SNAKE RIVER COMPREHENSIVE WATERSHED MANAGEMENT PLAN

CLEAN WATER LAND & LEGACY AMENDMENT

FINAL PLAN **January 25, 2023 – January 25, 2033**

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This plan was developed by several local government units (LGUs) that included counties, soil and water conservation districts (SWCDs), and the local watershed management board. Work was funded through the Clean Water Fund Grant from the Minnesota Board of Soil and Water Resources (BWSR).

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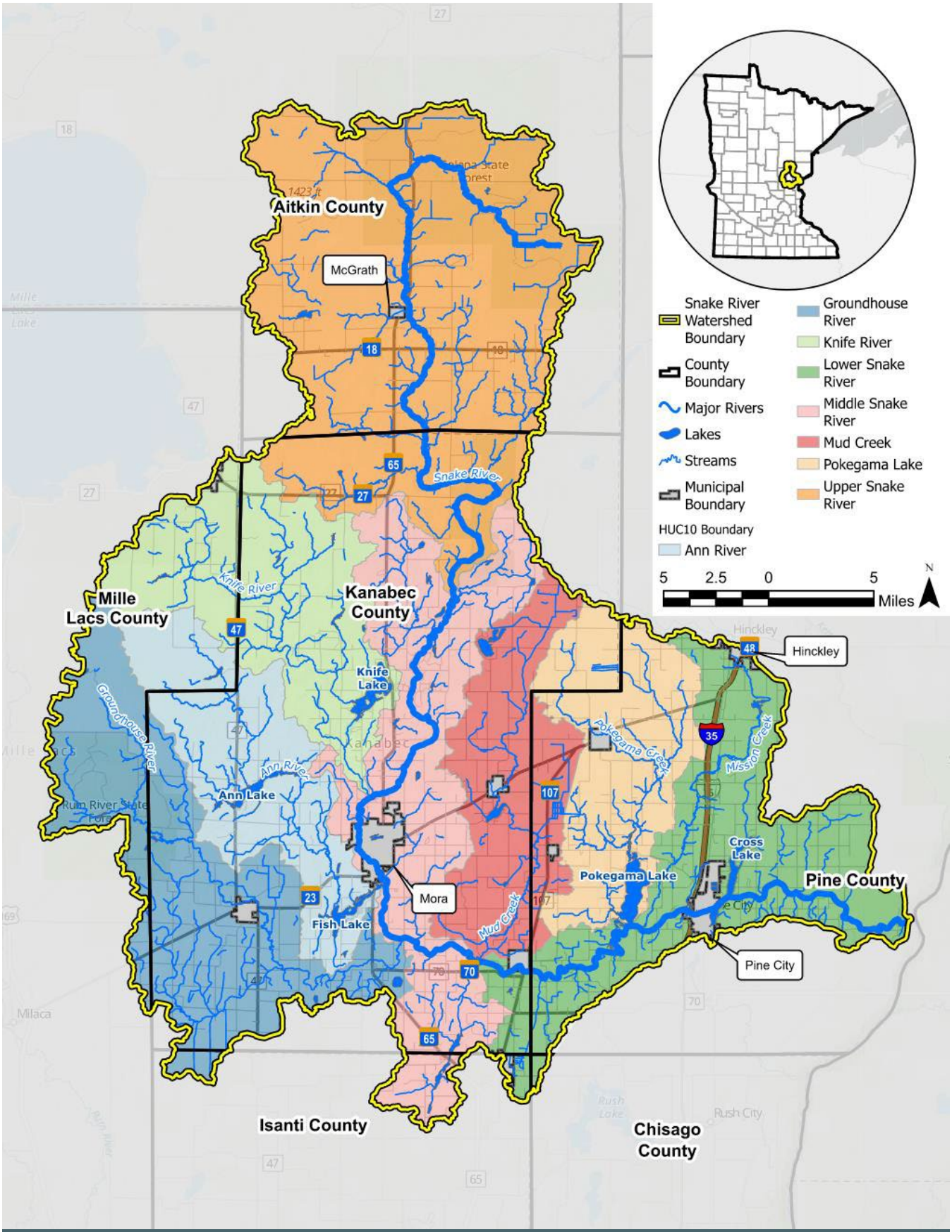


Overview of the Snake River Watershed.

1.0 Executive Summary

The Snake River Watershed Comprehensive Management Plan was developed as part of the State of Minnesota's One Watershed One Plan (1W1P) program. The purpose of the 1W1P program is to develop comprehensive watershed management plans in accordance with MS 103B.801. The following section describes how the local government units (LGUs) of the Snake River Watershed worked together with State agencies and consultants to develop Plan content intended to improve and protect the resources in the watershed.

1.1 PURPOSE, ROLES, AND RESPONSIBILITIES

The Snake River Watershed Partnership Planning was developed through a memorandum of agreement (MOA) and collaborative partnership among several LGUs including Kanabec County, Kanabec Soil and Water Conservation District (SWCD), Pine County, Pine SWCD, Mille Lacs County, Mille Lacs SWCD, Aitkin County, Aitkin SWCD. Isanti and Chisago Counties and SWCDs opted not to participate in the planning process because of the small proportion of those county areas that fall within the watershed boundaries.

At the beginning of the planning process, watershed partners laid the foundation of how the various groups would work collaboratively on the planning efforts. Local and state government partners came together to complete an activity that walked through envisioning:

- What success would look like;
- What principles could be put in place to ensure success;
- What roles and responsibilities should look like to help achieve success; and
- How to begin discovering and addressing limiting beliefs, or concerns around the planning process.

The group described a successful, usable plan as one that satisfied all partners, was grounded in a firm understanding of community members living in the watershed, would build increased trust between LGUs and community members, and would inspire and promote institutional change. Stakeholders agreed to keep roles simple. A Steering Committee made of local partners was formed and transitioned into a Technical Advisory Committee (TAC), which included state agencies, to drive the bulk of the planning work. A Policy Committee made up of elected officials that signed the MOA offered revisions and made approvals of the TAC's work. A description of roles and responsibilities for each group is below (Table 1-1).

The planning partnership also identified a few limitations for consultants and the TAC to keep in mind and find ways to effectively address. These limitations included lack of staff time to devote to the planning process, planning partnership staff turnover resulting in timeline set-backs, and the COVID-19 pandemic which resulted in a fully virtual planning process. Based on these limitations, the consultant team and Steering Committee established practices to help the collaborative planning effort start out on the right foot and cohesively move into the planning process together.

The Policy Committee was comprised of elected officials from each of the LGUs. Plan content was primarily developed by the TAC that consisted of the Steering Committee and state agencies, with input from public stakeholders. The Planning Team (a small subset of TAC members) maintained day-to-day planning activities to keep the plan development on schedule. Stantec Consulting Services Inc (Stantec) and Freshwater Society (Freshwater) provided technical expertise on plan writing and meeting facilitation services.

Table 1-1. Roles and responsibilities for partners involved in the planning process.	
Local Boards of SWCDs & Counties	Approves the plan.
Policy Committee	Comprised of elected officials from each partner organization. Reviewed plan content generated by the TAC and Steering Committees for presentation to local boards.
Technical Advisory Committee (TAC)	Comprised of the Steering Committee members plus state agency staff from Department of Natural Resources (DNR), Minnesota Department of Health (MDH), Minnesota Pollution Control Agency (MPCA), Minnesota Board of Soil and Water Resources (BWSR), and Minnesota Department of Agriculture (MDA). Generated plan content. Provided technical assistance and review throughout planning process.
Steering Committee	Comprised of representatives from each partner organization. Provided logistical decision making to ensure the planning process moved forward.
Planning Team	A subset of TAC members. Handled day-to-day planning to ensure plan progress.
Public Stakeholders	Comprised of voluntary watershed stakeholders to represent the community at-large. Provided public input on plan content.

[1]See page V for a complete list of all members of the planning partnership.

1.2 COMMUNITY ENGAGEMENT

Community engagement requirements under MS 103B were followed during the planning. Two kick-off meetings were held in August 2020 to gather public input on issues and priorities in the watershed. Surveys were distributed at the kick-off meetings for obtaining input. Three topic group meetings were held at the beginning of the planning process to include many of the watershed's public stakeholders. Three separate meetings were held to discuss the topic areas of agriculture, forestry, and lakes. Content generated during topic group meetings was used during plan development to inform issues, goals, and actions. Two community engagement meetings were held near the end of the planning process to provide an opportunity for input on the implementation actions. Community engagement meetings were held on dates listed in **Table 1-2**.

Table 1-2. Community engagement meeting dates.		
Kick-off Meetings		August 4th & 5th, 2020
Early Plan Topic Group Meetings	Agriculture	October 15th, 2020
	Forestry	October 27th, 2020
	Lakes	November 4th, 2020

Late Plan Meetings	May 4th & 17th, 2022

1.3 ISSUE AND GOAL IDENTIFICATION

The 1W1P process requires careful consideration and prioritization of the watershed's issues. A comprehensive list of issues was identified during the topic group meetings and by the TAC at the beginning of the planning process using comment letters from State agencies and other stakeholder entities, public input, and existing studies, reports, and geographic information system (GIS) data.

Numerous existing documents and datasets related to the Snake River Watershed were compiled and reviewed during the planning process. The full list of existing documents that were considered during the planning process can be found in **Appendix A** but included key documents like county water plans, the Snake River Watershed Total Maximum Daily Load (TMDL), Snake River Watershed Restoration and Protection Strategies (WRAPS), and Snake River Watershed Groundwater Restoration and Protection Strategies (GRAPS). Comment letters from key state and local partners were reviewed by the TAC throughout the planning process. Letters were received from the DNR, BWSR, MPCA, MDH, the City of Mora, the City of Isle, and Isanti County.

As part of the planning process and issue identification process, an online, interactive GIS mapping tool was developed. The purpose of the mapping tool was to assist partners during the planning process with watershed-specific spatial data. The online map incorporated spatial data from many sources, including local and state agencies, the National Land Cover Database, and The Nature Conservancy (TNC). The mapping tool allowed stakeholders to view various spatial data layers together to understand the watershed and identify priority areas.

Nineteen issue areas were drafted during the beginning of the planning process. Issue areas were consolidated from the full list of 19 down to 7 during the process. Issues were consolidated or eliminated based on their relevance to the watershed. The full list of 19 issues can be found in **Appendix B**. Early in the issue identification process, stakeholders expressed the need for a description of the primary resource type affected by each issue to help provide background and context, herein referred to as the Resource Description.

The seven issue areas were ranked by the TAC to help prioritize planning efforts. Once issue areas were identified and ranked, measurable goals and their priority areas were developed using the same information shown in **Figure 1-1**, with the addition of information gathered in previous TAC meeting notes or worksheet. The final list of resource descriptions, issue statements, and goals for the plan are below, in ranked order by highest priority to lowest priority (**Table 1-3**).

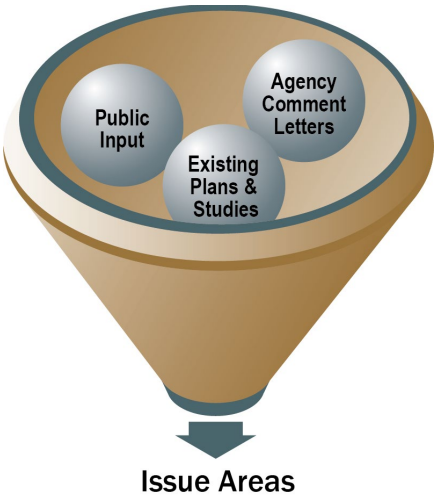


Figure 1-1. Overview of the issue identification process.

Table 1-3. Snake 1W1P Issue Areas, Resource Descriptions, Issue Statement, and Goals.

Surface Water Quality	
Resource description	There are 87 lakes and 128 streams (over 1,050 linear miles) in the Snake River Watershed. Major stream and river tributaries include the Groundhouse River, Ann River, Knife River, Mud Creek, Mission Creek, and Pokegama Creek. Major lakes within the watershed include Ann, Fish, Knife, Quamba, Pokegama, and Cross Lakes. All lakes except Pokegama and Cross are considered shallow lakes by DNR definition (i.e., a basin 50 acres or greater in size and having a maximum depth of 15 feet or less). The watershed supports one designated trout stream, Mission Creek. About 25% of stream miles in the watershed are impaired and 53% of the total lake area in the watershed is impaired. Impairments include bacteria (streams), fish and macroinvertebrates (streams), and nutrients (lakes). In total there are 49 impaired water bodies in the Snake River Watershed.
Issue Statement	Runoff contributes to algae and water quality and aquatic habitat degradation. Management of runoff across land uses is needed to reduce impacts to lakes, streams, and rivers. Additionally, internal nutrient loads in lakes can compound efforts to improve water quality and habitat also needs to be addressed.
Goal 1	Reduce phosphorus loading to priority impaired lakes by a combined total of 4,200 pounds over the 10-year plan.
Goal 2	Protect priority unimpaired lakes by maintaining or reducing current phosphorus levels.
Goal 3	Reduce sediment in priority streams and rivers by a combined total of 1,750 tons of the life of the plan.
Goal 4	Reduce *E. coli* exceedances in priority impaired streams and rivers by 10%.

Land Cover & Use

Resource Description	Land cover in the Snake River Watershed is dominated by forest/shrubland (36%), wetlands (33%), and pasture/hay (17%). A small portion of the watershed is cropland (8%), developed (4%), and open water (2%). Cultivated crops include corn, soybeans, cultivated perennials, and small grains. The watershed is largely rural, with 0.61% of its area in impervious surfaces and only two cities with populations over 3,000 (Mora and Pine City).
Issue Statement	Various types of land use and conversions between them contribute both to natural resource concerns and benefits, including the watershed's forests, agricultural lands, and developed lands. Appropriate management of these different land uses to limit or prevent damage from human activities—while supporting environmental benefits—is needed. Partnering with farmers, foresters, property owners, businesses, and municipalities in collaborative decision-making to protect natural, groundwater, and surface water resources is essential.
Goal 1	Increase protected acres by 5-10% in priority areas, with an eventual goal of 75% total protected acres in those areas.
Goal 2	Improve the watershed's stormwater control through robust planning and installation of 2-8 stormwater best management practices (BMPs).
Goal 3	Implement BMPs within priority areas to increase and improve continuous cover on 600 acres while partnering with other agencies and programs.

