actions can be found in Table 4-7 at the end of this chapter. Individual tasks as well as the staffing and budgetary requirements to implement them will be in ACD's annual plans.

Table 4-6: Priority programs to achieve surface water goals

Program	Biodiversity - sustain and restore	Biodiversity for recreation - sustain and restore	Groundwater quality for consumption - sustain and restore	Hydrologic function (groundwater recharge) - sustain and restore	Runoff storage and conveyance - sustain and restore	Surface water biogeochemical functions - sustain and restore	Surface water quality for consumption - sustain and restore	Surface water quality for recreation - sustain and restore	Grand Total
Land protection	4.53%	0.10%	0.00%	16.53%	10.19%	0.15%	0.00%	0.09%	31.59%
Stormwater BMPs	2.06%			4.14%	1.73%	5.51%		4.11%	17.54%
Shore and bank BMPs	2.20%	0.00%	0.00%	0.00%	0.00%	5.18%	0.00%	3.22%	10.60%
Surface water monitoring	0.75%			2.05%	1.34%	2.13%		1.88%	8.14%
Regulatory assistance	1.40%	0.00%	0.00%	1.43%	1.60%	0.66%	0.00%	1.79%	6.88%
Development standards	0.07%			0.55%	1.91%	1.68%		1.16%	5.37%
Ecological restoration	1.31%	0.00%	0.00%	1.53%	0.96%	0.72%	0.00%	0.00%	4.52%
Hydrologic enhancement	0.36%			1.51%	1.39%	0.70%			3.95%
Aquatic invasive species control	1.62%	0.00%	0.00%	0.00%	0.00%	1.03%	0.00%	0.69%	3.34%
Targeted pollutant management	0.08%		0.04%			0.78%	0.09%	0.65%	1.64%
Grand Total	**14.38%**	**0.10%**	**0.04%**	**27.74%**	**19.12%**	**18.54%**	**0.09%**	**13.59%**	**93.57%**

Implementation – Priority Programs

Implementation of priority programs with a high ROI identified by the Matrix will be a primary focus of ACD in the coming decade. Below is a description of those priority programs. Each program includes a suite of related projects and the services (consult, design, cost share, manage, etc.)

Land Protection

Permanently protecting natural landscapes ensures that water falling on those landscapes will remain unpolluted, have the greatest chance of infiltrating, and will travel to receiving surface waters at a natural rate. Several approaches to land protection are available including:

- Opens space design development
- Conservation easements
- Fee title acquisition

Stormwater BMPs

Stormwater BMPs include a variety of practices that manage stormwater runoff to improve water quality and reduce flooding. Stormwater BMPs vary in scale form regional ponds to front yard biofiltration basins. Their effectiveness varies not only by scale, but also by functional components and by the target pollutant. Some of the most effective stormwater BMPs are:

- Bioinfiltration
- Stormwater ponds (new and retrofits)
- Biofiltration
- Adopt a drain promotion
- Street sweeping promotion

Shore and Bank BMPs

Shore and bank BMPs often involve addressing active erosion on lake shorelines or riverbanks. Mild erosion may be addressed with minimal site disturbance and vegetative practices, where as severe erosion, particularly in areas where infrastructure is threatened, often requires hard armament. Another effective practice is to install or enhance vegetative buffers to intercept overland flow before it enters the lake or river. Not only do buffers filter nutrients and other contaminants from runoff, but they also provide valuable root structure to help hold the bank in place.

Surface Water Monitoring

No single surface water monitoring program component ranks out well in terms of ROI. Regardless of this, they are essential to inform other programs, targeting and to measure pace of progress. ACD maintains a robust county-wide surface water resource monitoring program that covers the following:

- Precipitation monitoring and analysis
- Stream water quality
- Stream biomonitoring
- Stream hydrology including hydrographs and rating curves
- Lake levels
- Lake water quality
- Wetland level

Regulatory Assistance

Providing assistance with implementation of environmental laws and rules helps to secure the benefits for which the laws were passed. SWCD have a mandated role to play in the Buffer Law and the Wetland Conservation Act while providing a supporting role in Shoreland ordinances and the Soil Loss Law.

BIOINFILTRATION VS. BIOFILTRATION

They may look similar, but

Bioinfiltration basins capture stormwater and infiltrate it into the ground preventing this water and its pollutants from washing downstream and infiltrating groundwater at the same time. Our sandy soils allow us to install this type of rain garden across much of the County.

Biofiltration basins use a special media to filter pollutants out of stormwater before sending it downstream via the storm sewer. We install these rain gardens where water tables are high, or soils are not conducive to infiltration.

Both are great, low impact practices that clean up stormwater!

Buffer Law

Implementation of the Buffer Law throughout Anoka County largely falls on ACD, other than actual enforcement action. ACD works with Anoka County landowners for 100% compliance in a friendly and effective way to reduce sediment, nutrient and anthropogenic toxin loading into ditch systems. Map 4-7 shows surface waters in Anoka County that require riparian buffers under the Minnesota Buffer Law.

Wetland Regulation

Assisting local government units with the technical aspects of implementing the Wetland Conservation Act (WCA) provides checks and balances to ensure that WCA is implemented effectively and at the highest standard. It remains vital to ACD's surface water stewardship goals to implement WCA and protect the wetlands that remain in Anoka County

Shoreland Ordinance Regulation

Shoreland ordinances protect waterbodies and riparian areas from encroachment, erosion, and habitat loss. ACD is well positioned to identify violations and provide regulatory guidance to landowners.

Development Standards

Anoka County is a construction hot zone. Ideally, new developments would maintain onsite stormwater storage and infiltration, preserve soil health, minimize clearing and grading, and control construction site erosion and sediment. Packaged together, these are often referred to as Minimum Impact Design Standards (MIDs). MIDs ensures that development is designed in a way to maximize storage, infiltration, and treatment of stormwater in newly developed landscapes to mimic the natural hydrology of those landscapes before development. Getting communities throughout Anoka County to adopt these standards and helping to guide them through the process of implementing them would help negate the negative effects of continued development on our surface waters.

Ecological Restoration

Many of the benefits associated with surface water are intrinsic in nature, such as biological diversity. To achieve maintain and enhance these benefits ecological restoration ranks highly. Ecological restoration, when it also involves hydrologic restoration such as the case with wetland restorations, may also water storage and treatment. Futhermore, restoration of terrestrial habitat can improve stormwater infiltration and filtration, improving surface water quality. Healthy ecosystems have also been shown to be more resistant to infestation by invasive species.

Hydrologic Enhancement

Restoring natural hydrology to altered systems can result in multiple benefits including attenuating flooding, reducing erosion. restoring habitat, and capturing contaminants. Examples include:

- Two-stage ditches
- Ditch remeandering
- Stream grade stabilization
- Ditch abandonment

Map 4-6 shows the extensive network of altered waterways in Anoka County.

Aquatic Invasive Species Control

Aquatic invasive species (AIS) management is a waterbody-specific endeavor due to the variability in infestation and effects that any particular invasive species may have on a waterbody. Specifically managing carp and curly-leaf pondweed in shallow lakes is very effective way to bring lakes infested with these species back to a higher quality state.

In the fight against invasive species, biological controls are optimal. After arduous long-term testing and analysis to ensure release of vectors won't harm other native species, state biologist introduce vectors into invasive species populations. They can be insects, fungi, bacteria, or other organisms that are able to keep the invading species population in check. Much of AIS management is designed to keep AIS at bay until biological controls are developed. Preventing the spread of AIS to new waterbodies requires a different mindset.

Targeted Pollutant Management

Some problems and solutions are confined to one or two pollutants of concern. E.g., an otherwise clear lake can have beach closures due to bacteria concentrations. A lake with good quality incoming water can have poor water quality due to resuspension of nutrients in the lakebed. In these cases, a biochar system or Aluminum sulfate (alum) treatment may be warranted respectively. Each project is optimized to remediate highly targeted pollutants. Iron-enhanced sand filters (IESFs) are an example of another project type that is specifically designed to capture dissolved phosphorus.

Prior to implementing targeted pollutant management systems, it is critical to complete analysis to identify the source of the pollutant a feasibility study to ensure the project is of the correct scope and scale to succeed at meeting objectives.

Suface Water Planning

Like surface water monitoring, planning does not rank highly in terms of ROI. This is due to is not actually resulting in tangible improvements to the resources. Surface water planning is critical however, to gather stakeholder input, identify and rank priorities, and identify and rank potential projects and programs based on cost-effectiveness. Examples of surface water plans are:

- Subwatershed analyses
- Water resource stewardship plans
- Watershed Restoration and Protection Plans

STREAMBANK STABILIZATION

Severely eroding streambanks cause sedimentation and nutrient loading. To correct and protect these banks, geotechnical engineering and hard armoring are required. These projects protect our river water quality and property from washing away.

Figure 4-9: Streambank stabilizations on the Rum River

TARGETING

ACD uses the most up to date analysis and modelling to determine the highest priority water bodies, the most cost-effective projects, and the most effective locations for those projects. The following methods are used for targeting surface water implementation actions:

- Water quality monitoring and analysis
- Shoreline erosion inventories
- AIS inventories
- Subwatershed analysis
- Cost-benefit analysis
- Stakeholder and partner input

Targeted locations for project installation include waterbodies where:

- Stewardship or targeting studies are complete
- There is public access and recreation potential
- Measurable progress toward goals is likely
- Support exists from agency partners, community groups and the public
- Impaired waterbodies could realistically be delisted through stewardship. Nutrient impairments are prioritized over biotic or bacterial impairments.
- A declining water quality trend exists but a waterbody is not yet impaired
- A short or long term threat exists
- Where downstream waterbodies will also benefit and are priorities
- Local jurisdictional agencies lack the capacity (e.g. staffing, funding, political will)

SUPPORTING ANALYSES

The following is a list of work products that are completed, underway or planned wherein multiple projects have been identified. All of these work products are for resources of high priority and as such, all projects identified therein are considered high priorities for installation. The most cost-effective projects should be pursued first however.

Lakeshore and Riverbank Inventories

- Centerville Lake
- Coon Lake
- Crooked Lake
- East Twin Lake
- Fawn Lake
- Lake George
- Ham Lake
- Linwood Lake
- Martin Lake
- Mississippi River
- Rum River
- Typo Lake

Subwatershed Retrofit Analyses

- Rice Lake
- Sand Creek
- Woodcrest Creek
- Lower Coon Creek
- Martin Lake
- Golden Lake
- Oak Glen Creek
- Coon Lake
- Moore Lake
- Middle Coon Creek
- Springbrook
- Stonybrook
- Pleasure Creek
- South Columbia Heights/ North Minneapolis
- Lake George
- Centerville Lake
- Peltier Lake
- Ditch 20 to Typo Lake

- Highland/Sullivan Lake
- Lower River Creek
- West Ford Brook

TMDL/WRAPS Reports and Implementation Plans

- Golden Lake TMDL
- Martin and Typo Lakes TMDL
- Peltier and Centerville Lakes TMDL
- Lake Pepin TMDL
- Hardwood Creek TMDL
- South Metro Mississippi River TMDL
- Sunrise River WRAPS
- Rum River WRAPS
- Coon Creek WRAPS
- Lower St. Croix 1W1P
- Rum River 1W1P

Water Resource Investigations

- Crooked Lake Management Plan
- Ham Lake Management Plan
- Golden Lake Alum Treatment Feasibility Analysis
- Linwood Lake Carp Management Feasibility Analysis
- Martin and Typo Lakes Carp Management Feasibility Analysis

MEASUREABLE OUTCOMES

- Impaired waters delisted
- Waters that are nearly impaired or with declining trends prevented from impairment
- Acres of wetland – no net loss
- Streambank miles restored
- Annual pollutant load reductions from BMPs, both direct and stormwater BMPs
- Number of BMPs of each type installed
- Gallons infiltrated annually from new infiltration BMPs
- Any numeric water quality goals achieved

SURFACE WATER UNMET NEED

Unmet needs in surface water stewardship were a discussion point during the two TAC meetings for the preparation of this plan. The gaps identified by TAC members included the following:

Data Gaps

Though surface water has been monitored more than other resources in Anoka County, there remains numerous gaps or shortcomings in surface water data and analysis that present obstacles to effective stewardship. Some of those gaps include:

- Lack of data or standardized data gathering
- Lack of deeper analysis of data collected for understanding of causes or sources
- Inconsistent monitoring among state, county, watershed, and SWCD staff
- Absence of monitoring data due to limited resources

In partnership with the Twin Cities Water Monitoring and Data Assessment Group, ACD is attempting to address this gap.

Long-Term BMP Maintenance

With routine maintenance, BMPs should function well beyond their intended useful life, providing additional benefits for minimal cost. During the early establishment phase of a project there is often need for minor adjustments. Following that, it's critical to identify and act on needed maintenance. Many landowners don't have the technical or financial means to address these issues and grants don't allow for funds to be used for long term maintenance. As a minimum, sites must be regularly inspected by a trained technician to prescribe

detailed maintenance actions and provide the landowner training if necessary. Funds for inspection and maintenance guidance are also not available.

Plan Coordination and Integration

Water resource and watershed planning in Minnesota is a complex network of state rules, county water plans, watershed district and organization water stewardship plans, MS4 stormwater management plans, and SWCD comprehensive and annual plans. Any number of these plans may overlap the same water resources with different goals, objectives, strategies, and requirements in place.

To coordinate and integrate water stewardship throughout Minnesota, the state has implemented a new framework of watershed planning called One Watershed, One Plan (1W1P). Under 1W1P, all government units responsible for managing water resources in a given watershed collaborate on and adopt the same water stewardship plan. Each is free to implement the stewardship actions in their jurisdictions, but the goals and anticipated outcomes for the watershed as a whole remain consistent.

ACD is involved in the development and implementation of 1W1P for the Lower St. Croix River (approved) and the Rum River (under development). These larger, watershed based plans will serve as a guide to watershed stewardship for over half of Anoka County moving forward. As of yet, no 1W1P effort has been initiated for the Mississippi River – Twin Cities watershed.

Surface Water Stewardship Literacy and Ethic

Most of Anoka County is privately owned by our 350,000 residents. Each of them carries with them a base of knowledge or misinformation, a history of good land stewardship or disregard, and a sense of obligation to others or not. Among them, you find farmers, business owners, community leaders, elected officials, agency staff, etc. If all of these 350,000 residents were excellent stewards, this plan would be unnecessary because the problems would go away. If all of them were terrible stewards, this plan would be pointless because no degree of implementation effort could reverse the tide of degradation.

The TAC members summarized the following as the primary engagement or education hurdles for surface water stewardship in Anoka County:

- Unrealistic expectations for resources (e.g. expecting lakes to be like pools)
- Underestimated value of resources to the individual (“Doing that won’t make my life any better.”)
- Poor land stewardship legacy (“I do things like my parents did.”)

To help overcome these hurdles to education and expectations, ACD now has a full-time Outreach and Engagement Coordinator who coordinates the Anoka Water Resource Outreach Collaborative.

Needed Implementation Assets

Some of the key assets that require additional resources or development for effective implementation are outlined below.

Support

Surface water stewardship enjoys broad-based support from the public, community leaders, and elected officials. ACD is not, however, regarded as a co-equal partner in the effort to manage our surface water resources by all other local entities. This creates some conflict and missed opportunity.

Capacity

Funding opportunities to build and maintain technical expertise and surface water resource stewardship projects are numerous. Covering the cost of public outreach and engagement staffing and direct expenses is far more challenging, in part due to the nature of outreach being to prevent problems as opposed to remediating

existing problems. Local partners value the role of outreach as an implementation activity and may be able to pool resources to maintain this capacity.

Awareness

While the data and science of surface water resource stewardship is robust and ever expanding, the level of literacy on the part of the public, community leaders, and public officials remains modest. Due to the scope and complexity of surface water resource stewardship, a sustained and comprehensive strategy to improve literacy of non-professionals is critical.

Jurisdiction

There is sufficient jurisdiction for ACD to manage surface water resources, both directly and through partnerships with other government units.

Surface Water Governance

The structure of surface water stewardship from the federal level to the local level is extensive. A graphic of the hierarchy of surface water stewardship in Minnesota can be found in the appendix.

Local stewardship of surface water resources in Anoka County lies primarily with the two watershed districts and five watershed management organizations that each cover a portion of the county. Map 4-5 shows the jurisdictional areas covered by each of these entities in Anoka County. ACD serves in a primarily support capacity to each of these entities albeit in varying degrees for each. For the Coon Creek Watershed District, Rice Creek Watershed District, and Mississippi WMO, that support typically includes contracted services like water resource monitoring and analysis, partnering on subwatershed analyses, and implementing projects that support the goals of water resource stewardship within the watersheds. These entities all have in-house staff with considerable resources to implement water stewardship plans and priorities.

The Upper Rum, Lower Rum, and Sunrise River WMOs on the other hand do not have dedicated staff to implement their water resource plans. For these entities, ACD tends to provide a much more robust suite of services that additionally may include leading feasibility studies, applying for grant funding on behalf of the organizations, managing project installation for the organizations, maintaining websites, and drafting water resource stewardship plans. Because so little of the Vadnais Lake Area WMO area intersects Anoka County (approximately 1,000 acres), ACD has not performed a lot of work in this watershed.

The minimum standards that must be enforced by each of these watershed entities related to surface water quality goals, stormwater management, and construction site erosion and sediment control are dictated by the state. Additionally, jurisdiction over activities occurring below the ordinary high water level (OHW) in Waters of the State lies with the state.

RESOURCES - LINKS TO OTHER REPORTS, STUDIES, RESOURCES

Rum River Watershed Restoration and Protection Strategies (WRAPS), Total Maximum Daily Load (TMDL) Study, and Stressor Identification Report. https://www.pca.state.mn.us/water/watersheds/rum-river

Lower St. Croix One Watershed, One Plan https://www.lsc1w1p.org

Rum River One Watershed, One Plan (anticipated to be complete in 2022) https://www.millelacsswcd.org/rum-river-one-watershed-one-plan/

Anoka Water Almanacs – annual reports of water monitoring by the ACD https://www.anokaswcd.org/technical-support/reports.html

Subwatershed Assessment Reports https://www.anokaswcd.org/technical-support/reports.html

Streambank and Lakeshore Condition Inventories https://www.anokaswcd.org/technical-support/reports.html

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SURFACE WATER STEWARDSHIP ACTION TABLE BY ROI

Table 4-7: Surface water stewardship programs and actions

Program and Related Action	Biodiversity - sustain and restore	Biodiversity for recreation - sustain and restore	Groundwater quality for consumption - sustain and restore	Hydrologic function (groundwater recharge) - sustain and restore	Runoff storage and conveyance - sustain and restore	Surface water biogeochemical functions - sustain and restore	Surface water quality for consumption - sustain and restore	Surface water quality for recreation - sustain and restore	Grand Total
Land protection	**4.53%**	**0.10%**	**0.00%**	**16.53%**	**10.19%**	**0.15%**	**0.00%**	**0.09%**	**31.59%**
Ag. land retirement and restoration program - promote	0.05%					0.15%		0.09%	0.29%
Conservation easement - fund	0.02%	0.00%	0.00%	0.05%	0.03%	0.00%	0.00%	0.00%	0.09%
Conservation easement - hold	0.97%			2.55%	1.61%				5.13%
Conservation easement - manage	0.01%	0.00%	0.00%	0.04%	0.02%	0.00%	0.00%	0.00%	0.07%
Conservation easement - promote	0.10%			0.26%	0.16%				0.51%
Fee title land acquisition - fund	0.02%	0.00%	0.00%	0.09%	0.06%	0.00%	0.00%	0.00%	0.16%
Fee title land acquisition - hold	1.09%			4.85%	3.06%				9.00%
Fee title land acquisition - manage	0.02%	0.00%	0.00%	0.07%	0.04%	0.00%	0.00%	0.00%	0.13%
Land protection - maintain	0.73%			2.91%	1.84%				5.47%
Land protection - plan	0.08%	0.03%	0.00%	0.23%	0.06%	0.00%	0.00%	0.00%	0.42%
Land protection compliance - inspect	0.36%			1.45%	0.92%				2.74%
Land protection opportunity - analyze	0.16%	0.07%	0.00%	0.47%	0.13%	0.00%	0.00%	0.00%	0.83%
Land protection violation compliance - guide	0.85%			3.39%	2.14%				6.38%
Open space design development - advocate	0.06%	0.00%	0.00%	0.13%	0.08%	0.00%	0.00%	0.00%	0.27%
Open space design development ordinance - prepare	0.02%			0.05%	0.03%				0.11%
Stormwater BMPs	**2.06%**	**0.00%**	**0.00%**	**4.14%**	**1.73%**	**5.51%**	**0.00%**	**4.11%**	**17.54%**
Adopt a drain - promote	0.02%					0.06%		0.07%	0.15%
Biofiltration - cost share	0.05%	0.00%	0.00%	0.00%	0.00%	0.14%	0.00%	0.08%	0.27%
Biofiltration - design	0.03%					0.09%		0.05%	0.18%
Biofiltration - evaluate	0.06%	0.00%	0.00%	0.00%	0.00%	0.15%	0.00%	0.09%	0.30%
Biofiltration - maintain	0.35%					0.91%		0.54%	1.80%
Biofiltration - promote	0.06%	0.00%	0.00%	0.00%	0.00%	0.15%	0.00%	0.09%	0.30%
Biofiltration install - manage	0.04%					0.11%		0.06%	0.21%
Bioinfiltration - cost share	0.07%	0.00%	0.00%	0.35%	0.06%	0.19%	0.00%	0.12%	0.78%
Bioinfiltration - design	0.04%			0.24%	0.04%	0.13%		0.08%	0.52%

Program and Related Action	Biodiversity - sustain and restore	Biodiversity for recreation - sustain and restore	Groundwater quality for consumption - sustain and restore	Hydrologic function (groundwater recharge) - sustain and restore	Runoff storage and conveyance - sustain and restore	Surface water biogeochemical functions - sustain and restore	Surface water quality for consumption - sustain and restore	Surface water quality for recreation - sustain and restore	Grand Total
Bioinfiltration - evaluate	0.07%	0.00%	0.00%	0.39%	0.06%	0.21%	0.00%	0.13%	0.87%
Bioinfiltration - maintain	0.44%			2.36%	0.39%	1.26%		0.77%	5.21%
Bioinfiltration - promote	0.07%	0.00%	0.00%	0.39%	0.06%	0.21%	0.00%	0.13%	0.87%
Bioinfiltration install - manage	0.05%			0.28%	0.05%	0.15%		0.09%	0.61%
Hydrodynamic device - cost share	0.01%	0.00%	0.00%	0.00%	0.00%	0.03%	0.00%	0.02%	0.07%
Hydrology and hydraulics study - analyze				0.07%	0.05%				0.12%
New pond - cost share	0.03%	0.00%	0.00%	0.00%	0.02%	0.06%	0.00%	0.00%	0.11%
New pond install - manage	0.02%				0.01%	0.05%			0.08%
New pond opportunity - analyze	0.03%	0.00%	0.00%	0.00%	0.02%	0.07%	0.00%	0.00%	0.11%
New pond performance - evaluate	0.10%				0.04%	0.17%			0.32%
Pond modification - design	0.03%	0.00%	0.00%	0.00%	0.00%	0.07%	0.00%	0.04%	0.14%
Pond modification - evaluate	0.04%					0.12%		0.07%	0.23%
Pond modification - fund	0.04%	0.00%	0.00%	0.00%	0.00%	0.11%	0.00%	0.06%	0.21%
Pond modification - manage	0.30%					0.82%		0.50%	1.62%
Pond modification opportunity - analyze	0.02%	0.00%	0.00%	0.00%	0.00%	0.05%	0.00%	0.03%	0.09%
Pond modification opportunity - inventory	0.01%					0.04%		0.02%	0.07%
Stormwater pond - evaluate	0.00%	0.00%	0.00%	0.00%	0.30%	0.00%	0.00%	0.32%	0.62%
Stormwater pond - maintain					0.61%			0.64%	1.25%
Stormwater treatment infrastructure - inventory	0.01%	0.00%	0.00%	0.06%	0.02%	0.04%	0.00%	0.02%	0.15%
Street sweeping - promote	0.05%					0.14%		0.08%	0.27%
Shore and bank BMPs	**2.20%**	**0.00%**	**0.00%**	**0.00%**	**0.00%**	**5.18%**	**0.00%**	**3.22%**	**10.60%**
Lakeshore condition - inventory	0.03%					0.08%		0.05%	0.17%
Lakeshore soil loss - analyze	0.04%	0.00%	0.00%	0.00%	0.00%	0.11%	0.00%	0.07%	0.22%
Lakeshore stabilization - cost share	0.05%					0.13%		0.08%	0.25%
Lakeshore stabilization - design	0.03%	0.00%	0.00%	0.00%	0.00%	0.08%	0.00%	0.05%	0.17%
Lakeshore stabilization -evaluate	0.05%					0.14%		0.08%	0.28%
Lakeshore stabilization install - manage	0.37%	0.00%	0.00%	0.00%	0.00%	0.98%	0.00%	0.59%	1.94%
Lakeshore stabilization -maintain	0.32%					0.84%		0.50%	1.66%
Shoreland and riparian buffer - cost share	0.11%	0.00%	0.00%	0.00%	0.00%	0.19%	0.00%	0.13%	0.44%

Program and Related Action	Biodiversity - sustain and restore	Biodiversity for recreation - sustain and restore	Groundwater quality for consumption - sustain and restore	Hydrologic function (groundwater recharge) - sustain and restore	Runoff storage and conveyance - sustain and restore	Surface water biogeochemical functions - sustain and restore	Surface water quality for consumption - sustain and restore	Surface water quality for recreation - sustain and restore	Grand Total
Shoreland and riparian buffer - design	0.07%					0.13%		0.09%	0.29%
Shoreland and riparian buffer - evaluate	0.06%	0.00%	0.00%	0.00%	0.00%	0.11%	0.00%	0.07%	0.24%
Shoreland and riparian buffer - maintain	0.37%					0.65%		0.44%	1.46%
Shoreland and riparian buffer - promote	0.06%	0.00%	0.00%	0.00%	0.00%	0.11%	0.00%	0.07%	0.24%
Shoreland and riparian buffer install - manage	0.09%					0.15%		0.10%	0.34%
Streambank condition - inventory	0.03%	0.00%	0.00%	0.00%	0.00%	0.08%	0.00%	0.05%	0.16%
Streambank soil loss - analyze	0.04%					0.11%		0.07%	0.22%
Streambank stabilization - cost share	0.05%	0.00%	0.00%	0.00%	0.00%	0.12%	0.00%	0.08%	0.25%
Streambank stabilization - design	0.03%					0.08%		0.05%	0.16%
Streambank stabilization - evaluate	0.05%	0.00%	0.00%	0.00%	0.00%	0.14%	0.00%	0.08%	0.27%
Streambank stabilization - maintain	0.30%					0.83%		0.50%	1.64%
Streambank stabilization install - manage	0.04%	0.00%	0.00%	0.00%	0.00%	0.10%	0.00%	0.06%	0.19%
Surface water monitoring	**0.75%**			**2.05%**	**1.34%**	**2.13%**		**1.88%**	**8.14%**
Lake level - monitor	0.00%	0.00%	0.00%	0.24%	0.15%	0.00%	0.00%	0.00%	0.40%
Lake water quality - monitor	0.06%					0.23%		0.22%	0.51%
Lake water quality threshold exceedance - analyze	0.08%	0.00%	0.00%	0.00%	0.00%	0.31%	0.00%	0.30%	0.68%
Lake water quality trends - analyze	0.08%					0.31%		0.30%	0.68%
Rating curve development - analyze	0.00%	0.00%	0.00%	0.03%	0.02%	0.00%	0.00%	0.00%	0.05%
Stream discharge - monitor				0.24%	0.19%				0.44%
Stream fishes - monitor	0.04%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.06%	0.10%
Stream invertebrates - monitor	0.04%							0.06%	0.10%
Stream level - monitor	0.00%	0.00%	0.00%	0.24%	0.15%	0.00%	0.00%	0.00%	0.40%
Stream water quality - monitor	0.12%					0.35%		0.26%	0.73%
Stream water quality threshold exceedance - analyze	0.16%	0.00%	0.00%	0.00%	0.00%	0.46%	0.00%	0.34%	0.97%
Stream water quality trends - analyze	0.16%					0.46%		0.34%	0.97%
Wetland level - monitor	0.00%	0.00%	0.00%	0.55%	0.35%	0.00%	0.00%	0.00%	0.90%

Program and Related Action	Biodiversity - sustain and restore	Biodiversity for recreation - sustain and restore	Groundwater quality for consumption - sustain and restore	Hydrologic function (groundwater recharge) - sustain and restore	Runoff storage and conveyance - sustain and restore	Surface water biogeochemical functions - sustain and restore	Surface water quality for consumption - sustain and restore	Surface water quality for recreation - sustain and restore	Grand Total
Wetland level trends - analysis				0.73%	0.46%				1.20%
Regulatory assistance	**1.40%**	**0.00%**	**0.00%**	**1.43%**	**1.60%**	**0.66%**	**0.00%**	**1.79%**	**6.88%**
Buffer law compliance - inspect	0.14%					0.20%		0.15%	0.49%
Buffer law violation compliance - guide	0.33%	0.00%	0.00%	0.00%	0.00%	0.46%	0.00%	0.35%	1.14%
Shoreland ordinance compliance - inspect	0.10%				0.17%			0.06%	0.34%
Shoreland ordinance violation compliance - guide	0.24%	0.00%	0.00%	0.00%	0.41%	0.00%	0.00%	0.15%	0.79%
Soil loss law compliance - inspect								0.21%	0.21%
Soil loss law violation compliance - guide	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.50%	0.50%
Wetland Conservation Act compliance - inspect	0.18%			0.43%	0.30%			0.11%	1.02%
Wetland Conservation Act violation compliance - guide	0.41%	0.00%	0.00%	1.00%	0.71%	0.00%	0.00%	0.26%	2.39%
Development standards	**0.07%**			**0.55%**	**1.91%**	**1.68%**		**1.16%**	**5.37%**
Compensatory storage ordinance - prepare	0.00%	0.00%	0.00%	0.00%	0.04%	0.00%	0.00%	0.00%	0.04%
Construction site erosion control compliance - inspect					0.23%	0.23%		0.15%	0.62%
Construction site erosion control standards - prepare	0.02%	0.00%	0.00%	0.00%	0.00%	0.07%	0.00%	0.04%	0.13%
Construction site erosion control violation compliance - guide					0.54%	0.54%		0.36%	1.44%
Construction site sediment control compliance - inspect	0.00%	0.00%	0.00%	0.00%	0.23%	0.23%	0.00%	0.15%	0.62%
Construction site sediment control standards - prepare	0.02%					0.07%		0.04%	0.13%
Construction site sediment control violation compliance - guide	0.00%	0.00%	0.00%	0.00%	0.54%	0.54%	0.00%	0.36%	1.44%
Infiltration grading ordinance - prepare				0.06%					0.06%
Infiltration rate ordinance - prepare	0.00%	0.00%	0.00%	0.17%	0.06%	0.00%	0.00%	0.00%	0.23%
Micro-storage grading ordinance - prepare					0.06%				0.06%

Program and Related Action	Biodiversity - sustain and restore	Biodiversity for recreation - sustain and restore	Groundwater quality for consumption - sustain and restore	Hydrologic function (groundwater recharge) - sustain and restore	Runoff storage and conveyance - sustain and restore	Surface water biogeochemical functions - sustain and restore	Surface water quality for consumption - sustain and restore	Surface water quality for recreation - sustain and restore	Grand Total
Minimum impact design standards - advocate	0.00%	0.00%	0.00%	0.15%	0.09%	0.00%	0.00%	0.02%	0.26%
Minimum impact design standards ordinance - prepare	0.02%			0.17%	0.11%			0.03%	0.33%
Ecological restoration	**1.31%**	**0.00%**	**0.00%**	**1.53%**	**0.96%**	**0.72%**	**0.00%**	**0.00%**	**4.52%**
Habitat restoration - design	0.05%								0.05%
Habitat restoration - evaluate	0.08%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.08%
Habitat restoration - fund	0.08%								0.08%
Habitat restoration - maintain	0.51%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.51%
Habitat restoration - promote	0.08%								0.08%
Habitat restoration install - manage	0.06%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.06%
Habitat restoration opportunity - inventory	0.05%								0.05%
Habitat restoration protocol efficacy - analyze	0.03%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.03%
Wetland restoration - design	0.01%			0.02%	0.02%	0.01%			0.06%
Wetland restoration - evaluate	0.04%	0.00%	0.00%	0.16%	0.10%	0.08%	0.00%	0.00%	0.38%
Wetland restoration - fund	0.01%			0.04%	0.02%	0.02%			0.09%
Wetland restoration - maintain	0.23%	0.00%	0.00%	0.98%	0.62%	0.46%	0.00%	0.00%	2.29%
Wetland restoration - promote	0.04%			0.16%	0.10%	0.08%			0.38%
Wetland restoration install - manage	0.01%	0.00%	0.00%	0.03%	0.02%	0.01%	0.00%	0.00%	0.07%
Wetland restoration opportunity - analyze	0.03%			0.13%	0.08%	0.06%			0.31%
Hydrologic enhancement	**0.36%**	**0.00%**	**0.00%**	**1.51%**	**1.39%**	**0.70%**	**0.00%**	**0.00%**	**3.95%**
Culvert - inventory				0.03%	0.03%				0.06%
Ditch remeander - design	0.01%	0.00%	0.00%	0.02%	0.02%	0.01%	0.00%	0.00%	0.06%
Ditch remeander - evaluate	0.01%			0.05%	0.03%	0.02%			0.11%
Ditch remeander - fund	0.01%	0.00%	0.00%	0.04%	0.02%	0.02%	0.00%	0.00%	0.09%
Ditch remeander - manage	0.27%			1.14%	0.72%	0.54%			2.68%
Ditch remeander opportunity - analyze	0.01%	0.00%	0.00%	0.03%	0.02%	0.02%	0.00%	0.00%	0.08%
Perched culvert - inventory	0.01%								0.01%
Stream grade stabilization - design	0.00%	0.00%	0.00%	0.00%	0.02%	0.00%	0.00%	0.00%	0.02%

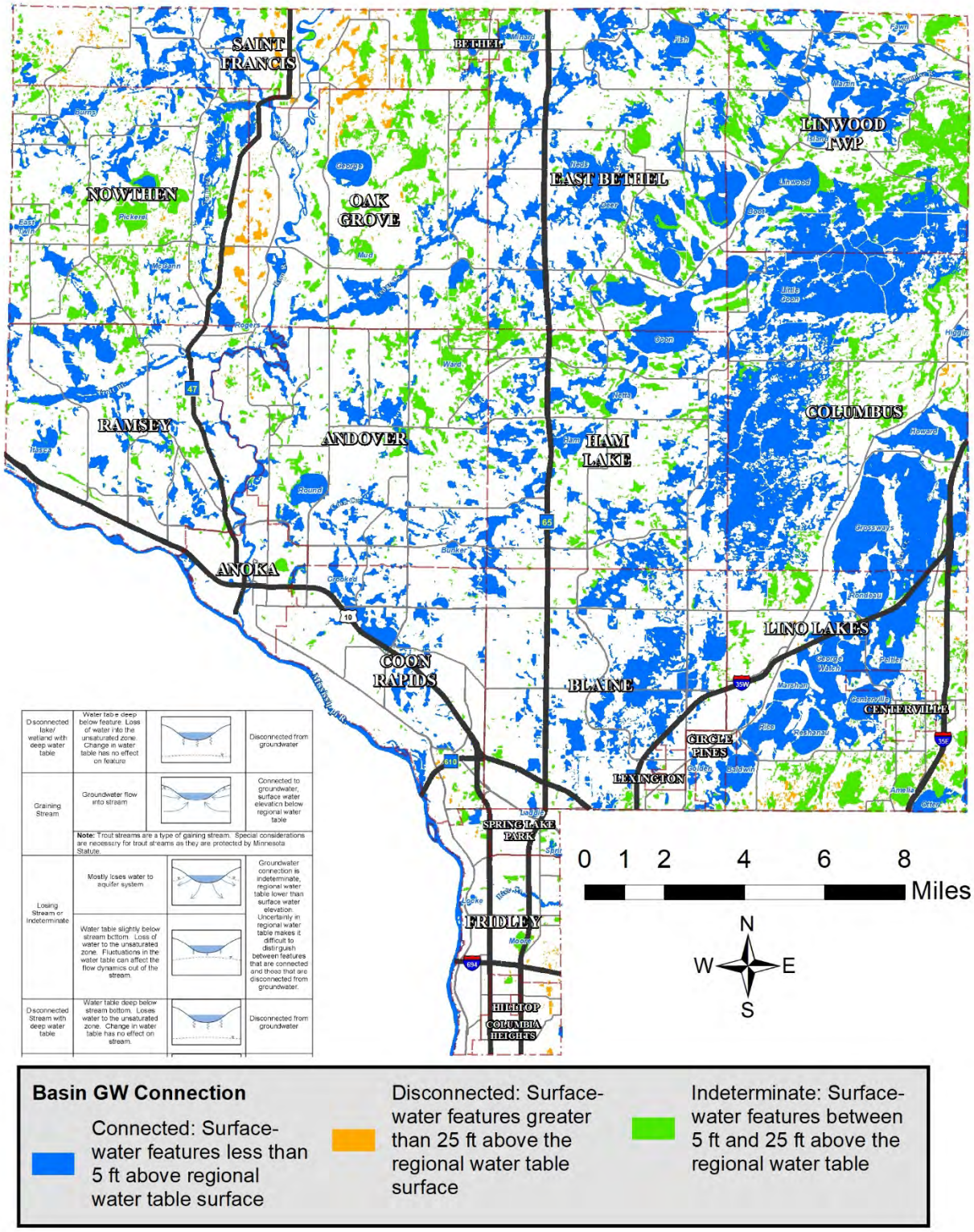
Program and Related Action	Biodiversity - sustain and restore	Biodiversity for recreation - sustain and restore	Groundwater quality for consumption - sustain and restore	Hydrologic function (groundwater recharge) - sustain and restore	Runoff storage and conveyance - sustain and restore	Surface water biogeochemical functions - sustain and restore	Surface water quality for consumption - sustain and restore	Surface water quality for recreation - sustain and restore	Grand Total
Stream grade stabilization - evaluate					0.03%				0.03%
Stream grade stabilization - fund	0.00%	0.00%	0.00%	0.00%	0.02%	0.00%	0.00%	0.00%	0.02%
Stream grade stabilization - maintain					0.31%				0.31%
Stream grade stabilization - manage	0.00%	0.00%	0.00%	0.00%	0.02%	0.00%	0.00%	0.00%	0.02%
Stream grade stabilization opportunity - analyze					0.01%				0.01%
Stream incision - inventory	0.00%	0.00%	0.00%	0.00%	0.01%	0.00%	0.00%	0.00%	0.01%
Two-stage ditch - evaluate	0.01%			0.06%	0.04%	0.03%			0.14%
Two-stage ditch retrofit - design	0.01%	0.00%	0.00%	0.03%	0.02%	0.01%	0.00%	0.00%	0.07%
Two-stage ditch retrofit - fund	0.01%			0.05%	0.03%	0.02%			0.11%
Two-stage ditch retrofit - manage	0.01%	0.00%	0.00%	0.04%	0.02%	0.02%	0.00%	0.00%	0.08%
Two-stage ditch retrofit opportunity - analyze	0.00%			0.02%	0.01%	0.01%			0.05%
Aquatic invasive species control	**1.62%**	**0.00%**	**0.00%**	**0.00%**	**0.00%**	**1.03%**	**0.00%**	**0.69%**	**3.34%**
Aquatic invasive animal control - promote	0.08%					0.05%		0.03%	0.16%
Aquatic invasive animal early detection - promote	0.08%	0.00%	0.00%	0.00%	0.00%	0.05%	0.00%	0.03%	0.16%
Aquatic invasive plant - inventory	0.23%					0.15%		0.10%	0.49%
Aquatic invasive plant control - promote	0.08%	0.00%	0.00%	0.00%	0.00%	0.05%	0.00%	0.03%	0.16%
Aquatic invasive plant control plan - design	0.09%					0.06%		0.04%	0.20%
Aquatic invasive plant early detection - promote	0.08%	0.00%	0.00%	0.00%	0.00%	0.05%	0.00%	0.03%	0.16%
Aquatic invasive plant treatment - manage	0.11%					0.07%		0.05%	0.23%
Aquatic invasive species action plan	0.02%	0.00%	0.00%	0.00%	0.00%	0.01%	0.00%	0.01%	0.03%
Aquatic invasive species project - evaluate	0.08%								0.08%
Aquatic invasive species treatment - fund	0.14%	0.00%	0.00%	0.00%	0.00%	0.09%	0.00%	0.06%	0.29%
Carp barrier - design	0.02%					0.01%		0.01%	0.04%
Carp barrier - evaluate	0.03%	0.00%	0.00%	0.00%	0.00%	0.02%	0.00%	0.02%	0.07%

Program and Related Action	Biodiversity - sustain and restore	Biodiversity for recreation - sustain and restore	Groundwater quality for consumption - sustain and restore	Hydrologic function (groundwater recharge) - sustain and restore	Runoff storage and conveyance - sustain and restore	Surface water biogeochemical functions - sustain and restore	Surface water quality for consumption - sustain and restore	Surface water quality for recreation - sustain and restore	Grand Total
Carp barrier - maintain	0.35%					0.23%		0.15%	0.73%
Carp barrier construct - fund	0.03%	0.00%	0.00%	0.00%	0.00%	0.02%	0.00%	0.01%	0.06%
Carp barrier construct - manage	0.02%					0.01%		0.01%	0.04%
Carp harvest - fund	0.10%	0.00%	0.00%	0.00%	0.00%	0.07%	0.00%	0.05%	0.22%
Carp harvest - manage	0.08%					0.05%		0.04%	0.17%
Carp management feasibility - analyze	0.02%	0.00%	0.00%	0.00%	0.00%	0.01%	0.00%	0.01%	0.03%
Targeted pollutant management	**0.08%**		**0.04%**			**0.78%**	**0.09%**	**0.65%**	**1.64%**
Alum treatment - evaluate	0.02%	0.00%	0.00%	0.00%	0.00%	0.10%	0.00%	0.06%	0.19%
Alum treatment - fund	0.01%					0.04%		0.03%	0.08%
Alum treatment - manage	0.01%	0.00%	0.00%	0.00%	0.00%	0.03%	0.00%	0.02%	0.06%
Alum treatment feasibility - analyze	0.00%					0.02%		0.01%	0.03%
Bacteria source identification - analyze	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.04%	0.04%
Biochar filter - fund							0.01%	0.02%	0.03%
Household hazardous waste collection days - promote	0.00%	0.00%	0.02%	0.00%	0.00%	0.00%	0.02%	0.00%	0.03%
Household hazardous waste management - promote			0.02%				0.02%		0.05%
Iron enhanced sand filter - evaluate	0.02%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.02%
Iron enhanced sand filter - fund	0.01%					0.03%		0.02%	0.05%
Iron enhanced sand filter - maintain	0.00%	0.00%	0.00%	0.00%	0.00%	0.46%	0.00%	0.31%	0.77%
Iron enhanced sand filter install - manage	0.01%					0.02%		0.01%	0.04%
Nutrient source identification - analyze	0.00%	0.00%	0.00%	0.00%	0.00%	0.08%	0.00%	0.05%	0.13%
Pet waste management - promote								0.02%	0.02%
Sediment source identification - analyze	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.05%	0.05%
Smart salting - promote							0.03%		0.03%
Water softener upgrade - promote	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.02%	0.00%	0.02%
Drinking water protection	**0.17%**					**0.44%**		**0.66%**	**1.27%**
Septic system compliance - inspect	0.03%	0.00%	0.00%	0.00%	0.00%	0.12%	0.00%	0.17%	0.31%
Septic system failure - guide	0.07%					0.27%		0.39%	0.73%

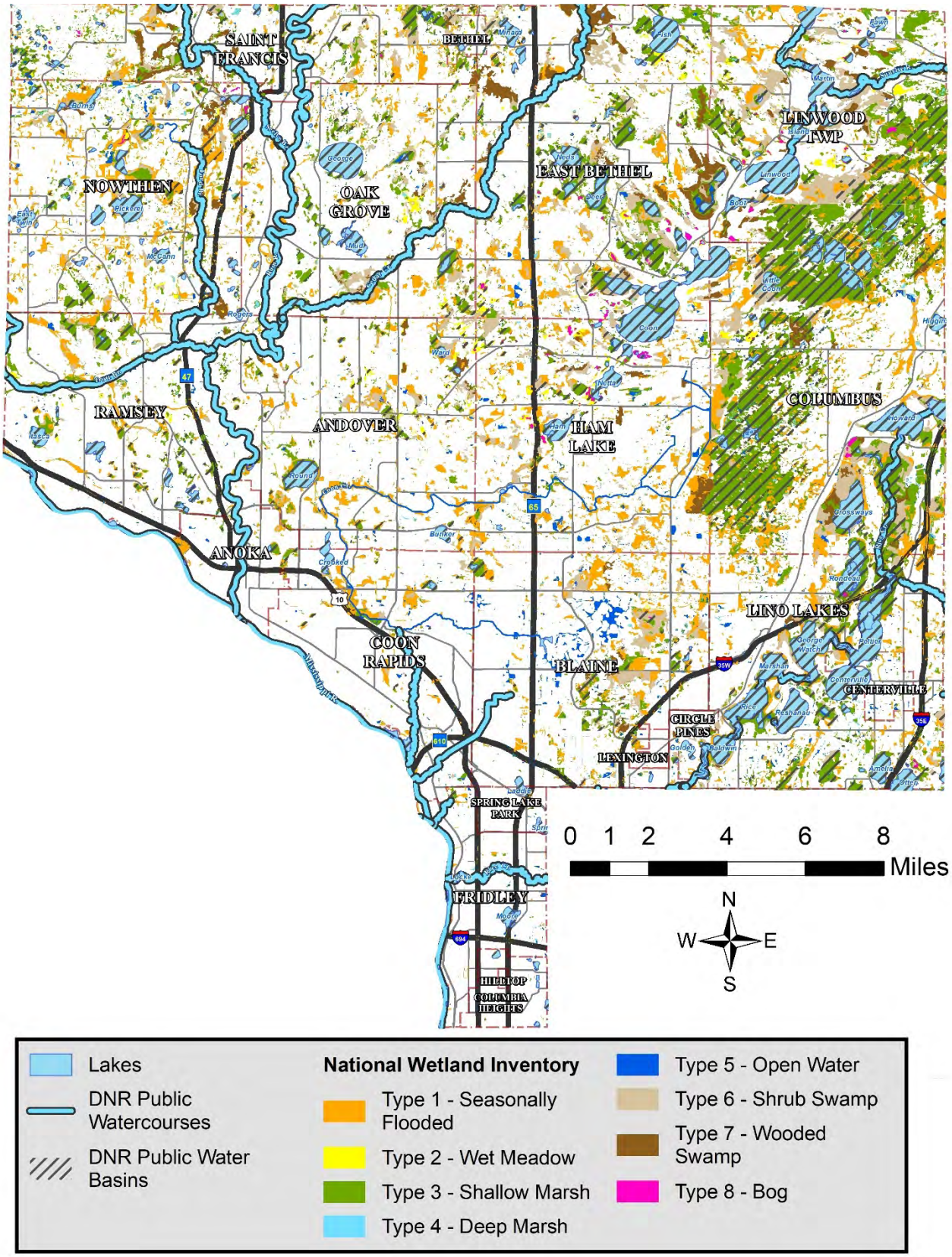
Program and Related Action	Biodiversity - sustain and restore	Biodiversity for recreation - sustain and restore	Groundwater quality for consumption - sustain and restore	Hydrologic function (groundwater recharge) - sustain and restore	Runoff storage and conveyance - sustain and restore	Surface water biogeochemical functions - sustain and restore	Surface water quality for consumption - sustain and restore	Surface water quality for recreation - sustain and restore	Grand Total
Septic system maintenance - promote	0.01%	0.00%	0.00%	0.00%	0.00%	0.04%	0.00%	0.06%	0.10%
Septic system upgrade - fund	0.00%					0.02%		0.03%	0.05%
Surface water for consumption - advocate	0.06%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.02%	0.08%
Precipitation monitoring				**0.71%**	**0.45%**				**1.17%**
Precipitation - monitor	0.00%	0.00%	0.00%	0.31%	0.19%	0.00%	0.00%	0.00%	0.50%
Precipitation status and trends - analyze				0.41%	0.26%				0.67%