Surface Water Quantity

Resource Description	Human alteration of water resources is common throughout the Snake River Watershed. Thirty-five percent, or 374 miles, of the total stream length in the watershed has been altered. Three of the highest flow years have occurred since 2010, suggesting that the hydrology of the Snake River may be in a period of transition.
Issue Statement	Recent flooding events have led to increased impacts to communities and ecosystems in the watershed. Fluctuations in lake levels in particular have been extreme, leading to increases in shoreline erosion and damage to aquatic communities. Likewise, altered hydrology—especially when combined with extreme rainfall events—reduces the ability of water bodies to store water, leading to increased, earlier peak flows, as well as flash flooding and ponding of water beyond surface water bodies.
Goal 1	Develop a report on flooding impacts and risk to property and infrastructure with a focus on the area between Mora and the St. Croix River.
Goal 2	Maintain existing watershed storage, as measured by Snake River flow (CFS) and adjusted for annual precipitation.

Drinking Water & Groundwater	
Resource Description	Groundwater comprises 100% of the Snake River Watershed's drinking water sources and is available primarily through buried sand and gravel aquifers, and to a lesser extent through surficial sand and gravel aquifers and deep bedrock sandstone aquifers.
Issue Statement	Well testing in the watershed has shown increasing nitrate and arsenic levels, and there are concerns about quality. Additionally, surface water-groundwater interaction, especially as it relates to groundwater-dependent surface water bodies, needs to be better understood and managed.
Goal 1	Prevent nitrate levels in groundwater from increasing.
Goal 2	Increase public entity understanding of groundwater trends and public understanding of contamination issues.

Erosion, Soil Health, & Soil Loss	
Resource Description	Soil has both inherent and dynamic properties that govern soil health. Soil types in the Snake River Watershed have high erodibility (I.e., high K factor) compared to other watersheds in the state. How soil is managed also affects the amount of soil organic matter, soil depth, and water and nutrient holding capacity. Additionally, how water flows across a landscape and how that has been altered impacts erosion rates.
Issue Statement	Overland and shoreline erosion is degrading aquatic habitat and water quality, and poor soil health management contributes to loss of soil and nutrients, as well as water and carbon storage capacity.
Goal 1	Protect areas prone to erosion from continuous erosion by saving 750 tons of sediment from eroding over the 10-year plan.
Goal 2	Increase adoption of soil health practices in agricultural areas by 4,500 acres over the 10-year plan.

Habitat	
Resource Description	Nine percent of the watershed is state forest land and seven percent is wildlife management areas (WMAs): Mille Lacs WMA, Ann Lake WMA, Dalbo WMA, Rice Creek WMA, Pine County V&S WMA, Solana State Forest, Snake River State Forest, Rum River State Forest, and Chengwatana State Forest. The watershed's current habitats support many rare, endangered, and sensitive terrestrial and aquatic species; however, there are also several biological impairments in the watershed's streams and rivers that indicate habitat degradation.
Issue Statement	High quality habitats and key ecological corridors should be protected or restored to maintain and improve connectivity, as well as support healthy upland and wetland ecosystems. Healthy aquatic habitats, especially for sensitive species, also need to be protected and restored. For both, invasive species threaten water quality, sensitive species, desired ecosystems, quality of life, and local economies.

Goal 1	Maintain or increase vigilance against continued spread of aquatic invasive species (AIS) and terrestrial invasive species.
Goal 2	Protect in-stream habitat and maintain or improve habitat connectivity by maintaining or improving fish and macroinvertebrate Index of Biological Integrity (IBI) scores.
Goal 3	Increase protection of stream riparian areas through land protection on 330 acres.

Extreme Weather	
Resource Description	The Snake River Watershed has been experiencing increased extreme weather, including more severe and frequent rainfall and flooding, warmer temperatures, and drought, all of which, can damage infrastructure and have negative impacts on quality of life and natural resources. In 2016 and 2018, multiple intense rain events contributed to flooding in this watershed; however, the watershed's intact wetlands, connected floodplains, and intact riparian lands, helped prevent erosion and pollutant runoff. These extreme weather events, and the Snake River Watershed's current ability to respond to them, necessitate proper planning, building contingency plans, and creating supports for local government partners navigating a wetter, warmer, and more unpredictable watershed.
Issue Statement	Extreme weather, such as more severe and frequent storms and longer periods of drought, are becoming more common in and around the watershed. These extreme events will continue to lead to shifting of habitat zones and amplification of other issues in the watershed, such as pollutant export to water bodies and damage to infrastructure.
Goal 1	Engage with LGUs, partners, and the public to inform everyone about how extreme weather will affect the Snake River Watershed and to understand how we can plan for those changes while improving the stability of implementation projects.

1.4 IMPLEMENTATION ACTIONS

Actions to address each of the plan's goals and the unique process used to reach them can be found in **Section 3.0 Implementation Actions**. Actions were developed using the same resources described in **Figure 1-1** with the addition of TAC and Steering Committee homework assignments and previous discussions. Actions were primarily developed by the Steering Committee, with input and refinement from the TAC, and final approval by the Policy Committee. The following considerations were used to develop actions for each goal:

- Does the action advance the goal in a meaningful or significant way?
- Local knowledge of existing demand and partnership availability
- Consider internal and external capacity needs
- For actions that LGUs cannot complete under current staff capacity, is outside funding available?

The plan actions generally focus on development of studies and data collection, on-the-ground implementation of both agricultural and urban BMPs to address the priority issues, policy improvements where feasible and timely, and active public outreach and engagement by local partners. See Section 5.0 for more detail on specific programs that this plan relies upon.

Table 1-4 outlines the anticipated cost and funding sources (state, local, and other) for implementing the Snake River Comprehensive Watershed Management Plan. Federal funding is included in the 'other' group.

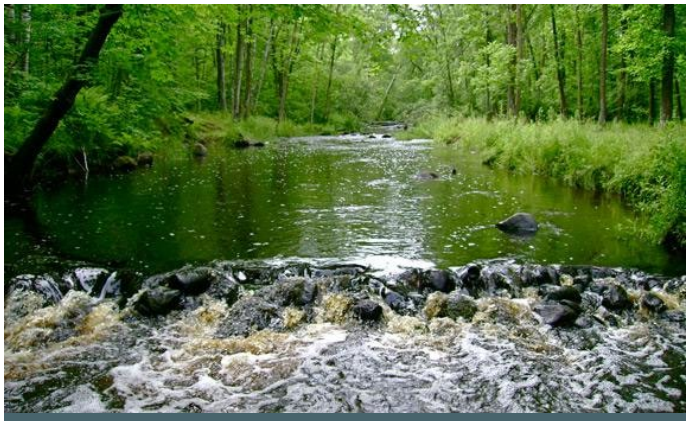
Table 1-4. Total cost and funding sources of the Snake River Watershed Comprehensive Management Plan.

Issue Area	State	Local	Other (incl. federal)	Total	% of total
Surface Water Quality	$2,943,000	$797,500	$6,432,000	$10,172,500	51%
Land Cover & Use	$1,885,900	$52,750	$188,850	$2,127,500	11%
Surface Water Quantity	$185,000	$290,000	$1,090,000	$1,565,000	8%
Groundwater	$912,500	$165,000	$2,215,000	$3,292,500	17%
Erosion	$681,500	$25,000	$48,500	$755,000	4%
Habitat	$1,697,000	$65,000	$80,000	$1,842,000	9%
Extreme Weather		$40,000		$40,000	0.2%
TOTAL				**$19,794,500**	100%

1.5 LOCAL GOVERNMENT RESPONSIBILITIES

Once the Plan has been approved by the State and locally adopted, implementation can begin. The LGUs involved in the planning process have agreed to enter into a Joint Powers Agreement (JPA) towards the establishment of a Joint Powers Entity (JPE) that will replace the Snake River Watershed Management Board. The newly formed JPE will be called the Snake River Watershed Plan Partnership (SRWPP). The SRWPP will be made up of a Board, a Citizen Advisory Committee (CAC), a TAC, and a Steering Committee. The TAC and Steering Committee will function similar to operations during the planning process. See Section 6.0 for more detail on the local government responsibilities.

2.0 Land & Water Resources Narrative



The Snake River

The Snake River Watershed (HUC-8 ID 07030004) is in east-central Minnesota within the St. Croix River Basin. Often referred to as "the Gateway to the North," the watershed straddles the Northern Lakes and Forest Ecoregion to the north and the North Central Hardwood Forest Ecoregion to the south. The watershed covers 1,006 square miles and drains portions of Kanabec, Pine, Mille Lacs, Aitkin, and small portions of Chisago and Isanti counties (**Figure 2-1**). The Snake River meanders over 100 miles from its headwaters in southeast Aitkin County through Kanabec County and east through Pine County to its confluence with the St. Croix River. From north to south the watershed transitions from forested areas with abundant wetlands through interspersed haylands to more developed and agricultural lands (i.e., cropland and pasture). The Snake River Watershed is home to outstanding quality forest, lake, wetland, and river resources that offer many opportunities for enjoyment and appreciation.

2.1 GEOLOGY, TOPOGRAPHY, AND SOILS

The Snake River Watershed landscape was shaped by glacial activity more than 16,000 years ago. The watershed encompasses a mostly flat, glacial till plain with several east-west morainal belts. The hills and ridges formed by the morainal belts are primarily forested while wetlands predominate in the glacial till plain. As the Snake River winds through steeper slopes in its heavily forested headwaters, it makes its way downstream through glacial till and sandstone bluffs, falling a total of 560 ft, until it reaches its confluence with the St. Croix River. The upper part of the Snake River Watershed is generally characterized by higher elevations and steeper slopes up to 25%, but just under three quarters of the watershed has a slope of less than 3% (DNR 2017).

Surficial sediments in the watershed consist mostly of sand, gravel, and glacial till. Sediments are generally 150-300 feet deep with up to 95 feet of silt and clay underneath. This dense glacial till underlies most soils in the watershed, limiting water movement through the soil profile. Soils are described as acid, stony, reddish sandy loams, silt loams, and loamy sands. Soils across the State of Minnesota, including the Snake River Watershed, are relatively high in phosphorus (P).

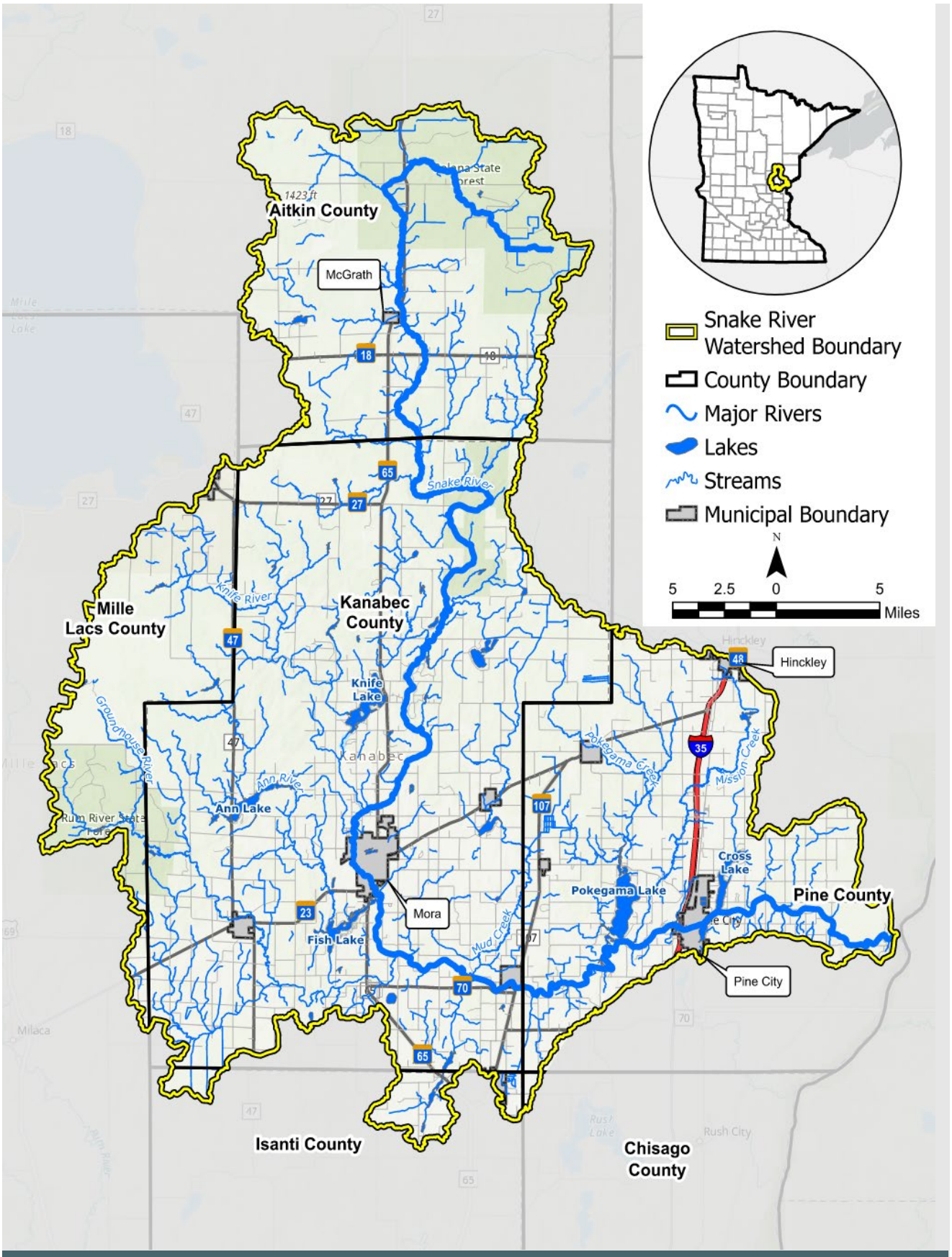


Figure 2-1. The Snake River Watershed.

2.2 CLIMATE

The climate of the Snake River Watershed is typical of northern latitudes, with warm summers and cold winters. Average summer temperature is 66.7 degrees F and average winter temperature is 14.9 degrees F (**Figure 2-2**). Minimum and maximum temperatures in the watershed have increased recently (1989-2018) when compared to the entire climate record (1895-2018), indicating a warming climate.

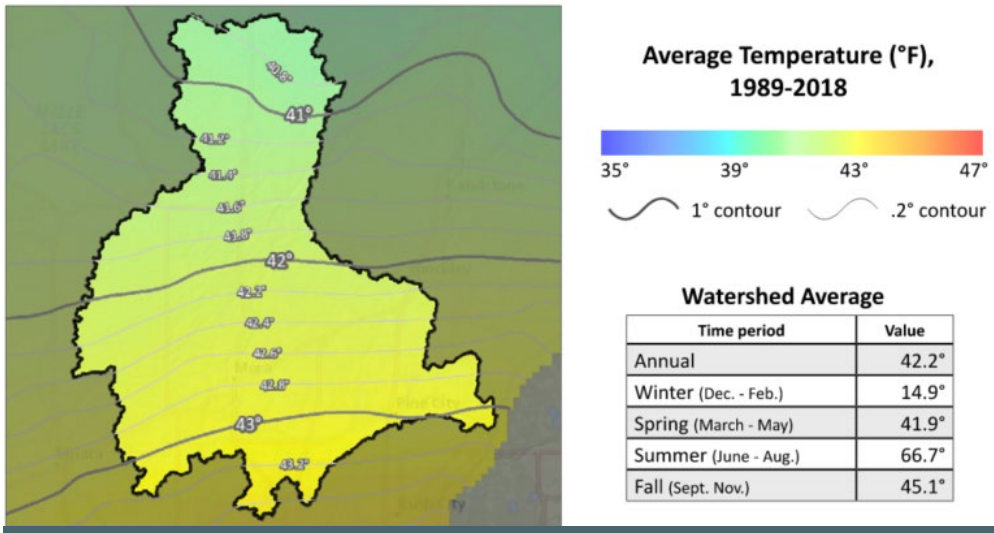


Figure 2-2. Average annual temperature for 1989-2018 in the Snake River Watershed (DNR 2019).

Average annual precipitation in the Snake River Watershed is 30.7 inches with most precipitation falling in the summer months (June–August). Precipitation is relatively uniform across the watershed. Precipitation in the watershed has increased recently (1989-2018) when compared to the entire climate record (1895-2018), indicating a wetter watershed with precipitation 2.0-2.2 inches higher than the historical average (**Figure 2-3**). Rainfall events across the State of Minnesota are more frequent and more intense, resulting in prolonged periods of flooding (DNR 2020). For more detailed climate information for the Snake River Watershed, see the DNR's *Climate Summary for Watersheds: Snake River (St. Croix).*

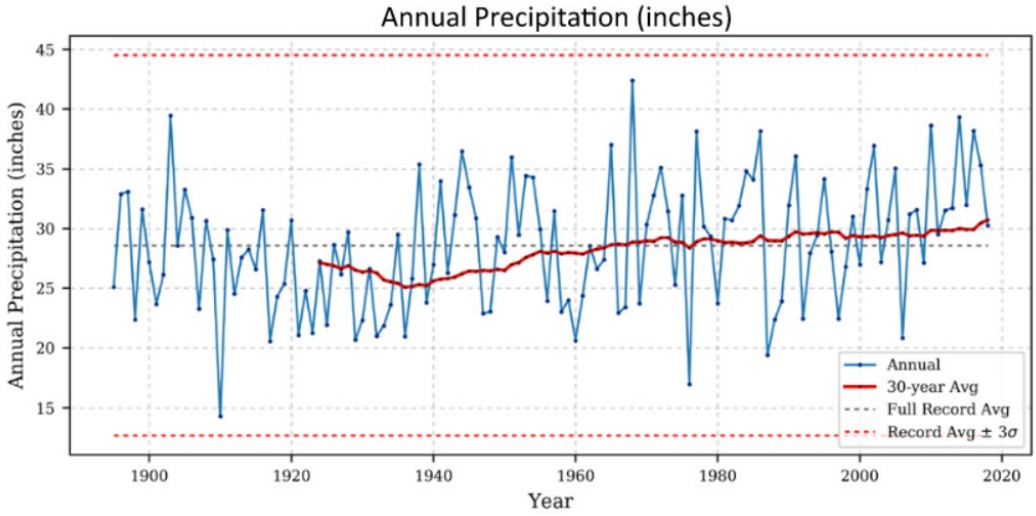


Figure 2-3. Average annual precipitation for 1895-2018 in the Snake River Watershed (connected blue line) compared to the 30-year average (solid red line) (DNR 2019).

2.3 LAND USE & SOCIOECONOMICS

Land cover in the Snake River Watershed is dominated by forest/shrubland (36%), wetlands (33%), and pasture/hay (17%) (Figure 2-4). Smaller portions of the watershed are composed of cropland (8%), developed land (4%), and open water (2%). Cultivated crops include corn, soybeans, cultivated perennials, and small grains. The watershed is largely rural, with 0.61% of its area in impervious surfaces and only two cities with populations over 3,000 (Mora and Pine City).

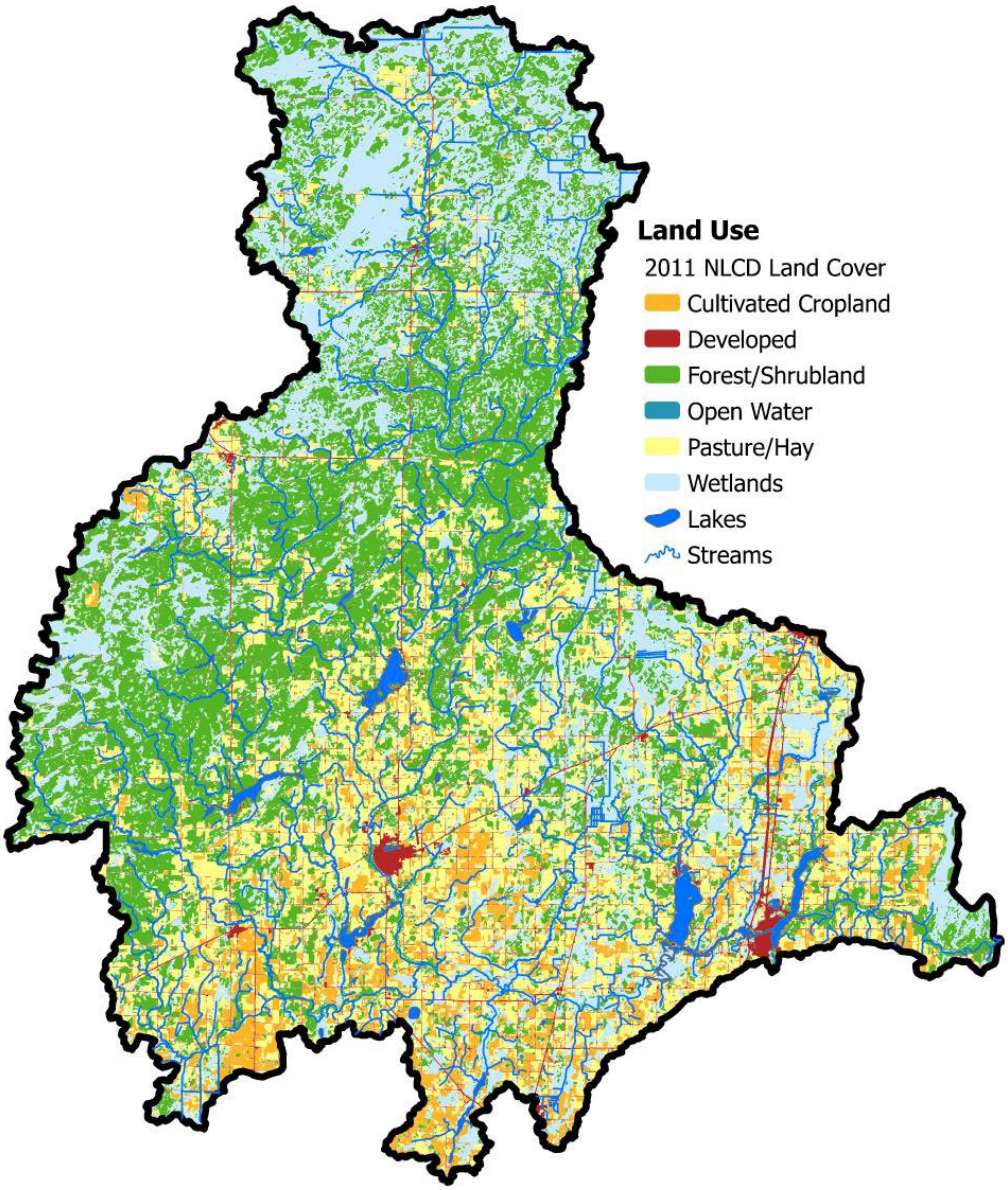


Figure 2-4. Land Cover in the Snake River Watershed (NLCD 2011).

Approximately 25% of the watershed is publicly owned. The largest proportion of public land is owned by the state, which is primarily located within the Upper Snake River, Ann River, and Groundhouse River subwatersheds (Figure 2-5). Large portions of state land from Solana State Forest, Rum River State Forest, Snake River State Forest, and Mille Lacs WMA fall within the watershed boundaries. The remaining 75% of the watershed is privately owned. The Snake River Watershed Plan Partnership acknowledges that there is tribal land within the Snake River Watershed.

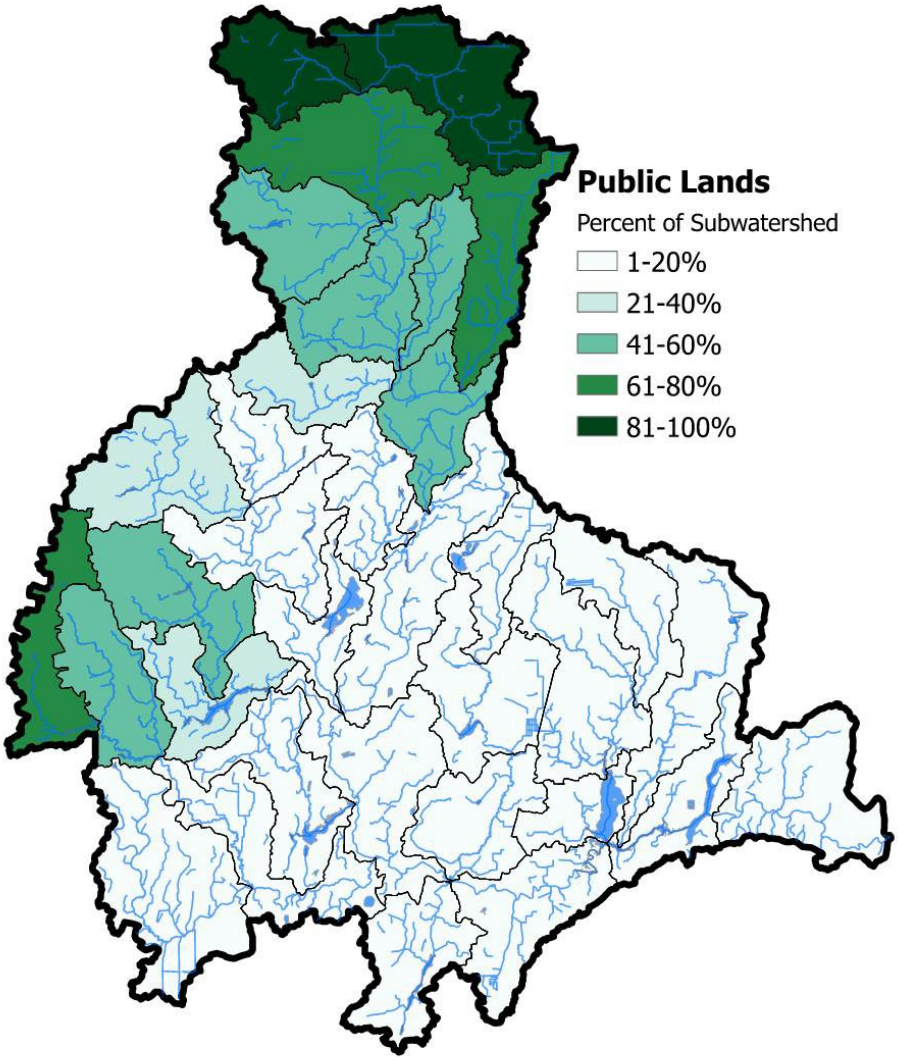


Figure 2-5. Public land in the Snake River Watershed as percent of each sub-watershed area.

Socio-economic information in the Snake River Watershed is presented on a county-wide basis. The four largest counties in the watershed are Kanabec (49% of watershed), Aitkin (20%), Pine (20%), and Mille Lacs (9%). Isanti and Chisago counties collectively make up 1.7% of the watershed. Socio-economic information for the four largest counties in the watershed is presented in Table 2-1. Poverty rates in these counties range from 12.0–13.7% compared to the Minnesota state average of 9.6% (US Census Bureau 2019). Poverty rates in Isanti and Chisago Counties are 7.6% and 6.4%, respectively.

At the time of the last census in 2010, the watershed had 29,253 residents and had grown since 2000 by 2,931 people (11%). Kanabec, Aitkin, Pine, and Mille Lacs County are expected to decrease in population from 2020–2030 (Table 2-1). Despite these declining trends, the proximity of the watershed to the Twin Cities and the availability of undeveloped shoreland make it an attractive location for vacationers and future development. Full-time cabin use has increased in recent years; many homes that were used temporarily on weekends and in the summer are being used full-time, particularly since the onset of the COVID-19 pandemic in 2020 when remote work and social distancing became widespread. As a result of increased cabin use, home sales, property prices, point-of-sale septic inspections, and septic upgrades during property transfers have all increased. Since the COVID-19 pandemic, there has also been a significant increase in lakeshore and shoreline clearing and development. Whether or not these trends will persist long-term is unknown, but they could contribute to population growth and land development within the watershed.

The two largest existing cities in the watershed are Mora (Kanabec County; pop. 3,540) and Pine City (Pine County; pop. 3,107). The next largest cities in the watershed include Hinckley (Pine County; pop. 1,925), Ogilvie (Kanabec County; pop. 368), Brook Park (Pine County; pop. 136), and Grasston (Kanabec County; pop. 153).

The number of farms and total land area in farms has decreased from 2012–2017 in the watershed's largest counties of Kanabec, Aitkin, Pine, and Mille Lacs. Dairy operations, particularly in Kanabec and Pine County, have been declining in numbers in the last 10 years from around 110 to 16 farms. In general, dairy operations in the United States have been declining consistently in recent years due to plummeting milk prices. The total labor force in the watershed's four largest counties is expected to decline from 2020–2030, though employment in construction, health care, and transportation are expected to continue increasing from 2016–2026 (MN DEED 2020). Farming, fishing, and forestry jobs are not main industries within the watershed; they make up only 0.2% of all jobs in Kanabec, Aitkin, Pine, and Mille Lacs Counties and there are no large-scale logging operations in the watershed; however, there are small forestry operations that are an important part of the local economies, including private, part-time firewood sales. There are over 15,500 acres of School Trust Lands in the watershed that are used for revenue for the Permanent School Fund. The DNR serves as the Trustee for School Trust Lands and works to promote revenue generation activities while simultaneously projecting the land's natural resources. Iron mining and timber harvesting are the largest sources of revenue for School Trust Lands state-wide.

Table 2-1. County-wide estimates of relevant socio-economic information, including recent and projected population changes, for the four largest counties within the Snake River Watershed (MN DEED 2020).