MAPS

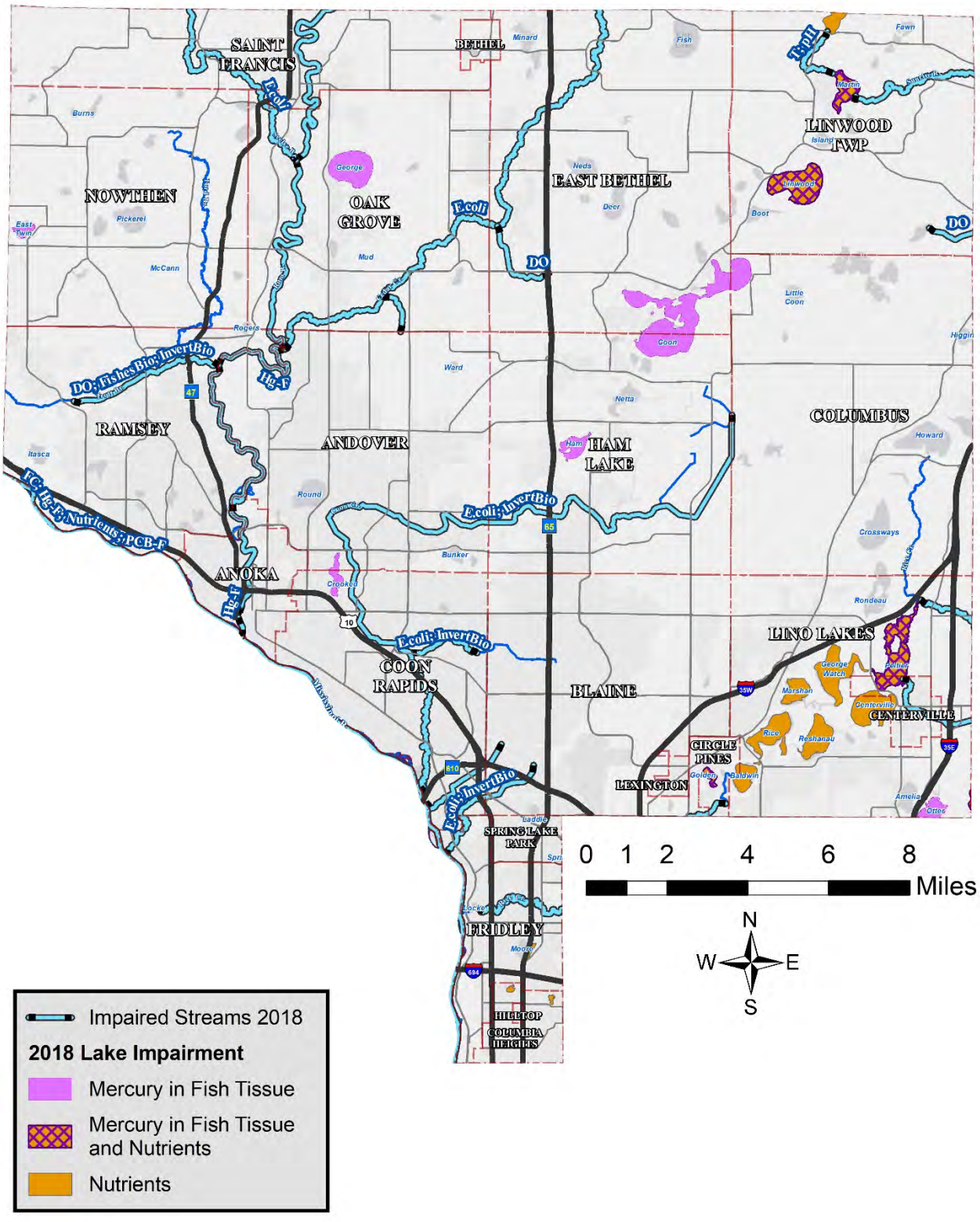
Map 4-1: Surface water/groundwater connection



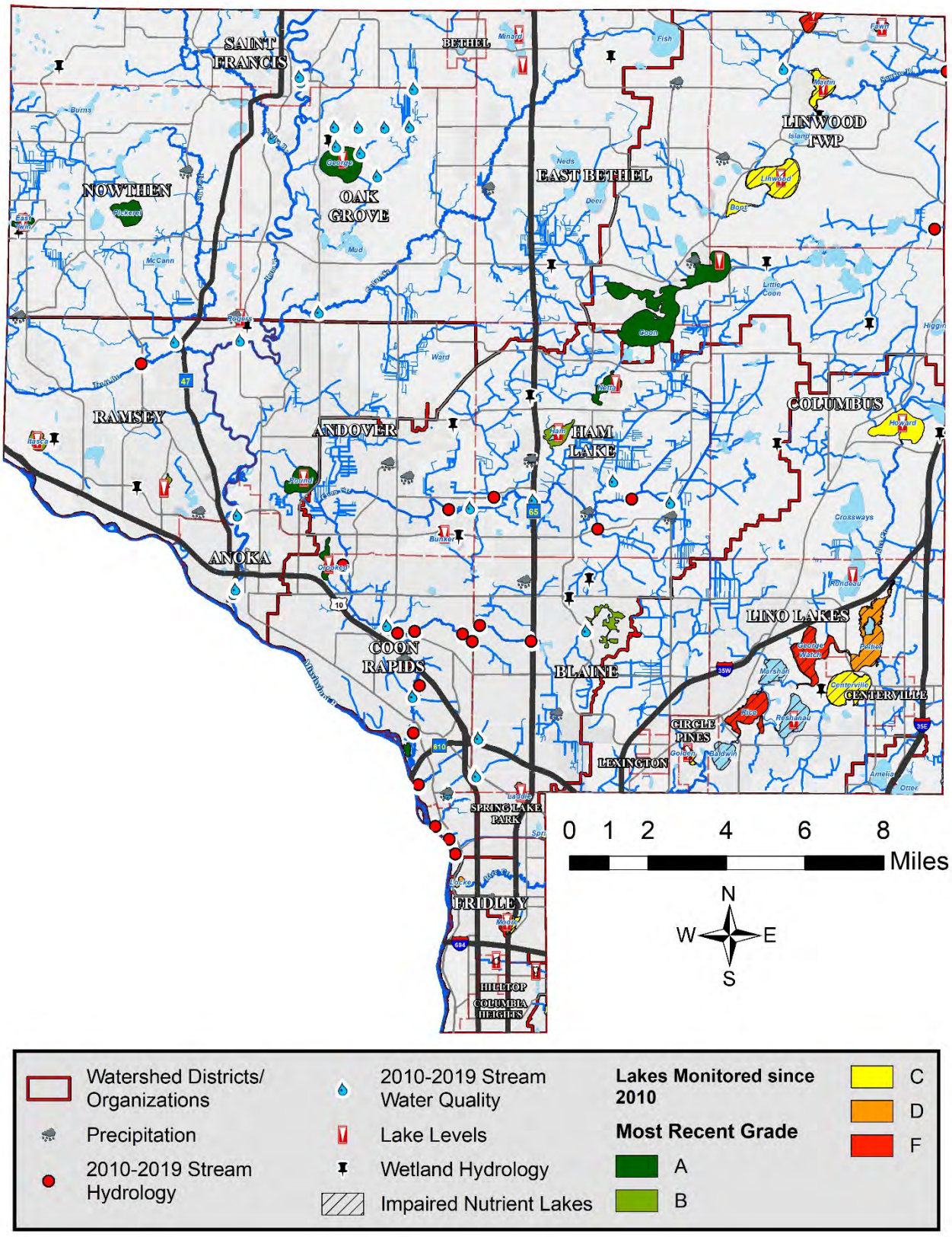
Map 4-2: Surface water inventory



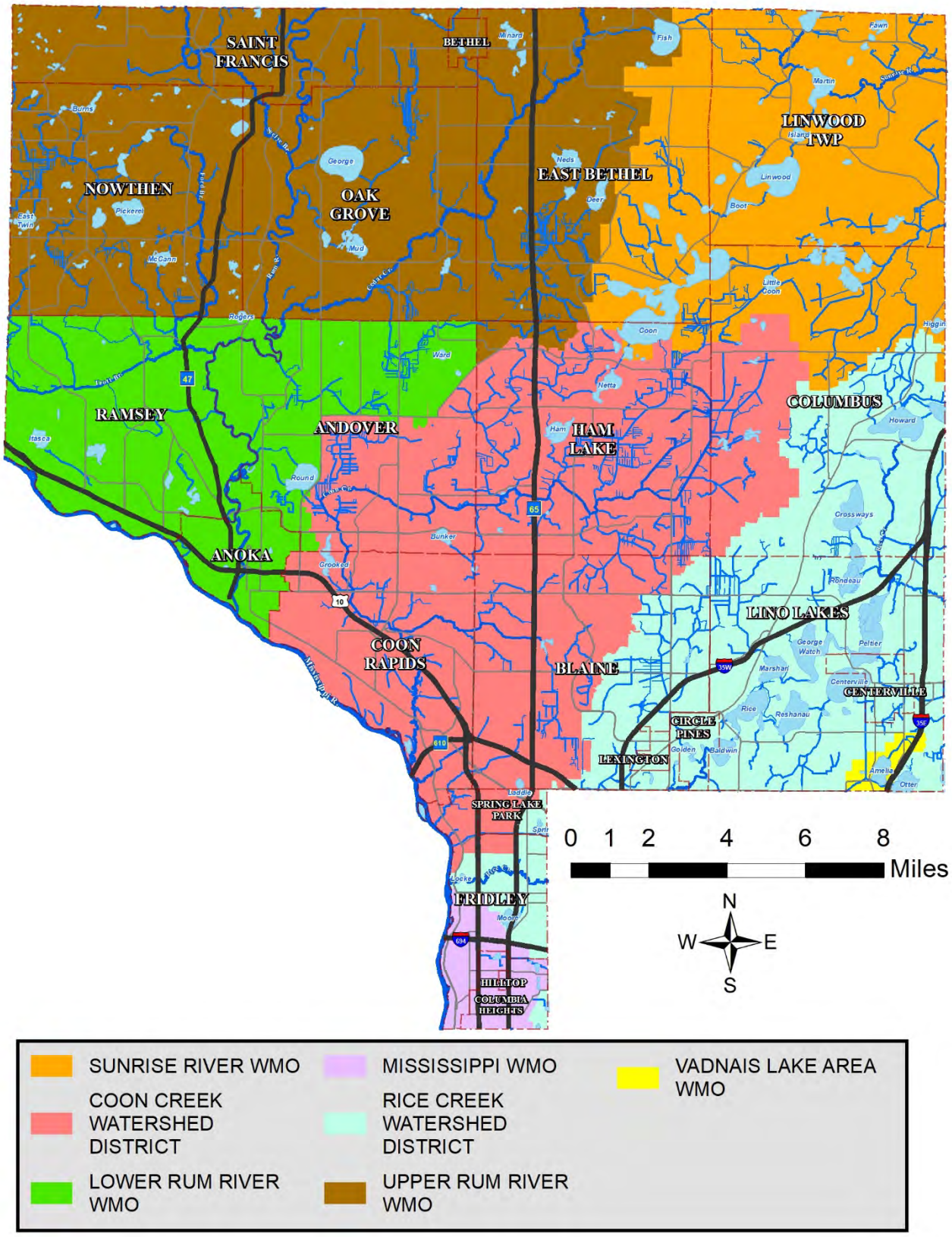
Map 4-3: Impaired waters 2018



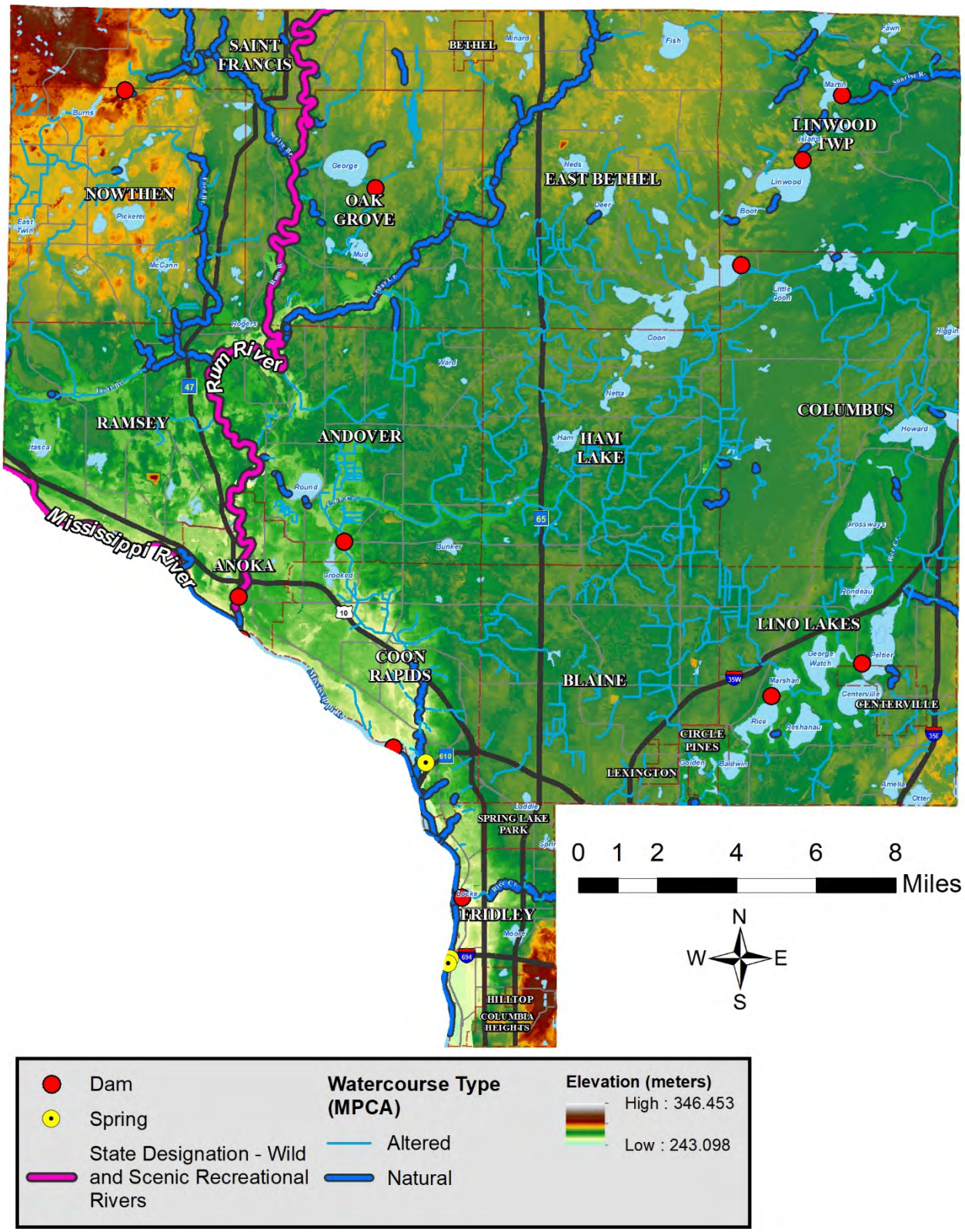
Map 4-4: Monitoring sites



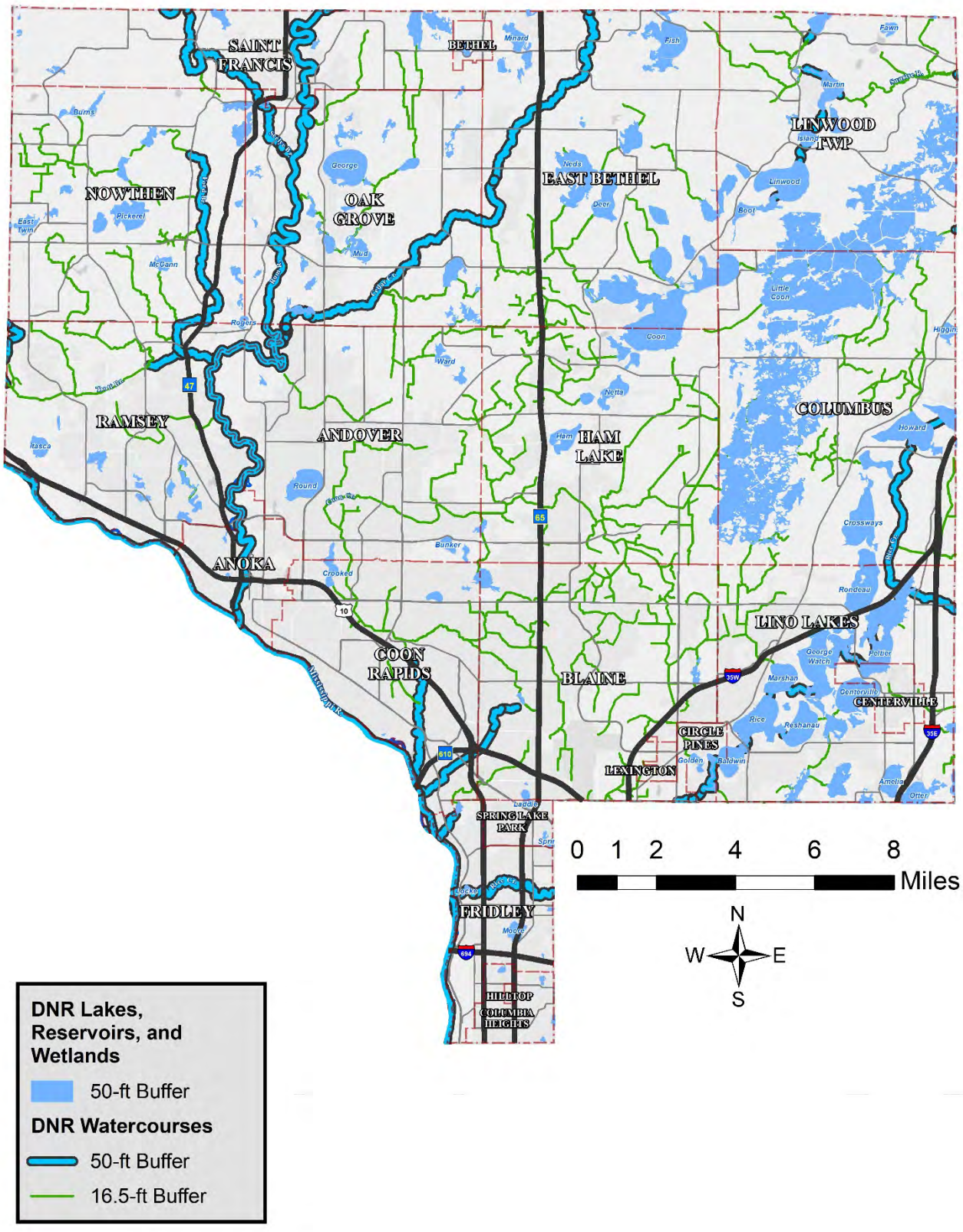
Map 4-5: Watershed districts and watershed management organizations



Map 4-6: Altered waterways



Map 4-7: Surface waters requiring buffers



Chapter 5

Our Ecological Resources.

The Anoka Conservation District will take measureable steps to conserve and enhance the quantity and quality of natural habitats.

Our 2021-2030 Keystone Ecological Endeavors Are:

Chapter 5 Contents

ECOLOGICAL RESOURCES

Anoka County lies at the convergence of three large ecosystems of North America: western prairies, northern evergreen forests, and eastern deciduous forests. Additionally, the Mississippi River, Rum River, lakes, shallow groundwater table, and sandy soils create a mosaic of habitat types that support rare plant communities and species. The existence of public lands, the Mississippi and Rum rivers, and residents' interest and engagement provide an opportunity to sustain and restore biodiversity, create habitat corridors, and resilient ecosystems in Anoka County.

WHY ARE ECOLOGICAL RESOURCES IMPORTANT?

The natural environment is the backdrop of our everyday lives. We rely on ecosystems, the physical and living systems - our habitat - for numerous goods and services. Functioning ecosystems support wildlife for fishing and hunting opportunities. Nature provides recreational opportunities, such as hiking and bird watching, which bring joy and wonder to our lives and enhance our quality of life. Many other ecosystem services that are essential to our existence go unnoticed such as nutrient cycling, water filtration, and pest control. In addition to the many benefits natural environments have for people, ecosystems and species have their own intrinsic values worthy of conserving.

ECOLOGICAL RESOURCES GOALS

Ecological resources provide many benefits in Anoka County that were also ranked high by Anoka Conservation District and its partners throughout this planning process. Sustaining and restoring ecological resources for the following benefits are the priorities of this plan:

- intrinsic value of ecological biodiversity,
- ecological biodiversity for consumptive recreation (e.g. hunting, fishing),
- ecological biodiversity for recreation (e.g. hiking, bird watching), and
- biogeochemical functions.

Presented as goals and objectives, Figure 5-1Figure 5-1: Ecology goals and objectives provides a high-level view of ACD's direction. Based on a return on investment (ROI) analysis, the objectives for each goal are listed in order. Objectives repeat because they achieve multiple goals. Also, many objectives directly relate to the other resources (i.e. surface water, groundwater, and soils) because they are all interconnected and interdependent. Viewing the subsequent strategies and actions provides a clearer perspective on what this means in terms of workload. That content is presented in the 'Implementation' section. Achievement of these goals will protect and enhance ecological resources in Anoka County.

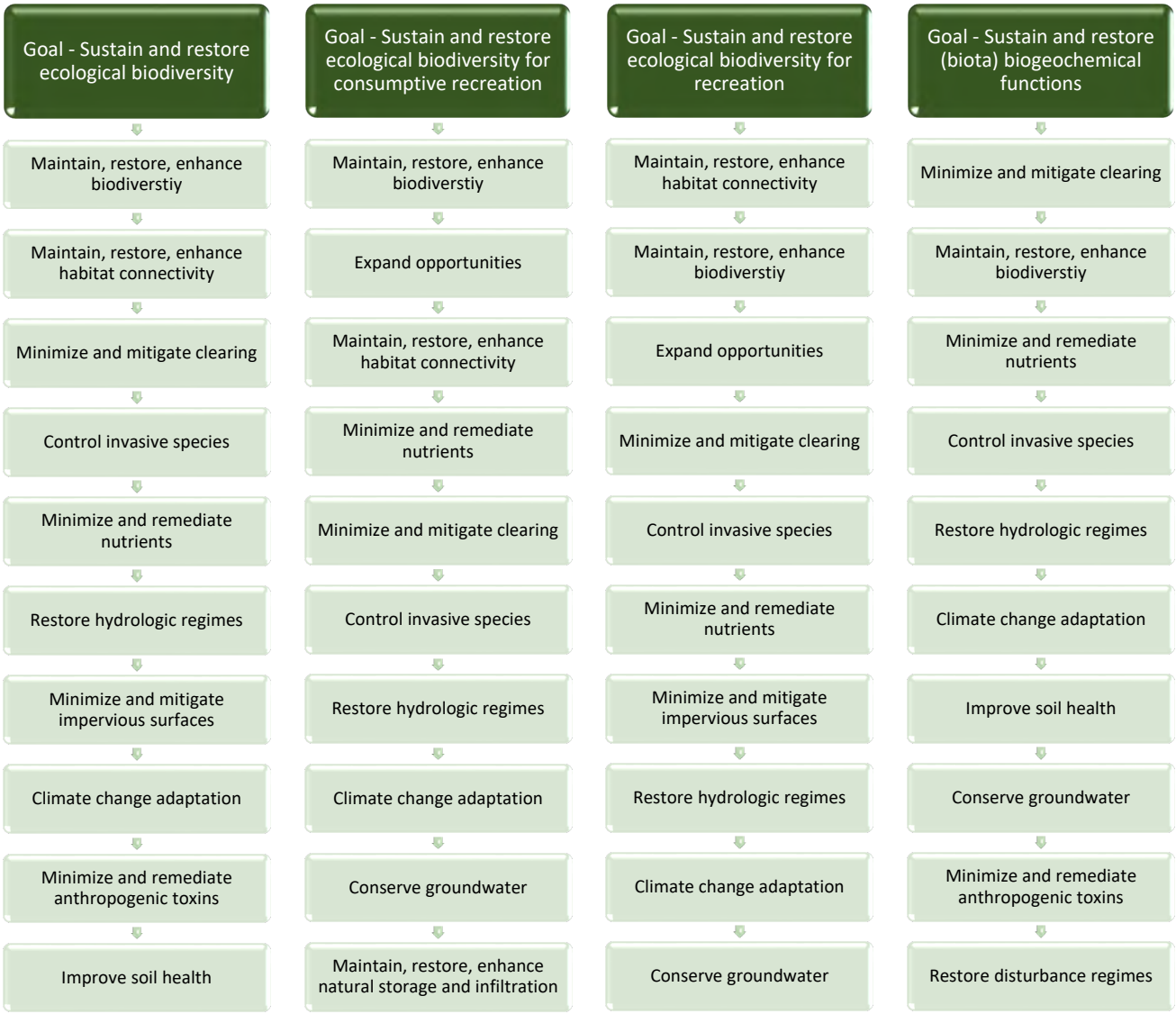


Figure 5-1: Ecology goals and objectives

ECOLOGICAL RESOURCES INVENTORY AND CONDITION

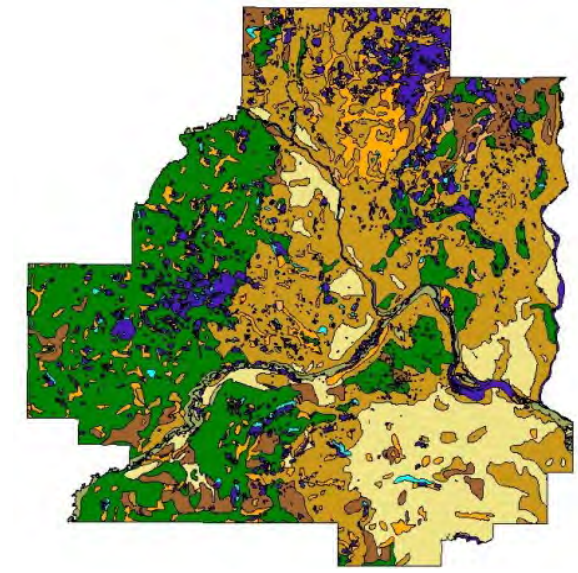
NATIVE LANDSCAPES

Anoka County lies within the Anoka Sand Plain region, defined by the broad sandy lake plain, kettle lakes, and large wetland complexes, which creates a mosaic of native landscapes. The Mississippi River and Rum River and their tributaries provide additional habitat for a diversity of species and provide natural corridors throughout Anoka County. These native landscapes have been altered by land conversion and development leaving only fragmented habitats. Figure 5-2 shows a comparison of pre-European settlement natural plant communities and the extent of current natural plant communities.

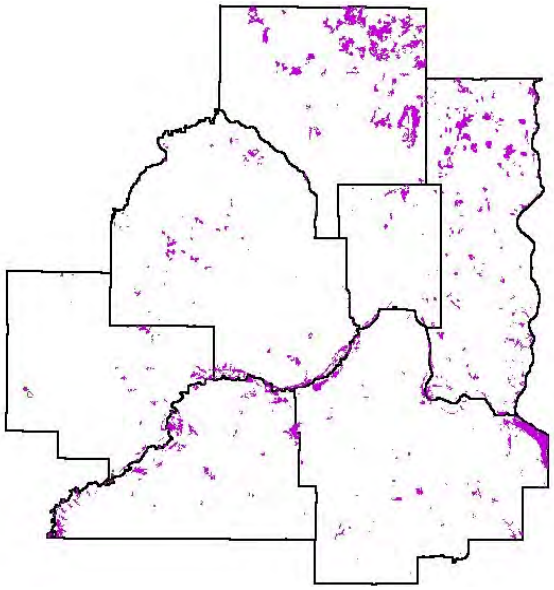
While most of Anoka County's natural communities have been altered, Anoka County still supports relatively large areas of native ecosystems. Natural areas and waterbodies include rare ecosystems, rare species, and sites with significant biodiversity.

- Critically imperiled oak savanna, dry prairie and wet prairie ecosystems are found in Anoka County (Map 5-1 and Map 5-2).
- The Anoka Sand Plain provides habitat for 97 known or predicted Species in Greatest Conservation Need.
- Habitat in Anoka County provides homes to 95 Federal and Minnesota Endangered, Threatened, and Special Concern species; which is 16% of the rare species (mammal, bird, fish, mussel, reptile, vascular plant, insect, spider, fungus) in Minnesota, despite Anoka County accounting for only 0.5% of the State's area (Map 5-3).
- The MN DNR has assigned Outstanding, High, or Moderate Biodiversity Significance Ranking to over 48,000 acres of native plant communities in Anoka County (Map 5-3).
- Anoka County has 11 lakes meeting criteria for Lakes of Biological Significance (Outstanding, High, or Moderate) (Map 5-1).
- Anoka County is unique in the seven county metro area as the only county with more than 50% of its original wetland acreage intact; nearly 30% of land area is covered in wetland.

Native ecosystems, public lands and waters provide numerous ecological services. There are many nature based recreational options in Anoka County with the Mississippi and Rum River, public access to lakes and public lands. In addition to the recreation opportunities, the native landscape provides economic benefits from ecosystem functions including nutrient cycling, carbon sequestration, pollination, water filtration, and drinking water supply.



Presettlement Vegetation



Remaining Natural Communities

Figure 5-2: Comparison of pre-European settlement vegetation and remaining natural communities

LAND USE

Anoka County's natural resource base supports a rapidly growing population of over 330,000 people (2010 U.S. Census Bureau) in an area of 273,450 acres. Approximately 50% of the county is densely or moderately urbanized with homes and places to work. The remaining portion of the county supports scattered agriculture and open space, including large wetland complexes, extensive county and city park systems and vast areas of state lands.

NATURE AND EXTENT OF HIGH PRIORITY PROBLEMS

Threats to Ecological Resources

To preserve ecological resource benefits, we must address the factors that threaten to diminish our ecological resources. Table 5-1 shows the threats by total return on investment (ROI) for ecological resource benefits. Fortunately addressing any threat has positive impacts on multiple resource benefits. For each threat, many potential actions can be taken with highly variable ROIs.

Table 5-1: Threats to ecological benefits

Threats	**Biogeochemical function (nutrient cycling and pollutant remediation)**	**Flora and fauna**	**Recreation - consumptive (e.g. hunting, fishing, and foraging)**	**Recreation - terrestrial (e.g. birding and hiking)**	**Grand Total**
Mowing	3.17%	10.37%	5.45%	4.67%	23.65%
Habitat fragmentation	0.00%	11.12%	2.72%	9.00%	22.84%
Clearing	3.56%	5.15%	1.93%	2.44%	13.08%
Demand excess	0.00%	0.00%	6.31%	4.69%	11.00%
Impervious surfaces - replace biota	0.01%	5.02%	2.34%	2.27%	9.64%
Invasive species	2.13%	3.33%	1.74%	1.52%	8.73%
Contaminants - nutrient excess	1.09%	1.23%	1.13%	0.16%	3.60%
Ditching	0.62%	0.78%	0.52%	0.13%	2.05%
Climate change	0.26%	0.40%	0.29%	0.21%	1.17%
Groundwater withdrawal	0.18%	0.26%	0.19%	0.14%	0.77%
Hydrologic regime altered	0.14%	0.24%	0.16%	0.12%	0.66%
Contaminants - anthropogenic toxins	0.16%	0.36%	0.10%	0.01%	0.64%
Natural disturbance suppressed	0.14%	0.28%	0.05%	0.08%	0.55%
Grading	0.10%	0.15%	0.11%	0.08%	0.44%
Monoculture cultivation - reduce biota	0.14%	0.22%	0.02%	0.02%	0.40%
Tillage	0.12%	0.18%	0.00%	0.00%	0.30%
Hydrologic barrier	0.00%	0.15%	0.08%	0.06%	0.29%
Contaminants - bacteria	0.05%	0.03%	0.02%	0.00%	0.11%
Contaminants - sediment	0.04%	0.04%	0.00%	0.00%	0.09%

Loss of Native Landscapes

Native landscapes have been converted to residential and commercial uses at an alarming rate. As natural areas become fragmented and smaller, management becomes more difficult. Development will continue to impact ecosystems in Anoka County. Projected population growth is 16% through 2045. The lack of regulation regarding impacts to native plant communities is resulting in rapid losses of habitat, native flora and fauna, and ecological services. However, ACD can help instill an appreciation for wild and rare landscape and improve the land stewardship ethic of the public and community leaders.

Impacts to natural areas include:

- the permanent conversion of natural areas to other land uses,
- habitat fragmentation of core plant and wildlife habitat due to land development and land subdivision,
- the degradation of fire-dependent ecosystems (e.g., oak savannah, prairie),
- the displacement of native species as a result of the introduction and expansion of exotic invasive species (e.g., Eurasian milfoil, buckthorn, emerald ash borer, earthworms),
- declining pollinator populations,
- declining populations of rare plant species (including some plants that are unique to the Anoka Sand Plain), and
- altered hydrologic processes.

Buckthorn invasion

Invasive Species

The spread of invasive species is an outcome of fragmented and degraded natural ecosystems. The presence of invasive species displaces native flora and fauna and alters ecosystem functions by creating negative feedback loops, such as changing the soil conditions to favor other invasive species. Aquatic and terrestrial invasive species have been documented in Anoka County lakes, rivers, streams, wetland, prairies, and forests. These inventories include:

- Eurasian milfoil has been documented in 13 lakes.
- Flowering rush has been documented in three lakes.
- At least 24 species on the MDA Noxious Weed List have been documented in Anoka County's terrestrial environments.

The spread of invasive species is the second greatest threat to biodiversity followed by habitat loss (Wilcove and Master 2005).

EMERGING ISSUES

Climate Change

More intense storms, warmer winters and drought, can significantly impact native plant communities. To manage natural resources effectively in this era of accelerated change, agencies must improve landscape resiliency and be prepared to adjust programs and services in response to ever-evolving conditions and trends. Protected riparian buffer, habitat cores and corridors will increase landscape resilience. Other important actions

to enhance ecological resources include assisted migration, planting resilient trees, and proactive management for vulnerable species.

Declining Pollinator Populations

Declining pollinator populations from insecticides, invasive pests, diseases, and habitat loss, undermines food production and native ecosystem functions. During the 1990s, neonicotinoids, a new type of systemic insecticide, became widely used. Neonicotinoid based insecticides provide full plant protection and one treatment can last for many months and can remain in the soil for years. This combination of persistence and systemic function make all plant components poisonous to insects for as long as the plant lives; even the pollen. In addition to pesticides, pollinators are threatened by parasites, pathogens, invasive species, and habitat loss. These factors have greatly reduced the numbers of beneficial native bees, moths, butterflies and other pollinators, and contribute to honeybee hive collapse.


Rusty Patched Bumblebee - Susan Day


Blanding's Turtle - Joe Crowley

Invasive Species

Invasive species threaten native ecosystems and the functions they provide. Invasive species can compromise fisheries and aquatic recreation, degrade water quality, diminish forest products, and degrade habitat for wild game, often by displacing native species and reducing species diversity. The only viable long-term strategy is to slow the spread and reduce the damage until biological controls can be developed to keep invasive species populations in check. Well-established invaders consume many technical and financial resources. Emerging threats include oriental bittersweet, Asian silver carp, and emerald ash borer.


Red-headed woodpecker - Jeff Stacey

Habitat Loss and Fragmentation

Habitat loss and fragmentation due to development, disturbance, and invasive species encroachment, has the potential to push many indigenous species out of the county. When the housing market crashed and development came to an abrupt halt in the late 2000s, this issue took a back seat to more pressing economic challenges. With the recovery of the housing sector, we are once again seeing many of our remaining natural areas forever lost to development. This occurs not only due to mass grading and the installation of roads, utilities, dwellings and structures, but also due to large acreage mowing, which essentially converts complex ecosystems into biological voids.


Twisted Yellow-eyed grass - J. Husveth

Threatened and Endangered Species

Threatened and endangered species stewardship at both the state and federal level is developing as an issue that impacts local project permitting. As local resource managers have become more aware of habitat requirements for rare species, populations that heretofore may have gone unidentified are now documented during permit reviews. A


Lance-leaf violet - C. Taylor

new MN DNR permit program allows for transplanting populations that are authorized for destruction. In conjunction with a program to salvage rare plants, a long-term monitoring program would provide insight to the feasibility for species-specific salvage and transplanting into protected areas.

ECOLOGICAL STEWARDSHIP STRATEGIES

ACCOMPLISHMENTS FROM THE LAST PLAN

Since 2015, ACD's accomplishments toward ecological resources include:

- Collaborated in developing the Anoka Sand Plan Partnership Strategic Plan.
- Updated Conservation Corridor Map (Map 5-4).
- Identified priority parcels for land protection.
- Partnered with MN Land Trust to secure two conservation easements.
- Implemented the Wetland Conservation Act.
- Established the Anoka Cooperative Weed Management Area to coordinate terrestrial invasive species control in Anoka County.
- Inventoried aquatic and terrestrial invasive species.
- Controlled priority terrestrial invasive species at priority locations.
- Enhanced a diversity of habitat complexes including prairie enhancements for improving monarch habitat.
- Initiated a pollinator corridor, specifically for the Rusty Patched Bumblebee, through the Lawns to Legumes program.
- Installed, designed, and/or funded 64 shoreline, streambank, and pond modification projects.
- Provided technical and financial assistance to private landowners for invasive species control and habitat enhancements.
- Initiated Rare Plant Rescue program with Critical Connections Ecological Services and the University of MN Landscape Arboretum.
- Salvaged over 9,000 lance-leaf violets and 20 swamp blackberry.

PRIORITIZATION

Based on ROI, the following are the top seventeen of forty-two total strategies to optimize achieving ecological resource goals. These strategies achieve 95% of total potential ROI.

Table 5-2: Priority strategies to achieve ecological goals

Strategies	Biodiversity - sustain and restore	Biodiversity for consumptive recreation - sustain and restore	Biodiversity for recreation - sustain and restore	Biota biogeochemical functions - sustain and restore	Grand Total
Land protection	10.78%	8.34%	7.05%	2.67%	28.84%
Maintain biota projects	9.29%	5.14%	8.16%	0.63%	23.21%
Ecological enhancement	6.66%	3.39%	5.17%	2.27%	17.48%
Evaluate biota projects	2.27%	1.27%	1.64%	0.99%	6.17%
Aquatic invasive plant management	1.39%	0.78%	0.69%	0.96%	3.82%
Ecological restoration	1.55%	0.55%	0.95%	0.29%	3.35%
Nutrient remediation	0.54%	0.60%	0.14%	0.55%	1.83%
Inspect for surface water regulation	0.62%	0.28%	0.24%	0.37%	1.51%
Terrestrial invasive plant management	0.53%	0.30%	0.26%	0.37%	1.46%
Analyze soil and landform data	0.66%	0.07%	0.04%	0.45%	1.22%
Analyze biotic data	0.41%	0.34%	0.27%	0.17%	1.19%
Maintain surface water projects	0.67%	0.18%	0.01%	0.17%	1.03%
Ditch abandonment	0.39%	0.30%	0.00%	0.27%	0.96%
Strategize biota management	0.68%	0.09%	0.06%	0.07%	0.90%
Aquatic invasive animal management	0.32%	0.18%	0.16%	0.22%	0.87%
Reduce groundwater waste	0.25%	0.19%	0.14%	0.17%	0.74%
Mitigation - carbon sequestration	0.22%	0.17%	0.12%	0.15%	0.66%

TARGETING

Targeted protection, restoration, and enhancement of habitat cores and corridors and preserving rare ecosystems and species are necessary for achieving diverse, functional, and resilient ecosystems. Areas that expand habitat cores and corridors, native plant communities, lakes and lands with Outstanding and High Biodiversity, rare habitat types and rare species are priorities for protection, restoration, and enhancement (Map 5-1, Map 5-2, Map 5-3, and Map 5-4). Prioritizing lands and waters that are already high quality is a cost effective means to maintaining and enhancing biodiversity. ACD relies upon MN DNR data to identify rare features, native plant communities, and sites and waters of significant biodiversity. ACD also refers to The Minnesota DNR Wildlife Action Plan and Anoka Sand Plain Subsection Profile for ecological stewardship guidance. The Wildlife Action Plan highlights quality habitat in Anoka County by scoring terrestrial and aquatic habitats (Map 5-5), identifies Species in Greatest Conservation Need and their key habitats, and provides priority conservation actions to maintain, enhance, and protect habitats.

Management efforts also respond to the threat of aquatic and terrestrial invasive species. If a new invasive insect, animal, or plant species, especially a species on the Eradicate Noxious Weed list is detected, efforts are made to minimize their impact through early detection and rapid response. If those species are treated while

the populations are small, there is a greater chance of controlling and preventing the spread into new waterbodies and lands.

IMPLEMENTATION

Anoka Conservation District collaborates with Partners and residents to preserve and enhance biological diversity and ecological corridors. This plan identifies actions and programs to achieve ecological resources goals. The top priority programs based on return on investment (ROI) analyses are listed below in Table 5-3 for the ecological resource goals. These programs cumulatively achieve over 95% of the ROI to increase biodiversity, provide benefits to wildlife, provide quality recreational opportunities, and enhance ecological services. A table detailing actions associated with these programs is presented at the end of this chapter.

Table 5-3: Ecological goals and programs ranked by ROI

Program	**Biodiversity - sustain and restore**	**Biodiversity for consumptive recreation - sustain and restore**	**Biodiversity for recreation - sustain and restore**	**Biota biogeochemical functions - sustain and restore**	**Grand Total**
Land protection	15.87%	12.51%	10.41%	3.82%	42.61%
Ecological restoration	4.12%	3.22%	2.39%	2.30%	12.03%
Ecological enhancement	3.00%	1.60%	2.26%	0.87%	7.73%
Regulatory assistance	2.90%	1.46%	1.27%	1.87%	7.50%
Aquatic invasive species control	2.39%	1.34%	1.18%	1.64%	6.56%
Terrestrial invasive species control	1.68%	0.94%	0.83%	1.15%	4.60%
Groundwater conservation	1.00%	0.75%	0.55%	0.69%	2.99%
Surface water monitoring	1.52%	0.49%	0.00%	0.67%	2.69%
Shore and bank BMPs	1.53%	0.45%	0.00%	0.42%	2.41%
Agricultural BMPs	0.91%	0.43%	0.25%	0.59%	2.18%
Hydrologic enhancement	0.34%	0.54%	0.40%	0.54%	1.82%
Rare species protection	1.15%	0.00%	0.58%	0.00%	1.72%
Vetted sum	**36.41%**	**23.73%**	**20.12%**	**14.56%**	**94.84%**

Land Protection

Land protection provides multiple benefits for all ecological resources; sustains habitat, biodiversity, soil health, and hydrologic function and has the potential to provide recreation opportunities. Preserving parcels that buffer existing public lands, native plant communities, and waters and that expand habitat corridors is a high priority for wildlife and enhancing landscape resilience.

ACD identifies priority parcels and provides recommendations for land protection to local and state government and other Land Trust Partners. Land protection is obtained through conservation easements or fee-title acquisition projects depending on available land protection project and funding. Technical and administrative assistance is provided to landowners interested in obtaining a conservation easement. Once easements are

established, inspections occur annually to ensure there are no easement violations. A lack of easement maintenance funding to implement stewardship plans has been identified as an issue that staff needs to address.

Ecological Restoration

Ecological restoration is necessary to sustain and improve biodiversity and habitat in Anoka County's prairies, oak savanna, forest, wetlands, shorelines, and riparian areas. Wetland restoration is unique in that it may involve both hydrology and vegetative management. In some cases, restoring the hydrology such as plugging ditches may be the first step to controlling monocultures of reed canary grass and restoring an area to a native wetland. Other sites do not require restoring hydrology but need active vegetative management to sustain native wetland plant communities, many of which support rare species populations.

Ecological Enhancement

Ecological enhancement differs from restoration in that the goal is simply to improve site ecology, not return the ecology to a previous pristine state. Currently, many ecological enhancement efforts are focused on improving pollinator habitat. An alarming recent decline in pollinator populations has led to more resources for creating pollinator habitat and habitat corridors that provide food sources, nesting sites, and spaces safe from pesticides. ACD promotes and implements creating pollinator habitat following best management practices using ecologically appropriate species-rich seed mixes and bloom times from early spring to late fall. Host plants are included in plantings, such as milkweed species for monarch caterpillars.
Examples of ecological enhancement in this plan include:

- Backyard habitat enhancement
- Fish ladders
- Lawns to gardens
- Lawns to legumes
- Pollinator gardens
- Prescribed burns
- Roadsides for wildlife

ECOLOGICAL RESTORATION AND ENHANCEMENT

Cumulatively Achieving Regional Goals on Many Small Publicly and Privately Owned Sites

Each restoration and enhancement project fits within a larger framework and is a piece of a slowly building network. Whether it be a pollinator corridor for the Rusty Patch bumblebee or a wildlife corridor to sustain keystone species, the concept is the same; string together enough sites situated in the right place on the landscape of a certain size and quality, and we may sustain our ecological diversity and services. ACD works with public and private landowner to identify priorities and develop stewardship plans. We coordinate across county boundaries through associations with groups like the Anoka Sand Plain Partnership and Metro Conservation Network. Technical assistance is provided to all landowners to ensure best management practices are followed and ecologically appropriate plant materials are utilized. When funds are available, cost share financial assistance is provided to residents. Volunteer engagement opportunities are organized to include the public and foster a sense of stewardship for ecological resources. Stewardship activities are monitored to facilitate long-term adaptive management.

Regulatory Assistance

Supporting regulatory efforts that improve water quality and prevent the degradation of terrestrial and aquatic habitats is useful to sustain biological diversity. Implementation assistance to local government units for the Buffer Law, Wetland Conservation Act, and Shoreland Ordinances all fall under this category.

Aquatic Invasive Species

ACD works with local partners to prevent the spread of aquatic invasive species. Aquatic invasive species are inventoried and monitored. Targeted invasive species controls are implemented such as carp management to improve water quality and aquatic habitats.

Flowering rush - P. Dziuk

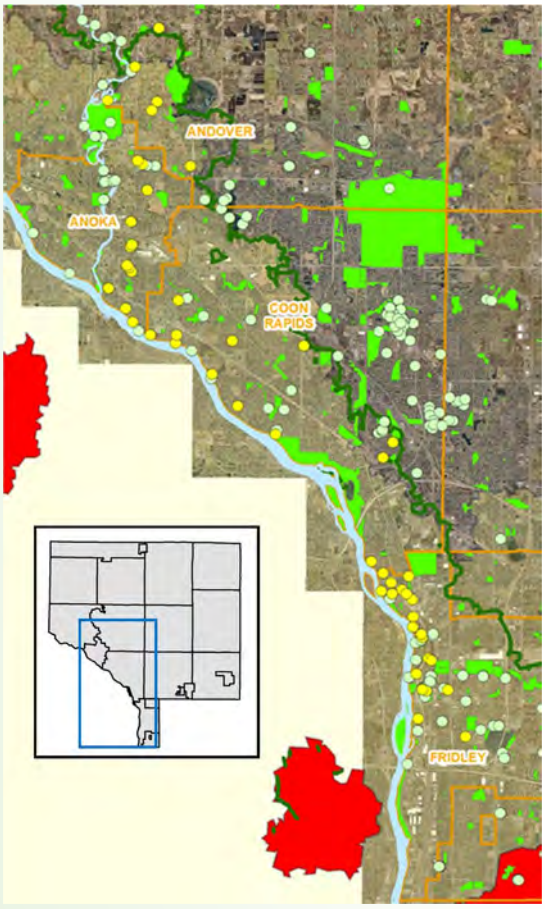
European common reed - P. Dziuk

Eurasian water-milfoil - P. Dziuk

BWSR LAWNS TO LEGUMES

Planting for Pollinators

ACD is working with residents and Cities along the Mississippi and Rum Rivers to provide a corridor of suitable habitat for the endangered rusty patched bumblebee and other pollinators.



Mississippi and Rum River Pollinator Corridor

- Lawns to Legumes Pollinator Sites
- City and ACD Native Plantings
- Public Lands
- Rusty Patched Bumble Bee Dispersal Zones
- Rusty Patched Bumble Bee High Potential Zones
- BWSR Lawns to Legumes Priority 1 Area

Terrestrial Invasive Species

Terrestrial invasive species are inventoried and monitored. Invasive species control is often a first step toward ecosystem restoration. The control of invasive species must be achieved in order to begin the process of reintroducing desirable native species. In some cases, invasive species removal is the only activity needed to preserve an otherwise high quality ecosystem with abundant natives that will continue to regenerate. In addition to controlling invasive species on specific sites, ACD collaborates with others in the Anoka Cooperative Weed Management Area Partnership to prioritize and implement terrestrial invasive species management and outreach throughout Anoka County.


Oriental bittersweet - P. Dziuk


Wild parsnip - K. Chayka

Groundwater Conservation

Ecosystems are greatly influenced by site hydrology. In Anoka County, with shallow water tables, this is extremely prevalent. A permanent drop in surficial groundwater would irreparably harm many of our native habitats. Guarding against this threat through efforts that both conserve groundwater and increase infiltration is critical to maintaining our rich and diverse landscape.

Surface Water Monitoring

Drawing upon data from monitoring lakes, streams and wetland for water quality, water level, and biology trends and threshold exceedance is important when managing aquatic ecosystems. The impact of poor water quality on flora and fauna composition must be considered when tailoring stewardship plans.

Shore and Bank BMPs

Installation of lakeshore and riparian buffers and stabilization projects can improve ecosystem health near and in the water, depending on the nature of the project. For projects that require hard armament of banks to stop erosion, steps can be taken to make them friendlier to local wildlife. Restoring vegetation along shorelines and riverbanks directly increases biodiversity and creates habitat corridors. It also protects aquatic habitats from erosion and excessive nutrients and pesticides.

Agricultural BMPs

Lands in agricultural remain important for wildlife. Agricultural best management practices that improve water quality and reduce the use of pesticides help wildlife. Examples in Anoka County include:

- Conservation grazing
- Cover Crops
- Integrated pest management
- Organic agriculture
- Permaculture
- Precision agriculture
- Strip cropping

Hydrologic Enhancement

Reconnecting waterways that are separated by structures like culverts, dams, weirs, and perched culverts helps water move in a more natural fashion as well as connects aquatic habitats so that aquatic biota can flourish. Restoring hydrology can affect surrounding plant communities and aid in enhancing habitats such as flood plain forests and wet meadows.

Altered waterways such as ditches and channelized streams can result in drained wetlands, loss of hydrologic connectivity, impacts to native plant communities, and spread of invasive species. Activities such as plugging ditches and remeandering can restore the area's hydrology, plant communities, and habitat.

Improved hydrology in altered systems can result in multiple benefits including attenuating flooding, reducing erosion, restoring habitat, and capturing contaminants. Examples include:

- Two-stage ditches
- Ditch remeandering
- Stream grade stabilization
- Ditch abandonment
- Water level management

Rare Species Protection

MN DNR's Propagation of Endangered or Threatened Species permit provides another tool for conserving rare plant species in Anoka County. ACD will work in partnership with the University of Minnesota Landscape Arboretum and Critical Connections Ecological Services to develop a rare plant rescue program where rare plants are salvaged from development areas and transplanted into protected areas. Ecologically appropriate and permanently protected recipient sites will be identified. Protocols for salvage, transplantation, species-specific stewardship, and monitoring will be developed.

In addition to developing a rare plant rescue program, ecological restoration projects and best management practices are implemented to enhance rare and declining species at specific sites.

Stormwater BMPs

While all stormwater BMPs help ecological resources by improving water quality, and to varying extent, attenuating flooding, some BMPs are also habitat. Rain gardens (biofiltration and bioinfiltration) provide pollinator habitat. Stormwater ponds provide habitat for same suite of flora and fauna that wetlands serve.