County	Percent of Watershed Area	Median Age	Median Household Income[1]	Total Population Change (2010-2018)	Total Projected Population Change (2020-2030)
Kanabec	48.7	45.1	53,300	-32	-735

Aitkin	20.4	56.4	45,989	-316	-884
Pine	20.2	45.3	49,138	-267	-215
Mille Lacs	9	40.8	53,888	42	-389

[1]Minnesota State Median Household Income is $68,411

2.4 WATER RESOURCES

2.4.1 Surface Water

There are 87 lakes and 128 streams (over 1,050 linear miles) in the Snake River watershed. Major stream and river tributaries include the Groundhouse River, Ann River, Knife River, Mud Creek, Mission Creek, and Pokegama Creek. Principal lakes within the watershed include Ann, Fish, Knife, Quamba, Pokegama, and Cross Lakes. All lakes except Pokegama and Cross are considered shallow lakes by DNR definition (i.e., maximum depth of 15 feet or less, or with 80% or more of the lake area shallow enough to support emergent and submerged rooted aquatic plants, also called the littoral zone). The watershed supports one designated trout stream called Mission Creek.

As a result of its glaciated past the watershed is home to many woody, emergent, and herbaceous wetlands. Wetlands currently cover approximately 30% (186,050 acres) of the Snake River Watershed and are mostly concentrated in the upper portions of the watershed.

Stream and lake water quality in the watershed is generally good, but conditions decline from north to south as land use transitions from forested to developed and agricultural. **Figure 2-6** shows the general location of water quality impairments in the watershed. About 25% of stream miles in the watershed are impaired and 53% of the total lake area in the watershed is impaired. Impairments include increased levels of bacteria (streams), decreased habitat for fish and macroinvertebrates (streams), and increased levels of nutrients (lakes). In total there are 49 impaired water bodies in the Snake River Watershed, 34 of which have approved TMDLs and Stressor Identification Reports (MPCA's Snake River Watershed website). Three new macroinvertebrate and six new E. coli impairments were identified during Cycle II of the Snake River Watershed Assessment (MPCA 2020). Lakes were assessed for aquatic life for the first time in MPCA's Cycle II Assessments. Knife, Fish, Ann, Cross and Pokegama Lakes were assessed and only Pokegama was listed as impaired for aquatic life due to fish IBI, a score that compares a lake's fish community to what is expected for a healthy lake. Lake water quality impairments may be exacerbated by large watershed to lake area ratios and short water residence times. For the impaired lakes within the watershed, watershed to lake area ratios range from 47–670 and water residence times range from 9.4–128 days. Water quality and impairments within the watershed will be discussed in further detail later in this plan.

The Snake River is a major tributary to the St. Croix River, which is protected under both federal and state designations. The St. Croix River is a designated Wild and Scenic River by the National Wild and Scenic River Act. This designation ensures preservation and restoration of continuous natural vegetation within the river's riparian corridor, which is critical to protecting and preserving wildlife, water quality, flood abatement, and the scenic nature of the river. In addition, the State of Minnesota has designated the entire St. Croix as an Outstanding Resource Value Water (ORVW). This designation means that no new or expanded discharge of any sewage, industrial waste, or other waste is allowed unless there is no prudent, feasible alternative to the discharge. A TMDL study was completed for Lake St. Croix which is located along the mainstem of the St. Croix River near Stillwater, MN. This study determined that outflow from the Snake River accounts for approximately 10% of the Lake St. Croix phosphorus budget. The TMDL calls for a 20% phosphorus reduction from the Snake River.

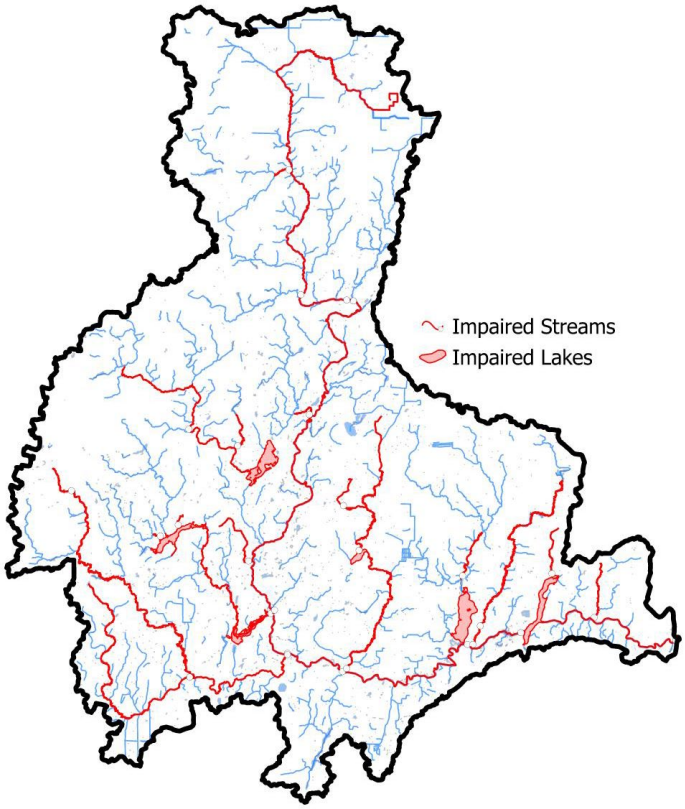


Figure 2-6. Impaired streams and lakes within the Snake River Watershed.

Surface waters in the Snake watershed are threatened by aquatic invasive species. Curly-leaf pondweed is a common, but invasive aquatic plant that has been found in some streams and all the large lakes in the watershed (Pokegama, Cross, Mud, Fish, Knife, Ann, and Bear). Curly-leaf pondweed has a unique life cycle, sprouting in the fall and growing under ice until spring, giving it a competitive advantage over native aquatic plants. Curly-leaf pondweed senesces by mid-summer and can exacerbate summer algae blooms when nutrients from the senescing plants are released during decomposition. Eurasian milfoil, faucet snail, and common carp are also present within the watershed. Common carp have been introduced to nearly half of the lakes in the watershed and can degrade water quality by uprooting aquatic vegetation and stirring up lake sediments.

2.4.2 Groundwater

Groundwater comprises 100% of the Snake River Watershed's drinking water sources and is available primarily through buried sand and gravel aquifers, and to a lesser extent through surficial sand and gravel aquifers and deep bedrock sandstone aquifers. The watershed is located within Minnesota's Western Groundwater Province, defined by the MN DNR as clayey glacial drift overlying Cretaceous (145-66 million years old) and Precambrian (4 billion-541 million years old) bedrock. Water table depths are shallow throughout large portions of the watershed, ranging from 0-20 feet below the surface. Topographic highs (moraines), areas with surficial sand and gravel, and areas along the bedrock/surficial sediment interface are important areas of recharge. Precipitation is a particularly important source of groundwater recharge in the area, as opposed to surface water

recharge; however, Knife, Mora, Fish, Spence, and Pennington Lakes are known to have strong groundwater connections (Snake River Watershed GRAPS 2020).

Dense glacial till protects much of the watershed's groundwater from contamination, but the southern parts of the watershed have highly permeable sand and gravel at the surface and are considered more vulnerable. Nitrate, arsenic, pesticides, active petroleum tank sites, and landfills threaten groundwater quality. Ten of the 12 public water systems within the Snake River Watershed are developing or implementing wellhead protection plans. Vulnerability of these areas ranges from low to high. There are 11 Drinking Water Supply Management Areas (DWSMA) that cover over 6,000 acres of the watershed. These DWSMAs are mostly concentrated in the southern portion of the watershed and Pine City has two DWSMAs (north and south).

The GRAPS report was completed for the Snake River Watershed in 2020. The GRAPS report presents existing state data and information about groundwater quantity, condition, and sensitivity in the watershed, including nitrate and arsenic levels in tested well water, locations of DWSMAs, and pollution sensitivity of near-surface materials and wells. The report was used to help prioritize and target local efforts to restore and protect groundwater resources in the 1W1P planning process. The GRAPS report presents actions and strategies in tables to support the restoration and protection of groundwater resources.

2.4.3 Pollutant Sources and Stressors

The TMDL and Stressor Identification (SID) Studies that have been completed to date in the Snake River Watershed identified the following major pollutant sources and stressors: altered hydrology, fertilizer and manure runoff, livestock overgrazing in riparian areas, failing septic systems, runoff from developed land, and internal nutrient loading in lakes and wetlands. Each of these sources and stressors are described below in more detail.

Human alteration of water resources is common throughout the watershed. Approximately 18% of wetlands in the watershed have been ditched, many of which can be found in the southeast portion of the watershed. Thirty-five percent, or 374 miles, of the total stream length in the watershed has been altered (DNR 2017, **Figure 2-7**). A few lakes within the watershed are impounded: Ann, Quamba, Knife, Cross, Pomroy, and Fish. Fish Lake has a low-head dam close to its outlet to the Snake River. These alterations, combined with the increased rainfall intensity discussed above, reduce the ability of water bodies to store water which leads to increased peak flows, lower base flows, increased sediment and nutrient export, and poorer water quality. Continuous annual streamflow (discharge) data are available for the Snake River Watershed since 1953. In that time period there is no clear trend, although three of the highest flow years have occurred since 2010, suggesting that the hydrology of the Snake River may be in a period of transition. High flows in the Snake River often result in backfilling to its connected streams and lakes causing variation in lake levels (i.e., lake bounce). The lakes that discharge near or directly to the Snake River (e.g., Fish, Pokegama, Cross) are particularly vulnerable and regularly experience high levels of lake bounce. Lake bounce can increase flood risk to homeowners and infrastructure within the floodplain.

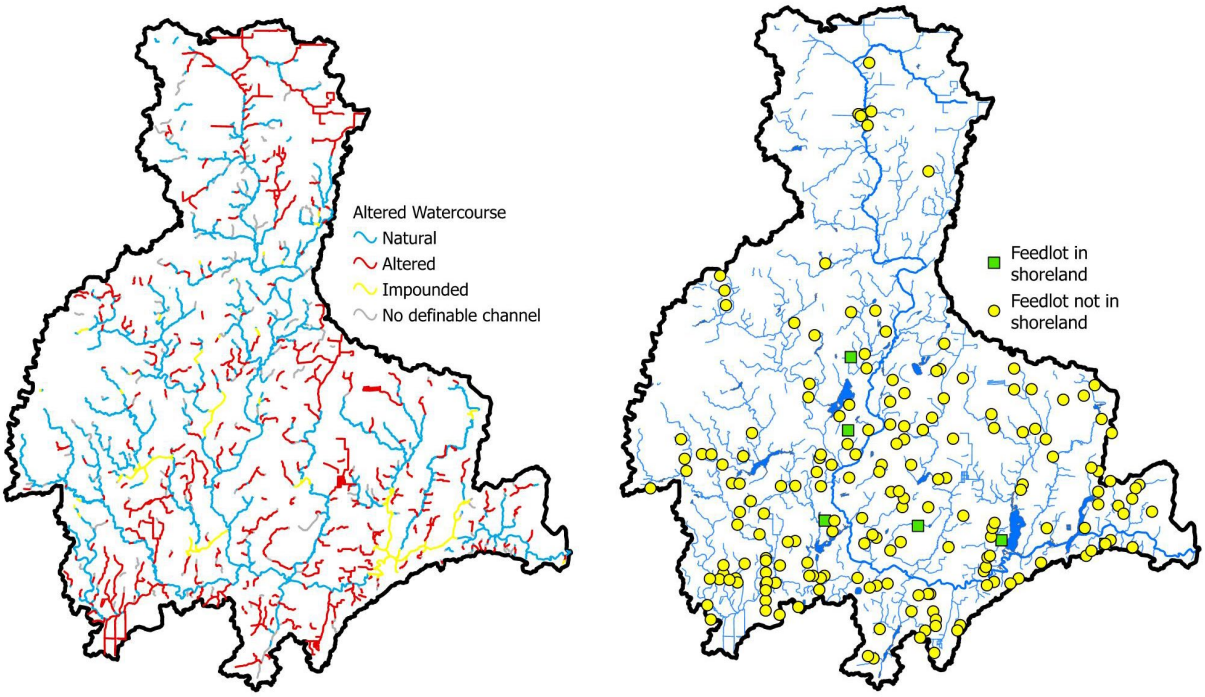


Figure 2-7. Natural, altered, and impounded watercourses (left) and MPCA registered feedlots within shoreland (right) in the Snake River Watershed.

As of 2016, there are 189 registered feedlots of varying size, five of which are within shoreland (i.e., located within 1,000 feet of a lake or 300 feet of a stream or river) within the watershed (**Figure 2-7**). A feedlot is recognized by the State if it holds 50 or more animal units (or ten if within shoreland areas). There are 18,538 animal units within the watershed.

The exact number of subsurface sewage treatment systems (SSTS) in the watershed is unknown, but failure rates reported by Kanabec, Pine, and Aitkin Counties in 2019 range from 11–20% for systems that fail to protect groundwater, and 1–10% for systems that are imminent threats to public health and safety. Both feedlots and failing SSTSs, particularly those in shoreland areas, have the potential to contribute bacteria and nutrients to downstream waterbodies. There are five wastewater treatment plants (WWTPs) that discharge directly to the Snake River or to tributaries of the Snake River. Two of these facilities, Isle WWTP and Wahkon WWTP, are located just outside the watershed boundary but discharge to the Knife River. The wastewater treatment plants collectively contribute only a small amount of nutrient loading to surface waters throughout the watershed.

The Snake River Watershed has little development compared to other watersheds in the State. Only 3% of the watershed is developed (e.g., cities, towns, roads), and less than 1% of the watershed is covered by impervious surfaces. However, lakes and streams located within or downstream of developed areas can be directly and indirectly impacted by how the land is managed in these areas. The City of Mora, the largest city in the watershed, has a storm sewer system with nine outlets to Mora Lake and five to the Snake River. Recent monitoring of Mora Lake that was done as part of MPCA's Cycle II Assessment indicate the lake is not impaired; however, it is very close to the State's impairment thresholds. Fluctuating water levels in Mora Lake in recent years are also a concern for homes and other infrastructure surrounding the lake.

The *Snake River Watershed TMDL (2013)* and the *Ann River Watershed Bacteria, Nutrient, and Biota TMDL (2013)* studies found that all of the impaired lakes in the watershed (Ann, Fish, Knife, Quamba, Pokegama, and Cross) will likely need significant phosphorus reductions from internal sources (i.e., the release of phosphorus from bottom sediments during periods of low oxygen), as well as external sources (e.g., watershed and failing SSTSs), in order to meet State water quality standards. Erosion of high P soils in the watershed can contribute to watershed nutrient loads. The TMDL studies found that phosphorus release from lake sediments were very high in all six lakes and is likely the primary driver of internal loading. Ann, Pokegama, and Cross Lakes showed the highest rates of phosphorus release from the sediments and therefore required the largest internal load reductions in the TMDL studies.

2.5 HIGH VALUE RESOURCES AND RECREATION OPPORTUNITIES

The watershed supports a variety of outdoor recreation areas, including the 90-mile stretch of the Snake River State Water Trail, multiple wildlife management areas and state forests, nineteen DNR-designated Wild Rice Lakes, and a 2.6-mile stretch of cold-water trout stream (Mission Creek). The Snake River State Water Trail is diverse with gentle, slow stretches and areas dotted with Class I-III rapids and falls. Campgrounds and picnic areas along the river corridor provide opportunities for recreation.

Canoers paddle the Snake River

The watershed boasts over 160,000 acres of public land. Nine percent of the watershed is state forest land and seven percent is WMAs: Mille Lacs WMA, Ann Lake WMA, Dalbo WMA, Rice Creek WMA, Pine County V&S WMA, Solana State Forest, Snake River State Forest, Rum River State Forest, and Chengwatana State Forest.

Purple wartyback freshwater mussel

Several threatened and endangered species call the watershed home, including Blanding's turtles, northern long-eared bat, osprey, and the butternut tree. The watershed supports over 65 species of fish and all its historically known mussel species. At least 26 mussel species can be found in the watershed, including the rare purple wartyback. Walleye, northern pike, bass, catfish, sunfish, crappies, and brook trout are commonly caught, but more rare species can also be found. A lake sturgeon was caught in the river during a recent State fish assessment. Other sensitive species such as northern hogsuckers and southern brook lamprey have been caught in the watershed. In general, the watershed supports a healthy fish and invertebrate community with most assessed reaches having IBIs in the 'fair' or 'good' category (**Figure 2-8**). The watershed has eight lakes and wetlands of outstanding biological significance: Pokegama, Knife, Ernst Pool, Fish, Upper Rice, Cross, Ann, and Dewitt Pool. The DNR designates lakes of biological significance primarily by unique plant or animal presence. Lakes are grouped into Outstanding, High, and Moderate categories based on aquatic plants, fish, birds, and amphibian communities.

Many reports and studies have been written to ensure protection of the watershed's biological communities, high value resources, and recreational opportunities. The *Snake River Monitoring and Assessment Report* was first published in 2017 and aimed to determine the overall health of water resources in the watershed and identify waters in need of protection efforts. SID reports have been completed for Mud Creek, Groundhouse River, and Ann River. All SID reports can be found on MPCA's Snake River Watershed website. The US Environmental Protection Agency (EPA) completed the *Aquatic Ecosystem Protection Efforts* report in 2013 that reviewed all protection efforts in the watershed. The study identified gaps in efforts and provided recommendations on how to protect the aquatic ecosystems of the watershed.

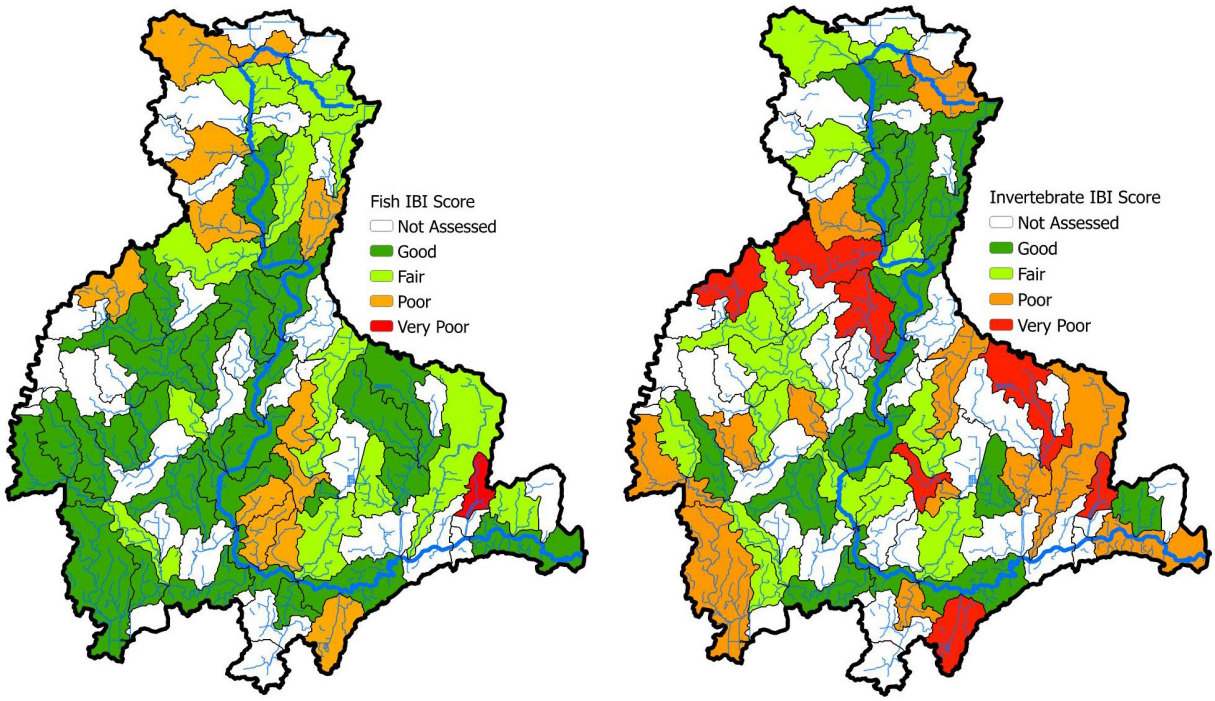


Figure 2-8. Fish IBI scores (left) and invertebrate IBI scores (right) in the Snake River Watershed by subwatershed.

2.6 SUMMARY

The Snake River Watershed is a diverse watershed that has been shaped over thousands of years by glaciers, and more recently by human activity. The watershed provides habitat to many rare and threatened species and supports multiple areas of outstanding biodiversity that can be enjoyed by both humans and animals alike. Significant areas of productive agricultural and forested land provide jobs and support the local economy. The watershed's valuable natural resources are threatened by extreme weather, land use changes, and pollutants. Protecting the outstanding resources within the Snake River Watershed now will ensure it is maintained for future generations to enjoy.

3.0 Implementation Actions

The Partnership developed a framework for each issue area that includes the issue statement, a desired future condition, goals with priority resources, and actions to address the goal. The Partnership discussed potential implementation actions throughout the entire planning process. After goals and priority resources had been narrowed down, the Partnership narrowed the list of potential implementation actions down to a selected list based on staff capacity and impact of the action towards achieving the goal.

Goals, priority areas, implementation actions, and schedules are provided in maps and tables in this section. There is a table for each issue area, and actions are organized within each table by each issue area goal. The table details a unique action ID number, the specific priority area for the action, the measurable outcome, who will lead and support the action, timing, and estimated costs. Where relevant, a map is provided for targeting implementation actions. Note that pollution reduction goal numbers are for the life of the Plan. For example, Surface Water Quality Goal 1 is a phosphorus reduction goal. The goal of 4,200 pounds of phosphorus reduced is the cumulative reduction expected after all relevant actions have been implemented. All cost estimates were made using 2022 estimates (the time of plan development) and are subject to change. Cost estimates for BMPs include technical assistance, design, permitting, and other direct costs related to implementing a BMP. Issue areas in **Section 3** are ordered from highest to lowest priority from the ranking exercise described in **Section 1.3**.

3.1 SURFACE WATER QUALITY

Issue Statement

Runoff contributes to algae and water quality and aquatic habitat degradation. Management of runoff across land uses is needed to reduce impacts to lakes, streams, and rivers. Additionally, internal nutrient loads in lakes can compound efforts to improve water quality and habitat also needs to be addressed.

Four goals were developed to address the Surface Water Quality Issue Statement (**Table 3-1**). Goals are focused on reducing pollutant loads to impaired lakes and streams in the watershed and protecting currently unimpaired lakes. For goals that encompass impaired lakes and streams, data used during TMDL development will serve as a baseline for evaluating progress towards that goal.

Table 3-1. Surface Water Quality Goals

Goal 1	Reduce phosphorus loading to priority impaired lakes by a combined total of 4,200 pounds over the 10-year plan.
Goal 2	Protect priority unimpaired lakes by maintaining or reducing current phosphorus levels.
Goal 3	Reduce sediment in priority streams and rivers by a combined total of 1,750 tons over the 10-year plan.
Goal 4	Reduce *E. coli* exceedances in priority impaired streams and rivers by 10%.

The Snake River Watershed has over 87 lakes and 128 streams. Forty-nine of those water bodies are impaired (i.e., fail to meet the State's water quality standards), 34 have approved TMDLs and Stressor Identification Reports. The Partnership reviewed the TMDLs, Stressor Identification Reports, WRAPS, historic lake water quality data from the MPCA, Hydrologic Simulation Program (HSPF) models, and stakeholder input to further narrow the 87 lake and 128 streams to priority water bodies. The Partnership gave special priority to water bodies that:

- If restored or protected, would reduce pollution to water bodies downstream or help achieve goals in other issue areas.
- If impaired, have had considerable restoration work done already or are close to the impairment threshold for the relevant parameter.
- If impaired and in need of considerable restoration work, these water bodies hold significant recreational value, and it is important for communities to see work being done there.
- Whether impaired or unimpaired, have active lake associations that can partner with local government units to carry out shared work.
- Whether impaired or unimpaired, provide important habitat for wild rice, fish, and other plants and wildlife species.
- Whether impaired or unimpaired, face current and future risk of pollution from urban and agricultural land uses.

After the Partnership identified a general list of priority lakes, streams, and rivers to focus on they began to develop goals. Four goals were developed to each address a different issue: phosphorus impairments, unimpaired lakes with threatened water quality, sediment impairments, and E. coli impairments. The Partnership considered the information and criteria described above and refined the four goals that encompass six impaired lakes, five unimpaired lakes, seven impaired streams/rivers, and one unimpaired stream. Table 3-2 lists all water bodies addressed under Surface Water Quality goals and the main reason for consideration in this plan.

Tiering was used to further prioritize lakes addressed in the Surface Water Quality issue area. Under Goal 1, the Partnership agreed that Tier 1 lakes would be prioritized for the early years of the 10-year plan and Tier 2 lakes would be prioritized for later years of the plan. Under Goal 2, Tier 1 lakes are prioritized for improvements to water quality, whereas Tier 2 lakes are prioritized for holding water quality at its current state. Goals 3 and 4 were determined not to need tiering. Maps on the following pages show priority water bodies related to each goal.

Table 3-2. Water bodies addressed under Surface Water Quality goals and the reason they were chosen.

Goal	Tier (if applicable)	Water Body Addressed	Impairment/Reason for Addressing
Goal 1	Tier 1	Ann Lake	Impaired for nutrients
	Tier 1	Cross Lake	Impaired for nutrients; urban lake
	Tier 1	Pokegama Lake	Impaired for nutrients, fish IBI
	Tier 1	Fish Lake	Impaired for nutrients
	Tier 2	Quamba Lake	Impaired for nutrients; close to being unimpaired
	Tier 2	Knife Lake	Impaired for nutrients

Goal	Tier (if applicable)	Water Body Addressed	Impairment/Reason for Addressing
Goal 2	Tier 1	Pennington Lake	Unimpaired, high recreational value
	Tier 1	Mora Lake	Unimpaired, urban lake, high recreational value
	Tier 2	Devils Lake (Kanabec Co.)	Unimpaired, high recreational value
	Tier 2	Devils Lake (Pine Co.)	Unimpaired, adjacent to urban development pressure
	Tier 2	Pomroy Lake	Unimpaired, high recreational value
Goal 3		Groundhouse River	Impaired for fecal coliform, sediment
Goal 3		Hay Creek	Unimpaired, high habitat value
Goal 3		Mission Creek	Impaired for dissolved oxygen, fish IBI
Goal 4		Knife River	Impaired for *E. coli*
Goal 4		Bear Creek (Pine Co.)	Impaired for *E. coli*
Goal 3 & 4		Ann River	Impaired for *E. coli*, invertebrate IBI, sediment
Goal 3 & 4		South Fork Groundhouse River	Impaired for fecal coliform, dissolved oxygen, sediment
Goal 3 & 4		Snake River (mainstem)	Some sections impaired for fecal coliform, high recreational value
Goal 3 & 4		Upper Mud Creek	Impaired for *E. coli*, fish IBI, sediment

Implementation actions under Surface Water Quality goals generally focus on education and outreach, lake restoration projects, septic upgrades, shoreline protection BMPs, and land protection (Table 3-3). Once a specific list of actions was developed, where possible, estimated pollution reduction goal numbers for actions were made using the Hydrological Simulation Program FORTRAN Scenario Application Manager (HSPF-SAM). HSPF-SAM is a state-adopted watershed modeling tool that was used to estimate pollution reduction numbers for Surface Water Quality actions focused on the installation or adoption of structural and non-structural BMPs such as pond, wetland, and buffer installations or reduced or no tillage practices. HSPF-SAM provided estimated phosphorus and sediment reductions based on BMP type, size, and watershed placement. More information on HSPF-SAM is provided in the glossary.