Wetlands Protection

Because wetlands cover 30% of the Anoka County landscape, they warrant a call out. Wetlands have many regulatory protections in recognition of the role they play in maintaining water quality in our lakes and rivers and attenuating floodwater. The federal government regulates wetlands under Section 404 of the Clean Water Act through the US Army Corps of Engineers and through Swampbuster on agricultural lands. The state regulates larger, permanently ponded wetlands through the DNR and the remaining wetlands through local government units under the Wetland Conservation Act of 1991 (WCA). ACD staff works with Local Government Units (LGUs) and residents to delineate wetlands and helps residents comply with WCA. ACD also serves to enforce WCA by determining if there are potential violations and the nature of remediation required to resolve the matter.

WCA requires mitigation for wetlands drained or filled in excess of exemptions by restoring wetland of equal value or purchasing credits from those who have previously completed wetland restoration projects. ACD staff identify wetland restoration opportunities for creating wetland banks that may be used for these credits and provides technical assistance with the design, review, and monitoring of wetland restoration projects.

MEASURABLE OUTCOMES

There are countless means to measure impacts and progress of achieving ecological resources goals. The number of acres protected, acres of habitat restored/enhanced and number of residential cost share projects resulting from ACD technical and financial cost share assistance provide a rough measure of ACD's effort. ACD's projects are monitored to assess the site's structural and functional integrity over time and determine whether there are any maintenance or redesign needs. More detailed measures may be taken to determine resource specific outcomes such as invasive species population size, the number of lakes and waters with invasive species on the infested waters list, the number rare plants salvaged and successfully transplanted, pollinator and wildlife populations, and vegetation monitoring data from restoration/enhancement sites. The level of measuring outcomes will vary in scale from summarizing organization goals and measuring site-specific goals.

ACD will track six outcomes to measure progress in maintaining and restoring Anoka County's ecological resources.

- Acres protected
- Habitat enhanced/restored
- Rare species rescued
- Invasive species controlled
- Consultations provided
- Increases in pollinator and wildlife populations

EXISTING PLANS AND GROUPS, AND COLLABORATION

Resources

- Minnesota DNR. 2015. Minnesota Wildlife Action Plan
- MNDNR Lakes of Biological Significance https://gisdata.mn.gov/dataset/env-lakes-of-biological-signific
- MN DNR Minnesota County Biological Survey Biodiversity Significance Rankings of sites (Outstanding, High, Moderate) https://files.dnr.state.mn.us/eco/mcbs/biodiversity_significance_ranking.pdf
- Rare Native Plant Communities (S1, S2, or S3) https://files.dnr.state.mn.us/natural_resources/npc/s-and-g-ranks-for-native-plant-communities.pdf
- MN DNR Rare Species Guide: https://www.dnr.state.mn.us/rsg/index.html
- MN DNR Infested Waters List https://www.dnr.state.mn.us/invasives/ais/infested.html
- MN Department of Agriculture MN Noxious Weed List https://www.mda.state.mn.us/plants-insects/minnesota-noxious-weed-list

Supporting Local Analyses and Plans

- Anoka Nature Preserve Management Plan
- Melanie Kern Easement Management Plan
- Herb Beach Easement Management Plan
- Burman WMA Management Plan
- Mikkelson WMA Management Plan
- Blaine SNA Management Plan
- Bonnel WMA Management Plan
- Cedar Creek Conservation Area Management Plan
- ACD Natural Heritage Protection and Management Strategy
- Anoka Sand Plain Partnership Strategic Plan

Collaboration

Collaboration is necessary and valued for achieving ecological resource goals. ACD collaborates with many partners including USFWS, BWSR, MN DNR, MN Department of Agriculture, MN Department of Transportation, University of MN, University of MN Landscape Arboretum, Anoka County Parks, cities, SWCDs, watershed districts, watershed management organizations, Great River Greening, Anoka Sand Plain Partners, MN Land Trust, and The Nature Conservancy.

ECOLOGICAL RESOURCE UNMET NEEDS

Baseline Natural Resources Data

Conservation planning and stewardship are inhibited by the lack of or old baseline natural resources data including rare features, native plant communities, biodiversity significance, MN Land Cover Classification System data, invasive species inventories, and extent of pollinator and wildlife populations.

Long-Term Stewardship

Many habitat types in Anoka County thrive from disturbance such as fire or herbivory. Removal of these keystone processes alters ecosystem structure and function. The lack of management and increased edge effect favors the spread of invasive species. Additional funding sources are needed to sustain functioning native ecosystems.

Refining Best Management Practices

Best management practices and habitat enhancement/restoration activities could be better evaluated if meaningful outcomes were defined and robust monitoring methods were developed. If similar methods are followed across the region, a large pool of data could provide guidance to refine and advance ecological resource stewardship.

Species-Specific Conservation Plans

In addition to drafting site specific stewardship plans, there is value in species-specific stewardship and conservation plans for keystone species, species in greatest conservation need, and rare species. Keystone species, which fill a critical ecological role that no other species can, maintains the local biodiversity of an ecosystem and influences the abundance and type of other species in a habitat. Stewardship plans that address keystone species would have a large impact on the ecosystem and other species. Rare species and species in greatest conservation need may be indicators of degraded ecosystems and due to their status, there is an urgent need to develop conservation plans to identify priority locations and actions to protect and enhance their specific habitat.

Holistic Stewardship

Ecological resources are interconnected and interdependent and thus stewardship decisions must consider the soil, water, vegetation, wildlife, and human interactions. Another consideration to take when investing resources and implementing practices, is whether to remediate the symptom of degraded ecological systems or to take action on solving the underlying problems.

NEEDED IMPLEMENTATION ASSETS

Implementation assets include support from others; financial, technical, and staffing capacity; adequate scientific insight and stakeholder literacy; and the proper jurisdiction to take action. When missing, these assets represent an obstacle to successful implementation.

Support

Ecological resources do no benefit from the widespread support that surface water resources garner. The economic or quality of life impacts from ecological resource services are not well defined or marketed. Ecological services valuation methodology and outreach materials are needed to reach stakeholders better.

Capacity

Anoka County has abundant resources to manage and is situated in a zone of rapid development. The combination of rapidly advancing threats and high quality resources spanning nearly 300,000 acres requires at least two FTEs to address the workload.

Awareness

Foundational data are missing to elevate planning and analysis. MLCCS data are needed along with invasive species inventories, and keystone species stewardship plans. Invasive species biological controls are always needed.

Jurisdiction

Until recently there were barriers in place to salvage rare species that were slated to be destroyed. Now that this has been addressed, projects are actively moving forward. Protections for rare species, declining habitats, or outstanding resource value habitats are minimal, providing very little regulatory leverage to help slow losses.

REFERENCES

Division of Ecological and Water Resources, M. D. (2016). *Minnesota's Wildlife Action Plan 2015-2025.* Saint Paul: Minnesota Department of Natural Resources.

D. Wilcove and M. Lawrence. (2005) How many endangered species are there in the United States? Frontiers in Ecology 3(8):414-420

ECOLOGICAL RESOURCE STEWARDSHIP ACTION TABLE BY ROI

Table 5-4: Ecological resource programs and actions – vetted to 95% of total ROI

Programs and Related Actions	Biodiversity - sustain and restore	Biodiversity for consumptive recreation - sustain and restore	Biodiversity for recreation - sustain and restore	Biota biogeochemical functions - sustain and restore	Grand Total
Land protection	**15.87%**	**12.51%**	**10.41%**	**3.82%**	**42.61%**
Conservation easement - hold	3.67%	2.56%	2.20%	0.98%	9.42%
Conservation easement - promote	0.37%	0.26%	0.22%	0.10%	0.94%
Fee title land acquisition - hold	3.97%	3.29%	2.76%	0.98%	10.99%
Land protection - maintain	2.56%	2.08%	1.74%	0.59%	6.98%
Land protection compliance - inspect	1.28%	1.04%	0.87%	0.29%	3.49%
Land protection opportunity - analyze	0.24%	0.24%	0.12%	0.00%	0.60%
Land protection violation compliance - guide	2.99%	2.43%	2.03%	0.69%	8.14%
Ecological restoration	**4.12%**	**3.22%**	**2.39%**	**2.30%**	**12.03%**
Habitat restoration - design	0.14%	0.12%	0.10%	0.07%	0.44%
Habitat restoration - evaluate	0.24%	0.20%	0.17%	0.12%	0.73%
Habitat restoration - fund	0.21%	0.18%	0.16%	0.10%	0.66%
Habitat restoration - maintain	1.43%	1.22%	1.03%	0.70%	4.38%
Habitat restoration - promote	0.24%	0.20%	0.17%	0.12%	0.73%
Habitat restoration install - manage	0.17%	0.14%	0.12%	0.08%	0.51%
Habitat restoration opportunity - inventory	0.14%	0.12%	0.10%	0.07%	0.44%
Habitat restoration protocol efficacy - analyze	0.10%	0.08%	0.07%	0.05%	0.29%
Wetland restoration - evaluate	0.16%	0.11%	0.05%	0.11%	0.44%
Wetland restoration - maintain	0.98%	0.64%	0.32%	0.68%	2.62%
Wetland restoration - promote	0.16%	0.11%	0.05%	0.11%	0.44%
Ecological enhancement	**3.00%**	**1.60%**	**2.26%**	**0.87%**	**7.73%**
Backyard habitat enhancement - cost share	0.10%	0.05%	0.08%	0.04%	0.27%
Backyard habitat enhancement - design	0.07%	0.04%	0.05%	0.02%	0.18%
Backyard habitat enhancement - promote	0.11%	0.06%	0.09%	0.04%	0.30%
Backyard habitat project - evaluate	0.07%	0.04%	0.05%	0.02%	0.18%
Backyard habitat project - maintain	0.65%	0.35%	0.54%	0.24%	1.78%
Fish ladder - fund	0.04%	0.03%	0.02%	0.00%	0.09%
Fish ladder - maintain	0.13%	0.10%	0.07%	0.00%	0.30%
Lawns to gardens - promote	0.07%	0.04%	0.03%	0.04%	0.18%
Lawns to legumes - cost share	0.06%	0.03%	0.03%	0.04%	0.16%
Lawns to legumes - promote	0.04%	0.02%	0.02%	0.02%	0.09%

Programs and Related Actions	Biodiversity - sustain and restore	Biodiversity for consumptive recreation - sustain and restore	Biodiversity for recreation - sustain and restore	Biota biogeochemical functions - sustain and restore	Grand Total
Lawns to legumes project - evaluate	0.05%	0.03%	0.02%	0.03%	0.13%
Pollinator garden - cost share	0.16%	0.09%	0.15%	0.05%	0.45%
Pollinator garden - design	0.11%	0.06%	0.10%	0.04%	0.30%
Pollinator garden - evaluate	0.09%	0.05%	0.08%	0.03%	0.25%
Pollinator garden - maintain	0.54%	0.30%	0.49%	0.00%	1.33%
Pollinator garden - promote	0.09%	0.05%	0.08%	0.03%	0.25%
Prescribed burn - cost share	0.15%	0.03%	0.04%	0.08%	0.31%
Prescribed burn - design	0.10%	0.02%	0.03%	0.05%	0.20%
Prescribed burn - promote	0.09%	0.02%	0.02%	0.04%	0.17%
Roadsides for wildlife - promote	0.16%	0.08%	0.15%	0.05%	0.44%
Regulatory assistance	**2.90%**	**1.46%**	**1.27%**	**1.87%**	**7.50%**
Buffer law violation compliance - guide	0.31%	0.04%	0.00%	0.03%	0.38%
Shoreland ordinance compliance - inspect	0.21%	0.11%	0.11%	0.16%	0.60%
Shoreland ordinance violation compliance - guide	0.50%	0.26%	0.25%	0.38%	1.39%
Wetland Conservation Act compliance - inspect	0.52%	0.31%	0.27%	0.39%	1.49%
Wetland Conservation Act violation compliance - guide	1.22%	0.72%	0.64%	0.90%	3.48%
Aquatic invasive species control	**2.39%**	**1.34%**	**1.18%**	**1.64%**	**6.56%**
Aquatic invasive animal control - promote	0.11%	0.06%	0.06%	0.08%	0.31%
Aquatic invasive animal early detection - promote	0.11%	0.06%	0.06%	0.08%	0.31%
Aquatic invasive plant - inventory	0.34%	0.19%	0.17%	0.24%	0.94%
Aquatic invasive plant control - promote	0.11%	0.06%	0.06%	0.08%	0.31%
Aquatic invasive plant control plan - design	0.14%	0.08%	0.07%	0.09%	0.38%
Aquatic invasive plant early detection - promote	0.11%	0.06%	0.06%	0.08%	0.31%
Aquatic invasive plant treatment - manage	0.16%	0.09%	0.08%	0.11%	0.44%
Aquatic invasive species project - evaluate	0.11%	0.06%	0.06%	0.08%	0.31%
Aquatic invasive species treatment - fund	0.21%	0.12%	0.10%	0.14%	0.56%
Carp barrier - evaluate	0.05%	0.03%	0.03%	0.04%	0.14%
Carp barrier - maintain	0.51%	0.29%	0.25%	0.35%	1.41%
Carp barrier construct - fund	0.04%	0.02%	0.02%	0.03%	0.11%
Carp harvest - fund	0.15%	0.09%	0.08%	0.11%	0.42%
Carp harvest - manage	0.12%	0.07%	0.06%	0.08%	0.33%
Terrestrial invasive species control	**1.68%**	**0.94%**	**0.83%**	**1.15%**	**4.60%**
Terrestrial invasive animal control - promote	0.07%	0.04%	0.04%	0.05%	0.20%
Terrestrial invasive animal early detection - promote	0.07%	0.04%	0.04%	0.05%	0.20%

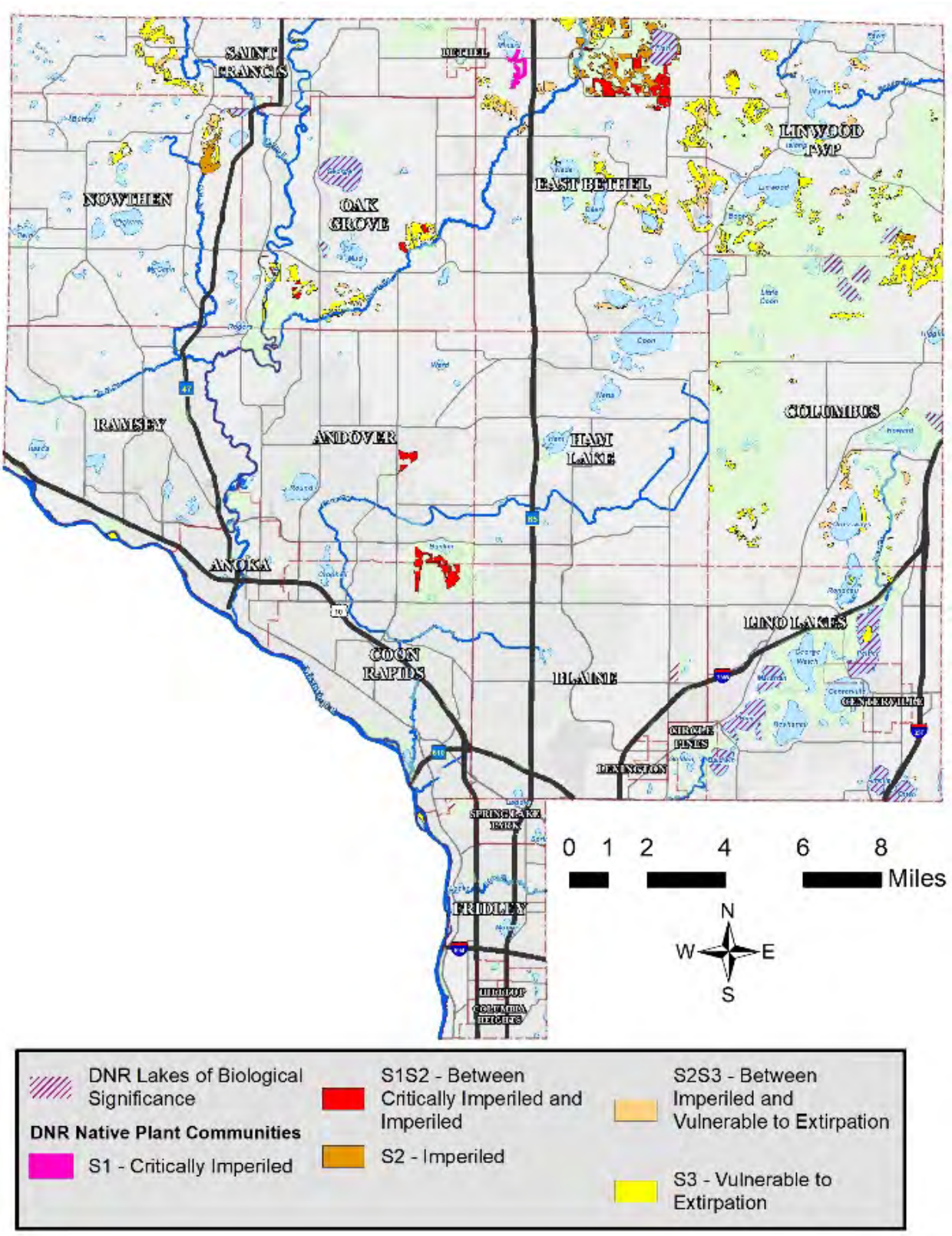
Programs and Related Actions	Biodiversity - sustain and restore	Biodiversity for consumptive recreation - sustain and restore	Biodiversity for recreation - sustain and restore	Biota biogeochemical functions - sustain and restore	Grand Total
Terrestrial invasive plant control - promote	0.10%	0.06%	0.05%	0.07%	0.27%
Terrestrial invasive plant control plan - design	0.12%	0.07%	0.06%	0.08%	0.33%
Terrestrial invasive plant early detection - promote	0.10%	0.06%	0.05%	0.07%	0.27%
Terrestrial invasive plant treatment - fund	0.18%	0.10%	0.09%	0.12%	0.49%
Terrestrial invasive plant treatment - manage	0.14%	0.08%	0.07%	0.10%	0.38%
Terrestrial invasive plant treatment supplies - supply	0.10%	0.06%	0.05%	0.07%	0.27%
Terrestrial invasive species project - evaluate	0.15%	0.08%	0.07%	0.10%	0.41%
Terrestrial invasive species project - maintain	0.60%	0.34%	0.29%	0.41%	1.64%
Groundwater conservation	**1.00%**	**0.75%**	**0.55%**	**0.69%**	**2.99%**
Graywater reuse - advocate	0.08%	0.06%	0.05%	0.06%	0.24%
Groundwater conservation plan - design	0.53%	0.40%	0.30%	0.37%	1.60%
Residential WaterSmart appliances/fixtures and practices - promote	0.04%	0.03%	0.03%	0.03%	0.13%
Smart irrigation - promote	0.06%	0.05%	0.04%	0.04%	0.19%
Surface water for irrigation - advocate	0.09%	0.07%	0.05%	0.06%	0.27%
Water efficient landscaping - promote	0.07%	0.05%	0.04%	0.05%	0.21%
Water-wise lawnscape - promote	0.09%	0.06%	0.04%	0.06%	0.25%
Surface water monitoring	**1.52%**	**0.49%**	**0.00%**	**0.67%**	**2.69%**
Lake water quality threshold exceedance - analyze	0.00%	0.08%	0.00%	0.08%	0.16%
Lake water quality trends - analyze	0.00%	0.08%	0.00%	0.08%	0.16%
Stream fishes - monitor	0.13%	0.06%	0.00%	0.00%	0.19%
Stream invertebrates - monitor	0.13%	0.06%	0.00%	0.00%	0.19%
Stream water quality - monitor	0.13%	0.04%	0.00%	0.12%	0.29%
Stream water quality threshold exceedance - analyze	0.17%	0.05%	0.00%	0.17%	0.39%
Stream water quality trends - analyze	0.17%	0.05%	0.00%	0.17%	0.39%
Wetland level - monitor	0.34%	0.00%	0.00%	0.00%	0.34%
Wetland level trends - analysis	0.46%	0.00%	0.00%	0.00%	0.46%
Shore and bank BMPs	**1.53%**	**0.45%**	**0.00%**	**0.42%**	**2.41%**
Lakeshore soil loss - analyze	0.01%	0.01%	0.00%	0.01%	0.03%
Lakeshore stabilization - cost share	0.01%	0.01%	0.00%	0.01%	0.03%
Lakeshore stabilization -evaluate	0.01%	0.01%	0.00%	0.01%	0.03%
Lakeshore stabilization install - manage	0.10%	0.07%	0.00%	0.07%	0.24%
Lakeshore stabilization -maintain	0.09%	0.06%	0.00%	0.06%	0.21%
Shoreland and riparian buffer - cost share	0.16%	0.02%	0.00%	0.02%	0.20%

Programs and Related Actions	Biodiversity - sustain and restore	Biodiversity for consumptive recreation - sustain and restore	Biodiversity for recreation - sustain and restore	Biota biogeochemical functions - sustain and restore	Grand Total
Shoreland and riparian buffer - design	0.11%	0.01%	0.00%	0.01%	0.13%
Shoreland and riparian buffer - evaluate	0.09%	0.01%	0.00%	0.01%	0.11%
Shoreland and riparian buffer - maintain	0.53%	0.06%	0.00%	0.06%	0.66%
Shoreland and riparian buffer - promote	0.09%	0.01%	0.00%	0.01%	0.11%
Shoreland and riparian buffer install - manage	0.12%	0.01%	0.00%	0.01%	0.15%
Streambank soil loss - analyze	0.01%	0.01%	0.00%	0.01%	0.03%
Streambank stabilization - cost share	0.02%	0.01%	0.00%	0.01%	0.04%
Streambank stabilization - evaluate	0.02%	0.01%	0.00%	0.01%	0.04%
Streambank stabilization - maintain	0.11%	0.08%	0.00%	0.07%	0.26%
Streambank stabilization install - manage	0.01%	0.01%	0.00%	0.01%	0.03%
Agricultural BMPs	**0.91%**	**0.43%**	**0.25%**	**0.59%**	**2.18%**
Ag. conservation program - promote	0.06%	0.04%	0.02%	0.04%	0.16%
Ag. waste system - promote	0.05%	0.04%	0.00%	0.06%	0.15%
Ag. waste system need - inventory	0.03%	0.02%	0.00%	0.04%	0.09%
Conservation grazing - design	0.09%	0.02%	0.02%	0.04%	0.17%
Conservation grazing - promote	0.04%	0.01%	0.01%	0.02%	0.08%
Cover crop - promote	0.02%	0.01%	0.01%	0.01%	0.04%
Integrated pest management - promote	0.08%	0.03%	0.02%	0.06%	0.18%
Organic agriculture - promote	0.27%	0.13%	0.08%	0.17%	0.65%
Permaculture - promote	0.12%	0.07%	0.06%	0.07%	0.31%
Precision ag. - promote	0.08%	0.03%	0.02%	0.06%	0.18%
Strip cropping - promote	0.04%	0.02%	0.02%	0.02%	0.09%
Hydrologic enhancement	**0.34%**	**0.54%**	**0.40%**	**0.54%**	**1.82%**
Ditch remeander - evaluate	0.00%	0.01%	0.01%	0.01%	0.03%
Ditch remeander - fund	0.00%	0.01%	0.01%	0.01%	0.03%
Ditch remeander - manage	0.00%	0.30%	0.22%	0.27%	0.80%
Ditch remeander opportunity - analyze	0.00%	0.01%	0.01%	0.01%	0.02%
Stream grade stabilization - design	0.01%	0.01%	0.00%	0.01%	0.03%
Stream grade stabilization - evaluate	0.02%	0.01%	0.01%	0.01%	0.05%
Stream grade stabilization - fund	0.01%	0.01%	0.01%	0.01%	0.04%
Stream grade stabilization - maintain	0.17%	0.13%	0.10%	0.12%	0.51%
Stream grade stabilization - manage	0.01%	0.01%	0.01%	0.01%	0.03%
Stream grade stabilization opportunity - analyze	0.01%	0.01%	0.00%	0.01%	0.02%
Two-stage ditch - evaluate	0.02%	0.00%	0.00%	0.01%	0.04%

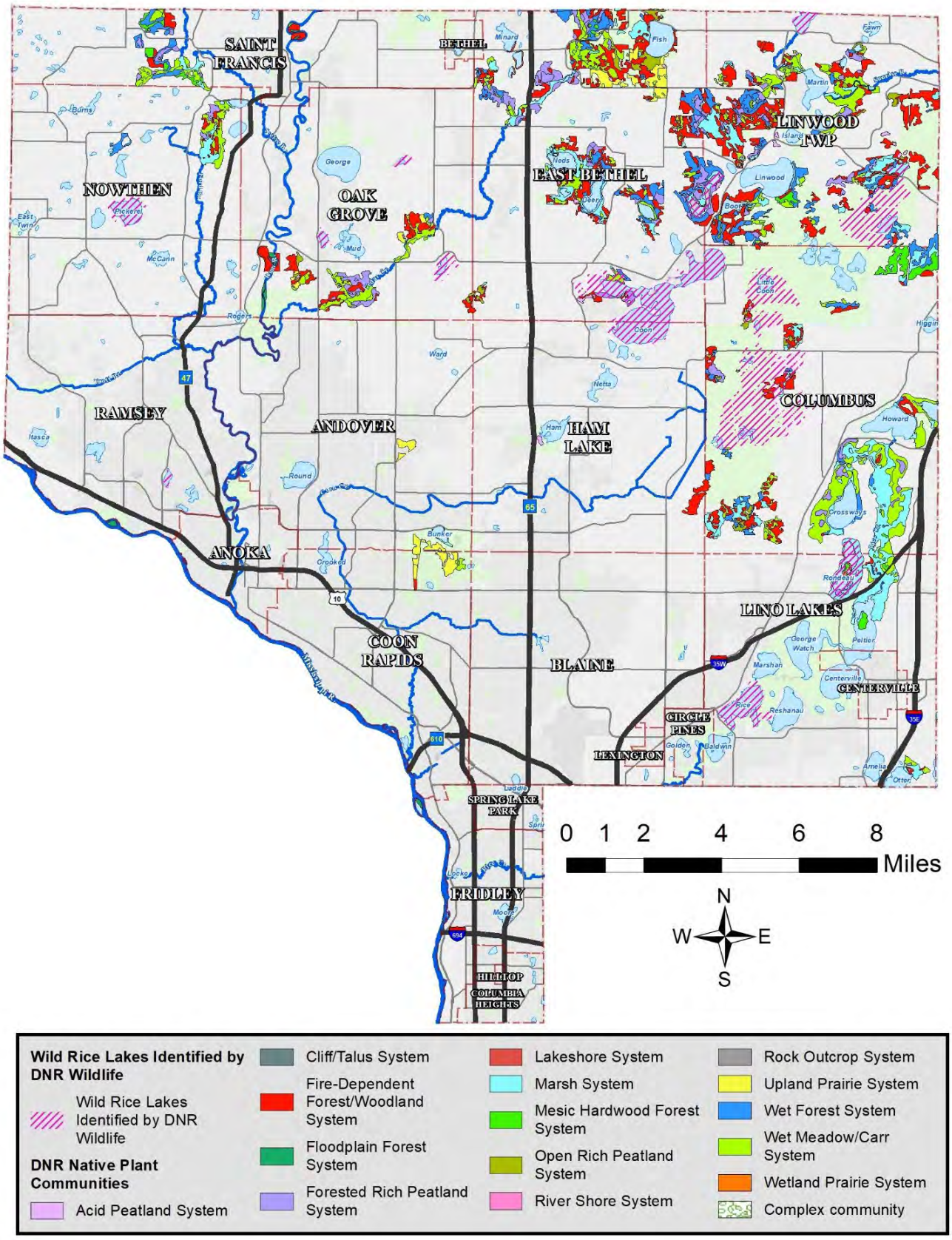
Programs and Related Actions	Biodiversity - sustain and restore	Biodiversity for consumptive recreation - sustain and restore	Biodiversity for recreation - sustain and restore	Biota biogeochemical functions - sustain and restore	Grand Total
Two-stage ditch retrofit - fund	0.02%	0.00%	0.00%	0.01%	0.03%
Water level control structure - inventory	0.01%	0.01%	0.00%	0.01%	0.03%
Water level management - design	0.02%	0.01%	0.01%	0.01%	0.05%
Water level management potential - analyze	0.01%	0.01%	0.01%	0.01%	0.03%
Rare species protection	**1.15%**	**0.00%**	**0.58%**	**0.00%**	**1.72%**
Rare plant salvage - advocate	0.19%	0.00%	0.10%	0.00%	0.28%
Rare plant salvage - evaluate	0.28%	0.00%	0.14%	0.00%	0.42%
Rare plant salvage - fund	0.33%	0.00%	0.17%	0.00%	0.51%
Rare plant salvage - manage	0.26%	0.00%	0.13%	0.00%	0.39%
Rare species - inventory	0.06%	0.00%	0.03%	0.00%	0.08%
Stormwater BMPs	**0.55%**	**0.41%**	**0.00%**	**0.38%**	**1.33%**
Adopt a drain - promote	0.01%	0.01%	0.00%	0.01%	0.03%
Bioinfiltration - cost share	0.03%	0.02%	0.00%	0.02%	0.08%
Bioinfiltration - design	0.02%	0.02%	0.00%	0.01%	0.05%
Bioinfiltration - evaluate	0.04%	0.03%	0.00%	0.02%	0.09%
Bioinfiltration - maintain	0.21%	0.16%	0.00%	0.15%	0.52%
Bioinfiltration - promote	0.04%	0.03%	0.00%	0.02%	0.09%
Bioinfiltration install - manage	0.02%	0.02%	0.00%	0.02%	0.06%
Pond modification - design	0.01%	0.01%	0.00%	0.01%	0.02%
Pond modification - evaluate	0.01%	0.01%	0.00%	0.01%	0.03%
Pond modification - fund	0.01%	0.01%	0.00%	0.01%	0.03%
Pond modification - manage	0.10%	0.07%	0.00%	0.07%	0.24%
Street sweeping - promote	0.02%	0.01%	0.00%	0.01%	0.04%

MAPS

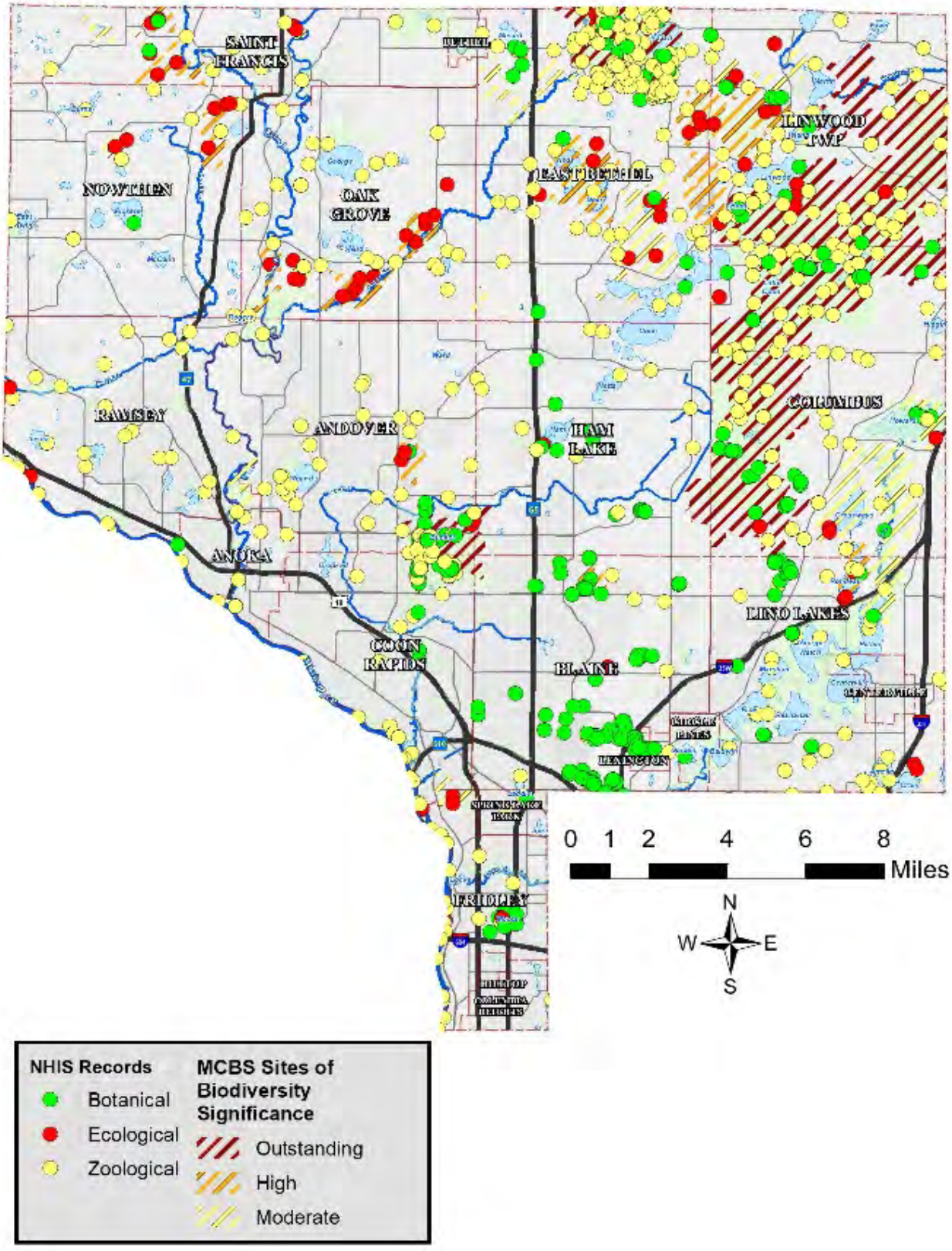
Map 5-1: DNR lakes of biological significance and rare native plant communities



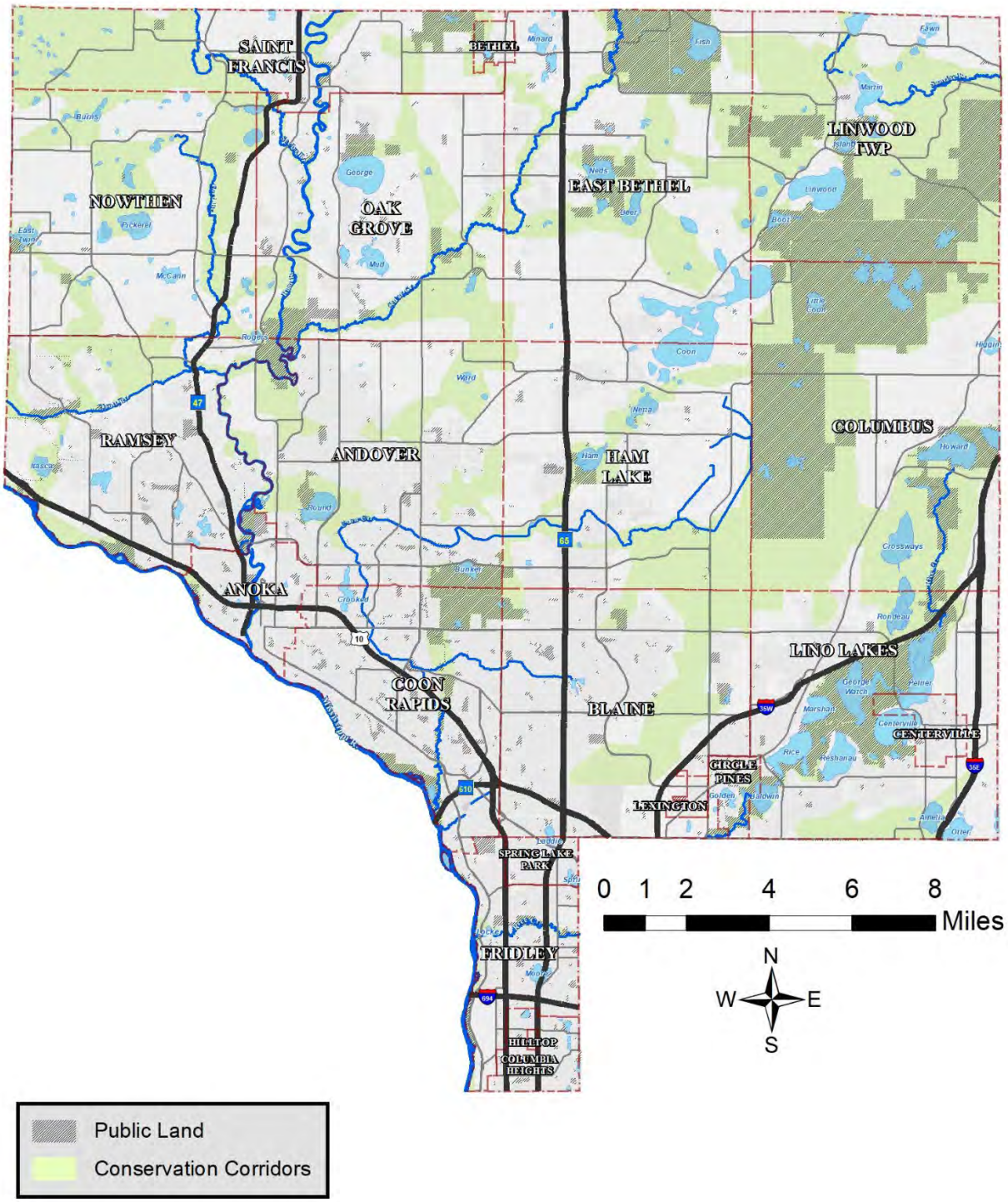
Map 5-2: Native plant communities



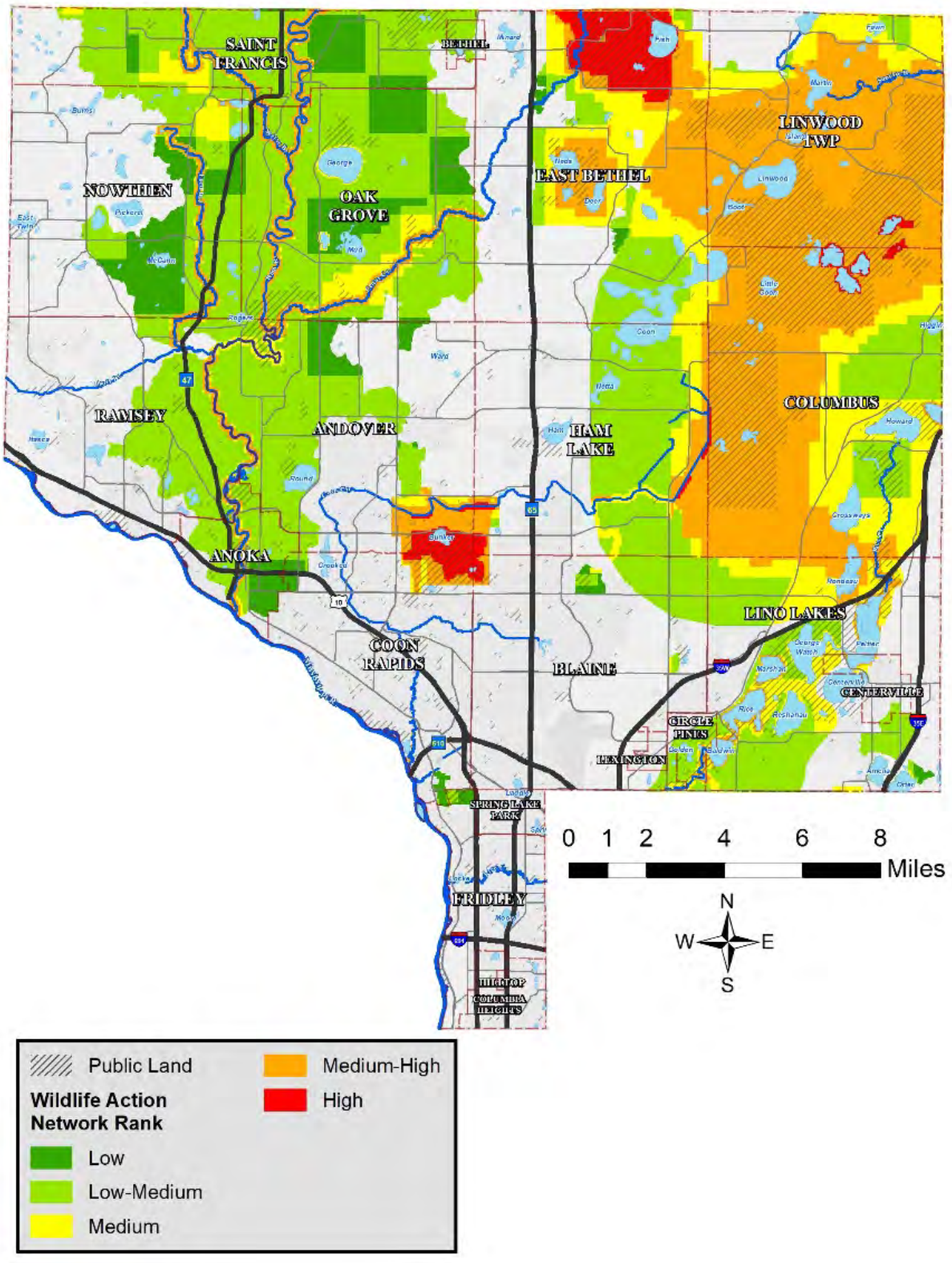
Map 5-3: Rare species and sites of biodiversity significance



Map 5-4: Anoka County conservation corridors



Map 5-5: MN DNR wildlife action network

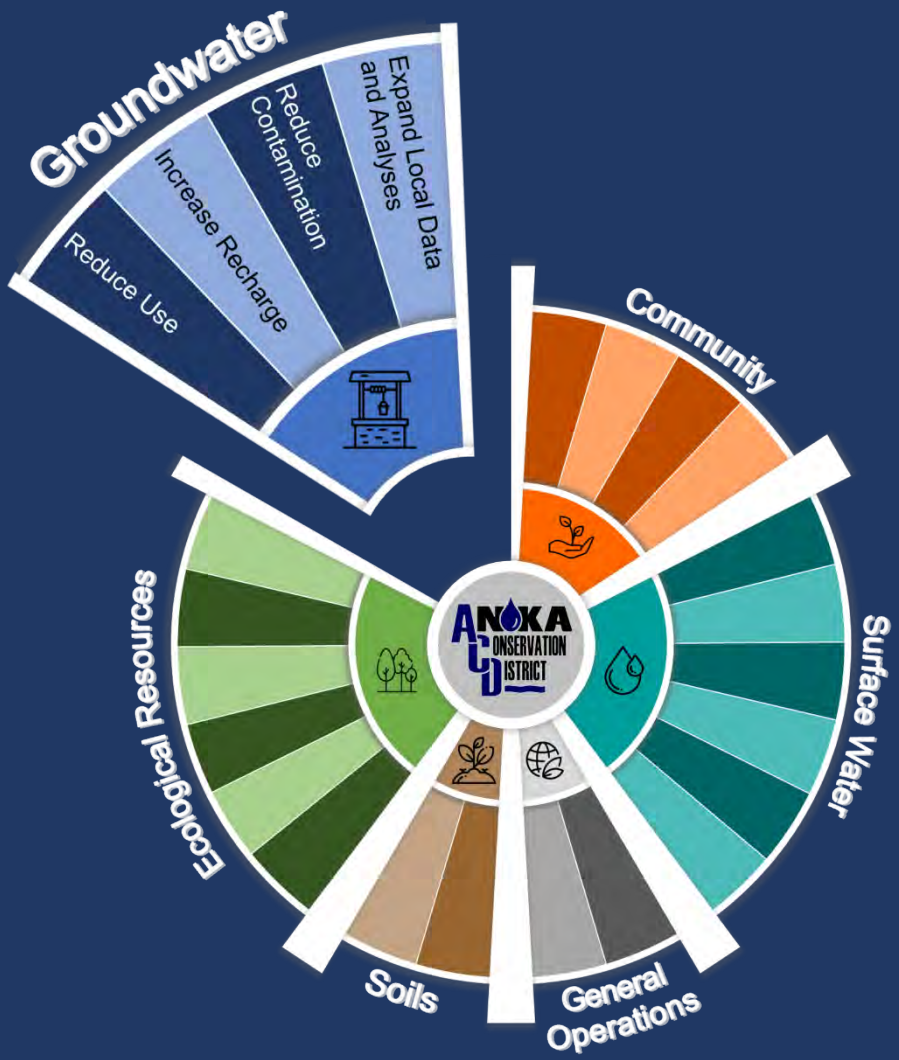


Chapter 6

Our Groundwater.

The Anoka Conservation District will take measureable steps to conserve and enhance the quantity and quality of groundwater.

Our 2021-2030 Keystone Groundwater Endeavors Are:



Chapter 6 Contents

GROUNDWATER FOUNDATION

Groundwater stewardship in Anoka County presents both opportunities and challenges because of the shallow groundwater tables and highly permeable sands present throughout much of the County. The shallow groundwater table provides a view of an otherwise invisible resource but that also means connected surface waters are the first to be impacted by changes in groundwater levels. The highly permeable sands provide unique opportunities for effective recharge but the quality of groundwater can be at risk because of the speed and ease with which contaminants can reach groundwater.

This section of the plan introduces groundwater and its current state in Anoka County as well as how ACD plans to manage this vital resource.

WHAT IS GROUNDWATER?

Groundwater is water that is held within the pore spaces of soil and rock below the ground. Areas in which the groundwater quantities are sufficiently large and interconnected to produce sustained water withdrawal yields are called aquifers. A good analogy for an aquifer is a sponge that is saturated with water. Aquifer depths can range from the land surface to hundreds of feet below the land surface in the case of the Mt. Simon-Hinckley aquifer. Accessibility, quantity, and quality of the aquifers vary spatially. Aquifers that intersect the land surface can serve as a water source for surface water features while deep aquifers are accessed with wells.

WHY IS GROUNDWATER IMPORTANT?

Historically, most of the Twin Cities Metropolitan Area (TCMA) population relied on surface water as the primary drinking water source. Since the early 1980s, the TCMA has transitioned to most of the population (~70%) relying on groundwater as the primary drinking water source. Using groundwater for drinking water requires that not only sufficient quantity is available but also that the quality meets State standards for consumption.

Within Anoka County, groundwater becomes even more important. Most Anoka County residents (94%) rely on groundwater as a drinking water source. Only the residents in the southernmost portion of the County get their drinking water from the Mississippi River. Ensuring sufficient, clean groundwater in Anoka County is imperative for the well-being of most of the residents.

In addition to human consumptive uses, groundwater is important for providing baseflow volumes for surface waters throughout the County. Water levels in streams, rivers, lakes, and wetlands can all be influenced by groundwater. The shallow groundwater table throughout much of Anoka County makes this particularly relevant.

MOST ANOKA COUNTY RESIDENTS RELY ON GROUNDWATER AS A DRINKING WATER SOURCE.

Lastly, groundwater is important because it is a limited resource. Effective stewardship is necessary to prevent overuse and contamination. Groundwater stewardship is often focused on prevention and protection because correcting contamination or water quantity problems after they develop is challenging.

WHAT GROUNDWATER CONCEPTS ARE IMPORTANT TO UNDERSTAND?

While this section introduces some concepts that are important for a basic understanding of groundwater, many other resources exist. Both the Metropolitan Council's Groundwater Digest (Metropolitan Council, 2013) and ACD's 'Our Groundwater Connection' videos (available on ACD's YouTube channel) provide additional detail for a better understanding of groundwater. The most comprehensive and detailed groundwater resource specific to Anoka County is the Geologic Atlas, Part B (Berg, 2016).

Water table

Water tables are often mentioned when discussing groundwater. Sediment has unsaturated and saturated zones, and the top of the saturated zone is referred to as the water table (Figure 6-1).

Aquifer

Aquifers are saturated geologic formations that hold groundwater in sufficient quantities to enable economical pumping of groundwater, such as the 'Saturated Zone' shown in Figure 6-1.

Groundwater Quality

Groundwater quality can be degraded when contaminants are allowed to soak into the ground with infiltrating precipitation. Some contaminants are filtered by the soil through which the precipitation soaks while others can travel long vertical distances into the deepest aquifers. Once there, some contaminants are extremely difficult and therefore expensive to remove.

Figure 6-1: Water table diagram (Metropolitan Council, 2013)

Groundwater can also be degraded by naturally occurring elements that can accumulate to unsafe concentrations. Arsenic and manganese are two relevant examples in Anoka County.

Discharge

Discharge occurs naturally to surface water systems like streams, lakes, wetlands, and springs. Some surface water systems rely solely on groundwater discharge, so excessive drawdown of groundwater can result in connected surface waters going dry.

Drawdown

Aquifers can be drawn down when pumping exceeds recharge. The water table is lowered around the pumping well, which creates a cone of depression around the well. Drawdown is quantified by measuring the difference between the original water level and the water level within the cone of depression.

Recharge

Groundwater is only replenished when precipitation soaks into the ground to the point that it intersects an aquifer, which is called recharge. That aquifer may be shallow, in the case of much of Anoka County, or very deep.

Sustainable Use

Sustainable use occurs when drawdown and recharge are balanced. This results in the use of groundwater in a way that does not harm ecosystems (e.g. decrease baseflow to streams or cause wetlands to dry up), degrade water quality, or limit the ability of future generations to use groundwater for their own needs. It is important to remember that aquifers can cover large geographies, and groundwater pumping and recharge may not occur in the same locations but must still balance for use to be sustainable.

Groundwater Movement

Groundwater is able to flow through pores within the sediment or fractures in rock if they are connected to one another. Confining layers such as heavy clays or shales have such limited pore space that they can prevent the movement of groundwater. Groundwater flow speed and direction can be driven by a number of factors including from higher elevations to lower elevations, from high-pressure areas to low pressure areas, and from recharge areas to discharge areas (e.g. streams, wetlands, and lakes). The suction from well pumps impact localized flow. Large rivers create significant low-pressure areas, causing them to act like large suction pumps. Groundwater flow paths may take from days to hundreds of years for the groundwater to reach its final destination (Figure 6-2). Groundwater flow in Anoka County is primarily toward the major creek and river valleys (Berg, 2016).