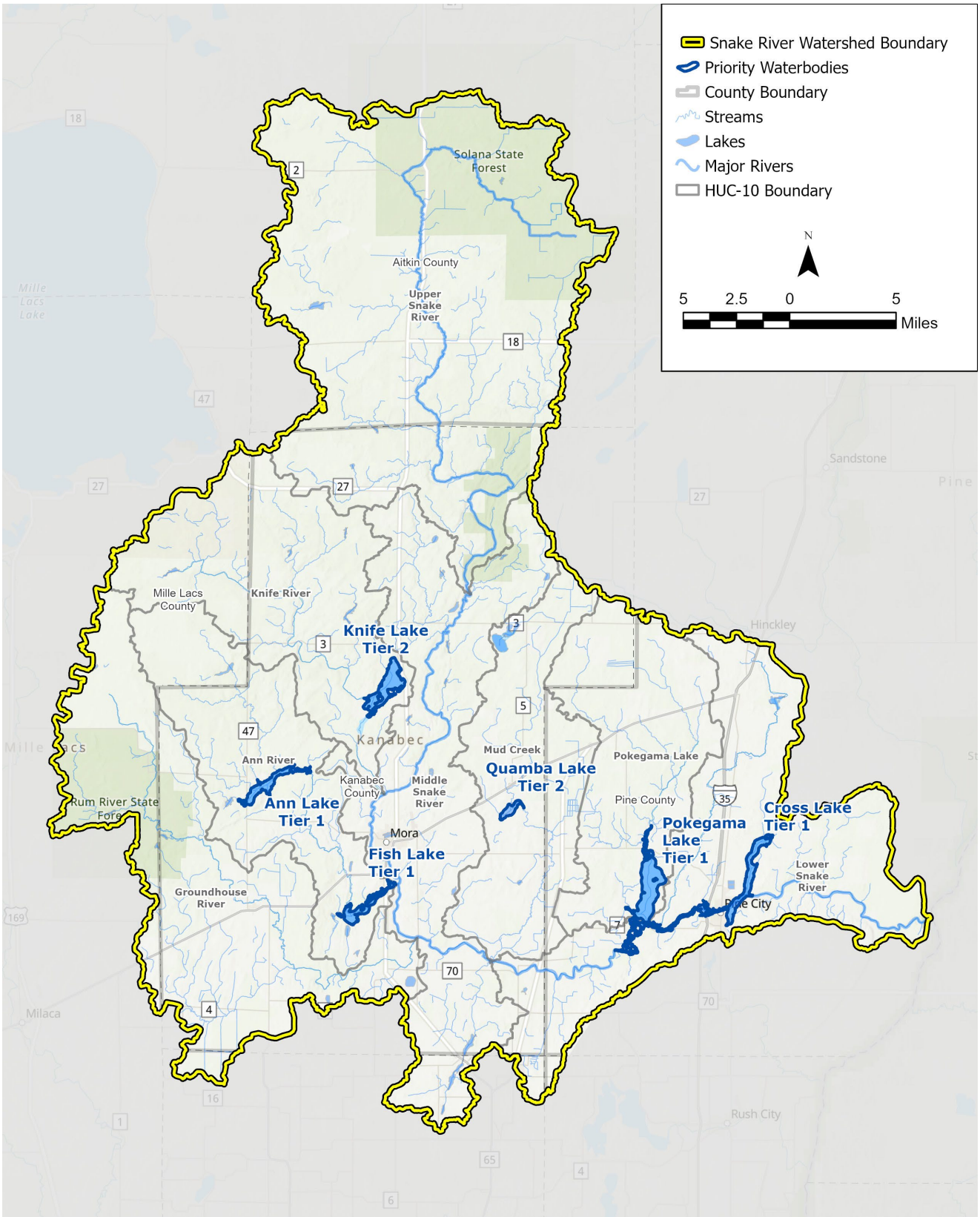


Figure 3-1. Surface Water Quality Goal 1: Priority lakes for phosphorus reduction.

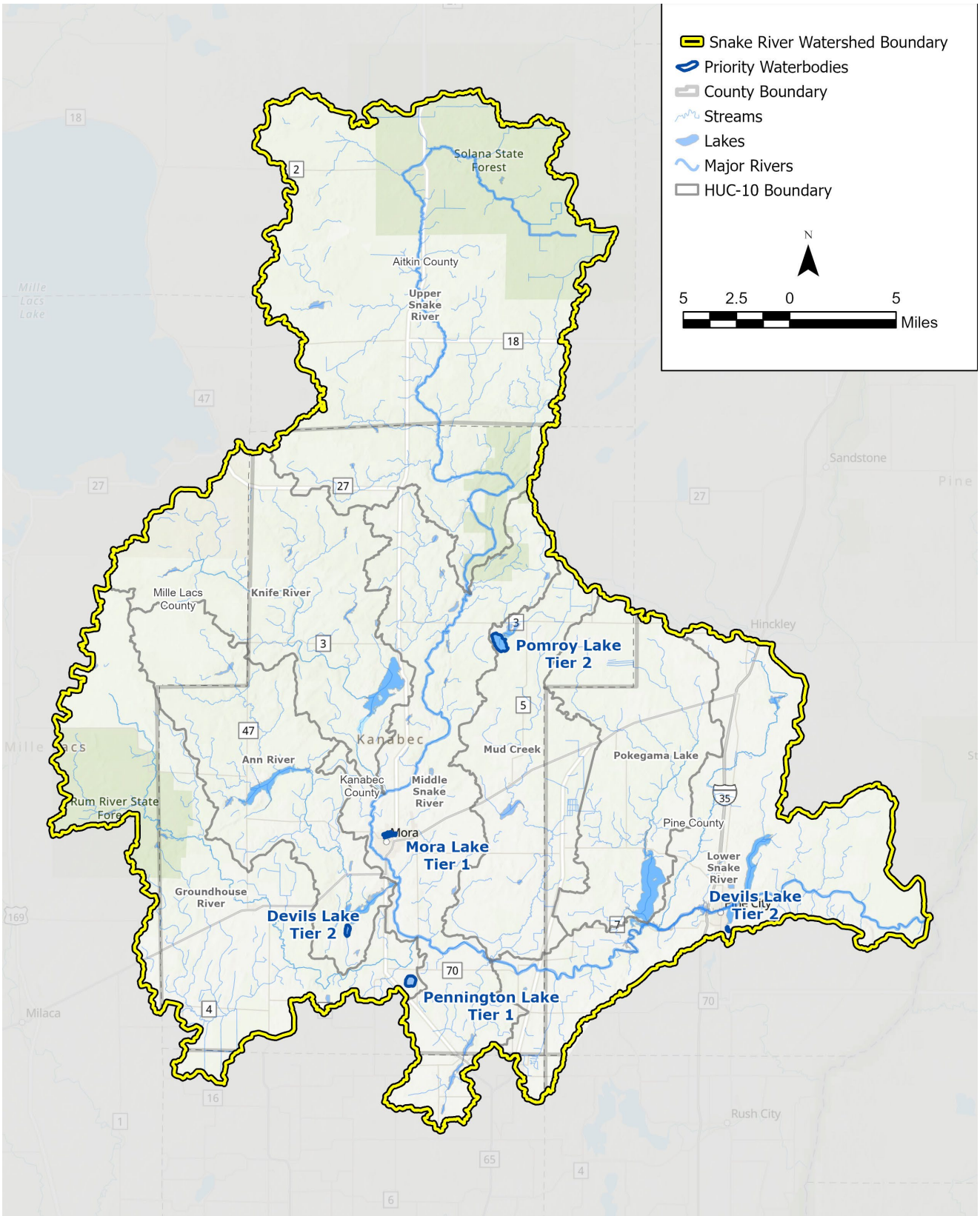


Figure 3-2. Surface Water Quality Goal 2: Priority lakes for protection.

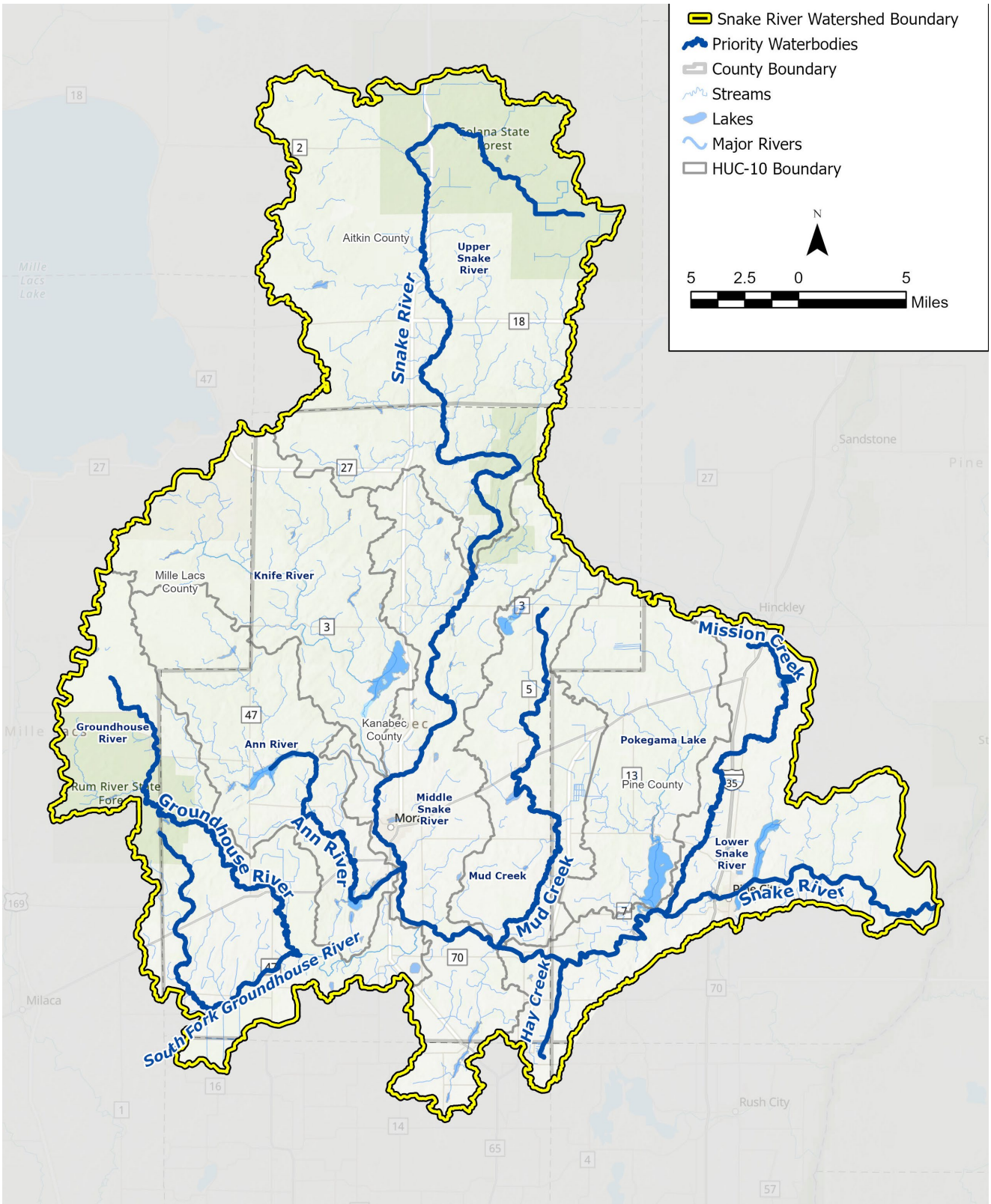


Figure 3-3. Surface Water Quality Goal 3: Priority streams and rivers for sediment reductions.

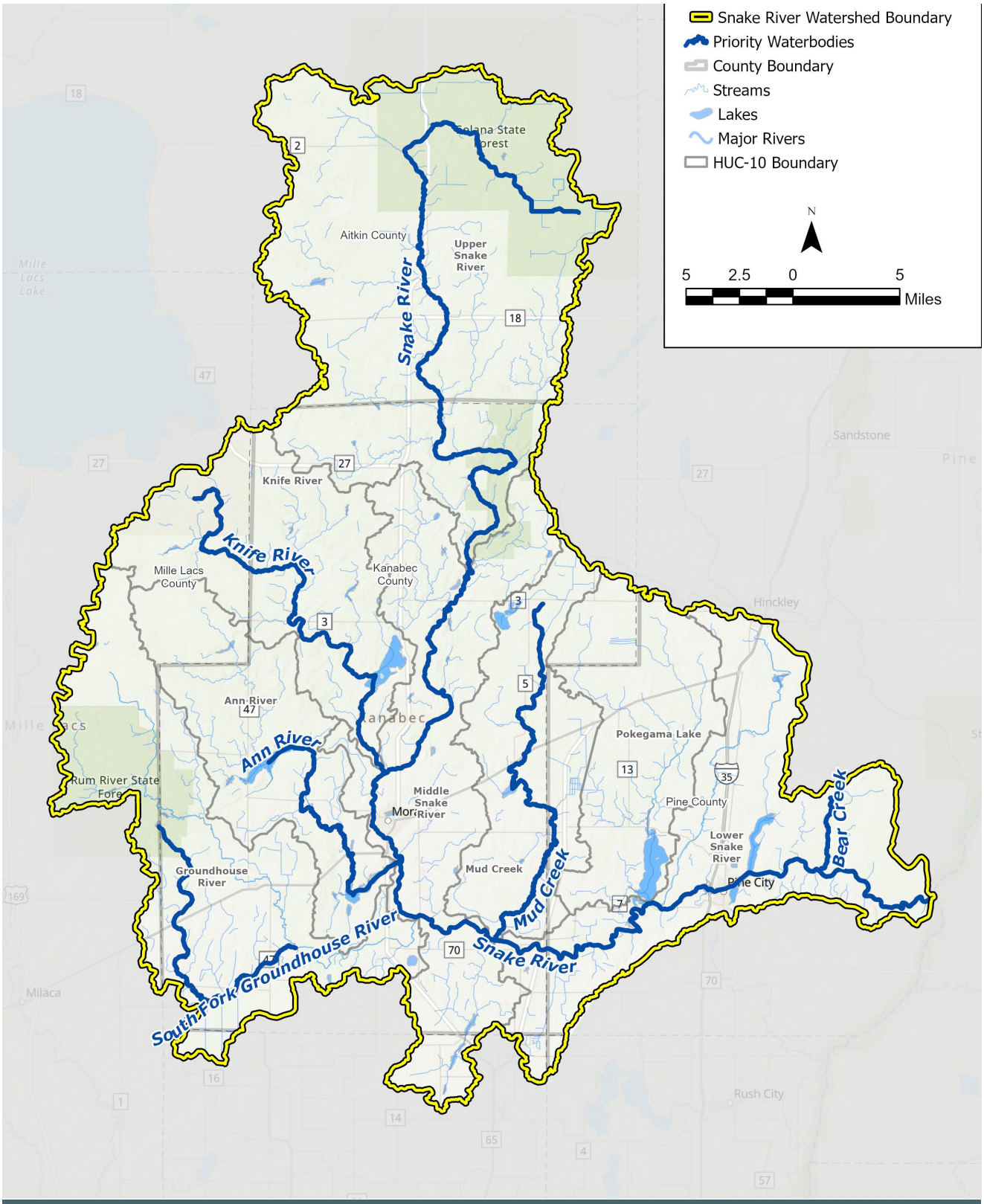


Figure 3-4. Surface Water Quality Goal 4: Priority streams and rivers for *E. coli* reductions.

Table 3-3. Surface Water Quality Implementation Table.

Action ID	Action	Priority Area	Measurable output/outcome	Lead/Supporting Entities	2023–2024	2025–2026	2027–2028	2029–2030	2031–2032	Estimated Cost (Outside Funding Needed)
Water Quality — Goal 1: Reduce phosphorus loading to priority impaired lakes by a combined total of 4,200 pounds over the 10-year plan										
SWQual-1	Complete or update internal loading feasibility studies	Ann Lake (Tier 1) Cross Lake (Tier 1) Pokegama Lake (Tier 1) Knife Lake (Tier 2)	1–4 completed or updated feasibility studies	SWCDs / LAs	■		■			$30,000–$120,000◈
SWQual-2	Perform internal load treatments to reduce nutrient load	Ann Lake (Tier 1) Cross Lake (Tier 1) Pokegama Lake*	1–3 full in lake treatments	SWCDs / LAs	■			■		$3 million◈
SWQual-3	Complete and/or adopt lake vegetation management plan	Ann Lake (Tier 1) Cross Lake (Tier 1) Fish Lake (Tier 1) Pokegama Lake (Tier 1) Knife Lake (Tier 2)	2–5 plans completed or adopted	LAs / SWCDs	■	■	■	■	■	$100,000✦
SWQual-4	Educate lake residents on in-lake vegetation management	Knife Lake (Tier 2)	1 newsletter article, 10–15 contact hours	KSWCD / LA	■					$7,500
SWQual-5	Promote and educate lake residents on shoreline restoration projects, including DIY projects, unmowed and native buffer areas, demonstrations	Goal 1 Priority Lakes (**Figure 3-1**)	20–50 contact hours; 2–5 shoreline restoration demonstration projects	SWCDs / LA	■	■	■	■	■	$50,000◈
SWQual-6	Protect, stabilize, or restore 1,000+ feet of shorelands using native buffers and other BMPs	Goal 1 Priority Lakes (**Figure 3-1**)	TP reduced by 750 lbs.	SWCDs/ LA	■	■	■	■	■	$120,000◈
SWQual-7	Increase activities that promote septic upgrades to reduce excess P, and work with lake associations to promote septic upgrades	Ann Lake (Tier 1) Fish Lake (Tier 1) Knife Lake (Tier 2) Quamba Lake (Tier 2)	15–20 septics updated	Counties/ SWCDs, LA	■	■	■	■	■	$300,000◈
SWQual-8	Complete sub-watershed analysis to identify priority BMP locations	Goal 1 Priority Lakes (**Figure 3-1**)	2–6 sub-watershed analyses completed	SWCDs, Counties / LA	■			■		$60,000◈
SWQual-9	Install agricultural BMPs	Goal 1 Priority Lakes (**Figure 3-1**)	TP reduced by 2,000 lbs.	SWCDs / NRCS, MAWQCP, MDA	■	■	■	■	■	$412,000–$785,000◈

KEY: ✦ Outside Funding Needed | ◈ Outside and WBIF Funding Needed | *Pokegama Lake will be reviewed for action after 2032

Action ID	Action	Priority Area	Measurable output/outcome	Lead/Supporting Entities	2023–2024	2025–2026	2027–2028	2029–2030	2031–2032	Estimated Cost (Outside Funding Needed)
SWQual-10	Reduce nutrient loads in Quamba Lake though hook ups into the Mora WWTP	Quamba Lake (Tier 2)	Hook up 50–70 Quamba Lake residence into the Mora municipal sewer system	Kanabec Co, Comfort Twp., MPCA/PFA				■	■	$1,500,000
SWQual-11	Educate producers on nutrient management plans and complete plans	Ann Lake (Tier 1) Fish Lake (Tier 1) Knife Lake (Tier 2) Quamba Lake (Tier 2)	3–10 nutrient management plans completed in lakes drainage areas	SWCDs / NRCS, MDA	■	■	■	■	■	$70,000 (◈; NMP w/NRCS, edu. w/WBIF)
SWQual-12	Complete a feasibility study for stormwater practices	Cross Lake (Tier 1)	1 study completed	Pine County				■	■	$30,000◈
SWQual-13	Promote and install stormwater practices (rain gardens, stormwater management plans, etc.)	Cross (Tier 1) Pokegama Lake (Tier 1)	TP reduced by 200 lbs.	SWCDs /Counties, Townships, LAs	■	■	■	■	■	$100,000◈
SWQual-14	Collect water quality parameters every 3rd year, monitoring each priority lake	Goal 1 Priority Lakes (**Figure 3-1**)	Water quality data collected every 3rd year	SWCDs / LA	■	■		■	■	$45,000✦
SWQual-15	Restore 35 acres of wetland	Goal 1 Priority Lake Watersheds (**Figure 3-1**)	TP reduced by 1,250 lbs.	SWCDs			■	■	■	$100,000◈
Water Quality—Goal 2: Protect priority unimpaired lakes by maintaining or reducing current phosphorus levels										
SWQual-16	Complete sub-watershed analysis to identify priority BMP locations	Pennington (Tier 1) Pomroy (Tier 2) Devils (Kanabec Co., Tier 2)	1–3 sub-watershed analyses completed	KSWCD	■	■		■	■	$30,000◈
SWQual-17	Install 2–6 BMPs identified in sub-watershed assessment	Pennington Lake (Tier 1) Mora Lake (Tier 1) Pomroy (Tier 2) Devils (Kanabec Co., Tier 2)	TP reduced by 150 lbs.	KSWCD/ NRCS			■	■	■	$135,000–270,000◈
SWQual-18	Educate residents to promote septic upgrades	Pennington (Tier 1) Pomroy (Tier 2) Devils (Kanabec Co., Tier 2)	20–40 contact hours	KSWCD / Kanabec Counties, LAs			■	■	■	$20,000◈
SWQual-19	Complete forest stewardship plans	Pennington (Tier 1) Pomroy (Tier 2) Devils (Kanabec Co., Tier 2)	5,000 acres planned	KSWCD			■	■	■	$200,000◈

KEY: ✦ Outside Funding Needed | ◈ Outside and WBIF Funding Needed

Action ID	Action	Priority Area	Measurable output/outcome	Lead/Supporting Entities	2023–2024	2025–2026	2027–2028	2029–2030	2031–2032	Estimated Cost (Outside Funding Needed)
SWQual-20	Work with contractors and lake residents to design projects with conservation in mind	Devils (Pine Co., Tier 2)	10 contact hours annually	Pine County	■	■	■	■	■	$20,000
Water Quality—Goal 3: Reduce sediment in priority streams and rivers by a combined total of 1,750 tons over the 10-year plan										
SWQual-21	Complete sub-watershed analysis to identify priority BMP locations	Goal 3 Priority Streams & Rivers (**Figure 3-3**)	2–5 sub-watershed analyses completed	SWCDs / Counties	■	■				$60,000✧
SWQual-22	Promote and install non-structural BMPs (i.e., cover crops, reduced tillage, prescribed grazing, etc.)	Ann River Groundhouse River Upper Mud Creek	TSS reduced by 1,000 T	SWCDs / NRCS, MAWQCP	■	■	■	■	■	$50,000✧
SWQual-23	Install 10–14 structural BMPs	Goal 3 Priority Streams and Rivers (**Figure 3-3**)	TSS reduced by 400 T	SWCDs / NRCS, MAWQCP		■	■	■	■	$330,000✧
SWQual-24	Complete 1,400+ feet of streambank buffers for habitat improvement and channel stabilization	Goal 3 Priority Streams and Rivers (**Figure 3-3**)	TSS reduced by 350 T	SWCDs	■	■	■	■	■	$180,000✧
SWQual-25	Implement 10 stream restoration and channel stabilization projects	Goal 3 Priority Streams and Rivers (**Figure 3-3**)	1,000 linear feet restored	SWCDs, DNR/ DOT, road authorities			■	■	■	$200,000✧
Water Quality—Goal 4: Reduce E. coli exceedances in priority impaired streams and rivers by 10%										
SWQual-26	ID and upgrade non-conforming septic systems within shoreline zones or that present a public health threat	Goal 4 Priority Streams and Rivers (**Figure 3-4**)	15–20 septics upgraded and compliant	Counties	■	■	■	■	■	$400,000✧
SWQual-27	Promote and Install feedlot runoff management and other BMPs, targeted first within shoreland areas	Goal 4 Priority Streams and Rivers (**Figure 3-4**)	15–20 practices	NRCS / SWCDs, MAWQCP	■	■	■	■	■	$1.5-2 million✧
SWQual-28	Plan & Implement Nutrient Management Plans (NMP)	Goal 4 Priority Streams and Rivers (**Figure 3-4**)	2–5 plans	NRCS	■	■	■	■	■	$10,000✧
SWQual-29	Hold outreach events and talk to individual producers to promote nutrient management (NMP, N-Smart, Core 4 Rs of NM)	Goal 4 Priority Streams and Rivers (**Figure 3-4**)	10–30 contact hours	SWCDs / NRCS, UMN Ext, MAWQCP, MDA		■	■	■	■	$15,000✧

KEY: ✦ Outside Funding Needed | ✧ Outside and WBIF Funding Needed

3.2 LAND COVER & USE

Issue Statement

Various types of land use and conversions between them contribute both to natural resource concerns and benefits, including the watershed's forests, agricultural lands, and developed lands. Appropriate management of these different land uses to limit or prevent damage from human activities—while supporting environmental benefits—is needed. Partnering with farmers, foresters, property owners, businesses, and municipalities in collaborative decision-making to protect natural, groundwater, and surface water resources is essential.

Three goals were developed to address the Land Cover & Use Issue Statement (**Table 3-4**). Goals are focused on increasing land protection through easements, land acquisition, and ordinances, implementing BMPs that mitigate impacts from land conversion, and educating landowners on the negative impacts of land conversions.

Table 3-4. Land Cover & Use Goals.

Goal 1	Increase protected acres by 5-10% in priority areas, with an eventual goal of 75% total protected acres in those areas.
Goal 2	Improve the watershed's stormwater control through robust planning and installation of 2-8 stormwater BMPs.
Goal 3	Implement BMPs within priority areas to increase and improve continuous cover on 600 acres while partnering with other agencies and programs.

To identify priority areas to address under this issue area, the Partnership reviewed land cover and use data, HSPF models, the Snake River Watershed Landscape Stewardship Plan (LSP, 2018), and stakeholder input. The TAC identified land protection, private forest management, stormwater management, and continuous vegetative cover as key strategies for addressing land cover and use goals in the plan.

This plan considers the watershed thermometer example to quantify protected lands in the watershed. Under this definition, protected lands include public/tribal land, public waters, wetlands, easements, and Sustainable Forest Incentive Act (SFIA) lands. The Snake River Watershed is currently 46% protected (**Figure 3-5**). Only 0.1% of the watershed is currently in easements. Individual subwatersheds within the Snake River Watershed vary in their amount of protection. A threshold of 75% protected land has been identified as the tipping point, below which water quality and other resource conditions may begin to decline and is used as a general goal for the priority areas in the Plan.

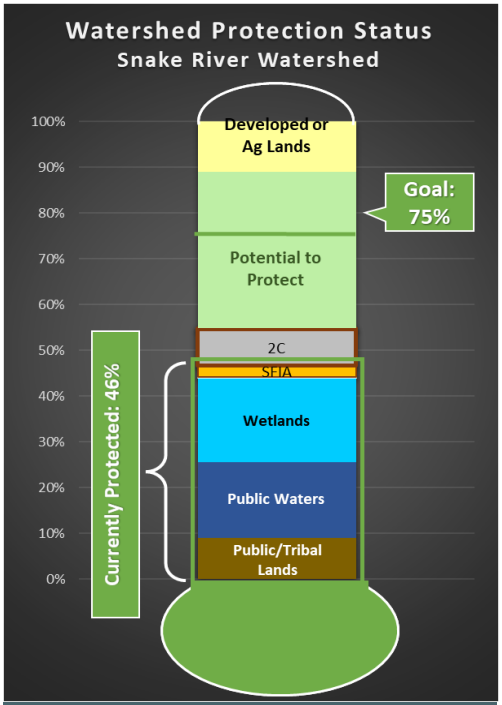


Figure 3-5. Watershed Protection Status thermometer (Mitch Brinks 2021).

Maintaining forested land, whether in public or private ownership, is a key component of maintaining healthy water

resources. Approximately 36% of the Snake River Watershed is forested/shrubland (see **Figure 2-4**). More forested land means reduced erosion during storms, increased filtration of water before it makes it to a lake or stream, and more infiltration of rainfall to reduce and slow runoff. The Partnership used the 75% protected threshold, with a special focus on increasing and protecting forest land, to develop Goal 1 actions. The Landscape Stewardship Plan (LSP) previously identified priority Conservation Opportunity Areas (COAs) and private parcels within each COA for protection. Three COAs from the LSP are repurposed for Land Cover & Use Goal 1 (**Figure 3-7**).

The Partnership recognized stormwater generation from developed lands as an area of concern under Land Cover & Use and developed Goal 2 to improve BMP implementation in developed areas. To maximize benefits, shoreland areas of the priority lakes under Surface Water Quality are repurposed, and the City of Mora and Pine City are additional priority areas due to their level of development (**Figure 3-8**).

Goal 3 is aimed at improving continuous cover in the watershed and targets subwatersheds with high row crop acres (**Figure 3-9**); however, continuous cover does not apply only to cropland. The Partnership also considers forested land and pasture as continuous cover and will apply Goal 3 to other priority areas where feasible. Improving continuous cover could include actions like improving vegetation diversity in a pasture by planting biodiverse seed mix or planting trees and shrubs.

Seventy-five percent of the Snake River Watershed is in private ownership. The prevalence of private land ownership will require the Partnership to prioritize working with landowners for private forest and land management. **Figure 3-6** shows a private forestry management toolbox, with options for management that range in cost and longevity, that will serve as a resource for implementation of Land Cover & Use actions under all goals.

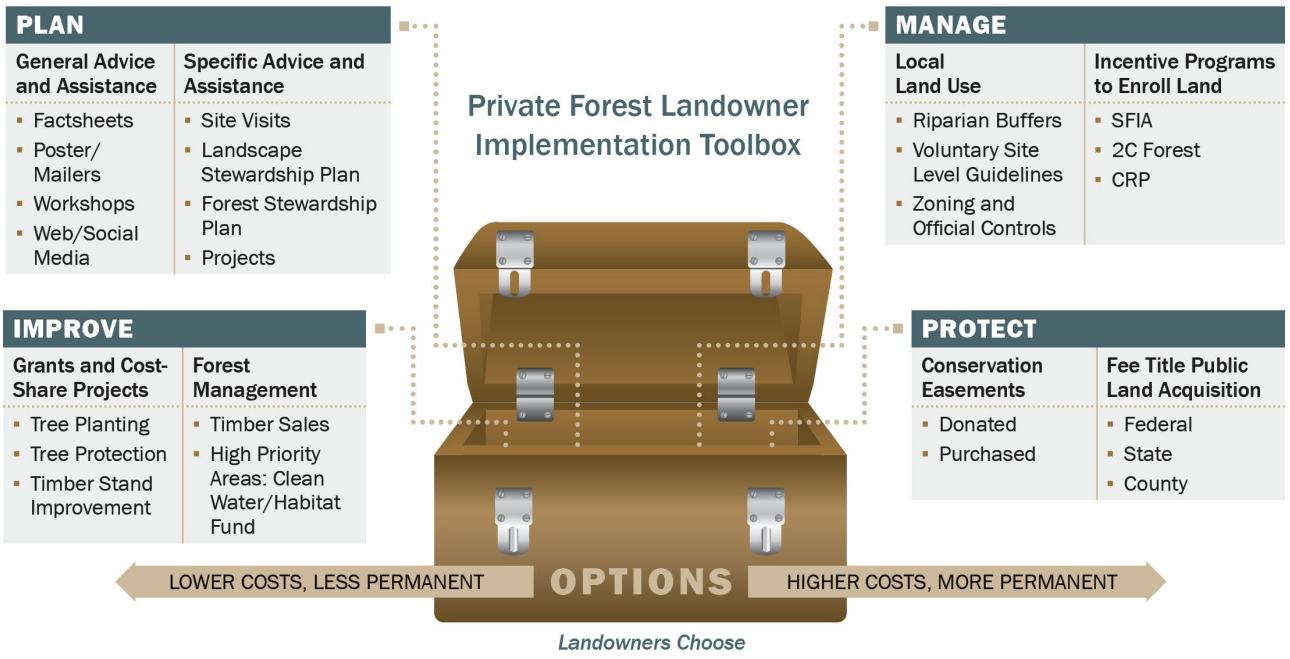


Figure 3-6. Private forestry management toolbox (Adapted from BWSR).