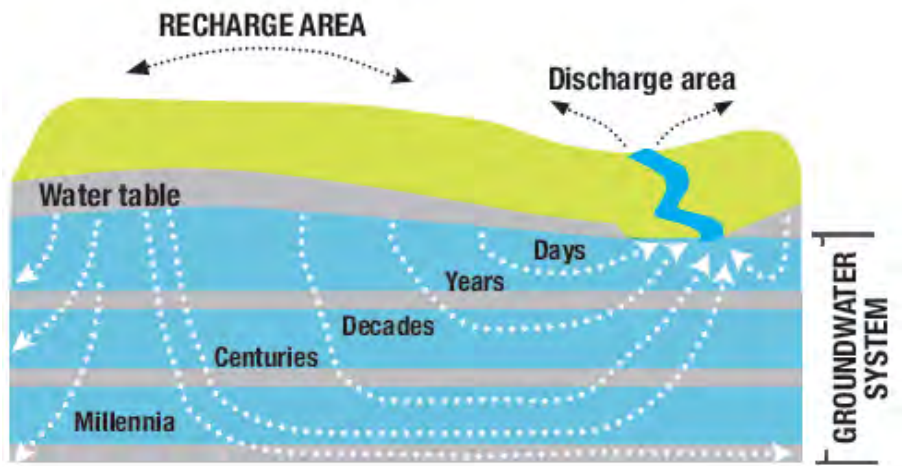


Figure 6-2: Groundwater flow (Metropolitan Council, 2013)

Groundwater Goals And Desired Future Condition

Of the four major resource categories managed by ACD, groundwater ranked third in importance. Sixteen goals were identified across the four major resource categories, and four were specific to groundwater. The four groundwater goals are aimed at a desired future condition of clean and sustainable groundwater for consumptive and non-consumptive uses, including protection of the surface water systems that rely on groundwater.

Groundwater provides many benefits in Anoka County, which were ranked high by ACD and its partners throughout this planning process. Figure 6-3 shows groundwater benefits (left column) and ACD's ranked goals for sustaining and restoring the key benefits provided by groundwater resources (right column).

Consumption	•Sustain and restore groundwater quality for consumption (2nd) •Sustain and restore groundwater quantity for consumption (9th)
Hyrdologic Function (surface water baseflow)	•Sustain and restore groundwater quantity for surface water baseflow (2nd)
Sanitation (e.g. bathing, laundry)	•Sustain and restore groundwater quantity for sanitation uses (13th)

Figure 6-3: Groundwater benefits (left column) and goals with priority ranking (right column)

Objectives to achieve each of the four groundwater goals are shown in Table 6-1, which provides a high-level view of ACD's direction. Based on a return on investment analysis, the objectives for each goal are listed in order

from highest to lowest. The objectives shown achieve 100% of the total calculated return on investment. Objectives repeat because they achieve multiple goals. Also, many objectives directly relate to the other resources (i.e. surface water, biota, and soils) because they are all interconnected and interdependent. Viewing the subsequent strategies and actions provides a clearer perspective on what this means in terms of workload. That content is presented in the 'Implementation' section.

Table 6-1: Groundwater goals (priority ranking) and objectives

Objectives	**Groundwater quality for consumption - sustain and restore**	**Groundwater quantity for surface water baseflow - sustain and restore**	**Groundwater quantity for sanitation uses - sustain and restore**	**Groundwater quantity for consumption - sustain and restore**
Rank>	2 of 16	2 of 16	8 of 16	13 of 16
Hydrologic function (groundwater recharge) - maintain, restore, enhance		1	1	1
Groundwater - conserve		2	2	2
Hydrologic regimes - restore		3	3	3
Nutrients - minimize and remediate	1			
Anthropogenic toxins - minimize and remediate	2			
Natural toxins - minimize exposure	3			
Soil infiltration rates - restore		4	4	4
Climate change adaptation		5	5	5
Bacterial contaminants - minimize and remediate	4			
Reduce vulnerability to contamination	5			
Emerging concern contaminants - minimize and remediate	6			
Clearing - minimize and mitigate		6		
Natural storage and infiltration - maintain, restore, enhance		7		
Impervious surfaces - minimize and mitigate		8	6	6

GROUNDWATER INVENTORY AND CONDITION

INVENTORY

The Anoka Sand Plain is characterized by a high groundwater table, typically within three to eight feet of the surface (Map 6-1 and Map 6-2). This high water table is due to a combination of shallow topography and highly permeable sandy soils. Wetlands form where groundwater levels are near or just above the surface. Areas where exposed groundwater is many feet deep result in a landscape dotted with shallow lakes. Many of the lakes are connected to each other with streams, creating chains of lakes. As shallow groundwater levels fluctuate so do the water levels in the lakes, streams and wetlands that dominate the landscape. Many surface waters in Anoka County are supported by upwelling groundwater (Map 6-3 and Map 6-4).

There are four primary aquifers in Anoka County (quaternary, Upper Tunnel City, Wonewoc, and Mt. Simon-Hinckley), and three additional aquifers (St. Peter, Prairie du Chien-Jordan, and St. Lawrence) that are more limited in extent. Table 6-2 presents the aquifers from shallowest to deepest and provides some general considerations for each aquifer.

Table 6-2: Anoka County aquifer overview, adapted from (Metropolitan Council, 2015) and (Anoka County, Human Services Division, Public Health & Environmental Services, 2020)

Aquifer (Shallowest to Deepest)	Considerations
Quaternary or Glacial Drift (Primary Source)	-Present throughout Anoka County -Identifying most productive layers is challenging -First aquifer to be recharged -Shallowest aquifer that is subjected to quantity and quality changes first -Shallowest aquifer that is most likely connected to surface waters -Treatment needs for quality vary -Climate and land use changes may influence recharge
St. Peter (Limited Source)	-Present in the south and southeastern portions of Anoka County, therefore it's not available to some communities - Very few wells use this aquifer in Anoka County
Prairie du Chien-Jordan (Limited Source)	-Limited to the south and southeastern portions of Anoka County -Most heavily used in region, so greater likelihood of water-use conflict -Connected to some protected surface waters -Treatment needs for quality vary -Climate and land use changes may influence recharge
St. Lawrence (Limited Source)	-Variable properties -Generally acts as a confining layer in locations where it overlaps with the Prairie du-Chien Jordan
Upper Tunnel City (Primary Source)	-Present in most areas of Anoka County, somewhat limited in northern half -Productivity varies and is highest in fractured or weathered areas -Connected to some protected surface waters -Treatment needs for quality vary -Some areas have low recharge. Climate and land use changes may influence recharge
Wonewoc (Primary Source)	-Highly permeable sandstone -Major aquifer in central Anoka County -Provides large volumes of water
Mt. Simon-Hinckley (Primary Source)	-Present throughout Anoka County -Use is restricted by Minnesota law -Very slow recharge rate that could be influenced by climate and land use changes -Significant use has occurred historically -Treatment needs for quality vary

NATURE AND EXTENT OF HIGH PRIORITY PROBLEMS

Quantity

In Anoka County, most residents, agriculture, and businesses rely on groundwater from either municipal or private wells for drinking water, irrigation, and other uses. Problems associated with groundwater quantity are related to overuse and reduced recharge. Because groundwater is a limited resource that recharges on variable temporal scales, managing use to be sustainable should be a top priority. Nearby MN DNR observation wells have documented a declining trend in some aquifer water levels. Anecdotally, many wetland basins in highly developed portions of cities like Coon Rapids, Andover and Ramsey are drying up.

Overuse

Groundwater supplies in Minnesota have not been an issue of significant concern in past planning efforts. Recent groundwater supply projections predict that areas of Anoka County will experience aquifer declines and localized supply issues under 2030 and 2040 projected pumping. As surficial groundwater is depleted, we can anticipate shallow domestic wells drying up, wetlands being converted to non-wetland, stream base flows being compromised, shallow lakes becoming wetlands, recreational lakes becoming smaller, shallower and experiencing water quality problems, and vegetation transitioning to more drought tolerant species. Although water consumption per capita has decreased, largely due to efficient sanitary fixtures and appliance requirements, population growth continues, so overuse remains a legitimate concern.

Population in the TCMA is projected to increase by ~13% by 2030 and ~27% by 2040. This increase will bring increased demand for water (Map 6-5). The Metropolitan Council promotes a 28% water use reduction from 125 gallons/person/day to 90 gallons, which would allow the region to grow by 800,000 people as expected by 2040 but use the same amount of water as today. This approach could ensure future groundwater sustainability.

In the TCMA, the majority of outdoor water use is for lawn and landscape irrigation, which represents approximately 20% of all treated drinking water (Metropolitan Council, 2016). In residential settings, outdoor water use, primarily irrigation, is the largest use of water (Figure 6-4). While access to clean, drinkable water is considered essential, irrigation is considered a non-essential use. According to the Metropolitan Council, 44% of irrigation systems run every other day or more, and summer water use is often triple that of winter use. There are opportunities to improve irrigation efficiency while still maintaining the irrigated areas in a way that accommodates their intended use. Efforts to conserve water by optimizing turf and crop irrigation techniques and reducing the footprint of highly manicured lawns are a couple of options to begin addressing the issue of outdoor water overuse.

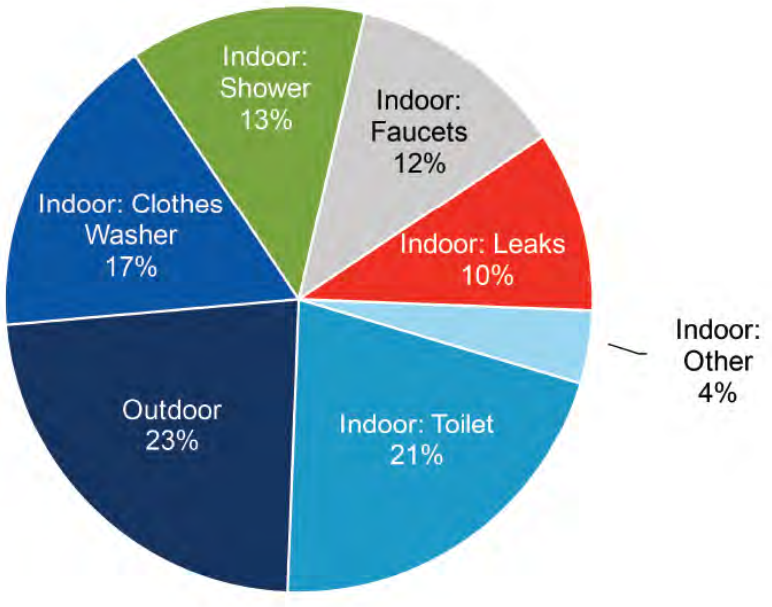


Figure 6-4: Estimated residential water consumption by type of use in the TCMA (Metropolitan Council, 2015)

Many of the summary statistics in this plan depicting water use are based on permitted wells, and therefore do not accurately account for private wells that are abundant in Anoka County and often shallower than public wells. The prevalence of private wells throughout the County also presents a potential groundwater quantity risk (Map 6-6). Private wells using less than 10,000 gallons per day or one million gallons per year are not required to have a water appropriation permit from the MN DNR. Private wells on smaller properties may use water inefficiently without any repercussions (e.g. regulation from the MN DNR or increased water bills associated from a municipal water provider).

Overuse in communities outside of Anoka County could also have impacts on aquifer levels within Anoka County. Because Anoka County also relies on many of the same aquifers as the surrounding suburbs outside of Anoka County, overuse in those communities could result in lower water tables within Anoka County.

> "When the well is dry, we know the worth of water."
>
> Benjamin Franklin

Reduced Recharge

Anoka County is also the recharge area for many of the deeper aquifers relied upon by the Twin Cities and surrounding suburbs to the south for commercial and domestic water supplies. Within the remaining natural areas, the underlying sandy soils serve as excellent groundwater recharge areas. However, in areas that are built or compacted due to human influence, groundwater recharge is greatly decreased or even eliminated relative to natural conditions (Map 6-4). Impervious surfaces such as driveways, roads, and parking lots eliminate groundwater recharge potential. Precipitation that falls in these areas is typically routed to stormwater infrastructure that pipes it to areas that are not commonly designed for infiltration.

Green infrastructure approaches strive to restore natural hydrologic cycles within urban areas, and increasing rainwater infiltration should be considered during planning efforts and project design. This can be challenging because large flat sandy uplands, which are common in Anoka County, are optimal groundwater recharge areas and they have the highest pressure to be developed to residential and commercial uses. Most communities have stormwater rules requiring retention (usually infiltration) of the first one inch of rainfall. Increasing adoption of Minimum Impact Design Standards (MIDS) and promoting land protection could also improve groundwater recharge on a large scale.

Quality

Groundwater supplies in Anoka County are particularly vulnerable to contamination due to the permeable sandy soils (Map 6-7). This is especially true for the surficial aquifer, but deeper aquifers are also sensitive in some specific areas. Travel time to bedrock aquifers in Anoka County is estimated to be less than 50 years. Once an aquifer is contaminated, the correction can be very expensive, and in some cases, large-scale contamination removal may not even be economically feasible. In some municipalities, wells have already become contaminated and may no longer be used for drinking water without expensive treatment. Potential contamination sources can be categorized as point source or non-point source.

Point Sources

Point sources of contamination can include leaks and spills, small dumps, failed septic systems, underground tanks, and hazardous waste. Once identified, the source can be addressed directly at the specific site. Some contaminants can be very complicated to remedy, depending on their physical and chemical properties and extent of the contamination plume.

Another potential point source of contamination that is particularly relevant in Anoka County is the network of private wells. Groundwater quality may be compromised by private wells if unused wells are

not properly sealed. Pollutants could enter the well and travel directly to the corresponding aquifer. Decaying well casings or well casings that were not adequately grouted during construction can also provide a conduit through which pollutants can travel vertically between aquifers that were once isolated due to the presence of confining layers

Non-Point Sources

Non-point sources of potential contamination can be much more challenging to identify because they are by definition more diffuse. Some examples of non-point sources of contamination related to groundwater include land-applied chloride, fertilizers, and pesticides.

Municipalities can help protect drinking water and reduce the number of potential non-point sources of contamination by using land use controls. Protection of municipal drinking water supplies through land use controls is enhanced by the identification and management of drinking water supply management areas (DWSMA) in two ways. First, identification of DWSMAs can enable resource managers to more quickly narrow in on a pollution source when contamination occurs. Second, DWSMA identification can enhance planning and zoning efforts to minimize the likelihood of contamination by prohibiting high-risk activities in sensitive areas. Several municipalities are working together under the umbrella of the Anoka County Groundwater Municipal Wellhead Protection Group to manage DWSMAs (Map 6-8).

EMERGING ISSUES

Climate Change

More frequent and intense storms, can significantly impact natural resource stewardship. Slow moving storms will infiltrate more water to recharge aquifers than equal rainfall during intense events. The seasonality of precipitation (winter versus other seasons) can also affect groundwater recharge. To manage natural resources effectively in this era of accelerated change, agencies must be prepared to adjust programs and services quickly and decisively in response to ever-evolving conditions and trends.

Groundwater Sustainability

The supply of sustainable drinking water in the Twin Cities Metro Area has emerged as a pressing concern. Model studies by the Metropolitan Council predict shortages in some communities under 2030 and 2040 projected pumping scenarios. The Governor appointed ACD's Water Resource Specialist to serve on the Metropolitan Water Supply Advisory Committee to help develop strategies to address this. The 2012 drought punctuated the concern about diminishing groundwater as lake levels in the TCMA area dramatically dropped and the connection between surface waters and groundwater was brought to light for many. Ultimately, implementation of changes on the ground to promote conservation and recharge will be important. ACD is committed to being an active part of the solution.

Balancing Conservation and Revenue

Cities that are completely built out typically recognize the importance of conserving groundwater. However, they are also responsible for maintaining aging, elaborate water delivery systems to their residents, which is funded through the sale of water. Increasingly efficient fixtures and behavior change reduce the volume of water provided and the revenue generated from the sale of that water. This creates a disincentive for cities to promote water conservation in their communities.

Growing communities are often more interested in conservation as a strategy to reduce the need for additional wells and larger infrastructure. Rural communities with private wells typically have a lower perceived stake in water conservation because they are not supplying water.

Infiltration and Groundwater Quality Protection

Infiltration and groundwater quality protection can conflict with each other. Infiltration of rainwater is critical to recharge aquifers. Under the direction of the MN Pollution Control Agency, many municipalities continue to have source-water-protection-strategies that prohibit the infiltration of stormwater in order to protect shallow groundwater from contamination. Several stormwater constituents such as nitrates, chlorides, pathogens, and heavy metals are not adequately filtered by the sandy soils of the Anoka Sand Plain. This concern is often addressed by prohibiting infiltration of runoff from possible pollutant "hotspots" such as fueling stations. This can dramatically reduce opportunities for groundwater recharge in developed areas.

Chloride Pollution

Chloride pollution in groundwater has been slowly trending upward. Chloride is highly soluble and accumulates over time until concentrations exceed healthy levels for consumption, irrigation, or aquatic life. In urban environments, chloride is primarily from road salt application. Due to the delivery mechanism and timing of application when soils are frozen, much of this chloride finds its way through the stormwater conveyance system into the Mississippi River and ultimately the Gulf of Mexico, where it contributes to the Dead Zone. In rural environments, water softeners cycle hundreds of pounds of salt annually per household into groundwater through septic system drain fields. Salts are also a component of agricultural fertilizers. Once chloride has exceeded water quality standards in either groundwater or surface water, it is nearly impossible to remove economically at any scale. Chloride levels in groundwater are currently far below, but trending toward, state water quality standards.

Other Contaminants

Contaminants of emerging concern include both natural and anthropogenic pollutants. Arsenic and manganese are natural elements that can accumulate within aquifers to concentrations that exceed State drinking water quality standards. Both are an emerging concern in Anoka County, and increased testing of private wells for those two constituents could aid in pinpointing problem areas. Some public wells, such as in the City of Ramsey, have high manganese levels that are addressed with treatment or blending with water from other wells.

Another naturally occurring compound is nitrate, which can be increased to unsafe concentrations most commonly through excess fertilizer applications that leach through the soil into groundwater. While this is a prevalent issue throughout Minnesota, it is not a widespread issue in Anoka County. Failing septic systems are a common example of a point source of pollution.

Other anthropogenic pollutants of concern include PFCs, radionuclides, VOCs, household hazardous waste, and pharmaceuticals.

GROUNDWATER STEWARDSHIP STRATEGIES

PRIORITIZATION

Based on the detailed return on investment analysis, the top 10 strategies to address each groundwater goal are presented in Table 6-3: Top 10 strategies for achieving each groundwater related goalTable 6-3. The strategies achieve 94.11% of the total return on investment for the four groundwater goals.

There are many similarities among the three goals focused on groundwater quantity. For example, land protection and infiltration enhancement are the two top strategies. The third highest ranking strategy for sustaining and restoring groundwater quantity for surface water baseflow is ditch abandonment, which is not included in the quantity consumption and sanitation use goals. The addition of this strategy for surface water baseflow displaced the 'inspect for surface water regulation' strategy, but all other strategies are the same for the three goals related to quantity, with the exception of the relative order shifting slightly among the goals.

While the strategies for the goals associated with groundwater quality are nearly identical, the goal focused on groundwater quality for consumption has many different strategies. This is logical because the strategies for quality are focused on pollution prevention.

Table 6-3 provides a clear prioritization scheme for strategies associated with sustaining and restoring both groundwater quality and quantity. The Matrix provides detailed actions with corresponding return on investment

ACCOMPLISHMENTS FROM THE LAST PLAN

The primary groundwater-related activities from the previous ACD comprehensive plan included monitoring groundwater levels in partnership with the MN DNR, pursuing groundwater use audits, and participating in regional water supply planning.

ACD continued the long-term monitoring of 23 groundwater observation wells in Anoka County. The wells range in depth from about 15 feet to over 800 feet. These groundwater wells are not as sensitive to short-term precipitation patterns as surface water resources like wetlands and streams. Rather, they respond to long-term trends and provide insight into rising or falling groundwater levels.

Arguably, the most innovative accomplishment by ACD in the groundwater realm since the last comprehensive plan is the successful completion of the Campus Groundwater Conservation Planning (CGCP) initiative. Similar to home-energy-use-audits that identify opportunities to save energy, the CGCP protocol establishes the current water budget of a campus and identifies projects and practices to reduce water use. The CGCP protocol was developed by adapting multiple existing protocols with the ultimate goal of water conservation project implementation. The CGCP protocol can be implemented by Soil and Water Conservation District (SWCD) staff throughout the State and produces a list of prioritized water conservation project opportunities. Project opportunities are ranked by cost-effectiveness and achieve water conservation through both reduced use and increased groundwater recharge. In total, 21 campuses were analyzed throughout the TCMA.

Since 2012, ACD has participated in regional water supply planning. An ACD staff person is seated on the Metropolitan Council's Metro Area Water Supply Advisory Committee. That committee helps develop and approve the Metropolitan Council's Master Water Supply Plan and discusses regional efforts for groundwater stewardship. The committee and its technical advisory committee is comprised of staff from water utilities, the University of Minnesota, state agencies, and others.

values that are used to prioritize ACD's groundwater stewardship activities.

Table 6-3: Top 10 strategies for achieving each groundwater related goal

Strategy	Groundwater quality for consumption -	Groundwater quantity for consumption -	Groundwater quantity for sanitation uses -	Groundwater quantity for surface water baseflow -
Land protection		1	1	1
Maintain surface water projects	4	3	3	3
Reduce groundwater waste		2	2	2
Monitor groundwater	1	7	7	7
Analyze groundwater data	7	4	4	4
Infiltration enhancement		6	6	6
Advise on surface water regulation compliance		5	5	
Alternative source to groundwater		8	8	8
Strategize groundwater stewardship	9	10	9	9
Nutrient remediation	2			
Anthropogenic toxin inputs minimized	3			
Maintain biota projects				5
Evaluate surface water projects	10			
Analyze precipitation data				10
Inspect for surface water regulation		9	10	
Advise on groundwater regulation compliance	5			
Nutrient inputs minimized	6			
Increase awareness of natural toxins	8			

TARGETING

ACD targets groundwater stewardship based on the best available data and analyses to pursue the most cost-effective approaches possible. The absence of an Anoka County groundwater stewardship plan limits the local detail available to target specific areas and aquifers. That being said, existing data from a number of sources (e.g. MN DNR, MPCA, Anoka County, and cities) can be used to inform targeting efforts.

Targeted locations for ACD action include:

- Aquifers with declining water levels or model-predicted future declines;
- Identified recharge areas for priority aquifers;
- Identified areas of high groundwater sensitivity or susceptibility to pollution;
- Properties developed without municipal water services but now using those services without record of private well sealing;
- Properties where septic system records indicate an SSTS older than typical life expectancy, unusually high maintenance frequencies that suggest failure, or lack of maintenance records;

- Areas with strong groundwater-surface water connections where groundwater stewardship strategies may also have benefits to surface waters;
- Large campuses (e.g. homeowner associations, schools, and churches) where there is high water use, high numbers of people using water, and an opportunity for high return on investment;
- DWSMAs.

IMPLEMENTATION

Groundwater is a critical natural resource and interconnected with other resources. ACD will address groundwater quality and quantity goals through programs that provide the greatest return on investment (ROI) with respect to the prioritized goals. The ROI for each top priority program with respect to the four groundwater goals is detailed in Table 6-4, which is followed by a brief description of each program. The programs cumulatively achieve 95% of the ROI for the four groundwater goals.

Table 6-4: Groundwater goals and programs ranked by Return on Investment (ROI)

Row Labels	Groundwater quality for consumption -	Groundwater quantity for consumption -	Groundwater quantity for sanitation uses -	Groundwater quantity for surface water baseflow -	Grand Total
Land protection	0.18%	17.10%	8.05%	17.31%	42.64%
Stormwater BMPs	3.98%	4.46%	2.10%	4.59%	15.13%
Groundwater monitoring	4.11%	2.42%	1.14%	2.42%	10.09%
Groundwater conservation	0.10%	3.83%	1.80%	3.83%	9.56%
Drinking water protection	3.35%	0.38%	0.21%	0.35%	4.28%
Regulatory assistance	0.52%	2.42%	1.14%	0.00%	4.08%
Precipitation monitoring	0.00%	0.97%	0.46%	1.21%	2.64%
Ecological restoration	0.00%	0.00%	0.00%	2.59%	2.59%
Agricultural BMPs	1.41%	0.29%	0.14%	0.29%	2.12%
Targeted pollutant management	1.88%	0.00%	0.00%	0.00%	1.88%
Vetted Total	**15.53%**	**31.87%**	**15.04%**	**32.59%**	**95.01%**

THESE PROGRAMS CUMULATIVELY ACHIEVE 95% OF THE ROI FOR THE FOUR GROUNDWATER GOALS.

Land Protection

Projects focused on preserving natural lands will benefit both groundwater quantity and quality by maintaining natural hydrologic cycles (e.g. groundwater recharge via infiltration of precipitation) and preventing potential sources of contamination associated with development. Several approaches to land protection are available including:

- Opens space design development
- Conservation easements
- Fee title acquisition

Stormwater BMPs

Infiltration, and therefore groundwater recharge, is greatly limited in urbanize areas due to compacted soil and impervious surfaces. Several stormwater BMPs hold water on the landscape longer to allow for infiltration. The most commonly used practice is bioinfiltration, i.e., curb cut rain garden.

Groundwater Monitoring

No single groundwater water monitoring program component ranks out well in terms of ROI. Regardless of this, they are essential to inform other programs, targeting and to measure pace of progress. ACD monitors groundwater levels in a network of wells throughout the county and promotes well water testing. Reductions in residential irrigation is an area with the most promise to make a meaningful difference.

Groundwater Conservation

Sustainable use of groundwater is arguably most reliant on limiting withdrawals because of the timeline on which groundwater recharge occurs, which is particularly true for deep aquifers. Reducing use through conservation projects provides an immediate reduction in groundwater withdrawal, and cost-effective options often exist.

Drinking Water Protection

In Anoka County, groundwater and drinking water are largely synonymous. Planning efforts are regularly undertaken to protect drinking water quality. Drinking water supply management areas incorporate larger geographic areas and may cover both groundwater and surface water sources. Wellhead protection plans focus on managing contamination within the contributing area of a municipal well. Cities that provide water to their residents and business conduct thorough testing and treat for contaminants. This level of planning, testing, and remediation does not exist to protect the quality of water from private wells. Private well users must be diligent. The following list of activities shows which prevent problems vs remediate them and which are useful in public vs private well settings.

- Home water filtration system: remediate: private
- Natural toxin awareness: remediate: private
- Septic system maintenance and repair: prevent: private
- Well sealing: preventative: public and private

Regulatory Assistance

Wetland protection laws help keep wetlands on the landscape, which in turn helps maintain groundwater recharge. Other laws such as the Buffer Law can lead to the reduction in the use of pesticides along waterways. This can improve the quality of water that does recharge our aquifers. Supporting implementation of these laws benefits groundwater to some extent.

Ecological Restoration

In the same way that preserving wetlands can improve aquifer recharge, so can wetland restoration, particularly when it involves hydrologic restoration components in addition to vegetative restoration.

Agricultural BMPs

Managing nutrients and pollutants associated with agricultural practices can reduce the threats to groundwater quality.

Targeted Pollutant Management

Some pollutants are directly targeted for implementation action. For groundwater, this includes chloride, nitrate, and anthropogenic toxins.

Chloride cannot be cost-effectively removed from groundwater once it is contaminated, so reducing the potential through smart salting or water softener upgrades will benefit groundwater quality protection efforts.

Promoting household hazardous waste management strategies can greatly reduce the likelihood of aquifer contamination with a variety of toxins.

If a well becomes contaminated, identification of the pollutant source is critical to develop and abate strategy.

Household Hazardous Waste

Reducing potential sources of groundwater contamination will help address quality concerns.

Measurable Outcomes

The most notable measurable outcome associated with groundwater quantity is stable groundwater levels, which suggest sustainable use of the resource.

The most notable measurable outcome associated with groundwater quality is contaminant concentrations in public and private wells below state standards.

One additional outcome that is somewhat less measurable but arguably equally important is improved resolution and confidence in long-term groundwater quantity and quality projections. This will result from the continued collection of quantity and quality data and the expansion of locally relevant analyses based on those data.

Groundwater Unmet Needs

Comprehensive Groundwater Planning

Counties were granted the authority to prepare and adopt groundwater plans in 1987. Having a plan enables opportunities to secure funds from matching grants to aid with implementation of the plan. Soil and water conservation districts have the ability to write, coordinate, and administer county groundwater plans if that authority is delegated by the county.

There is currently no Anoka County comprehensive groundwater stewardship plan. However, the County did prepare a groundwater protection assessment. Development of a comprehensive groundwater stewardship plan will require the collection of additional local data and compilation and analysis of data that may already be available (e.g. private well testing data).

Although a comprehensive groundwater stewardship plan does not yet exist, there are activities that can be

DUE TO THE EXTREMELY HIGH COST AND LOGISTICAL CHALLENGES OF TREATING GROUNDWATER CONTAMINATION IN-SITU, THE MOST EFFECTIVE APPROACH TO MANAGE GROUNDWATER IS TO AVOID CONTAMINATION.

implemented in key areas (e.g. DWSMAs). These activities will be detailed in annual plans but guided by the goals, objectives, and strategies outlined in this comprehensive plan.

Funding for Optimum Groundwater Stewardship Strategies

Due to extremely high cost and logistical challenges of treating ground water contamination in-situ, the most effective approach to manage groundwater is to avoid contamination. Entities that provide grants for groundwater stewardship tend to favor actions that remediate problems instead of prevent them; this conflict needs to be addressed. In principle, this also applies to water conservation initiatives.

Conservation as a Priority

Groundwater quantity conservation is important for numerous reasons discussed earlier in this chapter. The limited numbers of grants available for groundwater stewardship exclusively address water quality. Keeping our finite reservoir of pristine groundwater available to meet long-term drinking water needs through conservation efforts would reduce the need to focus on infiltration and recharge oriented practices, would curb problems associated with lower surficial groundwater, and would reduce contamination by lessening the physics of groundwater withdrawal that pull surficial contamination into deeper aquifers.

Needed Implementation Assets

Some of the key assets that require additional resources or development for effective implementation are outlined below.

Support

There is likely sufficient support at the political, agency, and public levels due to the acknowledgement that groundwater is a vital resource. That said, building trust in each of those categories is always beneficial and should continue to be pursued throughout the implementation period of this plan.

Capacity

Financial support to give groundwater the attention it deserves and effectively manage the resource is needed. The financial support could then be used to bolster staff time and expertise through either training of existing staff or hiring staff that have groundwater expertise.

Awareness

The lack of a comprehensive groundwater stewardship plan represents a lack of information and understanding at the Anoka County level. Effective implementation requires locally relevant guidance and a clear understanding of what, where, and how to act. Improving the science is an important first step to building the resources necessary for an effective planning effort. In addition, improving groundwater literacy among the public, community leaders, and elected and appointed officials is imperative. General groundwater literacy is also low. As a complex, invisible resource, it is misunderstood by most in the general public as well as local and state leaders and officials.

Jurisdiction

Groundwater regulation and stewardship fall under the purview of state, county and city level entities. Collaboration and partnership between these entities to act at a regional level is critical to effectively manage groundwater.

GOVERNANCE, EXISTING PLANS AND GROUPS, AND COLLABORATION

Governance

Groundwater quantity and quality are largely governed at the State level by MN DNR (water appropriation permits), MDH (quality standards), MPCA (contamination management), and MGS (groundwater monitoring).

Additional groundwater programs of note are outlined below.

- Groundwater Pollution Standards (Safe Drinking Water Act)
  - Establishes water quality standards to protect groundwater resources from pollution
- Public Drinking Water Program
  - Monitor and regulate construction and operation of public water supply systems
- Source Water Assessment Program
  - Source Water Protection Program was developed to help prevent contaminants from entering public drinking water sources
- Wellhead Protection Program
  - Helps prevent drinking water from becoming polluted by managing potential sources of contamination
- Well Management Program
  - Protects public health and groundwater quality by assuring proper construction and sealing of wells

Existing Studies and Plans

- Hydrogeologic Atlas, Part B
- 2020 Anoka County Water Resources Report
- North and East Metro Groundwater Management Strategy
- Rum River GRAPS
- Lower St. Croix GRAPS

Collaboration

Groundwater collaboration opportunities exist at all levels of natural resource stewardship (e.g. state, county, city, and watershed levels). ACD will leverage existing relationships and develop new relationships with partners that overlap areas where targeted actions are identified in annual plans.

REFERENCES

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GROUNDWATER STEWARDSHIP ACTION TABLE BY ROI

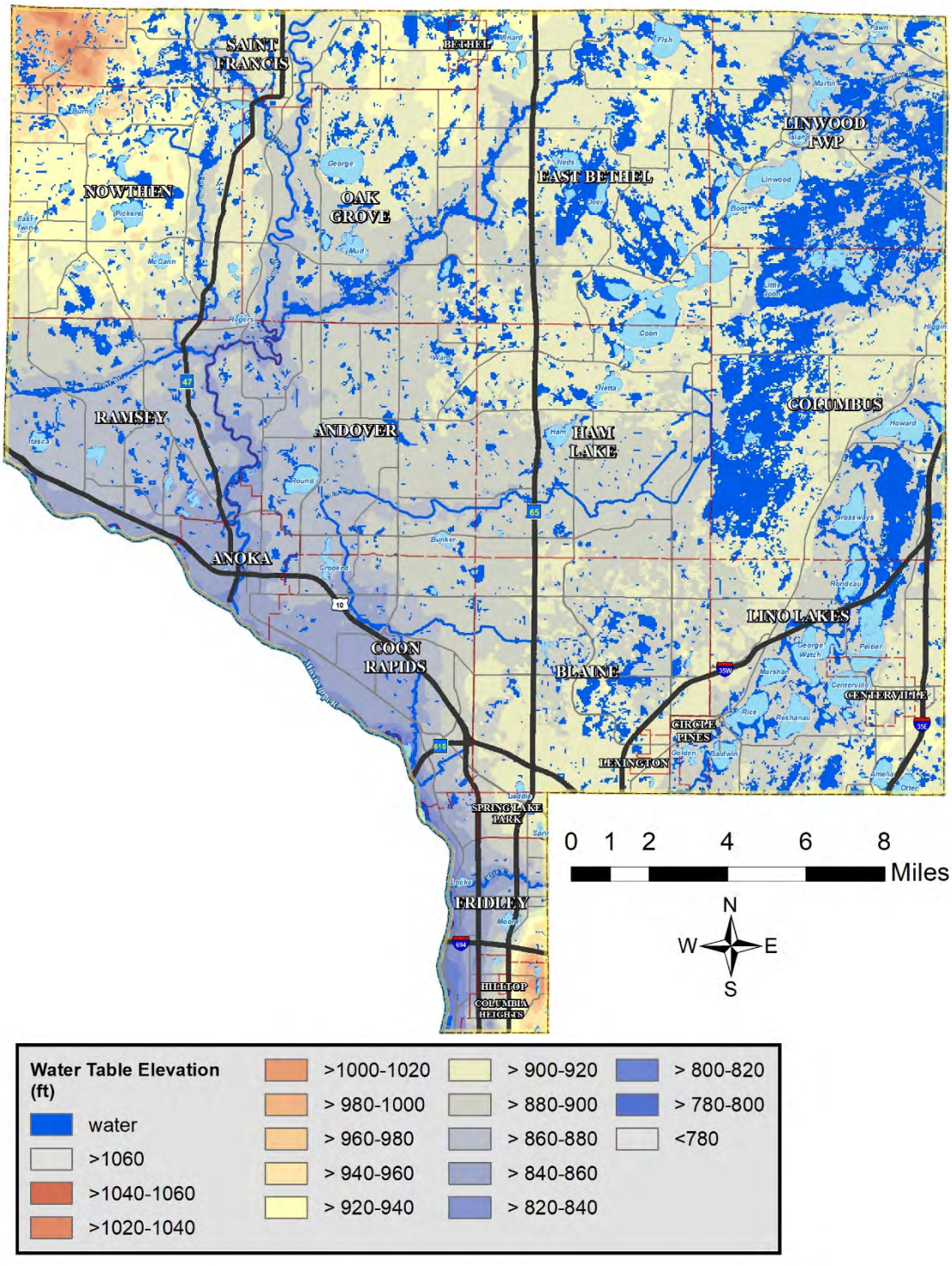
Table 6-5: Groundwater stewardship programs and actions - vetted to 95% of total ROI

Programs	Groundwater quality for consumption - sustain and restore	Groundwater quantity for consumption - sustain and restore	Groundwater quantity for sanitation uses - sustain and restore	Groundwater quantity for surface water baseflow - sustain and restore	Grand Total
Land Protection	**0.02%**	**14.43%**	**6.79%**	**14.51%**	**35.74%**
Conservation easement - hold	0.00%	2.10%	0.99%	2.10%	5.20%
Conservation easement - manage	0.00%	3.55%	1.67%	3.55%	8.76%
Fee title land acquisition - hold	0.00%	1.20%	0.56%	1.20%	2.96%
Fee title land acquisition - manage	0.00%	2.54%	1.20%	2.54%	6.28%
Land protection - maintain	0.00%	3.04%	1.43%	3.04%	7.51%
Land protection compliance - inspect	0.00%	1.21%	0.57%	1.21%	2.98%
Land protection violation compliance - guide	0.00%	0.36%	0.17%	0.36%	0.90%
Well sealing	**23.97%**	**0.00%**	**0.00%**	**0.00%**	**23.97%**
Well sealing - cost share	23.93%	0.00%	0.00%	0.00%	23.93%
Bioinfiltration	**3.15%**	**5.26%**	**2.47%**	**5.26%**	**16.14%**
Bioinfiltration - cost share	0.27%	0.46%	0.21%	0.46%	1.40%
Bioinfiltration - design	0.94%	1.57%	0.74%	1.57%	4.82%
Bioinfiltration - evaluate	0.28%	0.47%	0.22%	0.47%	1.44%
Bioinfiltration - maintain	0.54%	0.89%	0.42%	0.89%	2.74%
Bioinfiltration install - manage	1.09%	1.82%	0.86%	1.82%	5.59%
Groundwater quantity	**0.58%**	**2.08%**	**0.98%**	**2.08%**	**5.71%**
Groundwater conservation plan - design	0.00%	0.79%	0.37%	0.79%	1.95%
Groundwater level - monitor	0.00%	0.30%	0.14%	0.30%	0.74%
Groundwater level trends - analyze	0.00%	0.39%	0.18%	0.39%	0.95%
Recharge area identification - analyze	0.57%	0.20%	0.09%	0.20%	1.05%
Water use audits	0.00%	0.28%	0.13%	0.28%	0.68%
Water-wise lawnscape - promote	0.01%	0.03%	0.01%	0.03%	0.09%
Wetland restoration	**0.00%**	**0.00%**	**0.00%**	**2.68%**	**2.68%**
Wetland restoration - design	0.00%	0.00%	0.00%	1.13%	1.13%
Wetland restoration - fund	0.00%	0.00%	0.00%	0.23%	0.23%
Wetland restoration - maintain	0.00%	0.00%	0.00%	0.23%	0.23%
Wetland restoration install - manage	0.00%	0.00%	0.00%	0.83%	0.83%
Wetland restoration opportunity - analyze	0.00%	0.00%	0.00%	0.13%	0.13%
Infiltration regulation	**0.00%**	**0.72%**	**0.34%**	**1.16%**	**2.22%**

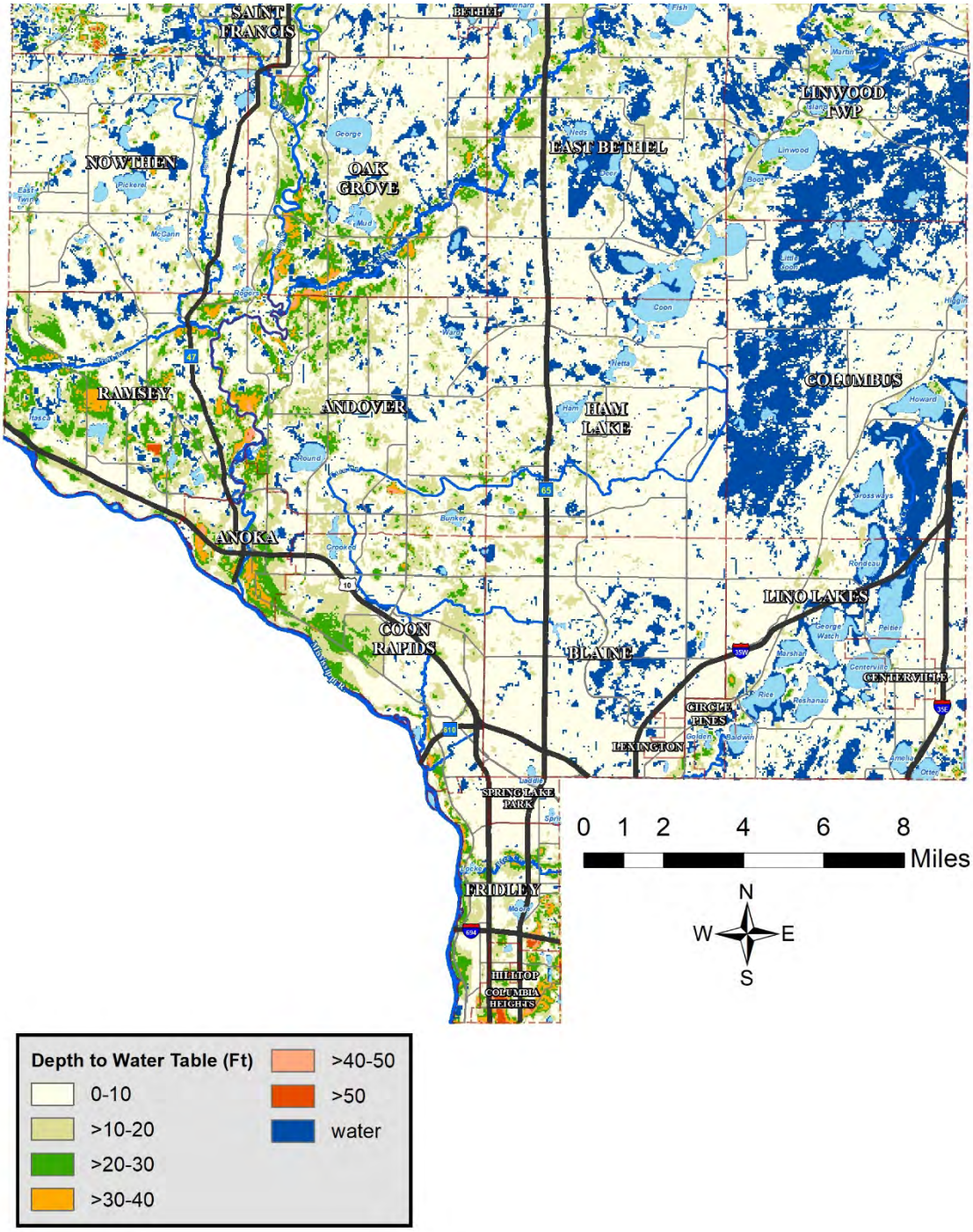
Programs	Groundwater quality for consumption - sustain and restore	Groundwater quantity for consumption - sustain and restore	Groundwater quantity for sanitation uses - sustain and restore	Groundwater quantity for surface water baseflow - sustain and restore	Grand Total
Infiltration grading ordinance - prepare	0.00%	0.00%	0.00%	0.43%	0.43%
Infiltration rate ordinance - prepare	0.00%	0.72%	0.34%	0.72%	1.79%
Agricultural BMP	**0.45%**	**0.67%**	**0.32%**	**0.67%**	**2.11%**
Ag. waste system need - inventory	0.34%	0.00%	0.00%	0.00%	0.34%
Conservation planting plan - design	0.00%	0.65%	0.31%	0.65%	1.61%
Cover crop - promote	0.00%	0.02%	0.01%	0.02%	0.05%
Organic agriculture - promote	0.04%	0.00%	0.00%	0.00%	0.04%
Construction site regulation	**0.77%**	**0.54%**	**0.25%**	**0.54%**	**2.10%**
Construction site erosion control standards - prepare	0.39%	0.00%	0.00%	0.00%	0.39%
Construction site sediment control standards - prepare	0.39%	0.00%	0.00%	0.00%	0.39%
Rip subsoils development standards - prepare	0.00%	0.54%	0.25%	0.54%	1.33%
Groundwater quality	**1.29%**	**0.00%**	**0.00%**	**0.00%**	**1.29%**
Groundwater quality threshold exceedance - analyze	1.14%	0.00%	0.00%	0.00%	1.14%
Unused well - inventory	0.12%	0.00%	0.00%	0.00%	0.12%
Precipitation monitoring and analysis	**0.00%**	**0.46%**	**0.22%**	**0.58%**	**1.26%**
Precipitation - monitor	0.00%	0.39%	0.18%	0.48%	1.05%
Precipitation status and trends - analyze	0.00%	0.08%	0.04%	0.10%	0.21%
Septic system	**1.18%**	**0.00%**	**0.00%**	**0.00%**	**1.18%**
Septic system compliance - inspect	0.50%	0.00%	0.00%	0.00%	0.50%
Septic system failure - guide	0.27%	0.00%	0.00%	0.00%	0.27%
Septic system upgrade - fund	0.40%	0.00%	0.00%	0.00%	0.40%
Minimum impact design standards	**0.00%**	**0.35%**	**0.17%**	**0.35%**	**0.87%**
Minimum impact design standards ordinance - prepare	0.00%	0.34%	0.16%	0.34%	0.85%
Vetted Total	**31.42%**	**24.51%**	**11.53%**	**27.82%**	**95.28%**

MAPS

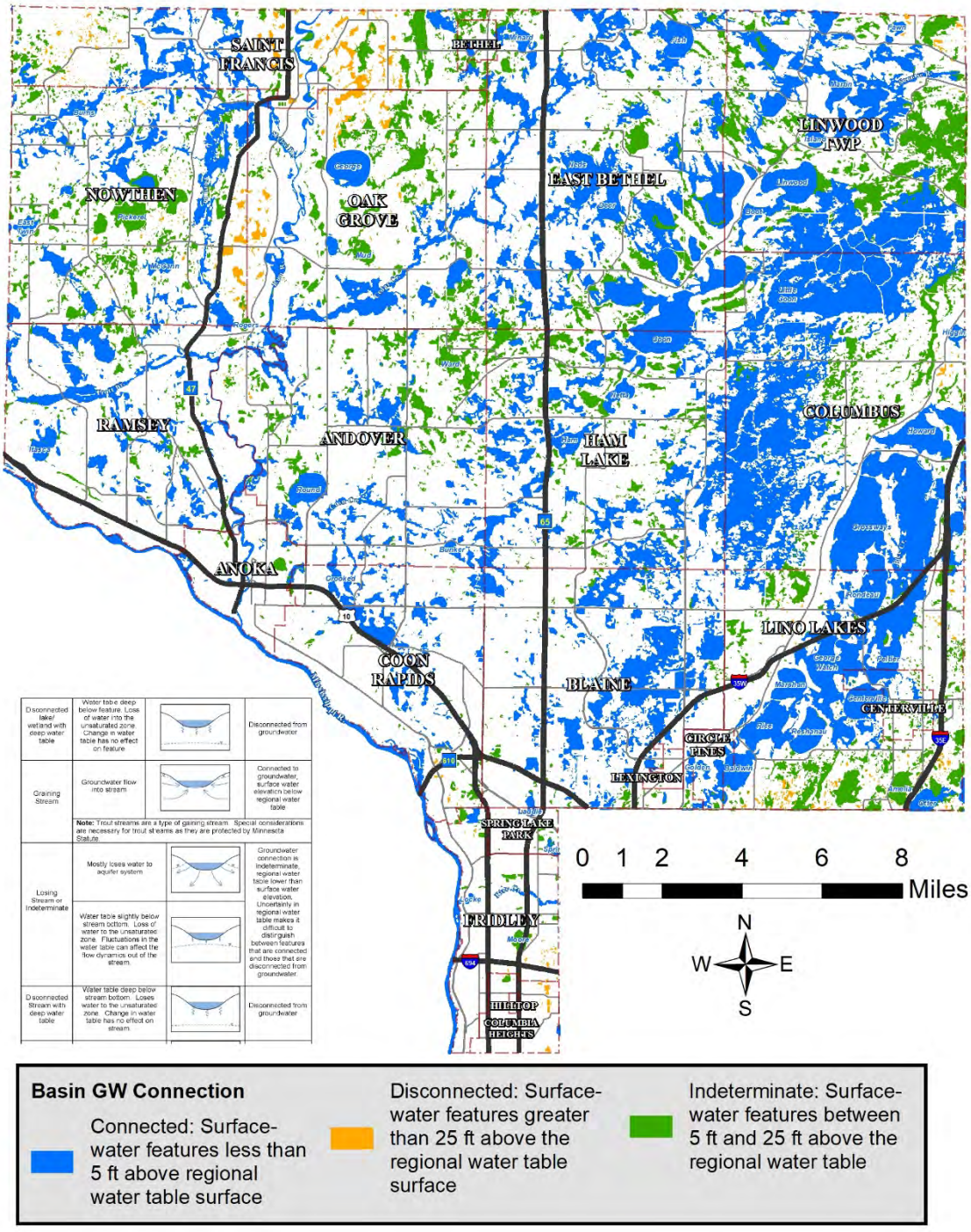
Map 6-1: Water table elevation



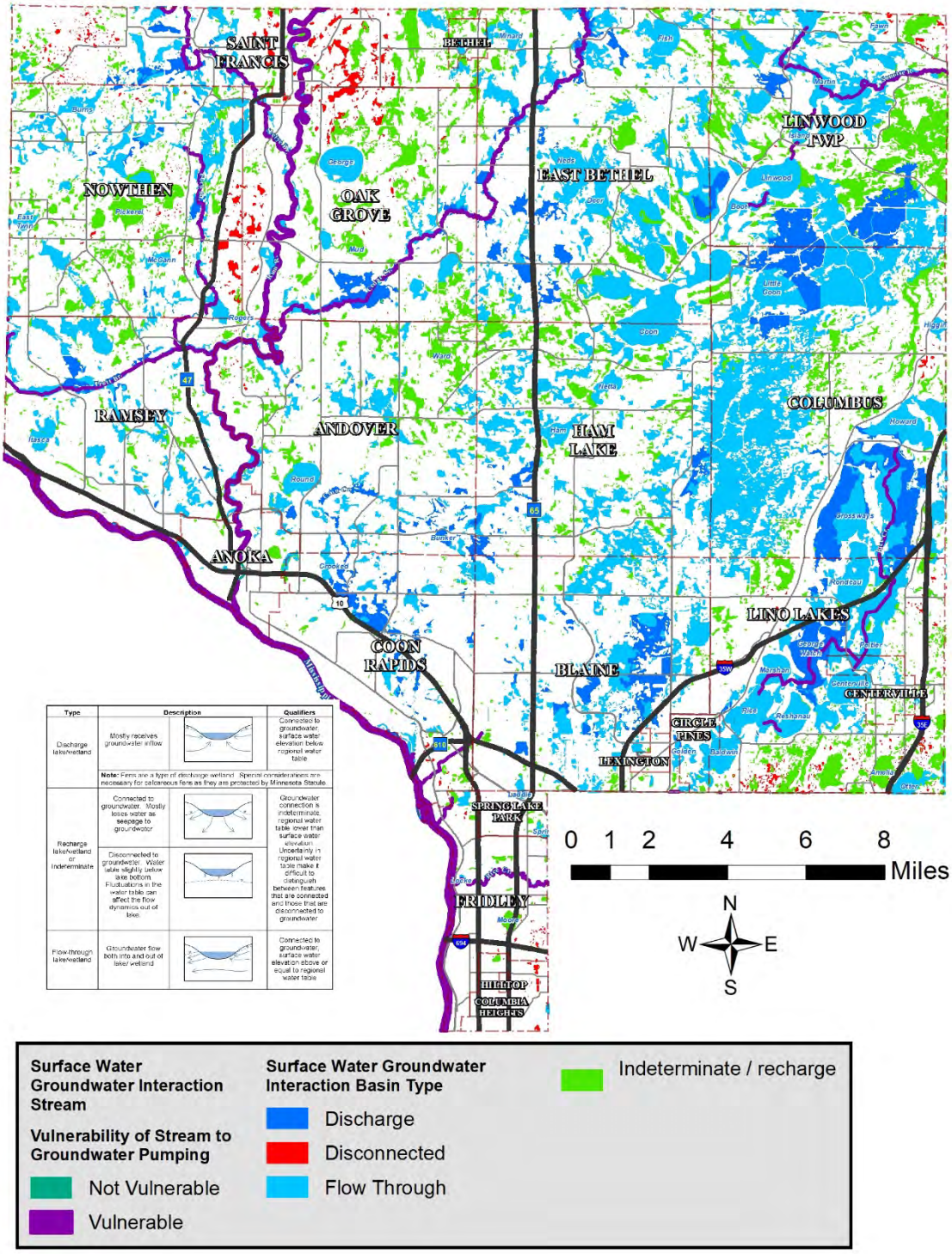
Map 6-2: Depth to water table



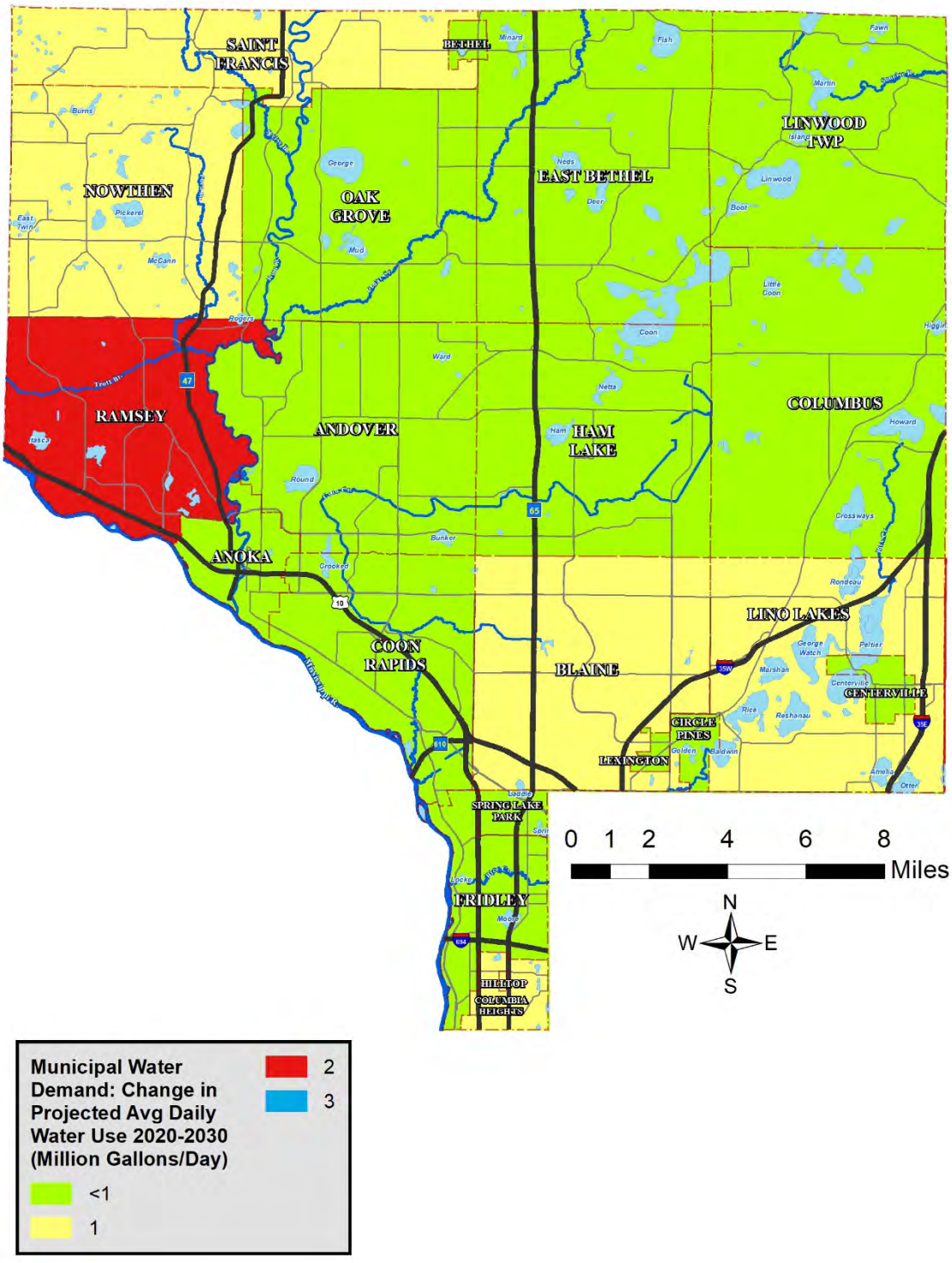
Map 6-3: Surface water connections to groundwater



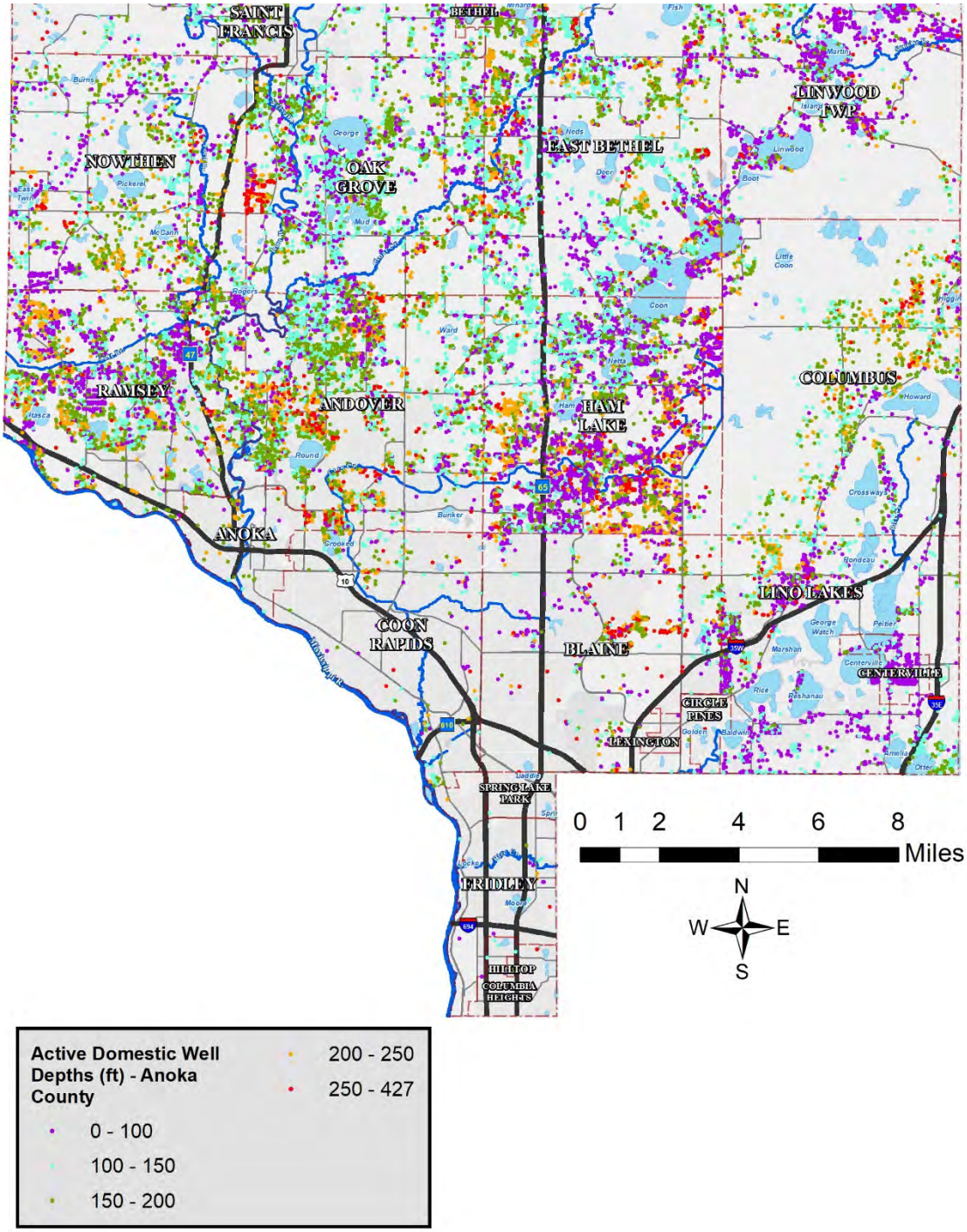
Map 6-4: Surface water interaction with groundwater and associated vulnerability



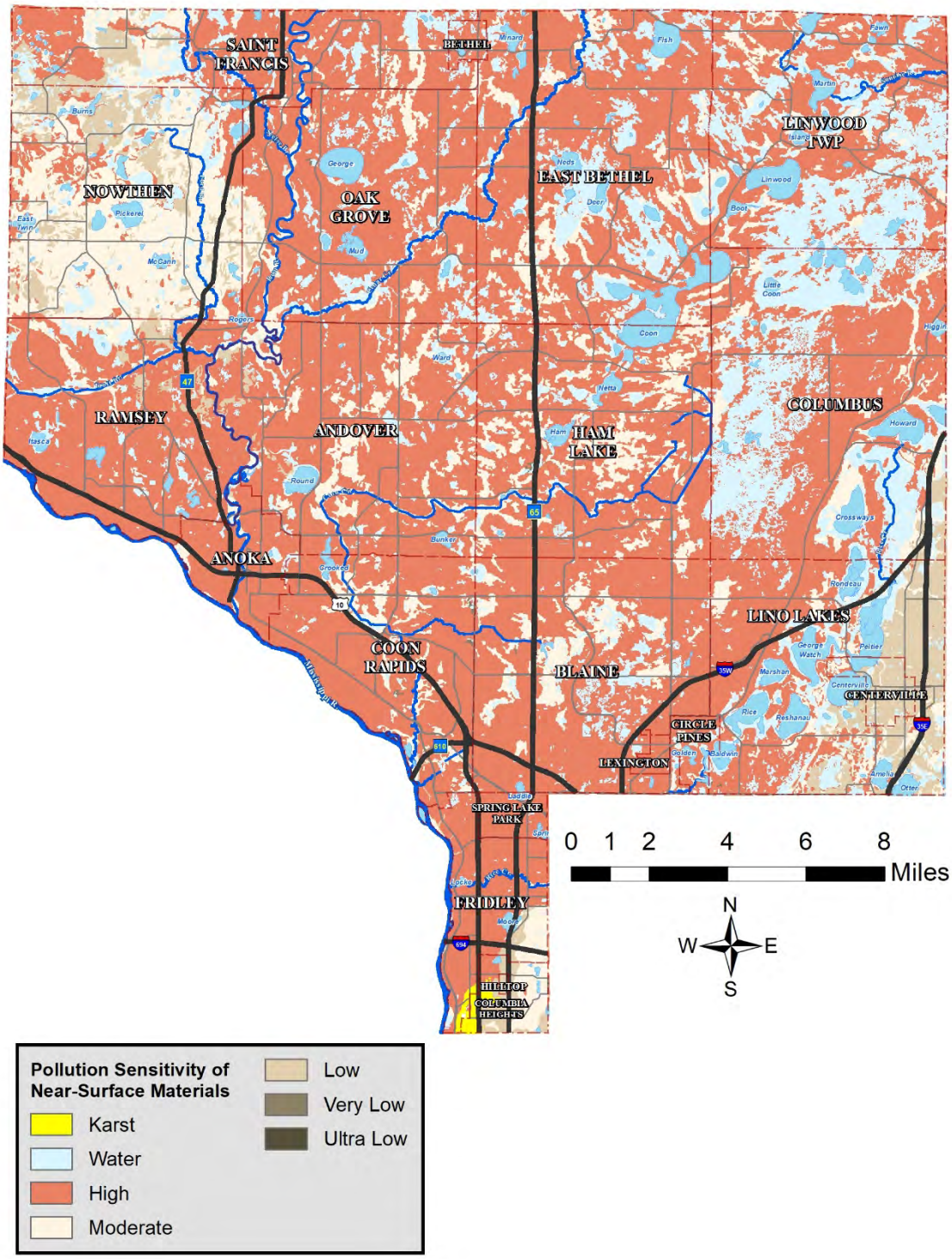
Map 6-5: Projected daily increase in average municipal water demand from 2020 to 2030



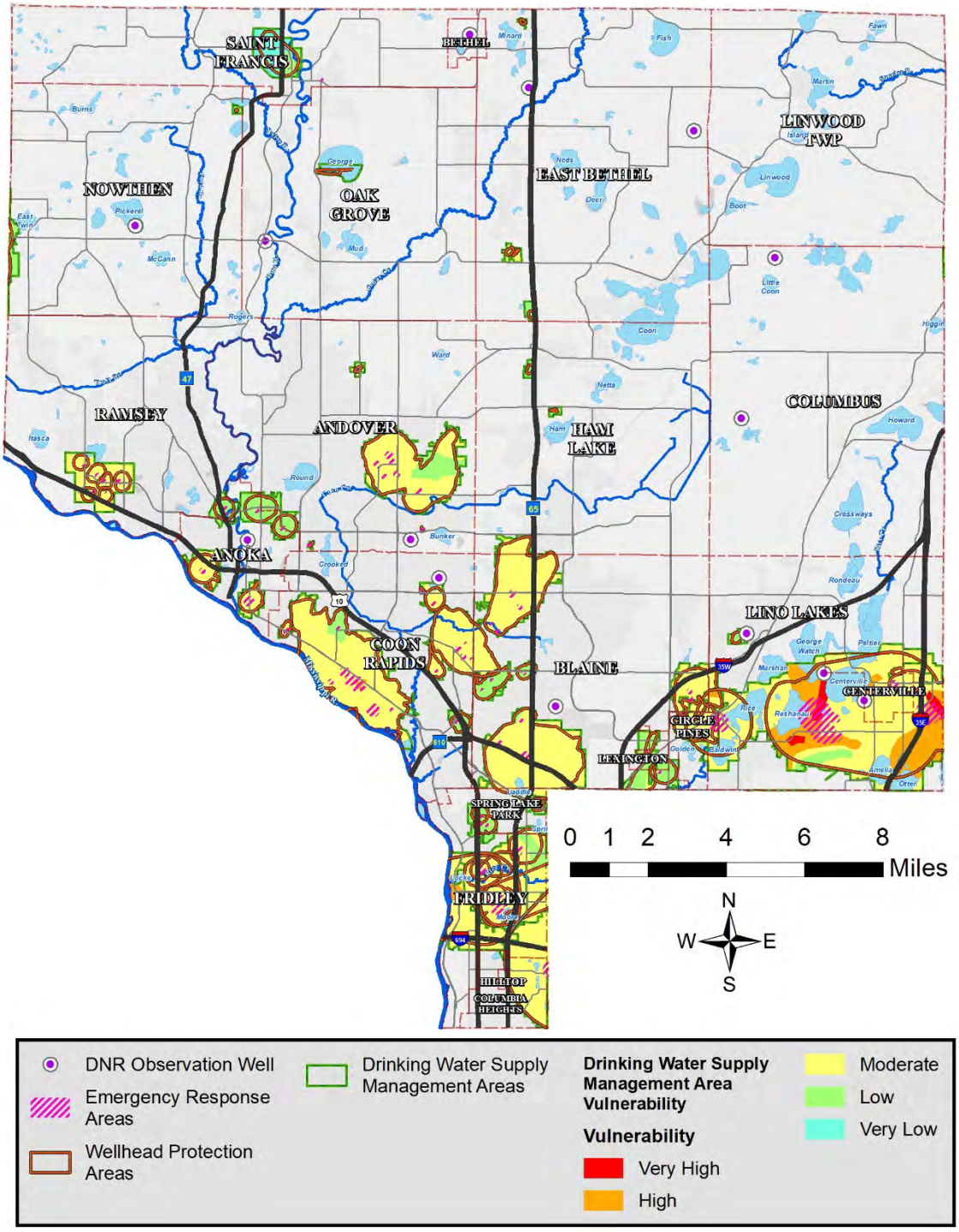
Map 6-6: Active domestic well locations and depths



Map 6-7: Pollution sensitivity to near surface materials



Map 6-8: DWSMAs and associated vulnerability

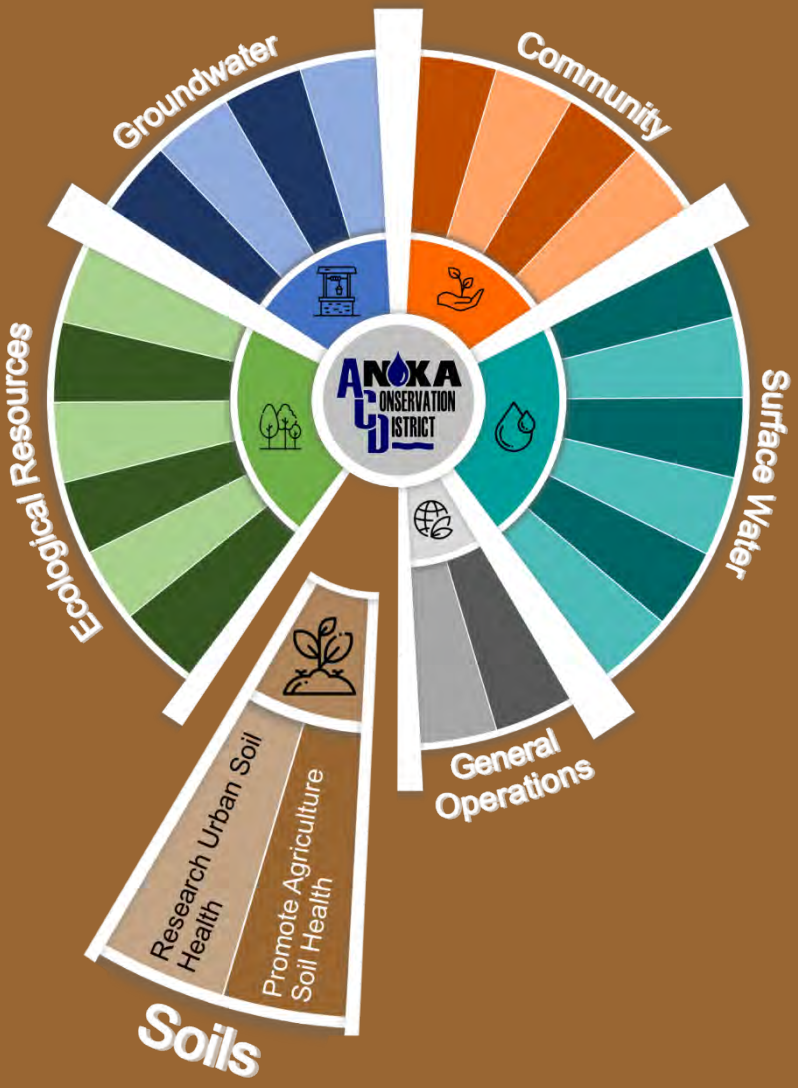


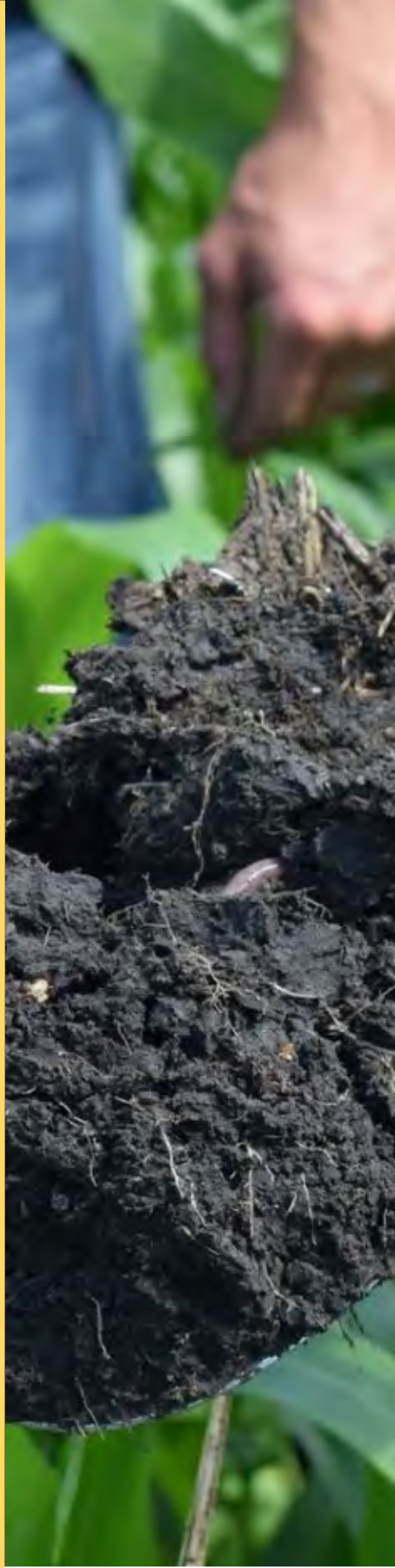
Chapter 7

Our Soil.

The Anoka Conservation District will take measureable steps to conserve and enhance the productivity and function of Anoka County Soils.

Our 2021-2030 Keystone Soil Endeavors Are:





Chapter 7 Contents

SOIL FOUNDATION

Soil stewardship in Anoka County is done in two distinct landuse areas; urban and rural, and two very different geomorphic regions; glacial till and outwash sands. The primary role that soil plays in the lives of those living on the landscape varies dramatically as well. While the agricultural community draws upon the productivity of soils to make a living, those in suburban areas rely primarily on soils' ability to infiltrate and filter water and support their lawns, trees and small gardens. Without realizing it, 93% of Anoka County residents rely on soils to allow water to infiltrate to recharge groundwater, which supplies our homes, business, and institutions. For clean drinking water, soils need to serve as an effective filter as well. Stewardship strategies must be customized to the landscape, the soil type and the user. This section introduces soil and its current state in Anoka County as well as how ACD plans to manage this vital resource.

LIVING SOILS MAY SURPRISE YOU

Soils are a dynamic living system that includes plant roots, bacteria, fungi, protozoa, algae, mites, worms, insects, nematodes, larvae and larger animals.

- A teaspoon of healthy soils supports 100 million to 1 billion individual bacteria (Ingham, Moldenke, & Edwards, 2000).
- The microbes in the top foot of soil from one acre would weigh more than two cows (Brady & Weil, 1996).
- Earthworms within an acre of soil consume two tons of dry matter a year, fortifying the soil (Duiker & Stehouwer, 2008).
- There's twice as much carbon stored in the organic matter in soil than in the atmosphere and all plant life combined (Schwartz, 2014).
- An increase of 1% organic matter results in as much as 25,000 gallons of available soil water per acre (Kansas State University, Department of Agronomy, 2012).

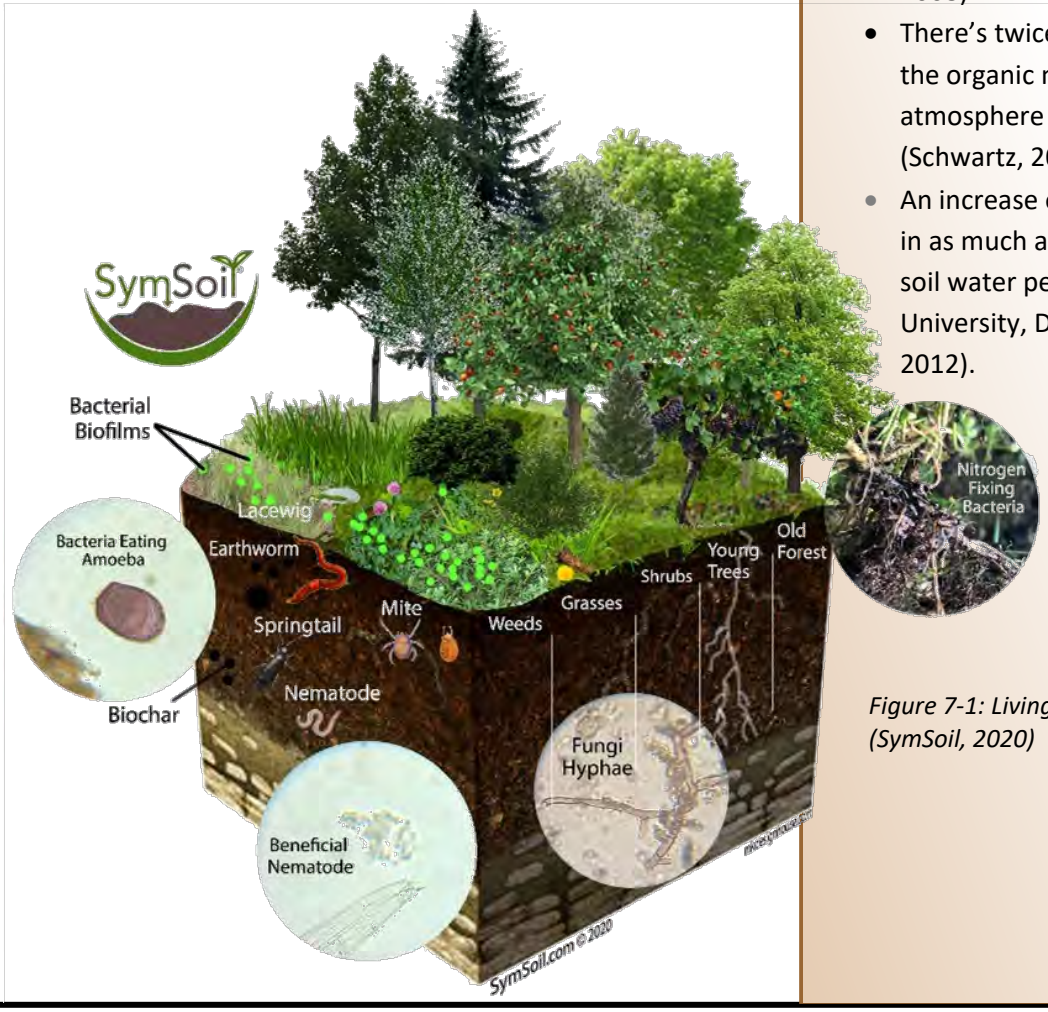


Figure 7-1: Living soil components (SymSoil, 2020)

Why Soil Is Important

It is said that water is the fulcrum of life. Soils are arguably the foundation upon which the fulcrum sits. Comprised of about 45% minerals, 25% water, 25% air and 5% organic matter, healthy soils are able to:

- infiltrate and filter water to recharge aquifers,
- sequester carbon to temper climate change,
- process nutrients to support life,
- breakdown toxins to abate hazards,
- reduce runoff and erosion,
- improve water storage,
- improve resiliency to drought, heavy rains and temperature extremes,
- reduce disease and pest problems, and
- provide the foundation for the production of food, biofuels, fiber, and wood products.

Maintaining healthy soils systems is critical for our health and economic well-being.

Soil Goals and Desired Future Condition

The priority goals (bulleted) of this plan are to maintain and restore soils resources to secure the benefits (bold) below.

Biogeochemical function (nutrient cycling and pollutant remediation)

- Sustain and restore soil biogeochemical functions

Flora and fauna

- Sustain and restore soil biodiversity

Food, fuel, and fiber production

- Sustain and restore soil productivity

IT IS SAID THAT WATER IS THE FULCRUM OF LIFE. SOILS ARE ARGUABLY THE FOUNDATION UPON WHICH THE FULCUM SITS.

Presented as goals and objectives, Table 7-1 provides a high-level view of ACD's direction. Based on a return on investment analysis, the objectives for each goal are listed in order. Many objectives achieve multiple goals. In addition, many objectives directly relate to other resources (i.e. surface water, groundwater, and biota) because they are all interconnected and interdependent. Viewing the subsequent strategies and actions provides a clearer perspective on how this influences workload. That content is presented in the 'Implementation' section.

Table 7-1: Objective ranking by goal, 1 being best

Objective	Goal - Sustain and restore soil biogeochemical function (11/17)	Goal - Sustain and restore soil biodiversity (15/17)	Goal - Sustain and restore soil productivity (16/17)
Minimize and remediate nutrients	1		
Minimize and mitigate clearing		1	
Improve soil health	2	2	1
Restore hydrologic regimes	3	4	
Maintain, restore, enhance biodiversity	4	3	
Minimize and remediate anthropogenic toxins	5	5	3
Maintain, restore, enhance natural storage and infiltration	6	6	
Control invasive species	7	8	2
Minimize and remediate bacterial contaminants	8		
Adapt to climate change	9	7	4

SOIL INVENTORY AND CONDITION

Soil Overview

A clear understanding of soil resources is the basis of sound natural resource stewardship. Soil characteristics influence water flow and water chemistry, determine the composition and abundance of plants that can be grown in an area, and impact the type of structures that can be built and selection of the most suitable building materials. Although Anoka County is located within the Anoka Sand Plain, which is characterized by flat topography, high water tables, sandy upland soils and expansive peatland in the low-lying areas, the soils are surprisingly complex. Not only are there areas in Anoka County of glacial till but there are also large areas of alluvial soils, laid down by river systems.

Soil Characteristics

Interactive soils map:
http://websoilsurvey.nrcs.usda.gov/app

Figure 7-2 illustrates the complexity of soil associations in Anoka County. Looking at the geomorphologic types in Figure 7-3 provides a simpler picture of the different types of soils in Anoka County. Resource planning and stewardship techniques and strategies vary within these areas.

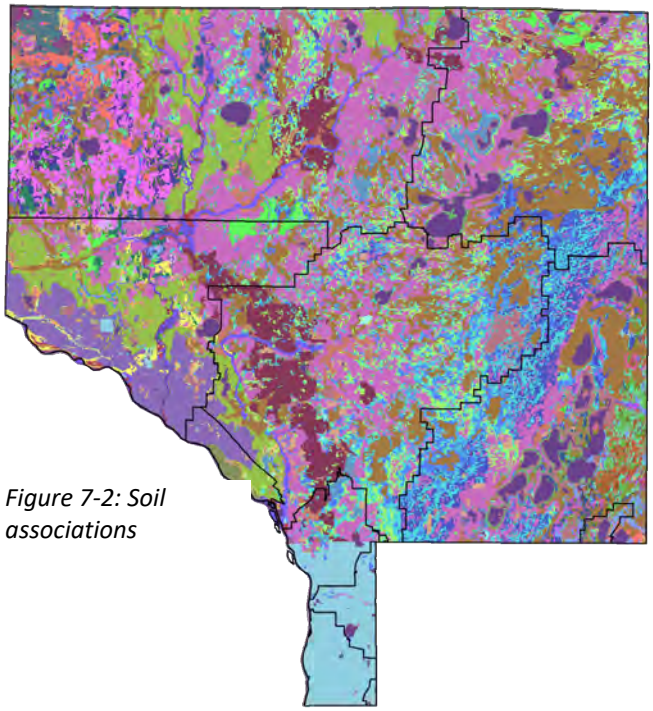


Figure 7-2: Soil associations

The lacustrine areas are dominated by large flat sand outwash plains created by glacial lakes. These soils having high infiltration rates, low fertility, and often high water tables. Terrace areas are course layered sands and silt laid down by large rivers. These soils may be associated with steeper slopes created by former river cutbanks as well as extremely high infiltration rates. The layers of varying soil texture create groundwater flows are difficult to predict. Soil fertility varies dramatically in this geomorphology type.

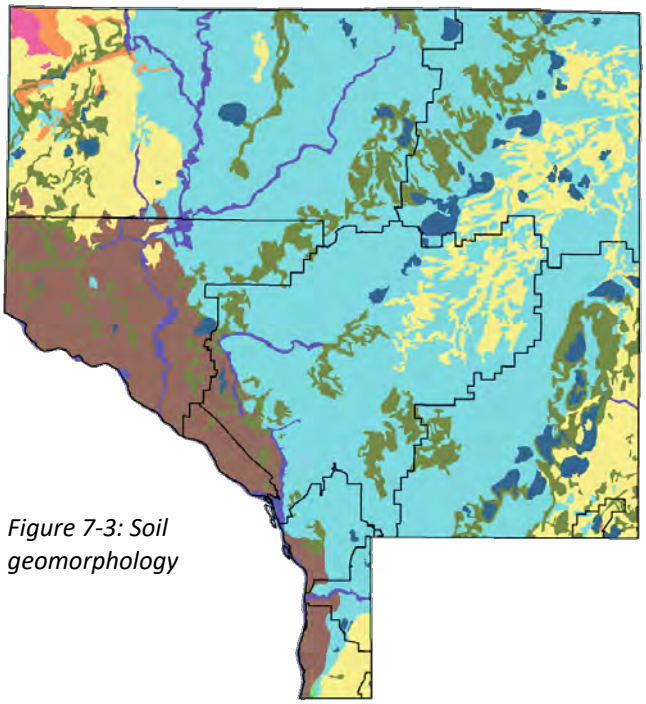
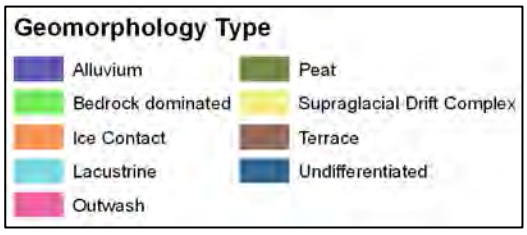


Figure 7-3: Soil geomorphology

Supraglacial drift complexes have undulating well drain glacial till that is highly productive. These soils support the majority of Anoka County's remaining prime farmland.



The soil characteristics determine the type and abundance of plant life it can support. In agricultural settings, highly productive soils that present few challenges due to erosion or flooding are categorized as Prime Farmland. Figure 7-4 shows prime farmland in Anoka County. Those areas in the southeastern part of the county are destined to become residential and commercial landuses due to the access to Interstate 35W. In the northwest, however, there may be opportunity to establish long-term prime farmland protection.

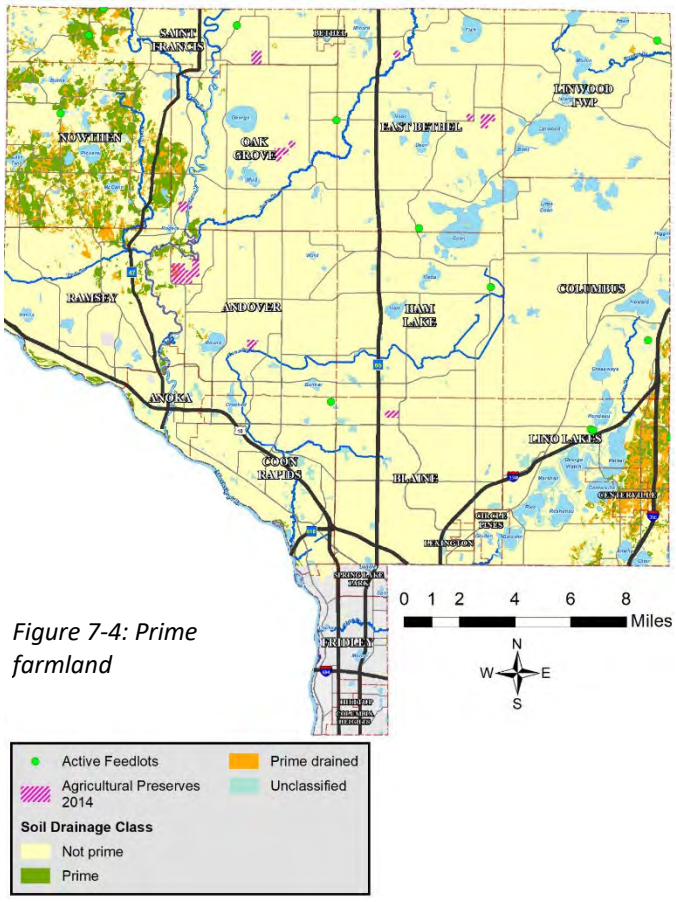


Figure 7-4: Prime farmland

Soils also grow species that are valued just for their intrinsic worth. The Anoka Sand Plain, which covers most of Anoka County has specific soil catenae that have been discovered to support rare plant species. Analysis completed by Critical Connections Ecological Services identified the most suitable soil catenae, shown in Figure 7-5 in bright red.

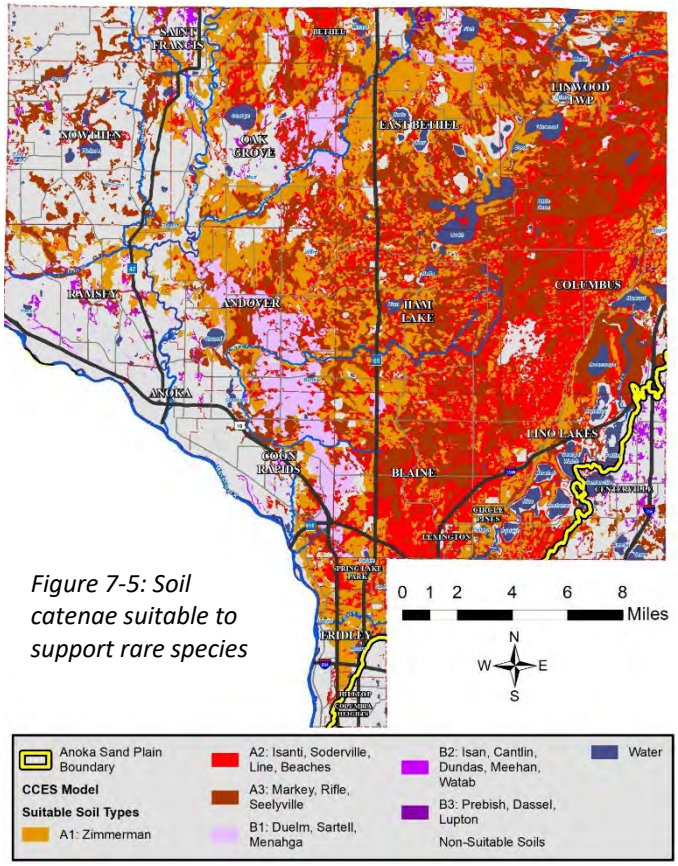


Figure 7-5: Soil catenae suitable to support rare species

The agricultural legacy of Anoka County has shifted from large farms to small farms focused on specialty crops. Producers like Bruce Bacon in Ramsey produced organic specialty crops for restaurants, while the Hmong community farm former drained peatlands to provide access to food items not readily available in stores.

Soil Limitations

As much as soil characteristics are an asset, they also present limitations. Steeply sloped soils limit buildability and are vulnerable to erosion (Figure 7-6). Although not common in Anoka County's generally flat landscape, most steeply sloped areas are adjacent to lakes, wetlands and streams. Their position in the landscape creates a threat to the adjacent surface water resources. Maintaining and restoring vegetative cover on steeply sloped soils is a priority for managing surface water quality.

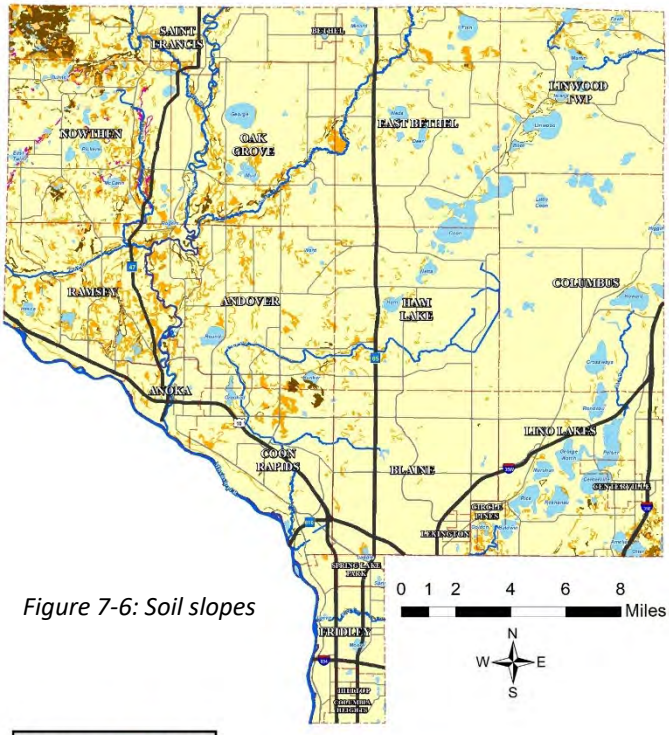


Figure 7-6: Soil slopes

Low soil fertility in sandy uplands and a seasonally high water table in much of the remainder of the county limit agricultural productivity. Anoka County's extensive drained peatlands do provide ideal conditions for growing sod and vegetables. With extensive irrigation and fertilizer, well-drained sands are well suited to root vegetables such as potatoes.

Combined, or individually, steep slopes, high water tables, flooding, and/or low organic matter content combined with high infiltration rates all make Anoka County soils largely suboptimal for septic systems. Geographically, the north half of Anoka County is serviced by individual subsurface sewage treatment systems.

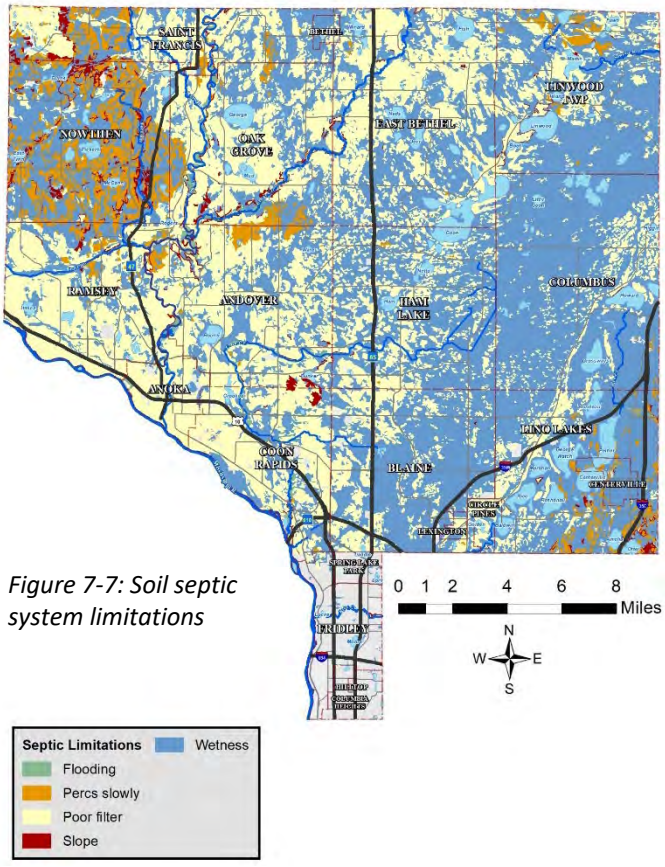


Figure 7-7: Soil septic system limitations

Emerging Soil Issues

Soil Health

Managing overall soil health as opposed to supplementing individual soil characteristics has emerged as the optimum strategy to secure multiple benefits from soils. Soil health is compromised by excessive cultivation, removal of topsoil, application of pesticides (fungicides, insecticides and herbicides), lack of vegetative cover, and compaction. Healthy soil provides a stable matrix that resists erosion, infiltrates water, cycles nutrients, adsorbs pollutants, provides drought tolerance, drives plant productivity, and sustains a complex food web. Healthy soils support a diverse ecosystem of bacteria, fungi, invertebrates (worms and arthropods) and other microscopic organisms in a matrix of mineral and organic matter that provides structural stability. All soil ecosystem elements are interdependent and comprise a living system that needs to be nourished with water, organic matter, nutrients, warmth and atmospheric gases. Maintaining healthy soils is critical to maintaining healthy terrestrial and aquatic ecosystems and is the foundation of a robust food web.

Soil Compaction

Soil compaction in agricultural, residential and commercial landscapes due to foot and vehicle traffic, and the reduction of deep-rooted plant species has greatly diminished soils capacity to store and infiltrate precipitation. This has cascading impacts on groundwater, surface water, and biota.

Urban Soils

The potential environmental benefits of maintaining and improving soil health in urban areas have been largely ignored. Because of the physical and biogeochemical function of soils in all areas of natural resources stewardship, this area of study has the potential to identify opportunities for natural resource managers in urban landscapes to improve natural resource quality significantly.

Regions of southern Anoka County have limited access to healthy fresh grown foods. These areas are called 'food deserts' and can be addressed with programs like community supported agriculture and community gardens.

Soil Genomics

With the advent of genetic sequencing and testing, scientist have begun to assess the incredible complexity and diversity of life in our soils. How this complexity manifests itself in ways that impact our natural resource benefits is a growing field of study that has the potential to upend conventional soil stewardship practices.

Carbon Sequestration

The potential for carbon to be sequestered (locked away) in soil organic matter as a means of slowing climate change is a promising area of analysis. Increased soil organic matter has multiple benefits of holding more water, improving soil productivity, binding soil to resist erosion, and improving soil infiltration rates. These benefits have positive implications for all of ACD natural resource stewardship goals

Nature and Extent of High Priority Soil Problems

Threats to Soil Health

To preserve soil benefits, we must address the factors that threaten to diminish our soil resources. It is important to remember that while agricultural production and landscapes are the largest single driving factor behind soil health stewardship and soil science, in Anoka County, we must manage soils in the urban environment as well. Some threats may only come into play in rural or urban environment.

Table 7-2 shows the threats by total return on investment (ROI) for soil resource benefits. Fortunately addressing any threat has positive impacts on multiple resource benefits. For each threat, many potential actions can be taken with highly variable ROIs.

Table 7-2: Threats to soil benefits

Threats	Biogeochemical function (nutrient cycling and pollutant remediation)	Flora and fauna	Food/fuel/fiber production	Grand Total
Contaminants - nutrient excess	27.82%	0.00%	0.00%	27.82%
Tillage	6.65%	3.56%	3.70%	13.91%
Clearing	0.00%	13.77%	0.00%	13.77%
Monoculture cultivation - degrade soils	5.50%	3.66%	3.04%	12.20%
Mowing	5.01%	4.29%	0.00%	9.29%
Ditching	5.11%	3.40%	0.00%	8.51%
Contaminants - anthropogenic toxins	2.67%	2.27%	1.48%	6.42%
Grading	2.21%	1.47%	0.00%	3.68%
Invasive species	1.36%	0.10%	1.85%	3.31%
Contaminants - bacteria	0.69%	0.00%	0.00%	0.69%
Climate change	0.24%	0.11%	0.04%	0.39%

While the threats listed above certainly damage soils in the short term, how long those impacts persist is not known. How long, if ever, does it take for soils cleared and graded during neighborhood development projects to recover? How does loss of ecological services affect society in the interim? The nature and extent of urban soil problems is unknown. Data are not available to ascertain soil health. Ergo, the most urgent need is to develop scientific understanding of our urban soil resource.

Priority Soil Problems

High priority soils problems are defined as:

- Application of nutrients in excess of vegetation needs
- Application of pesticides in excess of need
- Soil disturbance such as tillage, grading, or compaction that negatively impacts soil physical characteristics

"Never let a problem become an excuse."

Robert Schuller

- Alteration of soil hydrologic regimes
- Actions that significantly reduce the amount, diversity, or perpetuity of vegetation growth
- Erosion from wind and/or water occurring on Class I-IV soil in excess of 2T tons/acre/year of any soil within 300 feet of a stream or 1,000 feet of a water basin designated as a protected water or wetland by the DNR
- Lakeshore and streambank erosion on recreational surface water resources with a lateral recession rate in excess of 0.5"/year
- Active erosion that threatens to undermine or cause damage to infrastructure
- Active erosion that is likely to harm species of greatest conservation need or ecosystems of moderate to high ecological value

SOIL STEWARDSHIP STRATEGIES

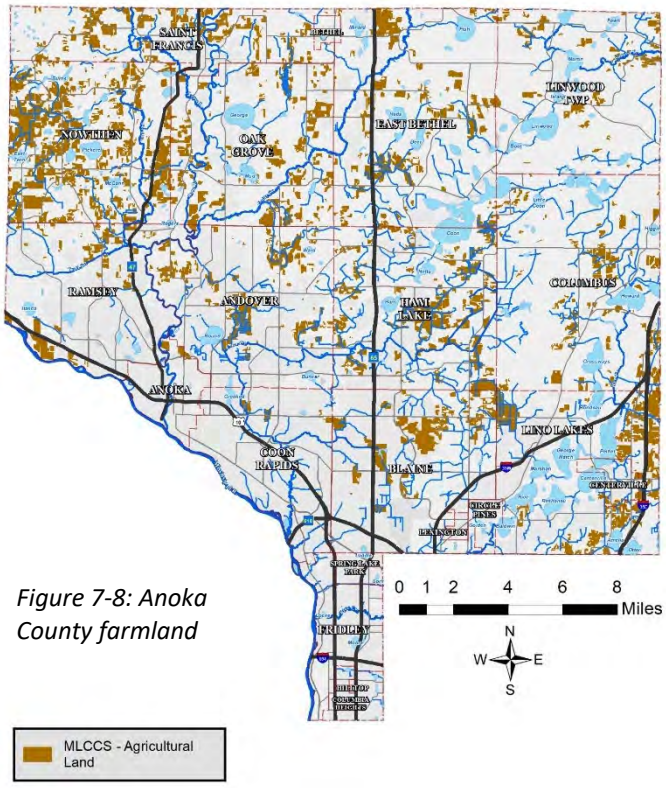


Figure 7-8: Anoka County farmland

NRCS Partnership

ACD helps landowners to manage soils to reduce erosion for water quality improvement and to establish and maintain desirable vegetation. While soils stewardship and agricultural conservation programs are not synonymous, the majority of programs that focus on managing soil health do so for the benefits provided to soil productivity. As a result, soils stewardship is generally implemented in areas where agriculture is a predominant land use. The agricultural component of the Anoka County landscape has greatly diminished over the years, giving way to residential and commercial land uses. While we promote sound agricultural conservation practices and soil health, we rely on the Natural Resources Conservation Service to be the primary point of contact for our agricultural producers. At less than 10% of the county by land cover and less than 1% of the county by population, ACD is not able to maintain agricultural staff expertise. Not only are the agricultural areas of the county small in size, but many of them occupy soils that are inherently resistant to significant erosion by water; drained peatlands and flat highly permeable sands. ACD's primary role in partnership with NRCS is to provide the timely promotion of conservation programs to producers.

Figure 7-9: Soil Health Principles (USDA NRCS, 2018)

Soil Health Principles

Maintaining and improving soil health in agricultural areas is a focus of the Natural Resources Conservation Service. The basic approach is to maintain vegetative cover all of the time, keep living plants on the landscape for as long as possible, maximize biotic diversity, increase organic matter, and minimize soil disturbance. Stewardship efforts that achieve these tenets will result in healthy, more productive soils that are less prone to soil loss through wind and water erosion.

Urban Soil Health Research

Scientific research is needed to determine how to extend soil health principles to the urban landscape and whether or not doing so would be a cost-effective natural resource stewardship strategy.

PRIORITIZATION

Based on ROI, the following are the top fifteen of twenty-five total strategies to optimize achieving soil resource goals. These strategies achieve 93% of total potential ROI.

Table 7-3: Priority strategies to achieve soil goals

Strategies	**Soil biodiversity - sustain and restore**	**Soil biogeochemical functions - sustain and restore**	**Soil productivity - sustain and restore**	**Grand Total**
Analyze soil and landform data	6.67%	9.24%	5.13%	**21.04%**
Nutrient remediation	0.00%	14.53%	0.00%	**14.53%**
Land protection	14.51%	0.00%	0.00%	**14.51%**
Ecological enhancement	3.55%	4.27%	0.32%	**8.15%**
Ditch abandonment	2.94%	4.42%	0.00%	**7.36%**
Inventory soils and landforms	1.71%	2.39%	1.33%	**5.43%**
Maintain surface water projects	0.00%	4.78%	0.00%	**4.78%**
Evaluate biota projects	1.60%	1.47%	0.00%	**3.07%**
Inspect for surface water regulation	0.88%	2.15%	0.00%	**3.03%**
Strategize soils management	0.35%	1.58%	0.08%	**2.01%**
Terrestrial invasive plant management	0.00%	0.00%	1.66%	**1.66%**
Ecological restoration	1.60%	0.00%	0.00%	**1.60%**
Anthropogenic toxin inputs minimized	0.55%	0.64%	0.36%	**1.55%**
Inspect for soil regulation	0.00%	0.88%	0.49%	**1.38%**
Advise on surface water regulation compliance	0.21%	1.07%	0.00%	**1.28%**
Maintain biota projects	0.82%	0.44%	0.00%	**1.26%**
Vetted Sum	**35.39%**	**47.86%**	**9.37%**	**92.64%**

TARGETING

Unlike other resources, soils are ubiquitous across the landscape. Because of this, they are not as well suited to geographic targeting. Targeting presented below focuses on audiences, associated land cover, landform characteristics, and noteworthy soil type and catenae properties.

- Prime farmland for preservation as working lands
- Wetlands well suited for hydrologic and vegetative restoration
- Soil catenae known to support rare biota
- Agricultural producers to encourage adoption of soil health improvement practices
- Local government officials and staff to enhance develop standards to incorporate soil health principles
- Active erosion sites in shoreland and riparian zones

IMPLEMENTATION

Soil is a critical natural resource and interconnected with other resources. ACD will manage soil resources through programs that provide the greatest return on investment (ROI) with respect to the prioritized goals. The top priority programs are summarized below, and more specifically, Table 7-4 details the ROI of each program with respect to the three soil goals. The programs listed below and in Table 7-4 cumulatively achieve over 95% of the ROI for the three soil goals. A table detailing actions associated with these programs is presented at the end of this chapter. Specific tasks will be presented in ACD's annual plans.

Table 7-4: Priority programs to achieve soil goals

Program	**Soil biodiversity - sustain and restore**	**Soil biogeochemical functions - sustain and restore**	**Soil productivity - sustain and restore**	**Grand Total**
Agricultural BMPs	5.98%	10.29%	4.69%	20.96%
Land protection	15.63%	1.36%	0.75%	17.74%
Regulatory assistance	2.98%	10.17%	2.26%	15.41%
Ecological restoration	6.75%	4.06%	0.00%	10.81%
Stormwater BMPs	0.00%	8.52%	0.00%	8.52%
Soil health improvement	2.29%	3.27%	1.81%	7.37%
Targeted pollutant management	2.03%	2.37%	1.32%	5.73%
Shore and bank BMPs	0.00%	4.04%	0.00%	4.04%
Holistic planning	0.84%	1.44%	0.55%	2.83%
Terrestrial invasive species control	0.05%	0.53%	1.77%	2.36%
Vetted Sum	**36.55%**	**46.05%**	**13.15%**	**95.77%**

Agricultural BMP

Promotion of agricultural BMPs and stewardship practices designed to improve soil health while maintaining or increasing productivity will yield multiple benefits as noted in earlier discussion on soil health.

Land Protection

Projects focused on preserving natural lands benefit soils by maintaining natural hydrologic regimes, preventing clearing or grading, preventing contamination, and preserving soil biodiversity. Protected land may be crucial by serving as a benchmark for soil health for different soil types in the county. Protection of prime agricultural lands as working lands is a strategy for maintaining productive farmland close to population centers.

Regulatory Assistance

Restoring vegetation along ditch banks via the Buffer Law rebuilds soil organic matter, holds soil in place, reduces soil disturbance, reduces nutrient and pesticide inputs, and enhances biodiversity.

Shoreland regulations help to prevent the drainage, clearing, or grading of soils in shoreland areas, all of which helps to maintain soil benefits.

Enforcement of Minnesota's Soil Loss Law will help to maintain soil organic matter, fertility, and productivity in agricultural landscapes.

Ecological Restoration

Restoring wetland hydrology and native vegetation in currently cultivated areas restores biodiversity and biogeochemical functions. Restoring vegetation rebuilds soil organic matter, holds soil in place, reduces soil disturbance, reduces nutrient and pesticide inputs, and enhances biodiversity.

Stormwater BMPs

Bioinfiltration practices provide a means to emulate landscape with healthy soils by allowing water to soak into the ground and by creating micro-biomes of diverse perennial vegetation.

Soil Health

Inventory and analysis of soil health parameters in agricultural and urban landscape will inform future stewardship efforts.

Targeted Pollutant Management

Anthropogenic toxins have become ubiquitous in the environment, such as mercury in precipitation. These substances can have untold consequences on the complex dynamics of soil organisms, and ultimately undermine soil productivity and biogeochemical functions. Others, such as pesticides are regularly applied to the same potential consequence. When exceedance threshold are approached or crossed, targeted action to remediate the pollutant may be warranted. Chlorides are among the most problematic. Because they dissolve into the water and are not filtered out by the soils matrix, Chlorides accumulate to harmful concentrations.

Shore and Bank BMPs

Restoring vegetation in shoreland and riparian areas with buffers rebuilds soil organic matter, holds soil in place, reduces soil disturbance, reduces nutrient and pesticide inputs, and enhances biodiversity.

Holistic Planning

Continued consideration of soils as a separate resource in future comprehensive and annual planning efforts will aid in developing and implementing soil stewardship practices and securing the associated benefits.

Terrestrial Invasive Species Control

Invasive animals such as earthworms greatly alter soil biogeochemical functions. Invasive plants tend to create monocultures, which also degrade soil biodiversity. Working to combat these threats will aid in restoring soil health.

ACCOMPLISHMENTS FROM THE LAST PLAN

Soils stewardship was not a focus in ACD's last plan. Because programs and services offered by ACD over the last ten years addressed multiple objectives and helped to maintain benefits from multiple resources, soil resources did benefit however.

Over the course of implementing the prior plan, however, it did become apparent to ACD Supervisors and staff that soils stewardship was foundational to successfully managing water and biotic resources. As such, soils were elevated in this comprehensive plan to be on par with other resources.

In the process of preparing the plan and engaging with soil experts, we learned that we have a lot to learn. In many landscapes, soils continue to hold many mysteries

Measurable Outcomes

ACD's preferred means of reporting outcomes is through monitoring and trend analysis of the target resources. There are no local data available on soil health characteristics, nor are soil resource stewardship benefits best measured in the soil. Benefits will manifest in surface water, groundwater and biotic resources, albeit in an indirect manner. Since it isn't practical to measure actual improvements in a particular soil resource, ACD will focus instead on reporting on project deliverables. Examples include: wetland restorations, soil data collection and analysis, farmland protection, rare species soil catenae managed, ag. producers engaged on soil health, local government officials and staff engaged on soil friendly development standards, etc.

Soil Unmet Needs

Urban Soil Health Research

Soils expertise and programming has historically gravitated toward agricultural landscapes and projects. Urban soils have been largely overlooked. How urban soil health impacts water quality, the health of landscape plantings, water recharge, and runoff are not well studied. It makes sense that the benefits of agricultural soil health should translate to the urban environment, but the degree to which this is true is unknown. Research on this topic is needed.

Anoka County Soils Quality Data

Basic metrics of soil health include soil organic matter, infiltration rates, and soil genomics. There are no data available on the condition of Anoka County's soil. We do not know if, much less to what extent, soils health has been degraded in Anoka County. A soil testing protocol to compare working agricultural and urbans lands to native soil baselines is needed to begin building the insight needed to take action.

Urban Food

Urban gardens, whether private or community, are emerging as a means of providing close to home, healthy food options. Healthy soils will be critical for productive urban gardens. Characterizing current soil health characteristics and developing a plan of action for urban gardeners to follow is needed. The U of MN Soil Testing Laboratory provides some of this service, but recommendations remain rooted in managing soil chemistry as opposed to soil health.

Needed Implementation Assets

Very few of the projects and actions for soils stewardship are limited to soils stewardship. As such, assets for implementation can be garnered from sources that prioritize surface water, groundwater, or biota resources. Funding specifically for soils stewardship is extremely limited. This section focuses on the soil specific implementation needs.

Support

Delving into the realm of urban soil health stewardship as a means to achieve water resource stewardship goals and objectives will require collaboration from watershed entities and cities. ACD will engage implementation partners to garner support to investigate the cost-effectiveness of incorporating urban soil health stewardship strategies into local water resource stewardship efforts.

Capacity

Funds are needed to gather or conduct research to fill knowledge gaps on the potential of urban soil health stewardship to be a water resource stewardship tool. While ACD staff have generalized soil knowledge, we are not equipped to engage in unique research. This would require collaboration with federal, state, and higher education partners.

Awareness

The role of soils stewardship in urban and urbanizing landscapes is neither understood nor valued. Until this is addressed, the bulk of soil health promotion and implementation will likely occur in agricultural landscapes. Even among agricultural producers, soil health is regarded as more of an idea or philosophy, than a set of land stewardship strategies to optimize productivity and other resource benefits. ACD will work to promote soil health principles among our remaining producers.

Jurisdiction

There are no jurisdictional obstacles to pursuing soils stewardship implementation.

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OTHER RESOURCES

Minnesota Office of Soil Health https://mosh.umn.edu/

Soil Health Nexus https://soilhealthnexus.org/

Minnesota Soil Health Coalition https://mnsoilhealth.org/

Soil Health Institute https://soilhealthinstitute.org/

Soil Health Partnership https://www.soilhealthpartnership.org/

SOIL STEWARDSHIP ACTION TABLE BY ROI

Table 7-5: Soil stewardship programs and actions –vetted to 95% of total ROI

Programs and Related Actions	Soil biodiversity - sustain and restore	Soil biogeochemical functions - sustain and restore	Soil productivity - sustain and restore	Grand Total
Agricultural BMPs	**5.98%**	**10.29%**	**4.69%**	**20.96%**
Ag. conservation program - promote	0.18%	0.60%	0.15%	0.93%
Ag. waste system - promote	0.00%	0.95%	0.00%	0.95%
Conservation tillage - promote	1.45%	2.17%	1.21%	4.82%
Cover crop - promote	0.90%	1.36%	0.75%	3.01%
Crop rotation - promote	0.18%	0.27%	0.15%	0.60%
Integrated pest management - promote	0.41%	0.47%	0.26%	1.15%
Organic agriculture - promote	1.36%	1.80%	1.00%	4.17%
Permaculture - promote	0.81%	1.22%	0.68%	2.71%
Precision ag. - promote	0.41%	0.47%	0.26%	1.15%
Strip cropping - promote	0.27%	0.41%	0.23%	0.90%
Land protection	**15.63%**	**1.36%**	**0.75%**	**17.74%**
Ag. land retirement and restoration program - promote	0.90%	1.36%	0.75%	3.01%
Conservation easement - hold	3.62%			3.62%
Conservation easement - promote	0.36%	0.00%	0.00%	0.36%
Fee title land acquisition - hold	3.62%			3.62%
Land protection - maintain	2.17%	0.00%	0.00%	2.17%
Land protection compliance - inspect	1.08%			1.08%
Land protection opportunity - analyze	0.58%	0.00%	0.00%	0.58%
Land protection violation compliance - guide	2.53%			2.53%
Regulatory assistance	**2.98%**	**10.17%**	**2.26%**	**15.41%**
Buffer law violation compliance - guide		1.14%		1.14%
Shoreland ordinance compliance - inspect	0.33%	0.49%	0.00%	0.81%
Shoreland ordinance violation compliance - guide	0.76%	1.14%		1.90%
Soil loss law compliance - inspect	0.00%	1.22%	0.68%	1.90%
Soil loss law violation compliance - guide		2.85%	1.58%	4.43%
Wetland Conservation Act compliance - inspect	0.57%	0.85%	0.00%	1.42%
Wetland Conservation Act violation compliance - guide	1.33%	1.99%		3.32%
Ecological restoration	**6.75%**	**4.06%**	**0.00%**	**10.81%**
Habitat restoration - design	0.22%			0.22%
Habitat restoration - evaluate	0.36%	0.00%	0.00%	0.36%
Habitat restoration - fund	0.33%			0.33%
Habitat restoration - maintain	2.17%	0.00%	0.00%	2.17%
Habitat restoration - promote	0.36%			0.36%
Habitat restoration install - manage	0.25%	0.00%	0.00%	0.25%

Programs and Related Actions	Soil biodiversity - sustain and restore	Soil biogeochemical functions - sustain and restore	Soil productivity - sustain and restore	Grand Total
Habitat restoration opportunity - inventory	0.22%			0.22%
Wetland restoration - evaluate	0.29%	0.43%	0.00%	0.72%
Wetland restoration - fund	0.07%	0.10%		0.16%
Wetland restoration - maintain	1.74%	2.60%	0.00%	4.34%
Wetland restoration - promote	0.29%	0.43%		0.72%
Wetland restoration opportunity - analyze	0.23%	0.35%	0.00%	0.58%
Stormwater BMPs		**8.52%**		**8.52%**
Bioinfiltration - cost share	0.00%	0.73%	0.00%	0.73%
Bioinfiltration - design		0.49%		0.49%
Bioinfiltration - evaluate	0.00%	0.81%	0.00%	0.81%
Bioinfiltration - maintain		4.88%		4.88%
Bioinfiltration - promote	0.00%	0.81%	0.00%	0.81%
Bioinfiltration install - manage		0.57%		0.57%
Soil health improvement	**2.29%**	**3.27%**	**1.81%**	**7.37%**
Soil health - analyze	1.77%	2.55%	1.42%	5.74%
Soil microbes - inventory	0.20%	0.23%	0.13%	0.55%
Soil organic matter content - inventory	0.33%	0.49%	0.27%	1.08%
Targeted pollutant management	**2.03%**	**2.37%**	**1.32%**	**5.73%**
Household hazardous waste collection days - promote	0.41%	0.47%	0.26%	1.15%
Household hazardous waste management - promote	0.57%	0.66%	0.37%	1.60%
Smart salting - promote	0.65%	0.76%	0.42%	1.83%
Water softener upgrade - promote	0.41%	0.47%	0.26%	1.15%
Shore and bank BMPs		**4.04%**		**4.04%**
Shoreland and riparian buffer - cost share	0.00%	0.59%	0.00%	0.59%
Shoreland and riparian buffer - design		0.39%		0.39%
Shoreland and riparian buffer - evaluate	0.00%	0.33%	0.00%	0.33%
Shoreland and riparian buffer - maintain		1.95%		1.95%
Shoreland and riparian buffer - promote	0.00%	0.33%	0.00%	0.33%
Shoreland and riparian buffer install - manage		0.46%		0.46%
Holistic planning	**0.84%**	**1.44%**	**0.55%**	**2.83%**
ACD Annual Plan	0.80%	1.19%	0.47%	2.46%
One Watershed, One Plan	0.00%	0.19%	0.06%	0.25%
Terrestrial invasive species control	**0.05%**	**0.53%**	**1.77%**	**2.36%**
Terrestrial invasive animal control - promote	0.00%	0.00%	0.15%	0.15%
Terrestrial invasive plant control - promote			0.21%	0.21%
Terrestrial invasive plant control plan - design	0.00%	0.00%	0.25%	0.25%
Terrestrial invasive plant early detection - promote			0.21%	0.21%

Programs and Related Actions	Soil biodiversity - sustain and restore	Soil biogeochemical functions - sustain and restore	Soil productivity - sustain and restore	Grand Total
Terrestrial invasive plant treatment - fund	0.00%	0.00%	0.38%	0.38%
Terrestrial invasive plant treatment - manage		0.53%	0.30%	0.83%
Terrestrial invasive plant treatment supplies - supply	0.00%	0.00%	0.21%	0.21%

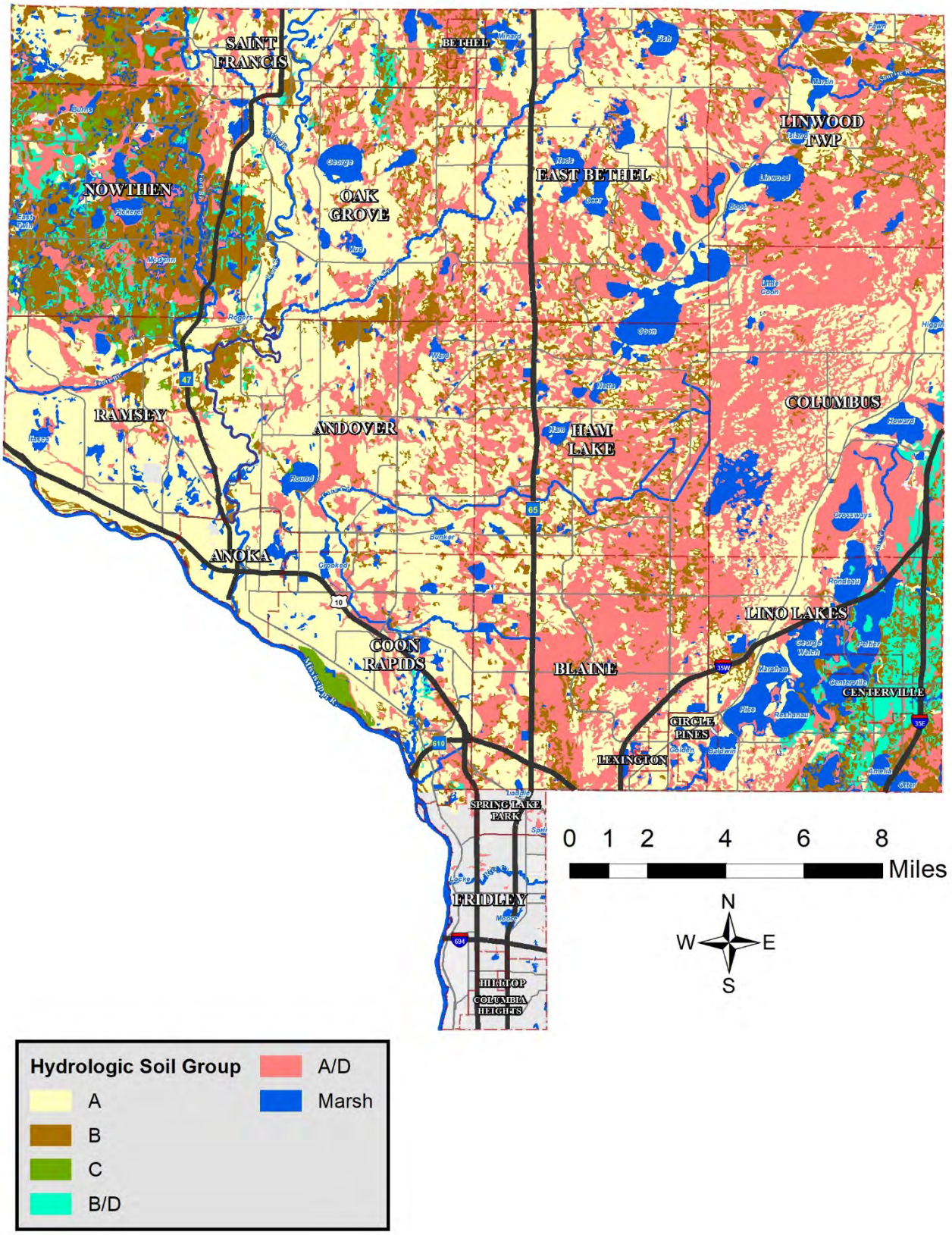
Programs and Related Actions	Soil biodiversity - sustain and restore	Soil biogeochemical functions - sustain and restore	Soil productivity - sustain and restore	Grand Total
Soil health	**8.13%**	**11.63%**	**6.46%**	**26.22%**
Soil health - analyze	6.42%	9.24%	5.13%	20.78%
Soil microbes - inventory	0.52%	0.60%	0.34%	1.46%
Soil organic matter content - inventory	1.19%	1.79%	0.99%	3.97%
Land Protection	**14.86%**	**0.18%**	**0.10%**	**15.13%**
Ag. land retirement and restoration program - promote	0.12%	0.18%	0.10%	0.39%
Conservation easement - fund	0.13%	0.00%	0.00%	0.13%
Conservation easement - hold	2.12%			2.12%
Conservation easement - manage	3.57%	0.00%	0.00%	3.57%
Conservation easement - promote	0.03%			0.03%
Fee title land acquisition - fund	0.06%	0.00%	0.00%	0.06%
Fee title land acquisition - hold	1.20%			1.20%
Fee title land acquisition - manage	2.56%	0.00%	0.00%	2.56%
Land protection - maintain	3.06%			3.06%
Land protection - plan	0.17%	0.00%	0.00%	0.17%
Land protection compliance - inspect	1.21%			1.21%
Land protection opportunity - analyze	0.25%	0.00%	0.00%	0.25%
Land protection violation compliance - guide	0.37%			0.37%
Bioinfiltration	0.00%	**11.91%**	0.00%	**11.91%**
Bioinfiltration - cost share		1.03%		1.03%
Bioinfiltration - design	0.00%	3.56%	0.00%	3.56%
Bioinfiltration - evaluate		1.06%		1.06%
Bioinfiltration - maintain	0.00%	2.03%	0.00%	2.03%
Bioinfiltration - promote		0.11%		0.11%

Programs and Related Actions	Soil biodiversity - sustain and restore	Soil biogeochemical functions - sustain and restore	Soil productivity - sustain and restore	Grand Total
Bioinfiltration install - manage	0.00%	4.13%	0.00%	4.13%
Pollinator habitat	**4.26%**	**4.97%**		**9.22%**
Lawns to gardens - promote	0.04%	0.05%	0.00%	0.09%
Lawns to legumes - cost share	3.10%	3.61%		6.71%
Lawns to legumes - promote	0.02%	0.03%	0.00%	0.05%
Lawns to legumes project - evaluate	1.09%	1.28%		2.37%
Wetland restoration	**3.37%**	**5.06%**	0.00%	**8.43%**
Wetland restoration - design	1.43%	2.14%		3.57%
Wetland restoration - evaluate	0.13%	0.20%	0.00%	0.33%
Wetland restoration - fund	0.29%	0.44%		0.73%
Wetland restoration - maintain	0.29%	0.44%	0.00%	0.74%
Wetland restoration - promote	0.02%	0.03%		0.06%
Wetland restoration install - manage	1.04%	1.56%	0.00%	2.61%
Wetland restoration opportunity - analyze	0.16%	0.24%		0.40%
Shoreland and riparian buffer	0.00%	**6.18%**	0.00%	**6.18%**
Shoreland and riparian buffer - cost share		0.89%		0.89%
Shoreland and riparian buffer - design	0.00%	0.94%	0.00%	0.94%
Shoreland and riparian buffer - evaluate		0.85%		0.85%
Shoreland and riparian buffer - maintain	0.00%	2.75%	0.00%	2.75%
Shoreland and riparian buffer - promote		0.03%		0.03%
Shoreland and riparian buffer install - manage	0.00%	0.72%	0.00%	0.72%
Agricultural BMP	**0.72%**	**2.80%**	**0.58%**	**4.10%**
Ag. conservation program - promote	0.02%	0.08%	0.02%	0.12%
Ag. waste system - promote		0.12%		0.12%
Ag. waste system need - inventory	0.00%	1.59%	0.00%	1.59%
Conservation tillage - promote	0.19%	0.28%	0.16%	0.63%
Cover crop - promote	0.12%	0.18%	0.10%	0.39%
Crop rotation - promote	0.02%	0.04%	0.02%	0.08%
Organic agriculture - promote	0.18%	0.23%	0.13%	0.54%
Permaculture - promote	0.11%	0.16%	0.09%	0.35%
Precision ag. - promote	0.05%	0.06%	0.03%	0.15%
Strip cropping - promote	0.04%	0.05%	0.03%	0.12%
Habitat restoration	**3.28%**	0.00%	0.00%	**3.28%**
Habitat restoration - design	0.81%			0.81%
Habitat restoration - evaluate	0.38%	0.00%	0.00%	0.38%
Habitat restoration - fund	0.11%			0.11%
Habitat restoration - maintain	0.52%	0.00%	0.00%	0.52%

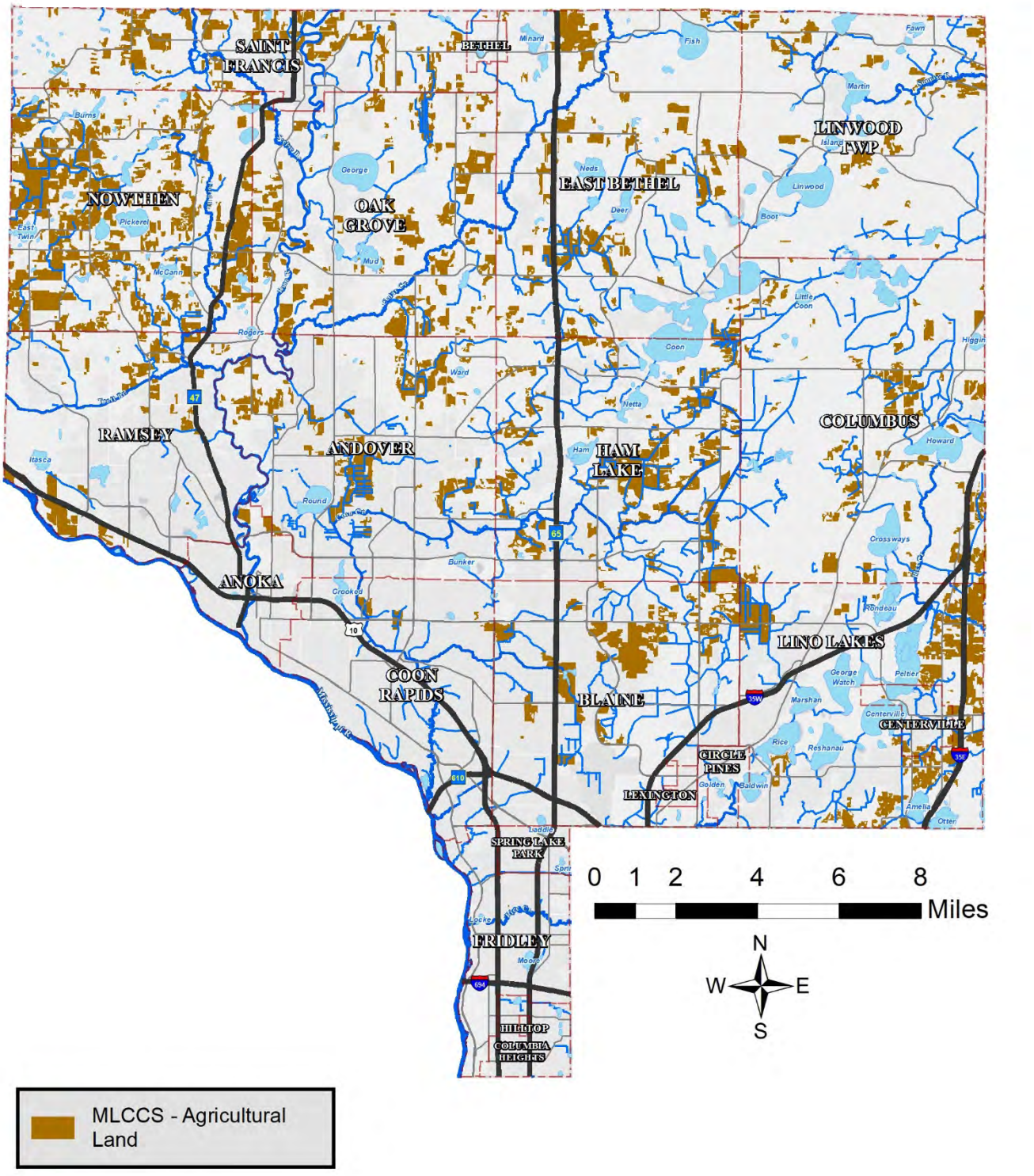
Programs and Related Actions	Soil biodiversity - sustain and restore	Soil biogeochemical functions - sustain and restore	Soil productivity - sustain and restore	Grand Total
Habitat restoration - promote	0.03%			0.03%
Habitat restoration install - manage	0.64%	0.00%	0.00%	0.64%
Habitat restoration opportunity - inventory	0.14%			0.14%
Habitat restoration protocol efficacy - analyze	0.64%	0.00%	0.00%	0.64%
Terrestrial invasive species	**0.09%**	**1.35%**	**1.83%**	**3.27%**
Terrestrial invasive animal control - promote	0.00%	0.00%	0.02%	0.02%
Terrestrial invasive plant - inventory			0.15%	0.15%
Terrestrial invasive plant control - promote	0.00%	0.00%	0.02%	0.02%
Terrestrial invasive plant control plan - design			0.61%	0.61%
Terrestrial invasive plant early detection - promote	0.00%	0.00%	0.03%	0.03%
Terrestrial invasive plant treatment - fund			0.20%	0.20%
Terrestrial invasive plant treatment - manage	0.00%	1.35%	0.75%	2.09%
Terrestrial invasive plant treatment supplies - supply			0.05%	0.05%
Terrestrial invasive species action plan	0.09%	0.00%	0.00%	0.09%
Soil loss regulation		**1.30%**	**0.72%**	**2.02%**
Soil loss law compliance - inspect	0.00%	0.88%	0.49%	1.38%
Soil loss law violation compliance - guide		0.41%	0.23%	0.64%
Minimum impact design standards	**0.66%**	**0.99%**	0.00%	**1.65%**
Minimum impact design standards - advocate	0.01%	0.02%		0.04%
Minimum impact design standards ordinance - prepare	0.65%	0.97%	0.00%	1.61%
Buffer law		**1.58%**		**1.58%**
Buffer law compliance - inspect	0.00%	0.82%	0.00%	0.82%
Buffer law violation compliance - guide		0.77%		0.77%
Construction site regulation	0.00%	**1.46%**	0.00%	**1.46%**
Construction site sediment control standards - prepare		1.46%		1.46%
Shoreland ordinance regulation	**0.58%**	**0.87%**	0.00%	**1.45%**
Shoreland ordinance compliance - inspect	0.47%	0.71%		1.18%
Shoreland ordinance violation compliance - guide	0.11%	0.17%	0.00%	0.28%
Vetted Total	**35.93%**	**50.28%**	**9.69%**	**95.90%**

MAPS

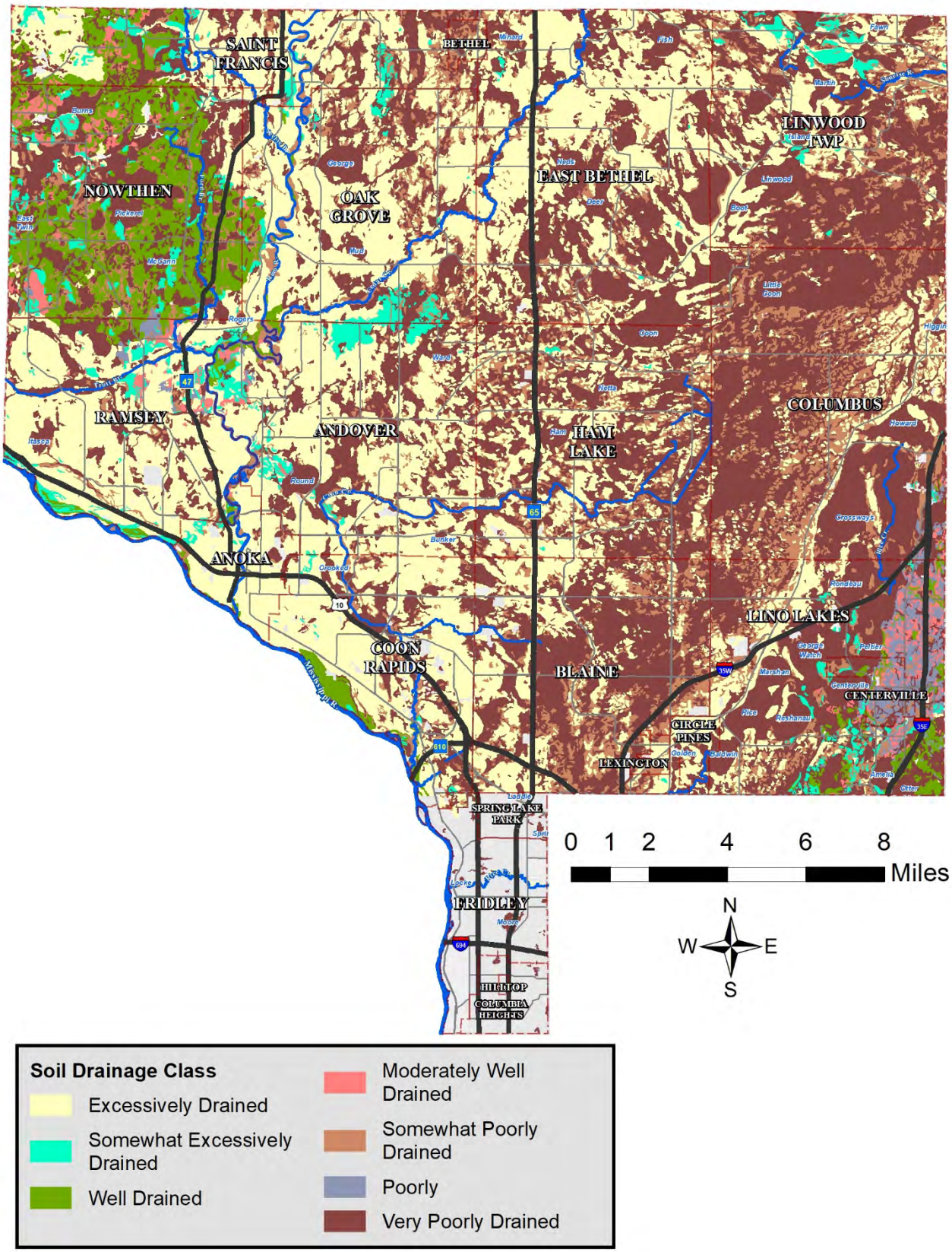
Map 7-1: Hydrologic soil group



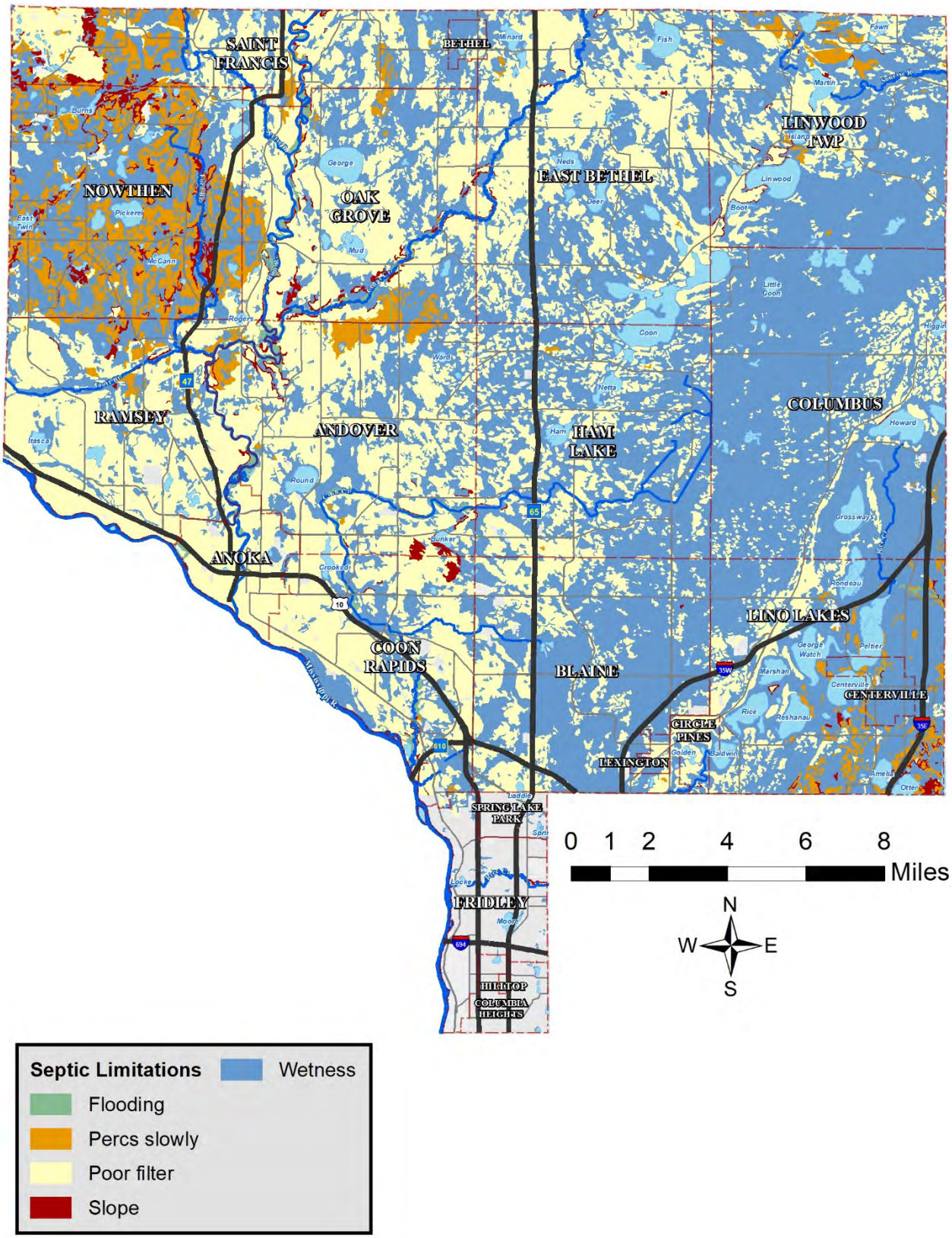
Map 7-2: Agricultural land cover - MLCCS



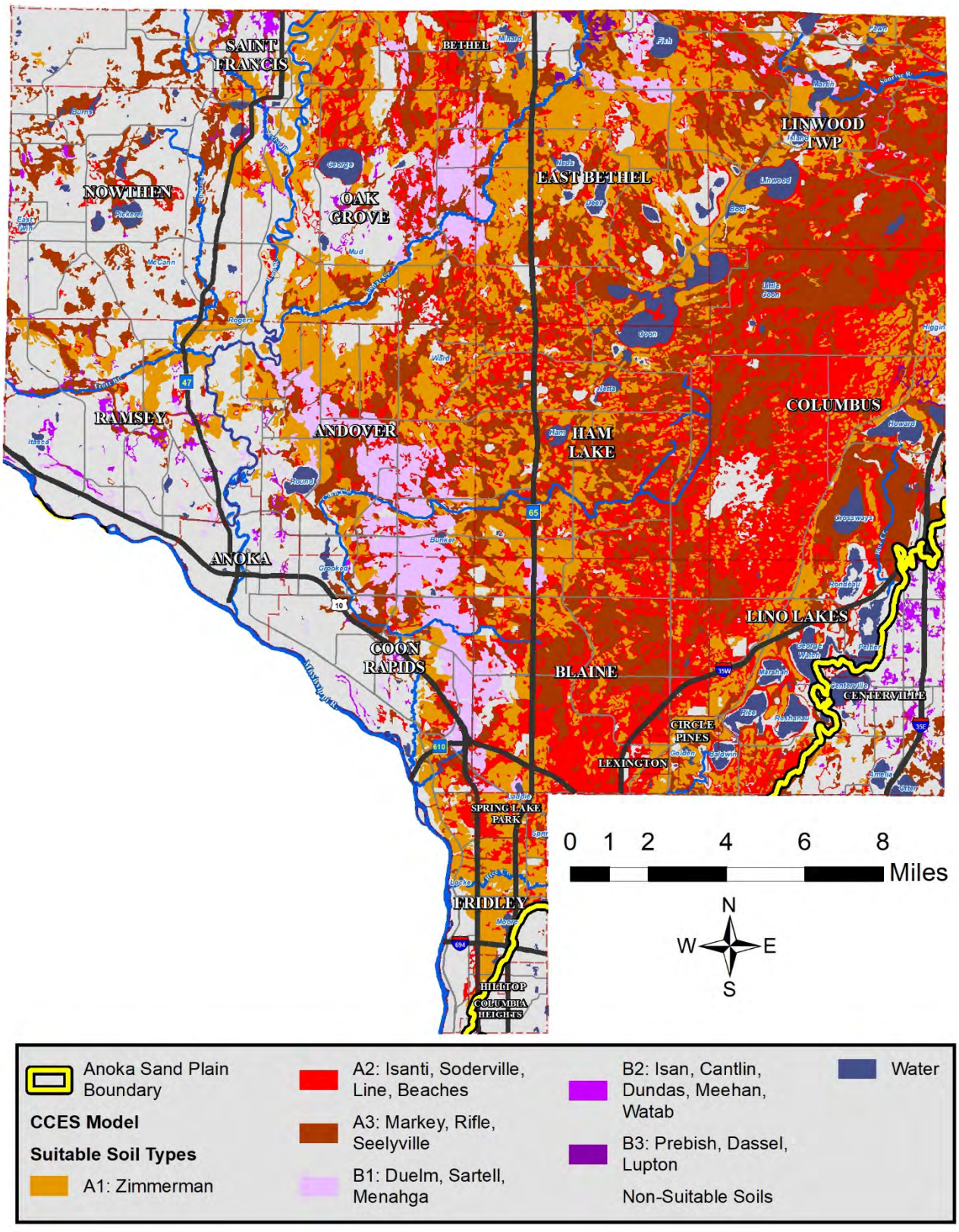
Map 7-3: Soil drainage class



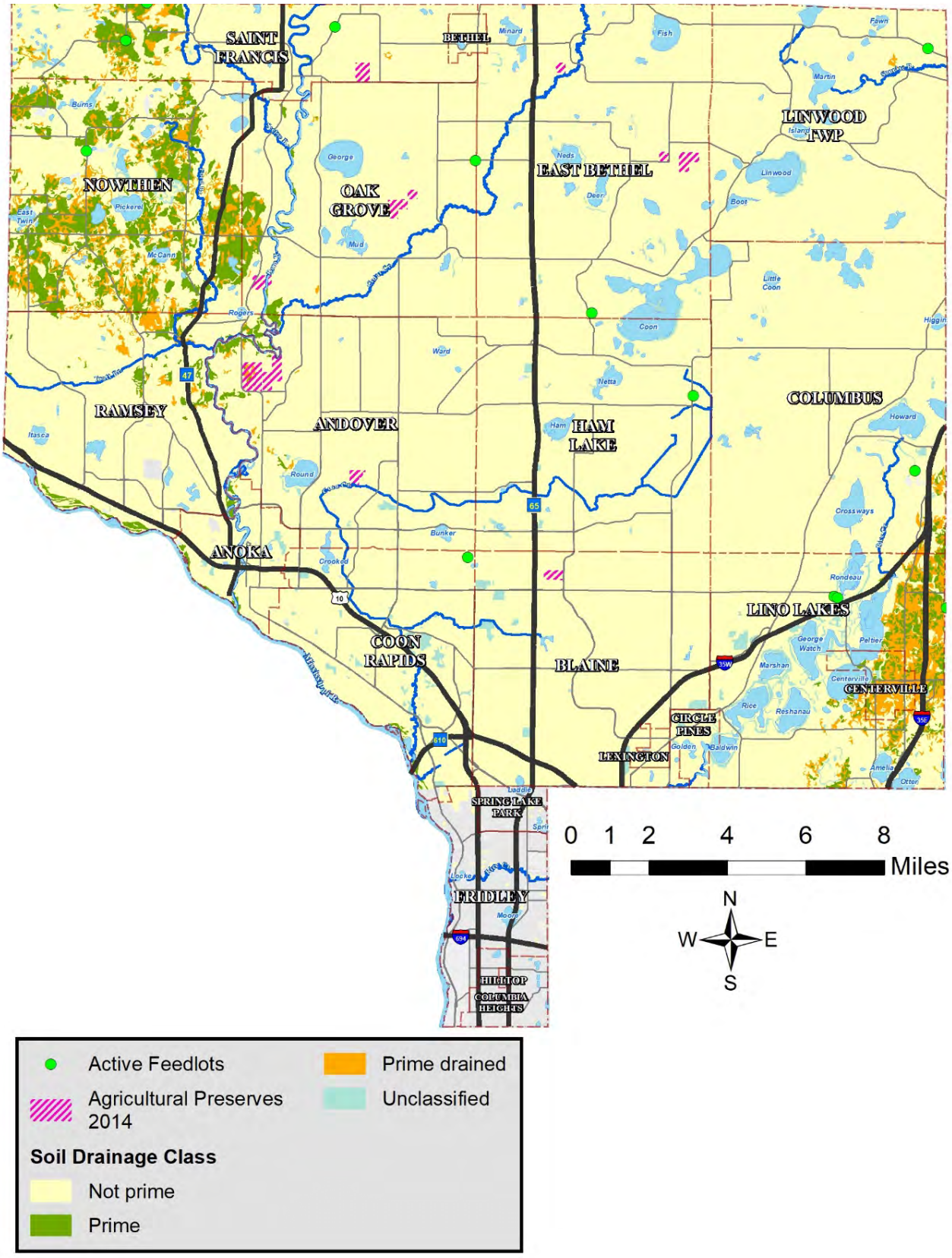
Map 7-4: Septic limitations



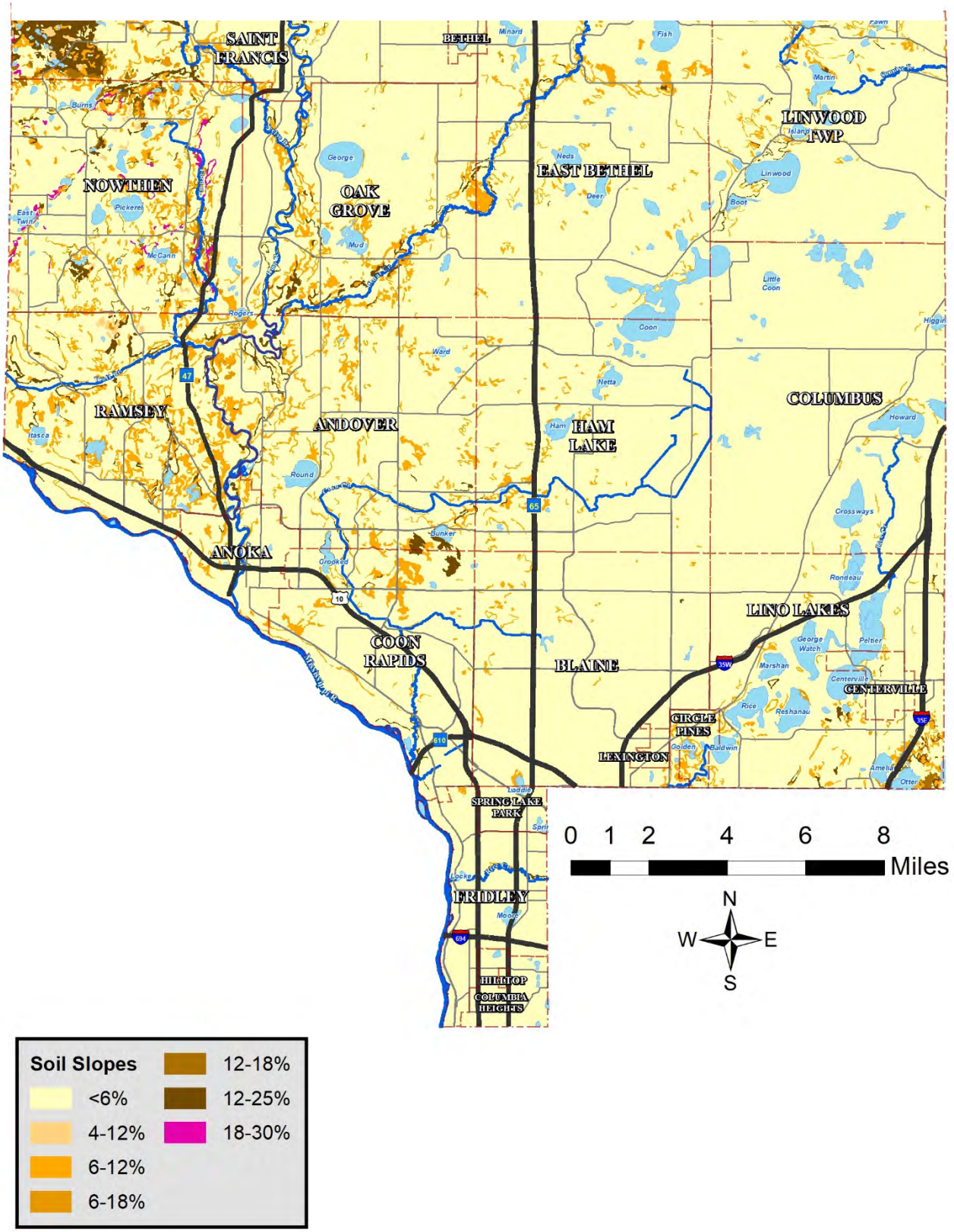
Map 7-5: Rare species habitat based on soils - CCES



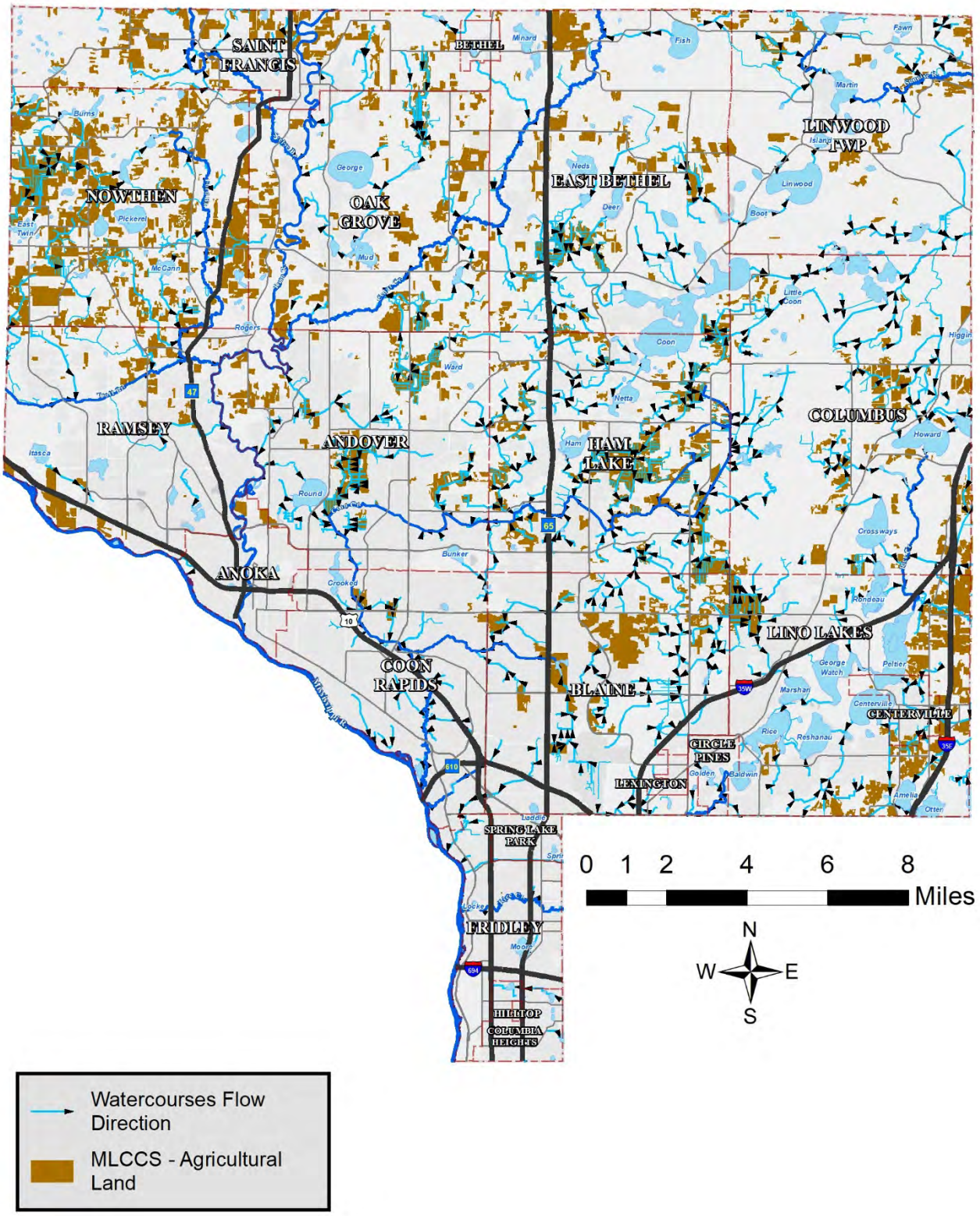
Map 7-6: Active feedlots and prime farmland



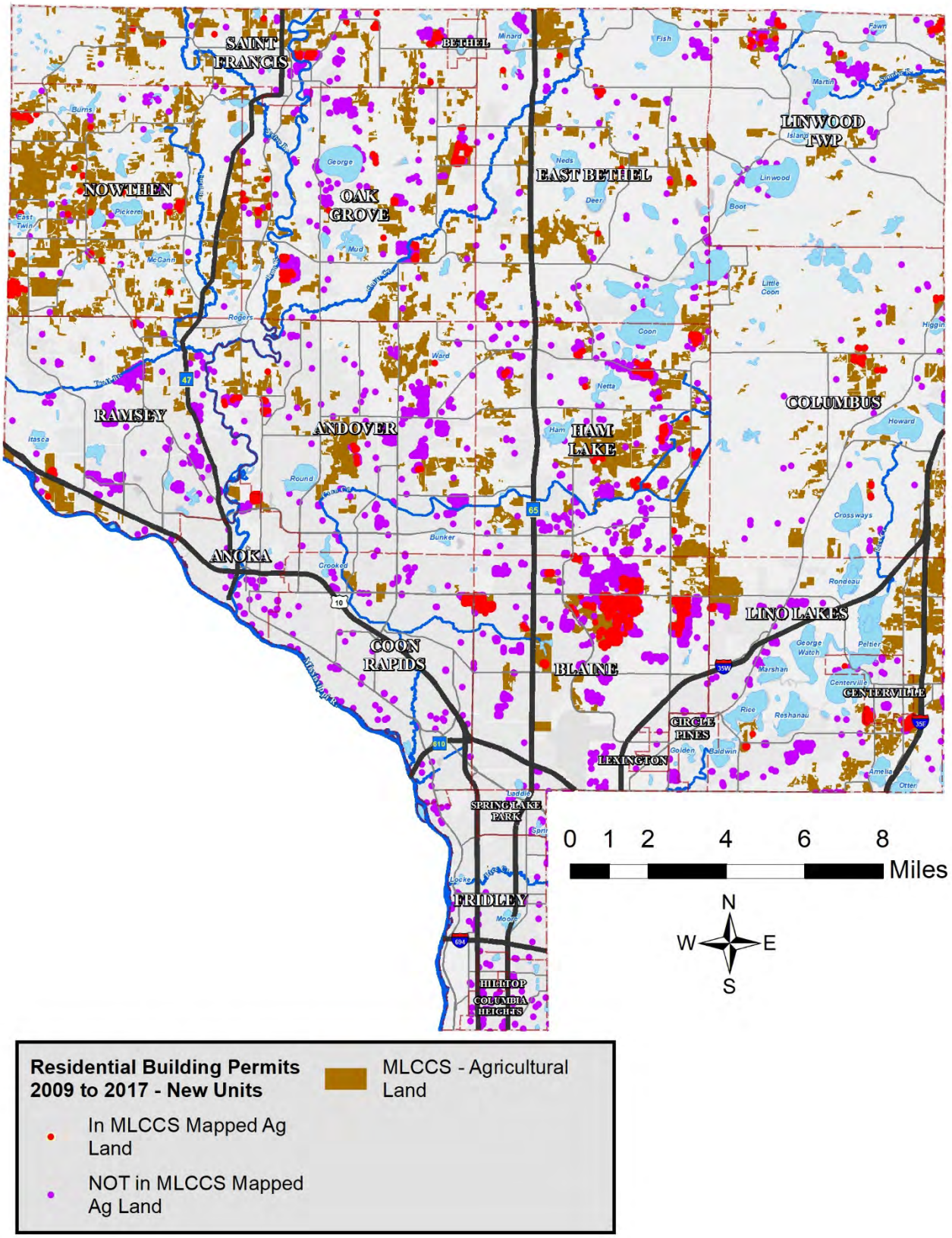
Map 7-7: Soil slopes



Map 7-8: Water courses and MLCCS agricultural land



Map 7-9: Building permits 2009-2017



Chapter 8

Implementing Our Plan.

The Anoka Conservation District will take measureable steps to conserve and enhance the quantity and quality of surface water, groundwater, soil, and ecological resources.

Our 2021-2030 Keystone Endeavors Are:

Chapter 8 Contents

IMPLEMENTATION AND BUDGET

ACTION SELECTION CONSIDERATIONS

The prior sections dealt individually with foundational resource goals, objectives, strategies, and programs. In this section, all resources are analyzed in total. The actions identified in this section, while consistent with the resource sections, will differ due to the comprehensive nature of the query as well as consideration of other factors.

Matrix Return on Investment (ROI)

The Matrix is used to identify those activities that provide the greatest return on investment (ROI) to guide decision making; it does not prescribe the actions ACD will take in any given year, or overall.

Many of ACD programs and services involve actions that may have a low ROI, but require our attention for other reasons as noted below and in the adaptive management section.

Data and Insight

Sound implementation is based in sound science. Current information on resource condition, extent and changing trends are needed to inform efforts. As such, ACD maintains a comprehensive monitoring program to provide baseline and diagnostic insights, a system for routinely inventorying geospatial data, and various methods of data analysis and planning. None of these actions alone lead to the direct improvement of natural resources and so provide a low ROI in the Matrix. They are, nevertheless, essential for operations.

Mandates

Some activities are compelled by law or must be done for pragmatic reasons, such as being a requirement to receive grant funding. The following fall into this category:

- Wetland Conservation Act guidance,
- Buffer Law guidance,
- Shoreland ordinance guidance,
- Soil Loss Law guidance,
- Subsurface Sewage Treatment System ordinance guidance,
- 10-Year Comprehensive Plans,
- Annual Plans, and
- One Watershed, One Plan plans

Prerequisites

There may be a sequence of actions that must be taken to achieve a goal, which creates prerequisites. Prerequisites may be logistical in nature, or required by a partner or funding entity. Figure 8-1 shows examples of prerequisite sequences.

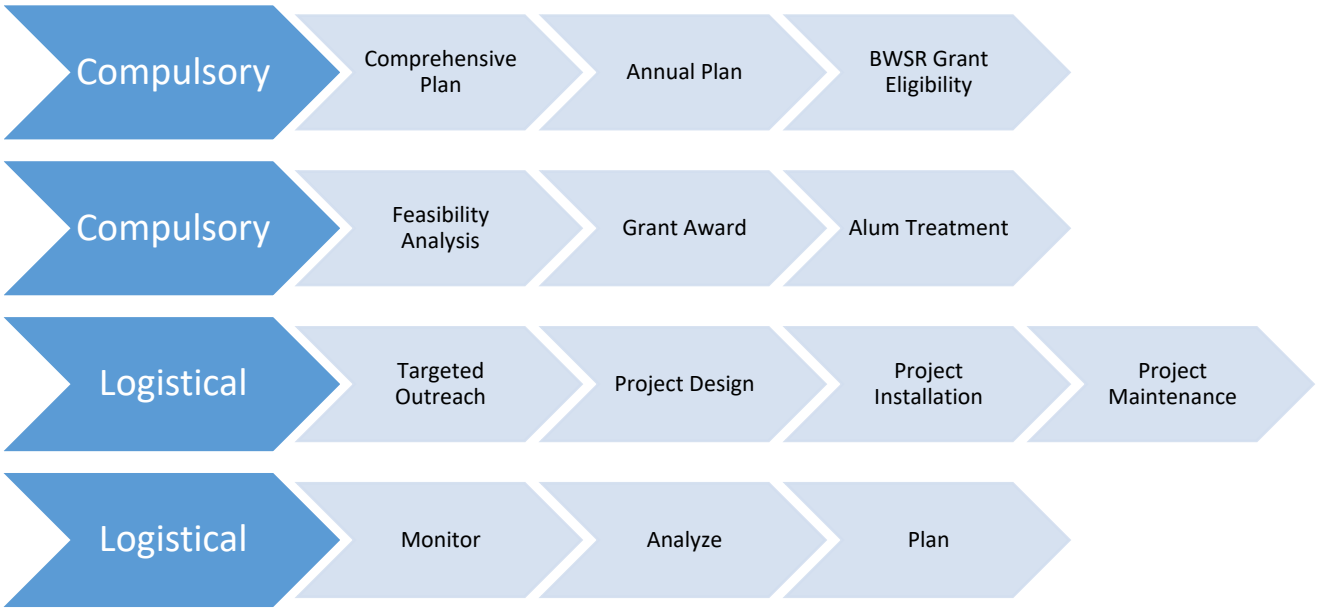


Figure 8-1: Prerequisite examples

Contracts for Services

ACD provides services under contract for partner entities on projects that advance mutual interests. While the project may not be central to our mission, it can be worth helping with. ACD in-house expertise enables us to provide service at a lower rate than the private sector, making the project more cost-effective. The project benefits that work toward ACD's goals are commensurate with the marginal effort invested by ACD, and fostering relationships and collaboration pays dividends in other ways.

Project Readiness and Support

For projects to come together, several assets must be secured; landowner cooperation, political support, funding, and staffing. For many implementing entities, funding through levy authority or other means may be sufficient to overcome the absence of one or more of these assets. For agencies such as ACD, that don't benefit from the certainty provided by statutory funding authority, all of these elements must align simultaneously. Because of this, pursuit of projects is opportunistic to some extent, and comprehensive plans and annual plans are aspirational as opposed to prescriptive.

Program and Service Priorities

To carry out the duties under subdivision 1 and implement the soil and water conservation policy of the state as stated in section 103A.206, ACD provides a range of programs and services. Table 8-1 shows the cumulative ROI for each program across all goals, sorted from highest to lowest. Each goal is listed to illustrate the relative impact of the program in achieving goals. The Matrix allows depiction of these data in countless configurations, but this compilation provides a good overall understanding of where ACD should focus efforts to improve natural resources. The listing includes 26 of 71 total programs, with the rest being removed after vetting. The remaining programs provide 95% of the overall ROI.

Table 8-1: Programs to achieve goals based on % of total ROI – vetted to 95% of potential ROI

Program	Biodiversity - sustain and restore	Biodiversity for consumptive recreation - sustain and restore	Biodiversity for recreation - sustain and restore	Biota biogeochemical functions - sustain and restore	Groundwater quality for consumption - sustain and restore	Groundwater quantity for consumption - sustain and restore	Groundwater quantity for sanitation uses - sustain and restore	Groundwater quantity for surface water baseflow - sustain and restore	Hydrologic function (groundwater recharge) - sustain and restore	Runoff storage and conveyance - sustain and restore	Soil biodiversity - sustain and restore	Soil biogeochemical functions - sustain and restore	Soil productivity - sustain and restore	Surface water biogeochemical functions - sustain and restore	Surface water quality for consumption - sustain and restore	Surface water quality for recreation - sustain and restore	Grand Total
Land protection	8.26	4.93	4.15	1.51	0.03	2.58	1.21	2.61	7.32	4.51	0.19	0.02	0.01	0.06	0.00	0.04	37.44
Stormwater BMPs	1.13	0.16		0.15	0.60	0.67	0.32	0.69	1.83	0.76		0.10		2.44		1.82	10.68
Ecological restoration	2.20	1.27	0.94	0.91	0.00	0.00	0.00	0.39	0.68	0.43	0.08	0.05	0.00	0.32	0.00	0.00	7.27
Regulatory assistance	1.77	0.57	0.50	0.74	0.08	0.37	0.17		0.63	0.71	0.04	0.12	0.03	0.29		0.79	6.81
Shore and bank BMPs	1.58	0.18	0.00	0.16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.00	2.29	0.00	1.43	5.69
Surface water monitoring	0.93	0.19		0.27					0.91	0.59				0.94		0.83	4.66
Aquatic invasive species control	1.66	0.53	0.46	0.65	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.46	0.00	0.30	4.06
Ecological enhancement	1.34	0.63	0.89	0.34		0.02	0.01	0.02			0.01	0.01					3.29
Groundwater conservation	0.69	0.30	0.22	0.27	0.02	0.58	0.27	0.58	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.12	3.06
Development standards	0.06	0.02	0.01	0.01	0.03	0.08	0.04	0.09	0.24	0.84	0.01	0.01		0.74		0.51	2.69
Hydrologic enhancement	0.29	0.21	0.16	0.21	0.00	0.00	0.00	0.01	0.67	0.61	0.00	0.00	0.00	0.31	0.00	0.00	2.48
Agricultural BMPs	0.42	0.17	0.10	0.23	0.21	0.04	0.02	0.04			0.07	0.12	0.06	0.20	0.03	0.13	1.86
Terrestrial invasive species control	0.66	0.37	0.33	0.46	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.02	0.00	0.00	0.00	1.84
Targeted pollutant management	0.23	0.10	0.05	0.14	0.30						0.02	0.03	0.02	0.35	0.04	0.29	1.57
Groundwater monitoring	0.00	0.00	0.00	0.00	0.62	0.37	0.17	0.37	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.52
Drinking water protection	0.18	0.07	0.02	0.07	0.50	0.06	0.03	0.05						0.20		0.29	1.47

Service (action type) effectiveness varies. When combined with the associated costs and other benefits, the resultant ROI provides insight into the areas where we can do the most good with limited resources. Table 8-2 lists the services in order of effectiveness by ROI. It is not surprising that Maintain ranked the highest, as that involves keeping past projects working at full capacity for as long as possible. Following that are the elements involved in new project design and installation. Some services, such as Monitor and Strategize rate very low but will need to be done regardless because of the needed data, insight, and prerequisites.

Table 8-2: Service ROI by resource

Service	Ecological (Biota)	Groundwater	Soils and Landforms	Surface Water	Grand Total
Maintain	14.89%	1.82%	0.09%	6.39%	23.19%
Manage	8.34%	3.34%	0.16%	9.23%	21.08%
Fund	8.18%	4.15%	0.10%	2.43%	14.87%
Consult	4.61%	1.57%	0.10%	4.35%	10.62%
Protect	3.01%	1.23%	0.03%	2.21%	6.48%
Evaluate	3.24%	0.32%	0.05%	1.80%	5.41%
Inspect	2.06%	0.65%	0.06%	2.54%	5.31%
Analyze	1.47%	0.79%	0.23%	1.97%	4.47%
Regulate	0.35%	0.85%	0.03%	1.76%	3.00%
Guide	0.65%	0.23%	0.02%	1.00%	1.90%
Inventory	0.41%	0.14%	0.08%	0.56%	1.19%
Engage	0.40%	0.17%	0.05%	0.23%	0.84%
Monitor	0.06%	0.28%	0.00%	0.45%	0.78%
Strategize	0.43%	0.09%	0.01%	0.23%	0.76%
Advocate	0.02%	0.03%	0.00%	0.02%	0.07%
Supply	0.02%	0.00%	0.00%	0.00%	0.02%

Program and Action Priorities

Table 8-3 presents action priorities categorized by program. Actions include the service in their name (e.g. maintain, promote, and design). This table illustrates well how programs relate to actions and services. Each program has a group of related actions and all of their services. The prior resource chapters of this plan described how each priority program relates to the resource in the chapter.

The listed ROI is a percent of the overall total for all actions. They are vetted by showing only those actions (124 of 281) needed to achieve approximately 90% of the potential ROI.

Because actions within The Matrix are subject to continuous revision, as are the estimates for annual amortized investment, the following table is illustrative of what is likely to emerge in annual plans as top contenders. Each year during annual plan preparation, the most up-to-date calculations will be used from The Matrix to formulate a plan of action.

Table 8-3: Program and action priorities by ROI – vetted to 90% of total potential ROI

Row Labels	Ecological (Biota)	Ground-water	Soils and Landforms	Surface Water	Grand Total
Land protection	**16.80%**	**6.43%**	**0.22%**	**13.98%**	**37.44%**
Conservation easement - hold	3.71%	1.61%	0.04%	2.27%	7.64%
Fee title land acquisition - hold	4.33%	1.61%	0.04%	3.98%	9.97%
Land protection - maintain	2.75%	0.97%	0.03%	2.42%	6.17%
Land protection compliance - inspect	1.38%	0.48%	0.01%	1.21%	3.08%
Land protection violation compliance - guide	3.21%	1.13%	0.03%	2.82%	7.20%
Stormwater BMPs	**0.53%**	**2.28%**	**0.10%**	**7.76%**	**10.68%**
Biofiltration - evaluate				0.13%	0.13%
Biofiltration - maintain	0.00%	0.00%	0.00%	0.80%	0.80%
Biofiltration - promote				0.13%	0.13%
Bioinfiltration - cost share	0.03%	0.18%	0.01%	0.35%	0.57%
Bioinfiltration - design	0.02%	0.12%	0.01%	0.23%	0.38%
Bioinfiltration - evaluate	0.03%	0.20%	0.01%	0.38%	0.63%
Bioinfiltration - maintain	0.21%	1.20%	0.06%	2.31%	3.77%
Bioinfiltration - promote	0.03%	0.20%	0.01%	0.38%	0.63%
Bioinfiltration install - manage	0.02%	0.14%	0.01%	0.27%	0.44%
New pond performance - evaluate	0.00%	0.00%	0.00%	0.14%	0.14%
Pond modification - evaluate	0.01%	0.02%		0.10%	0.13%
Pond modification - manage	0.10%	0.11%	0.00%	0.72%	0.92%
Stormwater pond - evaluate				0.28%	0.28%
Stormwater pond - maintain	0.00%	0.00%	0.00%	0.55%	0.55%
Street sweeping - promote	0.02%	0.02%		0.12%	0.16%
Ecological restoration	**4.74%**	**0.39%**	**0.13%**	**2.00%**	**7.27%**
Habitat restoration - design	0.17%		0.00%	0.02%	0.20%
Habitat restoration - evaluate	0.29%	0.00%	0.00%	0.04%	0.33%
Habitat restoration - fund	0.26%		0.00%	0.03%	0.30%
Habitat restoration - maintain	1.73%	0.00%	0.03%	0.22%	1.98%
Habitat restoration - promote	0.29%		0.00%	0.04%	0.33%
Habitat restoration install - manage	0.20%	0.00%	0.00%	0.03%	0.23%
Wetland restoration - evaluate	0.17%	0.04%	0.01%	0.17%	0.39%
Wetland restoration - maintain	1.04%	0.25%	0.05%	1.02%	2.35%
Wetland restoration - promote	0.17%	0.04%	0.01%	0.17%	0.39%
Wetland restoration opportunity - analyze	0.04%	0.03%	0.01%	0.14%	0.22%
Regulatory assistance	**2.96%**	**0.62%**	**0.19%**	**3.05%**	**6.81%**
Buffer law compliance - inspect	0.06%	0.02%	0.01%	0.22%	0.31%
Buffer law violation compliance - guide	0.15%	0.05%	0.01%	0.50%	0.72%
Shoreland ordinance compliance - inspect	0.23%	0.00%	0.01%	0.15%	0.40%
Shoreland ordinance violation compliance - guide	0.55%		0.02%	0.35%	0.92%
Wetland Conservation Act compliance - inspect	0.59%	0.16%	0.02%	0.45%	1.22%

Row Labels	Ecological (Biota)	Ground-water	Soils and Landforms	Surface Water	Grand Total
Wetland Conservation Act violation compliance - guide	1.37%	0.38%	0.04%	1.06%	2.85%
Shore and bank BMPs	**0.95%**	**0.00%**	**0.05%**	**4.69%**	**5.69%**
Lakeshore stabilization - cost share	0.01%			0.11%	0.12%
Lakeshore stabilization -evaluate	0.01%	0.00%	0.00%	0.12%	0.14%
Lakeshore stabilization install - manage	0.10%			0.86%	0.95%
Lakeshore stabilization -maintain	0.08%	0.00%	0.00%	0.74%	0.82%
Shoreland and riparian buffer - cost share	0.08%		0.01%	0.19%	0.28%
Shoreland and riparian buffer - design	0.05%	0.00%	0.00%	0.13%	0.19%
Shoreland and riparian buffer - evaluate	0.04%		0.00%	0.11%	0.16%
Shoreland and riparian buffer - maintain	0.26%	0.00%	0.02%	0.65%	0.93%
Shoreland and riparian buffer - promote	0.04%		0.00%	0.11%	0.16%
Shoreland and riparian buffer install - manage	0.06%	0.00%	0.01%	0.15%	0.22%
Streambank soil loss - analyze	0.01%			0.10%	0.11%
Streambank stabilization - cost share	0.02%	0.00%	0.00%	0.11%	0.12%
Streambank stabilization - evaluate	0.02%			0.12%	0.14%
Streambank stabilization - maintain	0.10%	0.00%	0.00%	0.73%	0.83%
Surface water monitoring	**1.06%**			**3.60%**	**4.66%**
Lake level - monitor	0.00%	0.00%	0.00%	0.18%	0.18%
Lake water quality - monitor	0.05%			0.23%	0.27%
Lake water quality threshold exceedance - analyze	0.06%	0.00%	0.00%	0.30%	0.36%
Lake water quality trends - analyze	0.06%			0.30%	0.36%
Stream discharge - monitor	0.00%	0.00%	0.00%	0.19%	0.19%
Stream water quality - monitor	0.12%			0.32%	0.44%
Stream water quality threshold exceedance - analyze	0.15%	0.00%	0.00%	0.43%	0.58%
Stream water quality trends - analyze	0.15%			0.43%	0.58%
Wetland level - monitor	0.13%	0.00%	0.00%	0.40%	0.53%
Wetland level trends - analysis	0.18%			0.53%	0.71%
Aquatic invasive species control	**2.59%**	**0.00%**	**0.00%**	**1.48%**	**4.06%**
Aquatic invasive animal control - promote	0.12%			0.07%	0.20%
Aquatic invasive animal early detection - promote	0.12%	0.00%	0.00%	0.07%	0.20%
Aquatic invasive plant - inventory	0.37%			0.22%	0.59%
Aquatic invasive plant control - promote	0.12%	0.00%	0.00%	0.07%	0.20%
Aquatic invasive plant control plan - design	0.15%			0.09%	0.23%
Aquatic invasive plant early detection - promote	0.12%	0.00%	0.00%	0.07%	0.20%
Aquatic invasive plant treatment - manage	0.17%			0.10%	0.27%
Aquatic invasive species project - evaluate	0.12%	0.00%	0.00%	0.03%	0.16%
Aquatic invasive species treatment - fund	0.22%			0.13%	0.35%
Carp barrier - maintain	0.55%	0.00%	0.00%	0.33%	0.88%

Row Labels	Ecological (Biota)	Ground-water	Soils and Landforms	Surface Water	Grand Total
Carp harvest - fund	0.17%			0.10%	0.26%
Carp harvest - manage	0.13%	0.00%	0.00%	0.08%	0.21%
Ecological enhancement	**3.05%**	**0.06%**	**0.03%**	**0.16%**	**3.29%**
Backyard habitat enhancement - cost share	0.11%	0.00%	0.00%	0.00%	0.11%
Backyard habitat enhancement - design	0.07%				0.07%
Backyard habitat enhancement - promote	0.12%	0.00%	0.00%	0.00%	0.12%
Backyard habitat project - evaluate	0.07%				0.07%
Backyard habitat project - maintain	0.70%	0.00%	0.00%	0.00%	0.70%
Fish ladder - fund	0.04%			0.02%	0.06%
Fish ladder - maintain	0.12%	0.00%	0.00%	0.08%	0.19%
Lawns to gardens - promote	0.07%		0.01%		0.08%
Lawns to legumes - cost share	0.06%	0.00%	0.01%	0.00%	0.07%
Lawns to legumes project - evaluate	0.05%		0.01%		0.06%
Pollinator garden - cost share	0.18%	0.00%	0.00%	0.00%	0.18%
Pollinator garden - design	0.12%				0.12%
Pollinator garden - evaluate	0.10%	0.00%	0.00%	0.00%	0.10%
Pollinator garden - maintain	0.53%				0.53%
Pollinator garden - promote	0.10%	0.00%	0.00%	0.00%	0.10%
Prescribed burn - cost share	0.12%				0.12%
Prescribed burn - design	0.08%	0.00%	0.00%	0.00%	0.08%
Prescribed burn - promote	0.07%				0.07%
Roadsides for wildlife - promote	0.17%	0.00%	0.00%	0.00%	0.17%
Groundwater conservation	**1.18%**	**1.44%**		**0.43%**	**3.06%**
Graywater reuse - advocate	0.09%	0.12%	0.00%	0.03%	0.24%
Groundwater conservation plan - design	0.63%	0.77%		0.22%	1.62%
Smart irrigation - promote	0.07%	0.09%	0.00%	0.03%	0.19%
Surface water for irrigation - advocate	0.11%	0.13%		0.04%	0.27%
Water efficient landscaping - promote	0.08%	0.10%	0.00%	0.03%	0.22%
Water-wise lawnscape - promote	0.10%	0.12%		0.06%	0.28%
Development standards	**0.06%**	**0.24%**	**0.02%**	**2.37%**	**2.69%**
Construction site erosion control compliance - inspect				0.27%	0.27%
Construction site erosion control violation compliance - guide	0.00%	0.00%	0.00%	0.64%	0.64%
Construction site sediment control compliance - inspect				0.27%	0.27%
Construction site sediment control standards - prepare	0.01%	0.01%	0.00%	0.06%	0.08%
Construction site sediment control violation compliance - guide				0.64%	0.64%
Infiltration rate ordinance - prepare	0.00%	0.06%	0.00%	0.10%	0.16%

Row Labels	Ecological (Biota)	Ground-water	Soils and Landforms	Surface Water	Grand Total
Minimum impact design standards - advocate	0.02%	0.05%	0.01%	0.12%	0.19%
Minimum impact design standards ordinance - prepare	0.02%	0.06%	0.01%	0.15%	0.23%
Hydrologic enhancement	**0.72%**	**0.01%**		**1.75%**	**2.48%**
Culvert - inventory	0.00%	0.01%	0.00%	0.03%	0.04%
Ditch remeander - evaluate	0.01%			0.05%	0.06%
Ditch remeander - fund	0.01%	0.00%	0.00%	0.04%	0.05%
Ditch remeander - manage	0.31%			1.18%	1.50%
Ditch remeander opportunity - analyze	0.01%	0.00%	0.00%	0.03%	0.04%
Stream grade stabilization - maintain	0.20%			0.14%	0.34%
Two-stage ditch - evaluate	0.01%	0.00%	0.00%	0.06%	0.08%
Two-stage ditch retrofit - design	0.01%			0.03%	0.04%
Two-stage ditch retrofit - fund	0.01%	0.00%	0.00%	0.05%	0.06%
Two-stage ditch retrofit - manage	0.01%			0.04%	0.05%
Agricultural BMPs	**0.86%**	**0.32%**	**0.25%**	**0.42%**	**1.86%**
Ag. conservation program - promote	0.06%	0.03%	0.01%	0.15%	0.25%
Ag. nutrient management - promote	0.01%	0.01%	0.00%	0.02%	0.05%
Ag. waste system - promote	0.06%	0.04%	0.01%	0.08%	0.19%
Ag. waste system need - inventory	0.03%	0.02%	0.01%	0.08%	0.14%
Conservation grazing - design	0.07%				0.07%
Conservation tillage - promote	0.00%	0.00%	0.06%	0.03%	0.09%
Cover crop - promote	0.02%	0.07%	0.04%	0.03%	0.16%
Integrated pest management - promote	0.07%	0.03%	0.01%	0.01%	0.12%
Organic agriculture - promote	0.25%	0.05%	0.05%	0.01%	0.37%
Permaculture - promote	0.12%	0.00%	0.03%	0.00%	0.16%
Precision ag. - promote	0.07%	0.03%	0.01%	0.01%	0.12%
Terrestrial invasive species control	**1.81%**	**0.00%**	**0.03%**	**0.00%**	**1.84%**
Terrestrial invasive animal control - promote	0.08%		0.00%		0.08%
Terrestrial invasive plant control - promote	0.11%	0.00%	0.00%	0.00%	0.11%
Terrestrial invasive plant control plan - design	0.13%		0.00%		0.13%
Terrestrial invasive plant early detection - promote	0.11%	0.00%	0.00%	0.00%	0.11%
Terrestrial invasive plant treatment - fund	0.19%		0.00%		0.20%
Terrestrial invasive plant treatment - manage	0.15%	0.00%	0.01%	0.00%	0.16%
Terrestrial invasive plant treatment supplies - supply	0.11%		0.00%		0.11%
Terrestrial invasive species project - evaluate	0.16%	0.00%	0.00%	0.00%	0.16%
Terrestrial invasive species project - maintain	0.65%				0.65%
Vetted Total	**35.82%**	**11.28%**	**0.92%**	**39.81%**	**87.90%**

TARGETING

Targeting is a process of identifying specific actions, in specific locations, at optimum scales that will result in the greatest improvement to priority resources for the least investment of staff and financial resources. Targeting is drawn from rigorous scientific analyses and the objective application of valuation protocols. For ACD, analyses come in the form of Subwatershed Retrofit Analyses (SRAs), shoreland condition inventories and analyses, and feasibility studies. Analyses such as these provide a ranked list of potential projects, their likely benefit to a priority resource, and estimated installation costs. Within The Matrix, ACD has applied an objective means to rank actions relative to each other based on ROI. By combining high ROI projects with targeting analysis in SRAs and other studies that place them in optimal locations in the landscape, we can maximize the benefits secured with limited assets.

10-YEAR PROJECT PRIORITIES

The following table presents an extensive listing of potential project opportunities to address ACD priorities and goals, listed generally in the order of priority based on activity type. The first column indicates initiative priority with a (H)igh, (M)edium, or (L)ow within each grouping of activity types.

Table 8-4: 10-year project priorities and opportunities

	Potential Initiative	Potential Grant	Potential Partner	Annual (Total[1])
H H H H H H	Shoreline and Streambank Stabilization • Rum River • Mississippi River • Lake George • Linwood Lake • Coon Lake • Martin Lake	CPL, OHF, WBIF, CWF Projects and Practices, District Capacity	WDs/WMOs, Cities, LIDs, Lake Assoc. Co. Depts., Landowners, SWCDs, NGOs	$500K ($5,000K)
H H H H H M M M H	SRA/WRAPS Project Implementation • City of Anoka • City of Ramsey • City of St. Francis • Lake George • Martin Lake • Coon Lake • CCWD – multiple • RCWD – multiple • MWO – multiple • Rum River WRAPS	WBIF, CWF Projects and Practices, District Capacity, Met Council, Dept. of Health, MPCA Section 319	WDs/WMOs, Cities, LIDs, Lake Assoc. Co. Depts., Landowners	$100K ($2,000K)
H	Alum Treatment • Golden Lake	WBIF, CWF	WD, City, Lake Assoc.,	$150K
M	SSTS Fix-Up – Riparian Focus	MPCA	Landowner	$40K ($400K)
H H H	Carp Management • Linwood Lake • Martin Lake • Typo Lake	WBIF, CWF, CPL	WMO, Twp., Lake Assoc.	$150K

[1] Anticipated 10-year need included to show long-term funding needs.

	Potential Initiative	Potential Grant	Potential Partner	Annual (Total[1])
M M H H M H H H M	Targeting Analyses • Linwood Lake SRA • Rice Creek Chain of Lakes SRA, • Lower Rice Creek SRA, • Lower Rum River SRA, • Lower Mississippi River Erosion Analysis • Mississippi Direct Discharge SRA • Pickerel Lake SRA • East Twin Lake SRA • Lake shore condition	LCCMR, CWF AIG, WBIF, MCD ETA, Met Council, District Capacity	WMOs/WDs, Cities, LIDs, Lake Assoc.	$50K ($500K)
M H M	Feasibility Analysis & Project Design • Sunrise Chain of Lakes Alum treatment • Lake George in-lake analysis • Ag. conservation planning	LCCMR, CWF AIG, WBIF, MCD ETA, Met Council, District Capacity, EQIP	WMOs/WDs, Cities, LIDs, Lake Assoc.	$90K ($270K)
M M M	Groundwater Projects and Analysis • Campus groundwater conservation planning • Well sealing cost share • Smart irrigation	CWF AIG, LCCMR, Met Council, MDH	Cities, Landowners, HOAs, School Districts	$120K ($1,200K)
H H M M M M M M H	Ecological Restoration • Burman WMA • Blaine SNA • Mikkelson WMA Prairie • Bonnell WMA • Carlos Avery WMA • Rum River Central Regional Park • Cedar Creek Conservation Area • Anoka Nature Preserve • Cedar Creek Ecosystem Science Reserve	OHF, CPL, USFWS, NWF	Co. Depts. Cities, DNR, Sports Orgs., Landowners, NGOs	$300K ($1,500K)
M M M H M H H L	Invasive/Noxious Species Treatment • Phragmites • Anoka CWMA • Buckthorn • CCCA • Rum Central • CCESR • Burman WMA • AIS	MDA, OHF, CWMA, MN AIS,	Co. Depts. Cities, Weed Inspectors, WDs/WMOs, DNR, MDA, Sport Orgs, Landowners, NGOs	$120K ($1,200K)
H	Rare Plant Salvage Program	LCCMR, OHF	Arboretum, DNR, Co. Depts., NGOs, Cities, WDs	$85K ($510K)
M	Pollinator Habitat	Lawns to Legumes – BWSR, CPL, EQIP, CWF	WDs/WMOs, Cities, Landowners, NGOs	$40K ($400K)

	Potential Initiative	Potential Grant	Potential Partner	Annual (Total[1])
L	Invasive Species Inventories	MDA, CWMA, MN AIS,	Co. Depts. Cities, Weed Inspectors, NGOs	$25K (75K)
H	Social Capacity – Empowering the Public • Create informational materials • Create displays and interactive models • Write articles for local newspapers, newsletters, and blogs • Create videos and other online content • Host workshops/trainings/presentations/tours • Host community engagement events • Promote individual and collective conservation actions • Promote behavior change campaigns • Coordinate with local partners • Partner regionally to support large-scale outreach efforts	WBIF, District Capacity, LCCMR	WDs/WMOs, Cities, Co. Depts., SWCDs, School Districts	$85K ($850K)
H H H	Land Protection • Easements - Rum RIM • Easements – MCBS Lands • Cedar Creek Corridor	RIM, OHF, District Capacity	BWSR, MLT, TNC, TPL, NGOs	$1,000K+
M	Wetland Restorations • Riparian Areas	BWSR Banking, District Capacity, DNR CPL, MPCA Section 319, OHF	Landowners, WDs/WMOs, NRCS, USFWS, NGOs	$40K ($200K)
M M L H L	Data Collection • Water monitoring • MLCCS • Wetland floristic quality • BMP/project efficacy • Soils	WBIF, District Capacity, LCCMR	WDs/WMOs, Lake Assoc., LIDs	$200K ($2,000K)

Supporting Analyses

ACD and its partners are continuously working to identify the most cost-effective opportunities to improve water quality, reduce discharge to the stormwater conveyance system, recharge groundwater, and improve habitat. Methods used each year to identify worthwhile projects include, but are not limited to, lakeshore and riverbank inventories, subwatershed stormwater retrofit analyses, site consultations and designs, TMDL implementation planning, water resource investigations, and open space planning.

Each of the resource sections included a list of work products that are completed, underway or planned wherein multiple projects have been identified. All of these work products are for resources of high priority and as such, all projects identified therein are considered high priorities for installation. The most cost-effective projects should be pursued first however.

Measurable Outcomes

Measuring outcomes can be done by using models, through monitoring the physical, chemical, and/or biological characteristics of the target resources, or by measuring work deliverables. Each has pros and cons, and is appropriate in different circumstances.

Using Models

While modeling is useful to estimate project effectiveness relative to other potential projects, it falls short when used as a means to determine progress toward goals. Model accuracy is compromised not only by the number and complexity of variables entered into it, but also by the fact that natural resource quality is constantly being impacted by factors unaccounted for in models, such as climatic variability, land cover changes, and land use management practices.

Monitor Target Resources

ACD maintains a rigorous routine monitoring program of target natural resources. Long-term routine monitoring provides a baseline, trends, and pace of progress. As goals are reached for a particular resource, stewardship efforts are shifted to maintenance mode. Detailed monitoring data and analysis are presented annually in a Water Resources Almanac prepared by ACD staff and available at AnokaSWCD.org. Almanacs are organized by watershed and are several hundred pages in length.

Measuring Work Throughput

Another alternative is to measure effort and work deliverables. For each of the four resource categories as well as community and general operations, two to six metrics of success in terms of effort and outcomes will be reported each year, and cumulatively over the coming 10 years in a progress indicator as shown in Figure 8-2. We are hopeful that by including intrinsic natural resource value throughout the plan and addressing community resources as a separate topic, the action wheel incorporates general quality of life outcomes to capture frequently overlooked benefits of managing our natural resources.

Figure 8-2: ACD action wheel

UNMET NEED - GAP ANALYSIS

A gap analysis is a process of identifying needs that are not being met. To cover all of the natural resource bases, this plan is built around four of the five foundational resources: soil, water, biota, mineral, and atmosphere. Managing the atmosphere is many orders of magnitude beyond what ACD could address. Managing minerals is strictly within the purview of state and federal government. Left with soil, water and biota, we opted to split water into surface water and groundwater topics. When considering these resources, as noted in the very beginning of this plan, goals, objectives, strategies and actions were viewed through the lens of what ACD's role could be. In a way, this entire plan is a gap analysis. Each of the resource sections includes an assessment of unmet need. Identified data and research needs are knowledge gap analyses. The lists of collaborations at different scales along with the selection of optimum lead entities are geographic gap analyses. The community section with identified audiences and outreach topics is a public awareness gap analysis. The identified adjustments in authorities are jurisdictional gap analyses.

DISTRICT OPERATIONS

One of the largest funding challenges for ACD is covering expenses associated with general operations. Grant funds typically restrict the amount and type of administrative and operational expenses that can be reimbursed or considered as match. General services funds received from the state are insufficient to cover otherwise ineligible operational expenses. Combined, the following operations categories account for approximately $360,000 of ACD's staff time and expenses.

General Administration

This category accounts for that portion of each employee's time that is dedicated to general district business. For technical staff, this is limited to general correspondence, time tracking, and reporting. For administrative and managerial staff this encompasses the following:

District Administration

- negotiate and manage contracts, leases, and agreements
- maintain adequate insurance, and develop and implement policies to minimize risk exposure
- facilitate Board communications and meetings
- update and administer supervisor and operations handbooks
- maintain office supplies
- coordinate computer technology services
- enact policies and procedures to ensure compliance with the MN Government Data Practices Act and Public Open Meeting Law
- administer payroll and employee benefits
- pay of sales, property, and payroll taxes

Human resource management

- attend to employee recruitment, evaluation, discipline, supervision, workload management, and professional development
- update and administer a personnel handbook
- develop and administer a classification and compensation plan

Financial administration

- prepare and maintain budgets
- complete timely bill payment and invoicing
- collect accounts receivable

- deposit receipts
- track financial activities
- prepare monthly financial reports for the Board and annual financial reports to the state
- reconcile accounts
- administer payroll and benefits
- prepare year-end financial reports and coordinate annual audits thereof

Planning and reporting

- prepare annual reports of activities
- complete pay equity reports every two years
- update workload plans and budgets regularly

Clerical

- process mail maintain files per records retention schedule
- prepare and post official notifications and records of meetings

General Planning

Effective natural resource stewardship requires both cooperative planning with other agencies, as well as internal prioritization. These efforts involve ACD staff, supervisors, other elected officials, and other agencies. Comprehensive planning is completed every ten years with annual plans completed each year. More frequent workload management planning sessions are needed to adapt to changing circumstances.

Program Development

Program development activities include efforts that increase program visibility, build mutually beneficial partnerships with other entities, and secure new grants to fund projects and programs that address ACD priorities.

Staff Development

The Board of Supervisors is committed to retaining highly qualified staff by providing competitive wages, offering professional development opportunities, and providing updated software and technology. ACD is also committed to sharing expertise via staff cross-training to ensure program continuity during staff turnover particularly with highly technical proficiencies such as GIS, WinSLAMM, Vectorworks, and Total Station Surveying.

Legislative Outreach

Engaging with, or encouraging others to engage with, State Legislators to support funding or policies that benefit ACD individually, or SWCD's collectively, falls under this category. This is limited but must be tracked to ensure compliance with state statute.

Public Relations

Efforts to inform and engage the public, partners, and civic leaders on the activities of ACD fall under this category. This is distinguished from outreach and engagement efforts, which are centered on natural resources stewardship as opposed to ACD programs, services, and operations.

Paid Leave

Regular full-time and part-time staff earn up to twelve paid holidays as well as eighteen to thirty-four days of flexible time off per year. Use of comprehensive time earned and extended medical benefits leave occurs to a lesser extent.

Property Owner - Lessor

In 2011, ACD purchased its office headquarters, which has six rentable suites, one of which is occupied by ACD. All direct expenses and staff time associated with ACD's role as lessor are tracked separately from conservation-oriented activities. Rental revenues are sufficient to cover all expenses property operations.

Rain Guardian Pretreatment Chambers

ACD staff designed and patented the Rain Guardian pretreatment chamber for curb-cut rain gardens to greatly reduce maintenance time and effort. Routine maintenance is critical for curbside bioinfiltration and biofiltration practices to function as designed and provide the anticipated benefits. Rain Guardians were designed to make maintenance fast and easy, thereby making it much more likely that maintenance will be completed. This simple, yet highly effective product is helping natural resource managers and property owners across the country achieve the water quality treatment they intended. While the function of Rain Guardians is germane to ACD's function, their primary purpose is to serve as a revenue generation engine for local conservation programs and services.

The RainGuardian.biz website provides promotional, technical, installation, and maintenance materials along with ordering instructions for our three styles of chambers. We have also developed custom solutions for large clients. Distributorships are in place for 36 states with efforts underway to expand into Canada. Rain Guardian revenues and expenses are tracked separately from conservation oriented activities.

Adjustments in Authorities

Resolutions to initiate the programs and services described in this plan will be prepared as appropriate. ACD's statutorily derived authorities are sufficient to implement this plan. With a stable funding source, this plan could be enhanced with a timeline for implementation.

ACD will support funding options, legislation, and local ordinances that achieve the following:

- Provide SWCDs with operational and programmatic levy authority.
- Conserve groundwater through mechanisms such as mandated rain/soil moisture sensors on irrigation systems, private well regulation, limits on manicured lawn size, plumbing code updates to allow gray water segregation, reuse and/or infiltration.
- Secure groundwater planning delegated authority and implementation funding.
- Allow reimbursement of full fee schedule rates from state grants for soil and water conservation districts.
- Provide funding for the long-term inspection and maintenance of BMPs.
- Support development of a technical approval authority training and certification program by BWSR that doesn't rely on NRCS provided training and oversight. An online module based system would be ideal to accommodate training needs arising from staff turnover and workload variability over time and would follow employees as they move between jobs.

Staffing, Programs, and Services

To implement the plan fully, it would be necessary to provide expertise as noted in the table below. Current staff offer most, but not all needed expertise.

Table 8-5: Staff expertise needed to implement the plan

Expertise	Duties
Management	Personnel management - Financial tracking and reporting - Secure funds and partnerships - Manage grants and projects - Develop programs and services to achieve Board objectives
Administration	Office administration - Grant administration - Website management - Financial tracking
Engagement	Public outreach, education and engagement to inform, encourage, and provide opportunities for action
Regulatory Guidance	Assist landowners to remain out of regulatory harm's way by complying with local, state and federal rules, ordinances and laws
Resource Assessment[2]	Resource monitoring and inventory to determine condition and trends
Project Development[2]	Site assessment – Survey - Project design
Project Management[2]	Project planning and installation management
Groundwater	Groundwater and geology outreach, planning and management
Soil Health	Soil health and sustainable agriculture outreach, planning and stewardship

[2] Needed for surface water and biota stewardship in terrestrial and aquatic environments

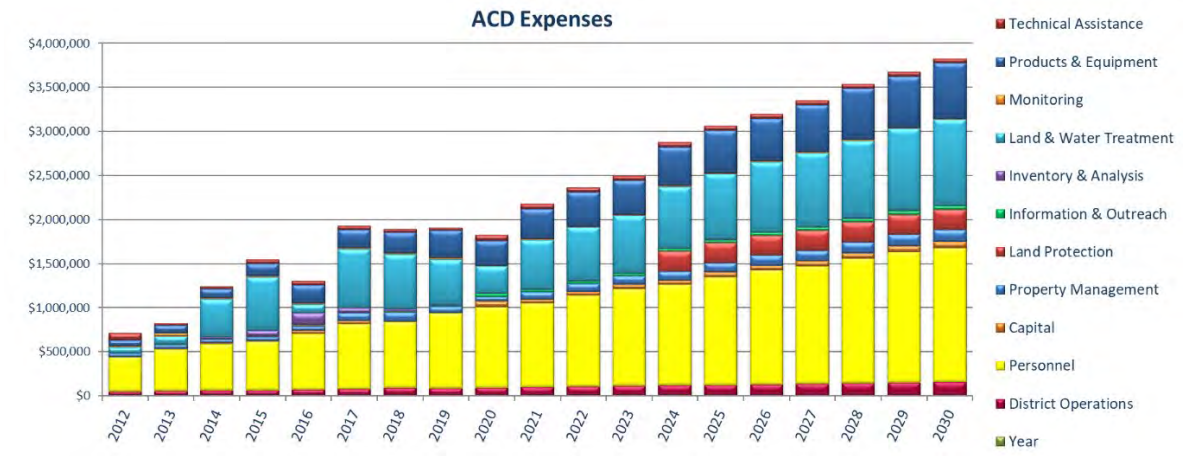
The programs and actions presented in this plan fall into one or more of the programs and services listed in Table 8-6. Actual staffing levels will be determined based on ACD's success in securing funds to implement the plan.

Table 8-6: Short-term annual staff needs

Program or Service	Mgr	Admin	Engage	Tech	Spec	Principal	Seasonal	Total
General Operations	0.55	0.75	0.10	0.20	0.30	0.20	0.01	2.11
Paid Leave	0.13	0.13	0.13	0.26	0.39	0.26	0.00	1.30
Landlord	0.01	0.01	0.01	0.02	0.03	0.02	0.01	0.11
Outreach and Engagement	0.01	0.01	0.70	0.02	0.03	0.02	0.00	0.79
Monitoring	0.01	0.00	0.00	0.20	0.15	0.00	0.35	0.71
Inventory	0.00	0.00	0.00	0.08	0.05	0.00	0.03	0.16
Analysis	0.03	0.00	0.00	0.00	0.10	0.20	0.00	0.33
Planning	0.10	0.01	0.01	0.05	0.30	0.20	0.00	0.67
Land Protection	0.02	0.00	0.00	0.00	0.08	0.02	0.00	0.12
Surface Water Stewardship	0.04	0.01	0.02	0.25	0.60	0.50	0.10	1.52
Groundwater Stewardship	0.01	0.00	0.01	0.10	0.03	0.05	0.05	0.25
Ecological Resource Stewardship	0.06	0.01	0.02	0.00	0.60	0.00	0.25	0.94
Soils Stewardship	0.03	0.00	0.01	0.02	0.03	0.02	0.01	0.12
Regulatory Assistance	0.01	0.00	0.00	0.02	0.66	0.02	0.00	0.71
Administrative Assistance	0.00	0.01	0.00	0.02	0.03	0.03	0.00	0.09
Financial Assistance	0.01	0.01	0.00	0.00	0.00	0.01	0.00	0.03
Products & Equipment	0.04	0.05	0.00	.05	0.2	0.15	0.15	0.64
Unallocated	0.00	0.00	0.00	0.0	0.42	0.30	0.04	0.76
Total	1.06	1.00	1.01	1.29	4.00	2.00	1.00	11.36

BUDGET

Expenses



Because ACD does not have statutory funding authority, budgets and work plans are aspirational as opposed to prescriptive. To project future budgets, expense and revenue trends over the prior ten years were used.

Figure 8-3: Historic and projected expenses

Table 8-7: 2021 – 2030 projected expenses

Year	District Operations	Personnel	Capital	Property Management	Land Protection	Information & Outreach	Inventory & Analysis	Land & Water Treatment	Monitoring	Products & Equipment	Technical Assistance	Total
2021	99,608	952,501	38,155	87,101		23,331	1,056	563,667	11,270	343,712	53,432	2,173,833
2022	105,611	1,032,345	41,832	92,454		25,900	1,159	609,344	11,382	388,889	52,890	2,361,805
2023	111,614	1,102,079	45,509	97,806		28,470	1,262	655,020	11,496	391,116	52,347	2,496,719
2024	117,618	1,143,084	49,185	103,158	225,000	31,039	1,365	700,697	11,611	438,619	51,805	2,873,182
2025	123,621	1,222,927	52,862	108,511	225,000	33,608	1,468	746,374	11,727	483,795	51,263	3,061,157
2026	129,625	1,292,662	56,539	113,863	225,000	36,177	1,571	792,050	11,844	486,023	50,721	3,196,075
2027	135,628	1,333,667	60,215	119,215	225,000	38,747	1,675	837,727	11,963	533,526	50,179	3,347,541
2028	141,632	1,413,510	63,892	124,568	225,000	41,316	1,778	883,404	12,083	578,702	49,636	3,535,519
2029	147,635	1,483,245	67,569	129,920	225,000	43,885	1,881	929,080	12,203	580,929	49,094	3,670,441
2030	153,638	1,524,249	71,245	135,272	225,000	46,454	1,984	974,757	12,325	628,433	48,552	3,821,910

Revenues

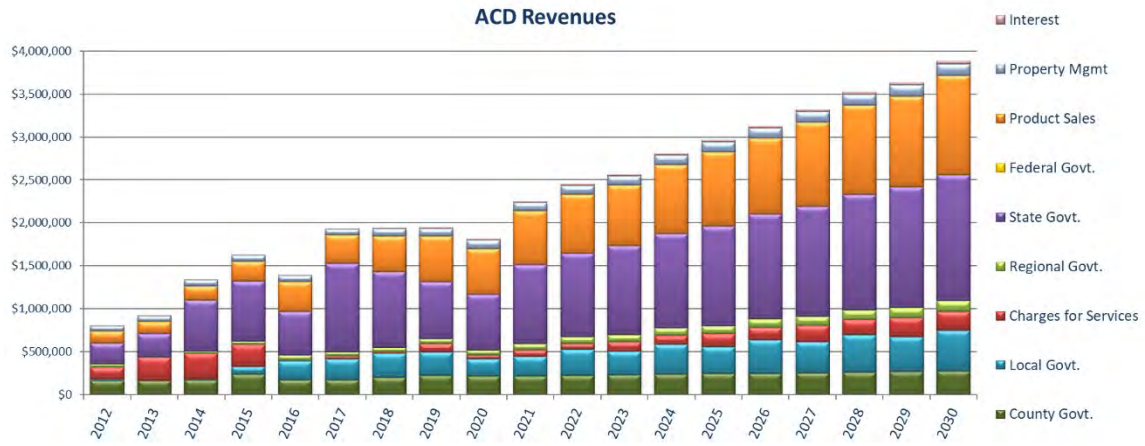


Figure 8-4: Historic and projected revenues

Table 8-8: 2021 - 2030 projected revenue

Year	Products and Equipment	Trees	Rain Guardian	Interest	Local Govt. Projects	Local Govt. Service Charges	Charges for Services	Property Mgmt.	Co. Project Funds	Co. Service Allocation	Regional Grants	State Projects	State Service Grants	Total
2021	626,453	35,548	590,904	15,286	94,444	133,241	74,557	98,669	52,958	164,340	70,447	469,653	448,888	2,248,935
2022	685,266	37,766	647,500	17,135	59,505	242,603	66,745	102,961	57,129	166,301	76,066	495,945	484,020	2,453,676
2023	703,091	39,983	663,108	18,984	105,452	165,788	112,595	107,254	61,301	168,262	81,684	522,237	519,153	2,565,803
2024	801,985	42,201	759,784	20,832	70,514	275,150	104,843	111,547	65,473	170,223	87,303	548,529	554,285	2,810,684
2025	860,798	44,419	816,380	22,681	116,461	198,336	150,749	115,839	69,645	172,185	92,922	574,821	589,418	2,963,854
2026	878,623	46,636	831,987	24,529	81,522	307,698	143,047	120,132	73,817	174,146	98,541	601,113	624,550	3,127,718
2027	977,517	48,854	928,663	26,378	127,470	230,883	189,000	124,425	77,988	176,107	104,160	627,405	659,682	3,321,015
2028	1,036,331	51,071	985,259	28,226	92,531	340,245	181,341	128,717	82,160	178,069	109,778	653,697	694,815	3,525,910
2029	1,054,156	53,289	1,000,867	30,075	138,478	263,431	227,335	133,010	86,332	180,030	115,397	679,989	729,947	3,638,180
2030	1,153,049	55,506	1,097,543	31,923	103,540	372,793	219,713	137,303	90,504	181,991	121,016	706,281	765,080	3,883,192

APPENDICES

APPENDIX – BOARD RESOLUTION ADOPTING THE 2021-2030 ANOKA CONSERVATION DISTRICT COMPREHENSIVE NATURAL RESOURCES MANAGEMENT PLAN

RESOLUTION 2021-03

RESOLUTION ADOPTING THE 2021-2030 ANOKA CONSERVATION DISTRICT COMPREHENSIVE NATURAL RESOURCES MANAGEMENT PLAN

WHEREAS MN Statute 103C.331 Subd. 11 Comprehensive Plan authorizes soil and water conservation districts to develop and revise a comprehensive plan, and

WHEREAS Anoka Conservation District (ACD) has prepared a 2021-2030 Comprehensive Plan that exceeds the minimum plan content requirements as presented in MN Statute 103C.331 Subd. 11, and

WHEREAS ACD has followed to the extent practicable, the process set forth in Metropolitan Surface Water Management Act MN Statute 8410.0045 Issue Identification and Assessment to engage partner implementing entities, public officials and the public early in the process,

THEREFORE, BE IT RESOLVED the Anoka Conservation District adopts the 2021-2030 Anoka Conservation District Comprehensive Natural Resources Management Plan.

BE IT FURTHER RESOLVED that the Plan is to be submitted to the Board of Water and Soil Resources for approval and placed on file with the USDA, Natural Resources Conservation Service area office.

BE IT FURTHER RESOLVED that the ACD District Manager is authorized to make minor alteration to the Plan provided they are non-substantive and non-controversial.

Mary Jo Thuckow
Chair, Board of Supervisors

Adopted Date: January 19, 2021

APPENDIX – STATUTORY AUTHORITIES AND DUTIES

Soil and Water Conservation Policy

Soil and Water Conservation Districts are authorized under Minnesota Statutes Chapter 103C known as the Soil and Water Conservation District Law. Soil and water conservation policy reads as follows (103A.206).

Maintaining and enhancing the quality of soil and water for the environmental and economic benefits they produce, preventing degradation, and restoring degraded soil and water resources of this state contribute greatly to the health, safety, economic well-being, and general welfare of this state and its citizens. Land occupiers have the responsibility to implement practices that conserve the soil and water resources of the state. Soil and water conservation measures implemented on private lands in this state provide benefits to the general public by reducing erosion, sedimentation, siltation, water pollution, and damages caused by floods. The soil and water conservation policy of the state is to encourage land occupiers to conserve soil, water, and the natural resources they support through the implementation of practices that:

(1) control or prevent erosion, sedimentation, siltation, and related pollution in order to preserve natural resources;
(2) ensure continued soil productivity;
(3) protect water quality;
(4) prevent impairment of dams and reservoirs;
(5) reduce damages caused by floods;
(6) preserve wildlife;
(7) protect the tax base; and
(8) protect public lands and waters.

Soil and Water Conservation District Authority

In order to carry out its mission, ACD has several powers granted in law. The following paraphrases those authorities. SWCDs may:

- conduct resource surveys and demonstration projects,
- carry out soil and water conservation measures on any lands in the district with the consent of the landowner,
- cooperate or enter into agreements for the purpose of carrying on a program of erosion prevention and control,
- purchase or accept property and income and provide equipment and supplies that will help to bring about conservation practices,
- construct, install, improve, maintain, and operate such structures and works as may be necessary for proper performance of the district,
- develop a comprehensive and annual plan for the conservation of soil and water resources,
- assume land by purchase, lease or otherwise to improve, maintain, operate, and administer any soil and water conservation project undertaken by federal or state government,
- sue or be sued,
- require compensation or contributions for goods and services provided,
- make application or enter into an agreement with any designated authority for federal assistance,
- perform any other acts necessary to secure and use federal aid,
- acquire land, easements, or rights-of-way needed in connection with works of improvement installed with federal assistance,
- use necessary funds to provide membership in state and national associations that pertain to district operations and to defray expenses of district representatives to participate in such groups,
- procure necessary insurance,

- publish any information related to the activities of the district,
- provide advice to or consult with county or municipal representatives, and
- present an annual budget to the board of county commissioners.

Soil and Water Conservation District Duties

In addition to any other duty prescribed by law, soil and water conservation districts must:

(1) respond to and provide technical and financial assistance to landowners to maintain and improve the quality, quantity, distribution, and sustainability of natural resources, including surface water, groundwater, soil, and ecological resources;
(2) provide technical assistance in implementing the soil erosion law under sections 103F.401 to 103F.48;
(3) arrange for employees to serve on technical evaluation panels to implement the wetland laws as required under section 103G.2242;
(4) locally administer the reinvest in Minnesota reserve program under section 103F.515 and rules adopted thereunder, using knowledge of local resources to manage each easement to maximize environmental benefits;
(5) participate in administering the Wetland Conservation Act as provided under sections 103G.221 to 103G.2375, either in an advisory capacity or as the designated local government unit administering the program;
(6) participate in the local water management program under chapter 103B, either in an advisory capacity or as the designated local government unit administering the program;
(7) participate, as appropriate, in the comprehensive watershed management planning program under section 103B.801;
(8) participate in disaster response efforts as provided in chapter 12A;
(9) provide technical recommendations to the Department of Natural Resources on general permit applications under section 103G.301;
(10) provide technical assistance and local administration of the agricultural water quality certification program under sections 17.9891 to 17.993;
(11) provide technical assistance for the agricultural land preservation program under chapter 40A, where applicable;
(12) maintain compliance with section 15.99 for deadlines for agency action;
(13) coordinate with appropriate county officials on matters related to electing soil and water conservation district supervisors; and
(14) cooperate to the extent possible with federal, state, and local agencies and with private organizations to avoid duplicating and to enhance implementing public and private conservation initiatives within the jurisdiction of the district.

Soil and Water Conservation District Services

To carry out the duties under subdivision 1 and implement the soil and water conservation policy of the state as stated in section 103A.206, soil and water conservation districts provide a range of services, including but not limited to:

(1) performing administrative services, including comprehensive and annual work planning, administering grants, leveraging outside funding, establishing fiscal accountability measures, reporting accomplishments, human resources management, and staff and supervisor development;
(2) entering into cooperative agreements with the United States Department of Agriculture, Natural Resources Conservation Service, and other United States Department of Agriculture agencies to leverage federal technical and financial assistance;

(3) providing technical expertise, including knowledge of local resources, performing technical evaluations and certifications, assessing concerns, and providing oversight in surveying, designing, and constructing conservation practices;
(4) providing information and education outreach, including increasing landowner awareness and knowledge of soil and water conservation program opportunities to protect soil and water resources and publicizing the benefits of soil and water conservation to the general public;
(5) facilitating regulatory processes for impacted landowners and providing technical review and comment on regulatory permits and development plans for regulations relating to soil and water conservation;
(6) administering projects and programs, including but not limited to the nonpoint source pollution abatement program; reinvest in Minnesota reserve conservation easements program; disaster response; local water management and comprehensive watershed management planning programs; and projects related to floodplains, lakes, streams and ditches, wetlands, upland resources, and groundwater resources, to maintain and improve the quality, quantity, distribution, and sustainability of natural resources, including surface water, groundwater, soil, and ecological resources;
(7) monitoring and inventorying to collect data that provide a baseline understanding of resource conditions and changes to the resources over time and analyzing and interpreting the data to support program implementation; and
(8) maintaining a modern technology infrastructure that facilitates planning and projects, including geographic information systems, modeling software, mobile workstations, survey and design equipment and software, and other technology for linking landowners with conservation plans

APPENDIX - NATURAL RESOURCE POLICIES

The following policies have been adopted over the years by the ACD Board of Supervisors. ACD's policy handbook is annually reviewed and approved by the Board of Supervisors and is the most current record of ACD standing policies and procedures.

Natural Resource Regulation Variances

State and local rule, policy and ordinances designed to protect natural resources are not always written to address all cases and may inadvertently lead to natural resource degradation when strictly enforced (e.g. filling a wetland in order to achieve wetland setback and buffer requirements). Project applicants are encouraged to seek, and permitting authorities are encourage to grant, variances from rules, policies, and ordinances when doing so will clearly result in a better outcome in terms of natural resources protection and management. Furthermore, policy makers are encouraged to incorporate performance standards into rules, policies, and ordinances to help avoid unintended consequences and allow for flexibility to achieve natural resource management goals.

Wetland Resources

Perform and/or Review Wetland Delineations

The Anoka Conservation District will not perform wetland delineations when frozen soils or snow cover make adequate analysis impossible in the professional opinion of the Anoka Conservation District technical staff.

Wetland Fill to Create Buildable Lots

Wetlands should not be filled in order to enlarge the buildable area to create buildable lots. Where impacts to highly degraded wetlands can be offset by permanent protection of high quality upland habitats, flexibility may be warranted.

Issuing Extensions for Compliance with Restoration Orders

Extensions for compliance with wetland Restoration Orders may only be recommended when the landowner has made a good faith effort to comply but was unable due to mitigating circumstances. The landowner must provide correspondence summarizing the reason for not complying and a date by which they will comply.

Holistic Natural Resource Management

All natural resource functions and values should be weighed when making management decisions to strive for the best overall outcome for soil, water, wildlife, recreation, and aesthetics. When reviewing applications and plans that may adversely affect natural resources, the Anoka Conservation District will recommend actions that will result in the least environmentally damaging practicable alternative. The following principles should be applied:

- Preserve natural resources that are rare in occurrence or of exceptional quality.
- Avoid degradation that is difficult or impractical to fully remediate.
- Consider all ecosystems; terrestrial, aquatic, and transitional.
- Preservation of an in-tact native ecosystem is preferable to restoration of a degraded ecosystem.
- Minimize long-term impacts from short-term activities (e.g. dewatering, minor grading or soil storage that allows for the establishment of invasive species).
- Identify, and strive to minimize and remediate for long-term impacts (e.g. reduced infiltration that lowers the surficial water table and subsequently shrinks wetlands).
- Balance short-term and long-terms impacts and benefits.

The following are examples of the application of these principles:

- Discourage excavation in wetlands that are dominated by native, non-invasive plant species.
- Maintain the hydrologic regime of habitats that support native, non-invasive plant communities.
- Limit the placement of mitigation wetlands to highly degraded terrestrial habitats or highly degraded wetland areas.
- Discourage removal of native, non-invasive vegetation.
- Request an on-site biological survey and report the proposed taking or degradation of native plant communities;
  - within areas mapped as moderate, high, or outstanding DNR biodiversity significance;
  - that have a conservation status ranking of S1, S2, S3, or S4;
  - that involve the taking of state (endangered, threatened, special concern) or federally-listed (endangered, threatened, candidate) species;
  - that are likely to support state or federally-listed species.
- Discourage pruning of, or damage to, oak trees April – July.
- Abandon private and public lateral drainage ditches during development to restore wetland hydrology provided adequate stormwater conveyance capacity can be maintained.
- Encourage discharge of dewatering water to areas where storage and infiltration is most likely to occur.

Criteria for Wildlife Habitat Exemptions

ACD will use the following criteria for certification of MN Statute Chapter 8420 Wildlife Habitat Exemptions

In Chapter 8420 Minnesota Wetland Conservation Act there is an exemption for excavation and deposition of spoil in a jurisdictional wetland for the purpose of improving wildlife habitat. The purpose of this guidance document is to provide sound rationale for applicants to perform wetland excavation and spoil deposition to improve wildlife habitat.

The 1995 Amendments to the Wetland Conservation Act of 1991 states “a replacement plan for wetlands is not required for excavation or associated deposition of spoil within a wetland for a wildlife habitat improvement project, if:” the project maintains all of the following regulations:

1. The area of deposition, within the wetland, does not exceed five percent of the wetland area or one-half acre, whichever is less.
2. Spoil is stabilized to prevent erosion, and permanent native, non-invasive vegetation is established, via plantings or seeding.
3. The project does not have an adverse impact on any species designated as endangered or threatened under state or federal law.
4. The project will provide wildlife habitat improvement as certified by the Soil and Water Conservation District using “Wildlife Habitat Improvements in Wetlands” guidance, or similar criteria used by the SWCD board.

Excavation and deposition of spoil of a wetland may be certified by the Soil and Water Conservation District for wildlife habitat exemption improvement provided the following conditions are met:

1. Excavation and deposition in a wetland is beneficial to wildlife. i.e. when done in a low quality wetlands, such as one dominated by invasive species.
2. Deposition in a wetland is beneficial and creates diversity of wetland community complimenting the existing ecosystem.
3. The spoil will form an island isolated from upland to prevent intrusion by people.
4. Excavations should have undulating bottoms and sinuous shorelines.
5. Depths shall be no greater than 6.5 feet from the original soil surface.
6. Side slopes should be no steeper than 5:1, but 10:1 or greater is recommended

7. Spoil placement not permitted in exemption, shall not be placed within any other wetland.
8. Excavations for wildlife habitat improvement will be discouraged, or denied when the wetland is already considered high quality, or the following conditions exist:
    - Excavation in sedge meadow wetlands.
    - Excavation in forested wetlands.
    - Excavation in bogs.
    - Excavations in wetlands identified as Natural Heritage Communities by the Minnesota County Biological Survey.
    - Excavations in wetlands deemed natural community, supporting ecologically sensitive flora and fauna, based on field visit by the Soil and Water Conservation District.
    - The excavation will not provide diversity to the wetland basin or complex (e.g. excavation in the fringe of a type 3, 4, or 5 wetland with standing open water throughout much of the growing season).
    - Wetlands which support a wide variety of plant species (i.e. approximately 50% of the area supports species which individually comprise <5% of the wetland).
    - Wetlands that score high on the MNRAM vegetative diversity criteria.
    - Excavations for the purpose of creating aesthetic reflecting pools.

Wildlife Habitat Exemptions are subject to approval by the ACD Board or the Technical Evaluation Panel.

Conservation Project Installation

ACD's program to assist with the cost of installing conservation practices to achieve the goals of the district consists of several funding sources, each with their own set of requirements. These funding sources change from year to year and so detailed procedures and policies are not included in this document. There are, however, some general policies that ACD has adopted to facilitate program administration and improve program outcomes.

- The ACD board may act to obligate funds toward a project without fully encumbering those funds within a contract. This serves to reserve funds for projects while other elements of project planning, design and coordination can be finalized.
- On a case by case basis, landowners/project sponsors/applicants may be required to provide an escrow in the amount of anticipated design and engineering costs. If the project construction bids come in within 10% of the engineer's estimate and the applicant does not move forward with project installation, the escrow may be used to reimburse ACD for the cost of the design. If the applicant moves forward with construction, these funds shall be applied toward construction costs.
- 100% of project costs may be paid for with public funds provided the project cooperator is not substantially at fault for creation of the problem. Curb cut rain gardens that treat water from much of the neighborhood but very little of the cooperator's property is an example.
- Investment of public funds into a project will be considered in terms of the benefits received by the public. ACD will consider all public funds going toward a project when determining if the project is worthwhile on a cost-benefit basis, not just those funds invested by or through ACD.
- Cost-benefit analysis will be conducted with consideration of all benefits and costs over the life the project.
- Public benefits for projects will be measured in terms of the actual benefits to the target receiving water body, not the capacity of a practice to treat water.
- Cost share rate maximums will be the same as those prescribed by the funding source.
- The value of in-kind services/equipment/materials provided by landowners/project sponsors will be based on State approved prevailing wage guidance for services, documented market rates for rental equipment, or documented actual cost/value for materials.

- Specialist level staff shall oversee project installation and maintenance. Specialist level staff have not less than a four year degree and three years' experience in natural resource management or related field along with substantial on-the-job training and professional development training.
- The NRCS Field Office Technical Guide or other standard generally accepted by the engineering profession will be used for project design, construction, operations and maintenance.
- Cost share payments are not to exceed the cost of installation.
- Performance based cost share approaches are encouraged.
- Cost share contract non-compliance will be reviewed by the operations committee with a recommendation to the full board. The committee shall seek input from staff from the agencies that provided funding. The primary goal will be to maintain/restore the project benefits. Failing that, a pro-rata refund of cost share funds will be sought based on the benefits received compared to the anticipated benefits over the planned life of the project.

Performance Based Cost Share

Performance based cost share is an approach by which public investment into projects is measured by the amount of benefit that results from the project. Funds received by a landowner/project sponsor/applicant are independent of the installation cost of the project but rather are based solely on how much benefit is received. Predetermined rates are developed for benefits over a specific durationriod. The rates may vary by geographic area, target water body or target benefit. Payments to landowners/project sponsors/applicants are not to exceed the cost of installation however.

APPENDIX - SOILS OF ANOKA COUNTY

Soils of Anoka County (USDA, Soil Conservation Service, 1977)

Alluvial Land	Growton Fine Sandy Loam	Meehan Sand
Anoka Loamy Fine Sand Series	Hayden Fine Sandy Loam Series	Millerville Mucky Peat
Becker Very Fine Sandy Loam	Heyder Fine Sandy Loam Series	Mora Fine Sandy Loam
Blomford Loamy Fine Sand	Hubbard Coarse Sand Series	Nessel fine Sandy Loam
Graham Loamy Fine Sand Series	Isan Sandy Loam	Nowen Sandy Loam
Brickton Silt Loam	Isanti Fine Sandy Loam	Nymore Loamy Sand Series
Cathro Muck	Kingsley Fine Sandy Loam Series	Rifle Series
Chetek Sandy Loam Series	Kratka Loamy Fine Sand	Rondeau Muck
Cut and Fill Land	Lake Beaches	Ronneby fine Sandy Loam
Dalbo Silt Loam	Langola Loamy Sand	Sartell Fine Sand Series
Dickman Sandy Loam Series	Lino Loamy Fine Sand	Seelyeville Muck
Duelm Loamy Coarse Sand	Loamy Wetland	Soderville Fine Sand
Dundas Loam	Lupton Muck	Webster Loam
Emmert Series	Markey Muck	Zimmerman Fine Sand Series
Glencoe Loam	Marsh	

Soil Characteristics of Anoka County

Hydric Soils of Anoka County

Alluvial Land	Kratka Loamy fine Sand	Nowen Sandy Loam
Blomford Loamy Fine Sand	Lake Beaches	Rifle Mucky Peat
Brickton Silt Loam	Loamy Wet Land	Rifle Muck, Woody
Cathro Muck	Lupton Muck	Rifle Soils, Ponded
Dundas Loam	Markey Muck	Rondeau Muck
Glencoe Loam	Marsh	Seelyeville Muck
Isan Sandy Loam	Millerville Mucky Peat	Webster Loam
Isanti Fine Sandy Loam		

Highly Erodible Soils of Anoka County

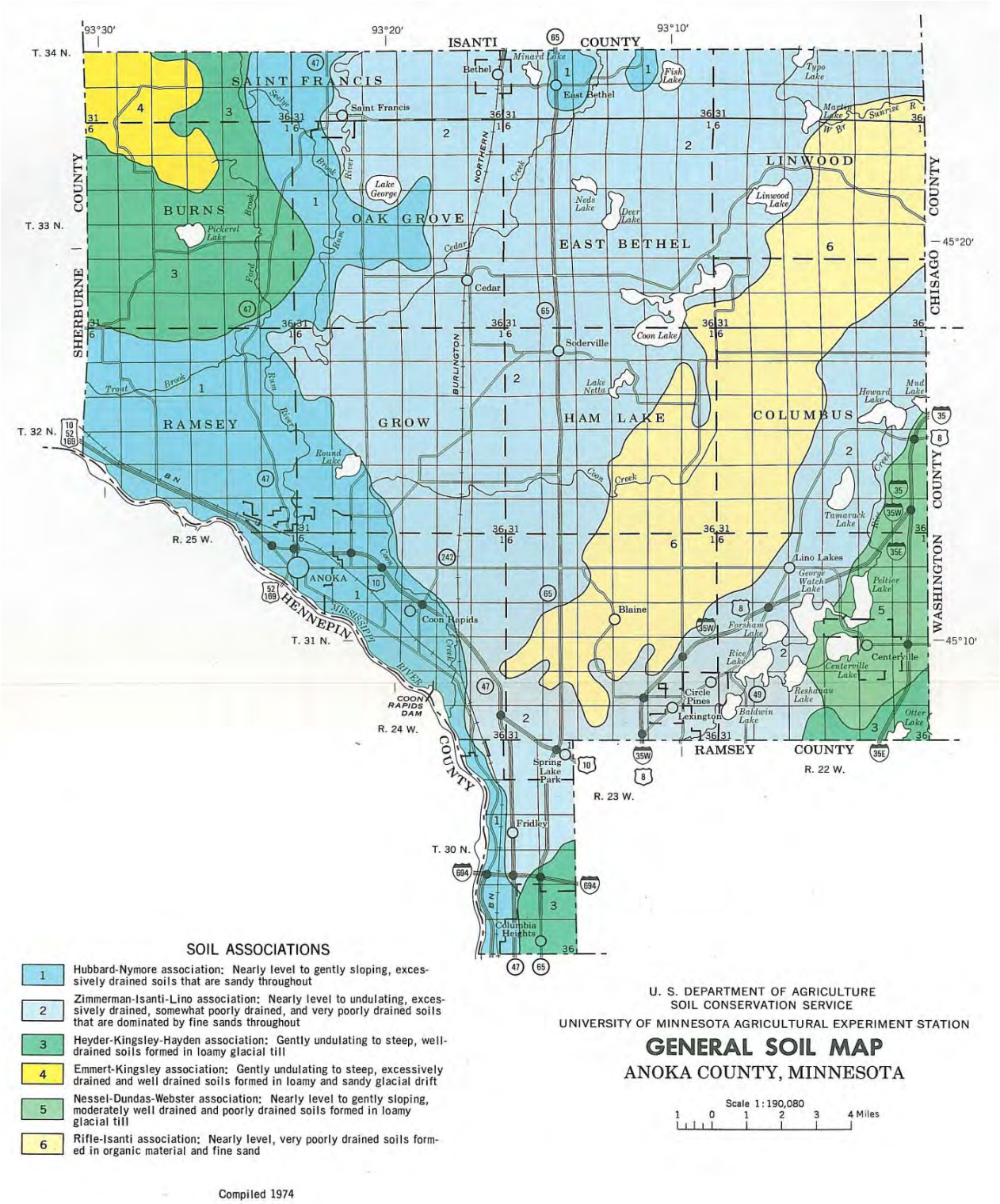
Chetek Sandy Loam, 6-12% Slope	Heyder Fine Sandy Loam, 18-30% slope
Emmert Gravely Coarse Sandy Loam, 6-12% slope	Heyder Complex, 12-25% slope
Emmert Gravely Coarse Sandy Loam, 12-25% slope	Kingsley Fine Sandy Loam, 12-18% slope
Emmert Complex, 4-12% Slope	Kingsley Fine Sandy Loam, 18-25% slope
Emmert Complex, 12-25% Slope	Nymore Loamy Coarse Sand, 12-25% slope
Hayden Fine Sandy Loam, 6-12% slope	Sartell Fine Sand, 12-24% slope
Hayden Fine Sandy Loam, 12-25% slope	Zimmerman Fine Sand, 12-24% slope
Heyder Fine Sandy Loam, 12-18% slope	

Questionable Highly Erodible Soils

Braham Loamy Fine Sand, 6-18% slope	Kingsley Fine Sandy Loam, 6-12% slope
Heyder Fine Sandy Loam, 6-12% slope	

General Soils Association Map

Map A-1: General soil association map of Anoka County



Soil Association Descriptions

Zimmerman-Isanti-Lino Association

This soil association is mainly a broad undulating sand plain. The naturally occurring high water table is at or near the surface in most depressed areas. Steeper slopes occur next to drainage ways and large depressions. This association makes up about 50% of the county. It is about 45% Zimmerman, 15% Isanti, 10% Lino and 30% soils of minor extent. Much of this association is well suited to urban development. In some areas, however, a high water table severely limits many uses. The association is moderately well suited to farming and provides sites for recreational facilities. Fertility and available water capacity are low. Main concerns of management are controlling soils blowing, improving fertility, and controlling the level of the water table in low-lying areas. Much of this association is used for urban development, with additional areas being urbanized every year. Small acreages are used as rural residences or are farmed. Corn, soybeans, and alfalfa are the crops commonly grown. Many former farm fields are planted to coniferous trees, which are harvested as Christmas trees. Truck crops and cultural sod are grown on drained organic soils. Additional acres provide wildlife habitat and sites for recreational facilities.

Rifle-Isanti Association

This soil association is a series of large level bogs and wetlands dominated by organic soils and small sandy island-like features that rise several feet above the level of the surrounding bogs. The water table is high. This association makes up about 17% of the county. It is about 60% Rifle, 20% Isanti, and 20% soils of minor extent. Most of this association is poorly suited to urban, farm, and recreational uses. Natural fertility is moderate to low. Available water capacity is low to very high. The chief management need is controlling the level of the water table. Drained organics are largely planted with sod and vegetables but have more recently been converted to uses such as golf courses.

Hubbard-Nymore Association

This soil association is mainly a nearly level to gently sloping outwash plain that is dissected by drainage-ways and pitted by large depressions. Steeper slopes occur next to these large depressions and drainage-ways. This association makes up about 15% of the county. It is about 40% Hubbard, 35% Nymore and 25% soils of minor extent. It is well suited to most urban uses and is moderately well suited to farming and recreation. Fertility and available water capacity are low. The chief management needs are controlling soil blowing, improving fertility, and controlling the level of the water table in low-lying areas. Much of this association is under urban development. Small areas are cultivated. At a few locations, potatoes are grown under irrigation. Poorly drained areas are used for permanent pasture, recreation, and wildlife.

Heyder-Kingsley-Hayden Association

This soil association is a gently undulating to steep morainic landscape of short irregular slopes, scattered small lakes, and scattered depression of organic soils. This association makes up 10% of the county. It is about 40% Heyder, 20% Kingsley, 10% Hayden, and 30% soils of minor extent. Much of this association is well suited to urban development. In some areas, however, poor drainage severely limits many uses. The association is well suited to farming and provides recreational facilities. Fertility and available water capacity are medium to high. Main concerns of management are controlling water erosion and the level of the water table in low-lying areas. Much of this association is farmed. A few steep areas and undrained wetland areas are used for recreation and wildlife. Crops commonly grown are corn, soybeans, and alfalfa. Small acreages are used as rural residences. The urban trend is increasing.

Nessel-Dundas-Webster Association

This nearly level to gently sloping soil association is a series of undulating ground moraines. Steeper slopes are adjacent to large bogs and drainage-ways. All slopes are short. The soil association makes up about 5% of the county. It is about 35% Nessel, 15% Dundas, 15% Webster, and 35% soils of minor extent. Much of this association is moderately to poorly suited to most urban uses. It is well suited to farming and provides sites for recreational facilities. Fertility is high, and the available water capacity is very high. The chief management needs are controlling the level of the water table in low-lying areas, controlling erosion in the more sloping areas, and maintaining fertility. About half of the association is farmed. Commonly grown crops are corn, soybeans, and alfalfa. Some undrained wet areas are used for recreation and wildlife. The increasing urban trend is expected to continue.

Emmert-Kingsley Association

This soil association is a gently undulating to steep morainic landscapes of short irregular slopes and scattered small marshes and depressions of organic soils. This association makes up 3% of the county. It is about 45% Emmert, 30% Kingsley, and 25% soils of minor extent. Much of this association is moderately well suited to urban uses and is moderately well to poorly suited to farming and recreational uses. The small areas that are poorly drained are severely limited. Fertility and available water capacity range from very low to high. The chief management needs are controlling water erosion and controlling the level of the water table in low-lying areas. A large part of this association is an ordnance de-arming ground. Only a small part is farmed because the soils are steep and droughty. Commonly grown crops are alfalfa, corn silage, and oats. Few areas are used for recreation and wildlife. Small acreages are rural residences. The urban trend continues to increase.

APPENDIX - WATER GOVERNANCE IN MINNESOTA

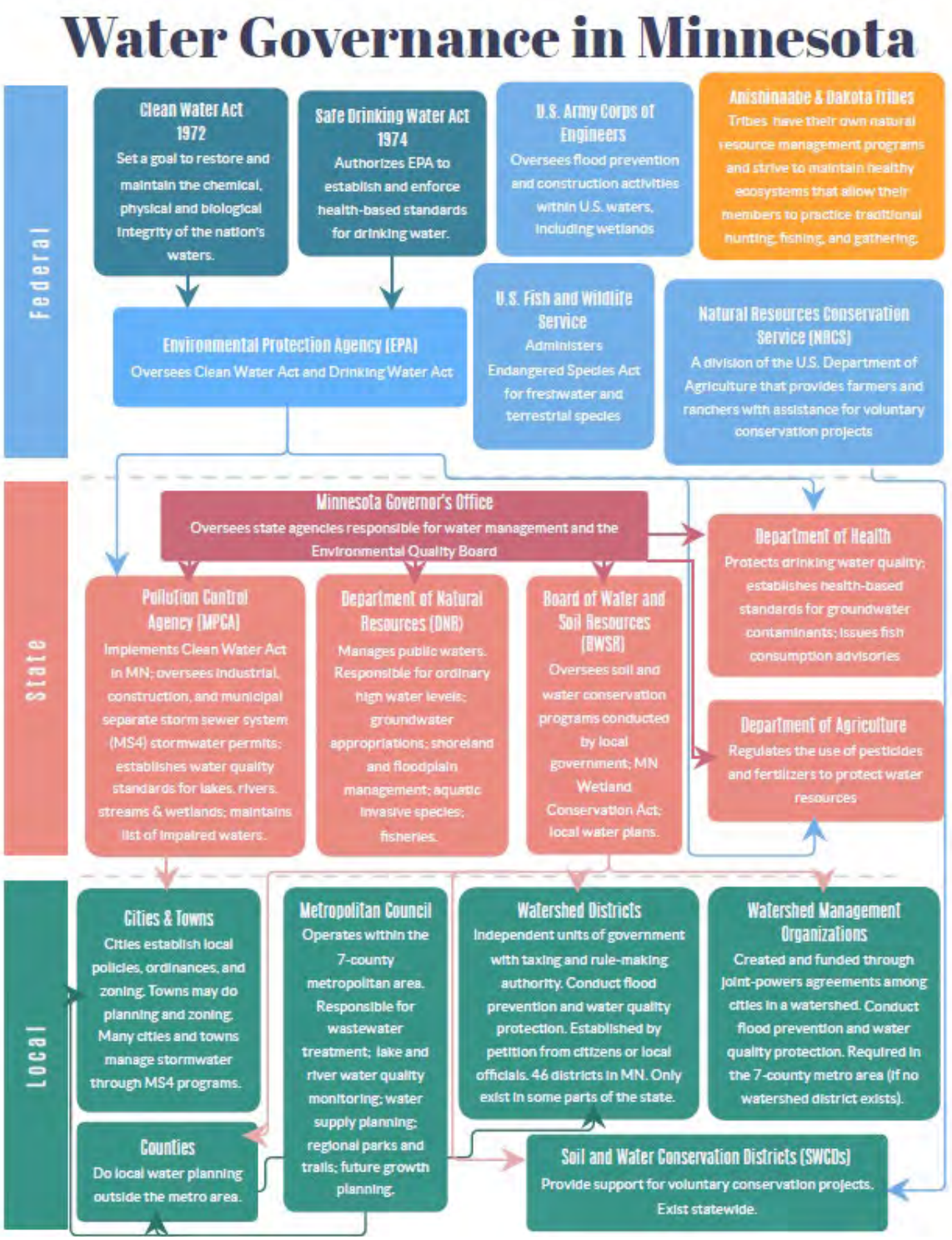


Figure A-1: Water governance in Minnesota flow chart (East Metro Water Resources Outreach Collaborative, 2020)

APPENDIX - PUBLIC AND STAKEHOLDER ENGAGEMENT

Initial 60 Day Comments

Agency Up-Front Comments Summary

Metropolitan Council

- **Maximize regional cost benefit** in areas of water management and protection.
- **Promote water reuse** to offset high demands on groundwater supplies.
- **Promote greater collaboration** and sharing of resources between partners to address regional water resource issues.
- **Promote the concept of sustainable water resources** through sustainability goals such as;
  - Provide an adequate water supply
  - Implement BMP's aimed at protecting the quality and quantity of water resources
  - Efficient wastewater services
  - Address nonpoint and point pollution issues and solutions
  - monitor water resources to direct regional water management
- **Quantifiable and measureable goals** and policies that conform with the 8410 rules.
- **Process for identification, prioritization, and implementation.**
- **Include monitoring activities** for assessment of outcomes

BWSR

- *Inclusive Plan Development (Issue Identification and Prioritization) Process:*
  - **Proposed plan development process and timeline**.
  - **Complete a gap analysis** defining activities and needs of the district compared to mission, responsibilities and capacity.
  - **Complete a self-assessment** of past district planning efforts
  - **Effective process to receive input** into the planning process.
    - Document this process and the results achieved.
  - **Reference 1W1P adoption** of the Lower St. Croix and Rum River 1W1P Plans.
- *Measurable Goals:*
  - **Set clear prioritized, targeted and measurable goals**
  - **Evaluation of goal implementation**.
  - **Use positive action verbs**
- *Implementation Actions:*
  - **Identify implementation actions** to be accomplished over the next ten years and funding sources.
  - **Tie into the Comprehensive Plan.**
  - **Evaluate implementation progress** on a scheduled timeline.
  - **Work with outside partners** who are not part of the 1W1P planning efforts
  - **Ability to adopt** assessment/feasibility studies.
    - Tie this process into the Plans amendment/revision process.

MNDNR

General:

- **Keep water where it falls**

- **Protect and create buffers**
- **Reduce the flow**
- **Design culverts and bridges**
- **Support land use planning and practices**
- **perennial vegetation**
- **Promote conservation practices**
- **Efficient water use**

Stream Bank Stabilization and Restoration:

- **Consider all natural stream dynamics**

Groundwater Sustainability:

- **Promote groundwater conservation**

AIS:

- **Prevent the spread of AIS**

Rare Species and Significant Natural Areas:

- **Have an active NHIS data license**
- **Protect rare native species and native plant communities.**
- **Avoid developmental impacts on native wetland species and rare communities.**
- **Incorporate current available information**

Shoreline Development:

- **Address shoreline development issues**
- **Promote the use of native plants**

State and County Elected Official Input Event

ANOKA CONSERVATION DISTRICT
2020-2029 COMPREHENSIVE PLAN
STATE AND COUNTY ELECTED OFFICIAL INPUT EVENT
Wednesday, October 17th, 2018
3:00 PM – 5:00 PM
Springbrook Nature Center – Oak Savanna Room - 100 – 85th Ave NW Fridley, MN

ATTENDEES:
County Commissioners: Look, Braastad, Gamache, Schulte, West
State Senators: Newton
State Representatives: Kunesh-Podein, Koegel, Bernardy,
ACD Supervisors: Truchon, LeMay, Laitinen, Lindahl, Meixell
ACD Staff: Lord, Berkness, Schurbon, Haustein, Wozney, Johnson, Hammer-Lester, Walz

DESIRED MEETING OUTCOMES:

- Gather input from other state and county elected officials on natural resource management priorities for the coming decade.
- Expand understanding of natural resource management issues and challenges and what ACD does.
- Initiate conversations.

GENERAL OBSERVATIONS:

- The rapid fire, multi-station approach was well received.
- The helicopter tour was a great addition to the event.
- Small group conversations enabled Commissioners, State Legislators, ACD Supervisors, and ACD staff to engage in beneficial exchanges.
- Follow-up with the attendees so they know we are taking their comments seriously.
- Regular updates on ACD's projects are welcomed by the attendees.

GENERAL COMMENTS:

- Put science before politics
- Keep other agencies and elected officials informed of projects in their area
- Annual visits to the capitol are appreciated
- Hosting an event every couple years for state and county officials would be helpful

STATION NOTES:

Soils:

- Overall: This topic is hard to focus on. Discussions routinely transitioned to water resources or habitat (pollinators). Many anticipated concerns didn't get mentioned even with staff input; saving topsoil for healthy lawns and food production, maintaining local food production capacity by savings some of our historic peatland farms, reducing use of pesticides (fungicides, insecticides) to keep soil biology healthy, building up organic matter in topsoil to reduce the need for irrigation, encourage community co-op type gardens.
- Energy Bar: both quality and quantity rankings were scattered from low to high, averaging a little above moderate.
- Buffer requirements – some for them, some against.
- Salting alternatives – landowner education; educate residents/LGUs of Anoka County Highway Department's award-winning procedures that reduce the use of salt and save money
- Mississippi River and Rum River stabilization is a win-win for residents/environment

Habitat/Wildlife:

- Overall: Generally people are very interested and communicated their concerns/ideas readily.
- Energy Bar: quality ranked high while quantity ranked moderately high to high.
- Rum River fisheries – walleye fry stocking and smallmouth bass spawning both a concern, the latter due to sedimentation
- Overpopulation of some species causing conflicts with people; white tail deer, wild turkey, and coyote. Others enjoy seeing these wildlife species and encourage populations by feeding (especially deer).
- User conflicts along the Mississippi River (e.g. trapping)
- More educational outreach to encourage residents to use their own "backyards" for hunting, hiking, birdwatching, fishing, etc. (e.g. Cedar Creek Conservation Area, Carlos Avery WMA, SNAs). This encourages spending recreational dollars locally.
- Clean water attracts users for recreation
- Outreach for urban residents including 'planting for pollinators'. ACD has resources available to them and this should be communicated via social media or other outlets.
- Aquatic invasive species are a concern for local lake associations. Need for educational outreach and funding

Groundwater:

- Overall: The groups were excited to discuss groundwater and recognized its importance as a natural resource. Recommendations for ACD's role tended toward education and outreach because we're a non-regulatory entity. When current efforts to identify cost-effective opportunities for water conservation on large campuses were mentioned, most participants reacted favorably, as long as implementation of the identified projects is not mandatory. Emphasis was made that many projects are financially favorable (i.e. have a short simple payback period). There was a clear difference in how people think and talk about groundwater depending on whether they have a private well or have city water and sewer. Because Anoka County has relatively large groups of people in both categories, our education efforts need to be customized to both audiences.
- Energy Bar: both quality and quantity ranked high.
- Education to residents, businesses, and government officials
    - Careful to avoid redundancy/duplication
    - Ensure community engagement
- Confusion about ACD's role with groundwater as a non-regulatory entity – what is ACD's authority?
- Current penalties and fee structures don't sufficiently deter wasteful use of groundwater – agricultural irrigation wells given as an example.
- Localized stormwater and gray water treatment and infiltration would be good to keep the resource local rather than sending it downstream.

Surface Water (Lakes, Rivers & Wetlands):

- Overall: All groups acknowledged the importance of our surface waters. Conversations tended to drift toward identifying threats as opposed to actions ACD could take to address issues. Rain garden maintenance was discussed more than once, so ensuring our existing rain gardens are functioning well should be a priority. Encouraging infiltration was also discussed multiple times, so the value of rain gardens and larger infiltration practices is recognized.
- Energy Bar: both quality and quantity ranked high
- Roadway salt and alternative options – county have very advanced system.
- Capture and retain stormwater runoff.
- Encourage infiltration practices.
- Invasive species – need money and technical assistance for lake groups.
- Restore degraded wetlands.
- Rain garden maintenance – ensure the projects already installed are functioning as intended.
- As land use changes, prioritize positive groundwater and surface water strategies.
- Flooding – minimize property damage from flooding.
- Adjacent landowners (and agencies) should collaborate and share costs to protect and manage water resources.
- Installing rain gardens at schools (Fridley example).
- Gray water use.
- Phosphorus and nitrogen.

Needs Fixin':

- Rain gardens in the CCWD around 104th & Dogwood need maintenance. Some in the area have expressed concern about them not filling with water even when there is pooling in the streets.
- Sand Creek storm damage needs to be cleaned up. Toppled trees can lead to bank erosion.
- Rain gardens should be considered at schools.
- Permitting complexity and expense is onerous and doesn't always lead to better projects.

- Aquatic Invasive Species control and prevention – need new funding sources and to help lake groups.
- Link ACD website & county website.
- Provide education topics for County newsletter.
- Better publicize completed projects to generate public interest.
- We should start *initiatives* with other agencies, not just projects and programs. We should be working on *coalition building*.
- Needs assistance with pollinator initiatives at the capitol. Need to find ways to have pollinator initiatives that the farming groups won't object to. Providing pollinator habitat in road right-of-ways was an example given that has not received support.
- ACD should consider drafting language that we recommend for city comp plans. Then, seek to get that language in city's plans by formally submitting it during comment periods.
- Seek collaboration with the county. Both the county and ACD have strong expertise.
- Coordinate with Metro Mosquito Control for treating sensitive areas.

<u>Keep Doing:</u>

- It's important for landowners to have a local interface/contact to deal with state regulation and programs.
- Rum River bank stabilization design and cost share assistance.
- Work from a well thought out comprehensive plan that is prepared with broad input from other stakeholders.
- Keep doing what we are doing – county officials never get negative feedback about ACD.
- Work with highly visible and influential allies like Ron Schara to generate support for projects/programs/initiatives.
- Advocate for science-based environmental policy that can be applied broadly.
- Serve as a technical expert for policy makers.
- Monitor rivers where they enter and leave our area to determine how much of the problem is from us.
- Monitor where we get the most return on investments – where it leads to projects or management.
- ACD serves as an efficient central water monitoring service for many agencies.
- Remain adaptive – continually look for better ways to address needs.