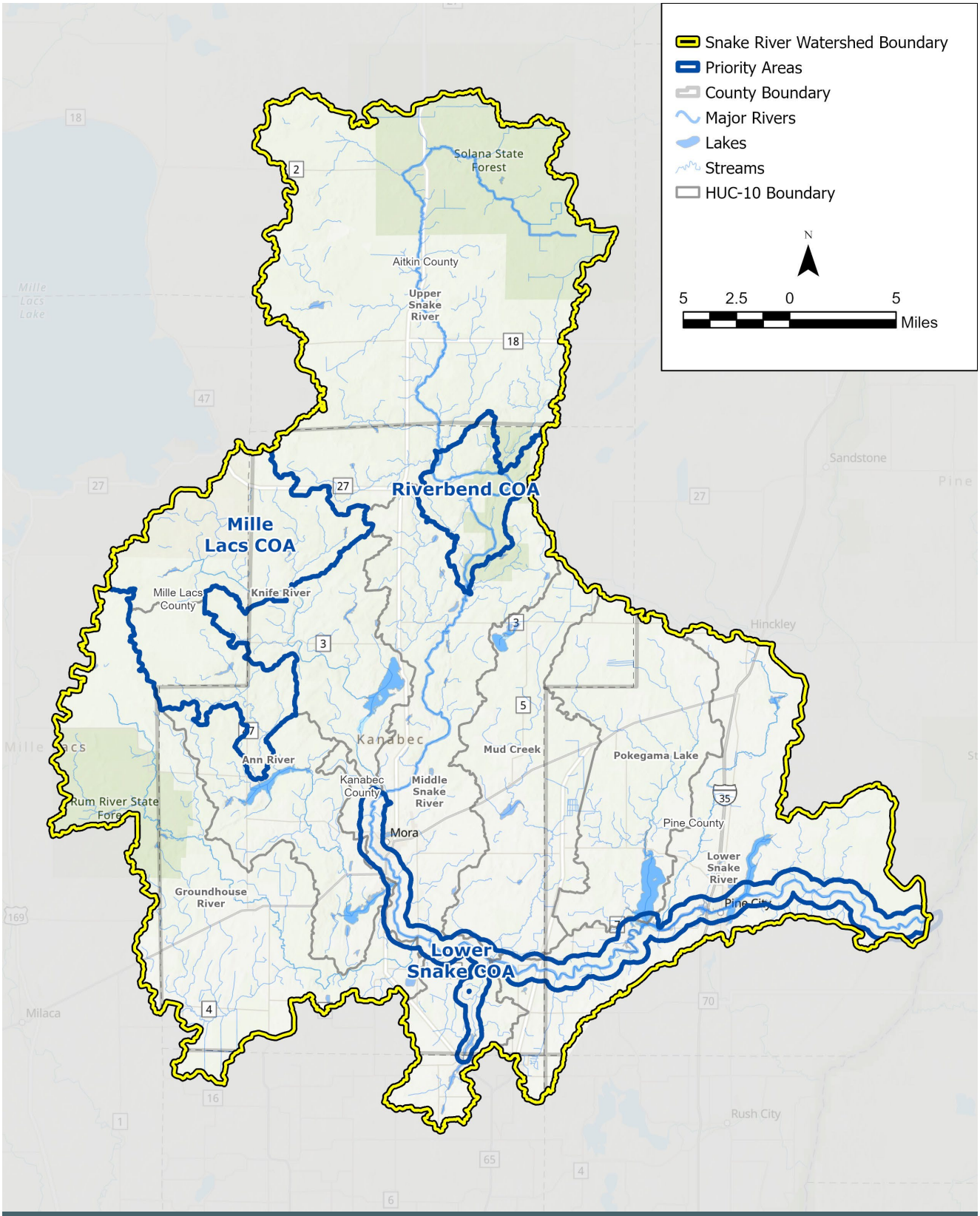


Figure 3-7. Land Cover & Use Goal 1: Priority Conservation Opportunity Areas (COAs) for land protection.

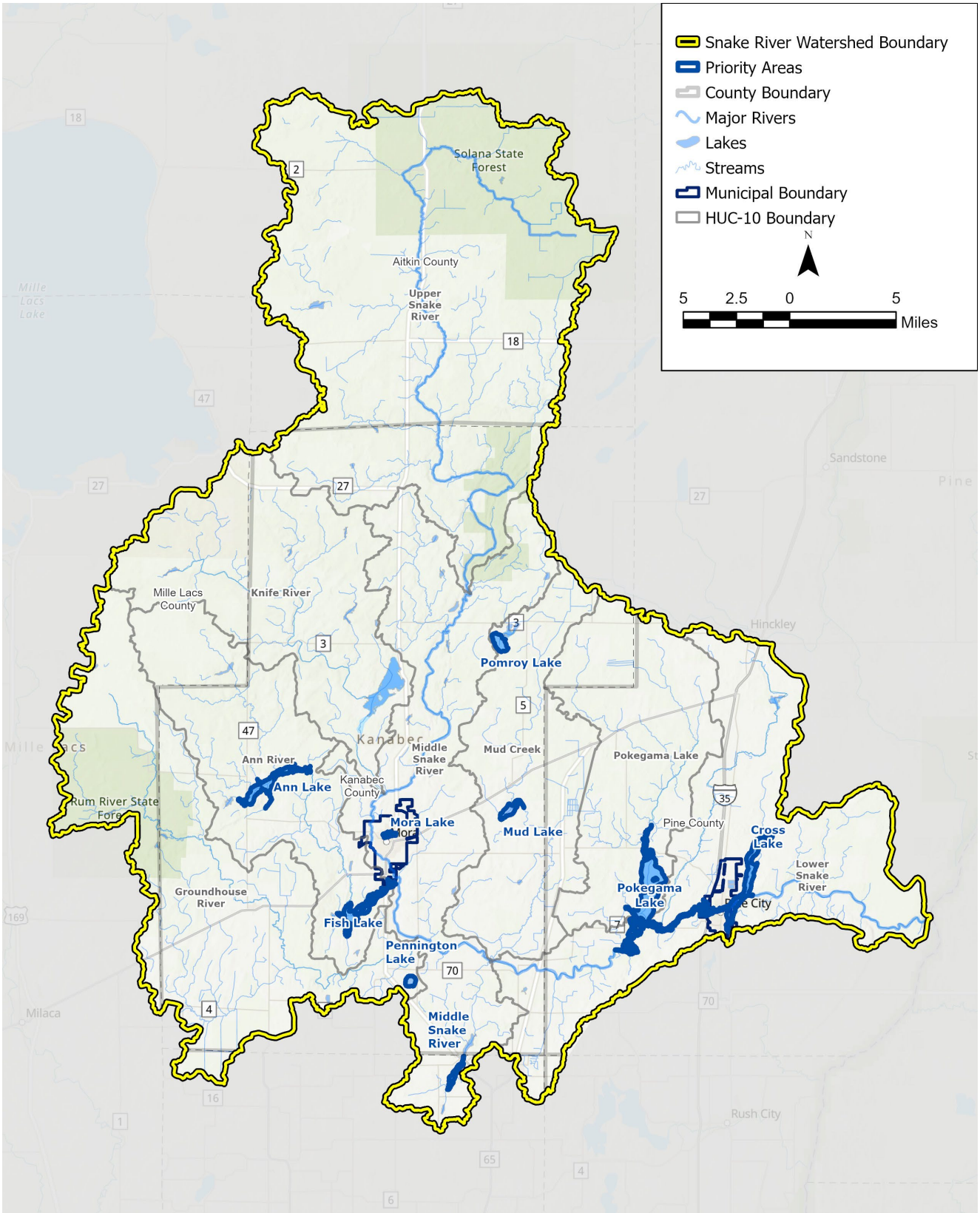


Figure 3-8. Land Cover & Use Goal 2: Priority shoreland and urban areas for stormwater practices.

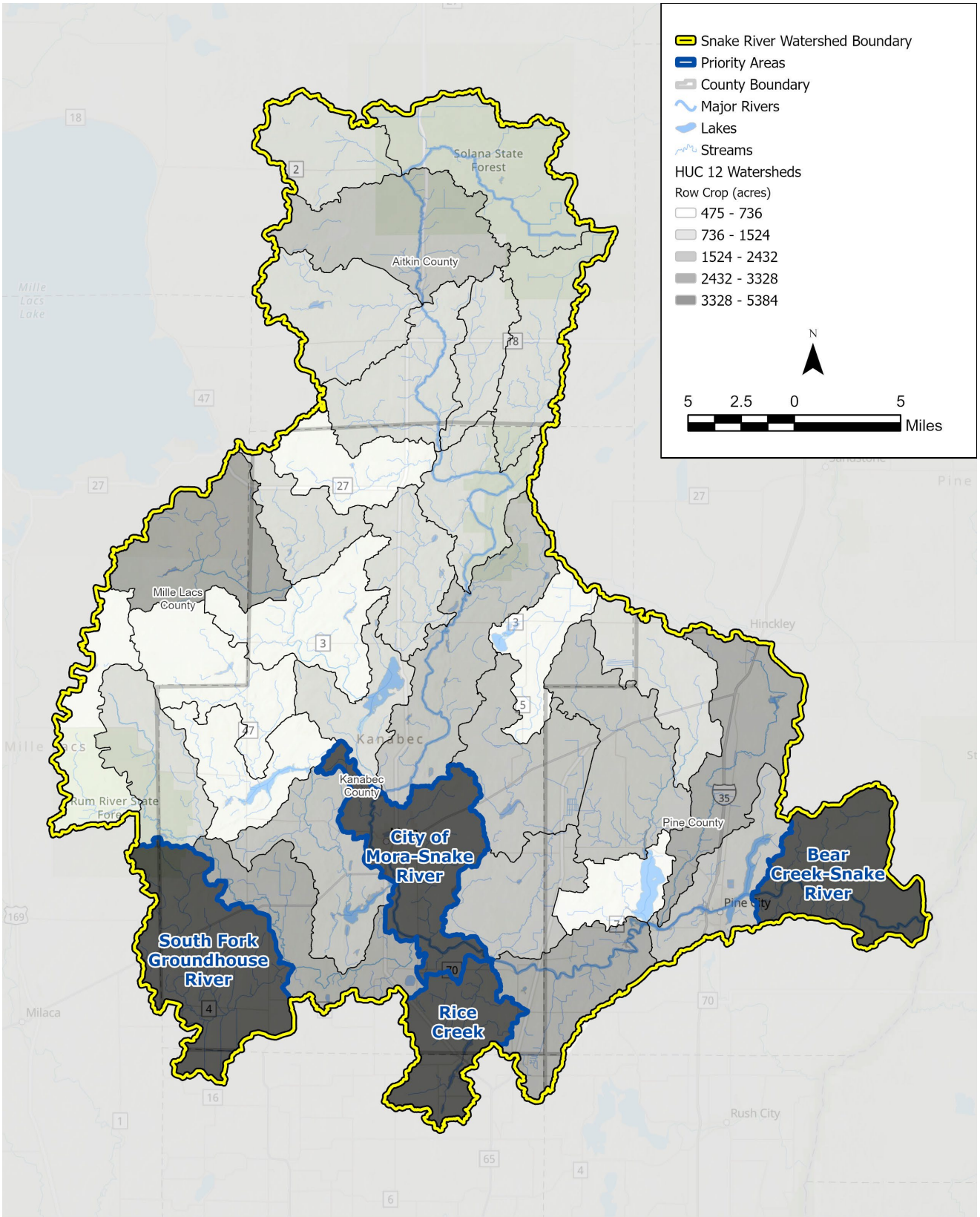


Figure 3-9. Land Cover & Use Goal 3: Priority areas for increasing continuous cover.

Table 3-5. Land Cover & Use Implementation Table.

Action ID	Action	Priority Area	Measurable output/outcome	Lead/Supporting Entities	2023–2024	2025–2026	2027–2028	2029–2030	2031–2032	Estimated Cost (Outside Funding Needed)
Land Cover Use—Goal 1: Increase protected acres by 5–10% in priority areas, with an eventual goal of 75% total protected acres in those priority areas										
LC-1	Complete stewardship plans on forest lands	Goal 1 Priority COAs (**Figure 3-7**)	5,000 acres planned	SWCDs	■	■	■	■	■	$329,500◈
LC-2	Implement forestry BMPs	Goal 1 Priority COAs (**Figure 3-7**)	800–1,000 acres of Forestry BMPs	DNR, SWCDs	■	■	■	■	■	$102,750◈
LC-3	Educate forest landowners on good forest management, protection practices, voluntary conservation easements and forest stewardship planning	Goal 1 Priority COAs (**Figure 3-7**)	30–50 contact hours	SWCDs	■	■	■	■	■	$52,750
LC-4	Update and amend ordinances to stay current with state mandates and local land use issues to promote good forest management for preservation of clean waters	Goal 1 Priority COAs (**Figure 3-7**)	0–2 ordinances passed	County	■	■	■	■	■	$10,000◈
LC-5	Increase number of voluntary conservation easements in priority areas and/or high-quality areas	Snake River shorelands	200–330 acres enrolled	SWCDs /BWSR	■					$717,500 [current funding Snake]✦
LC-6	Increase tree/shrub planting	Goal 1 Priority COAs (**Figure 3-7**)	600 acres reforested	SWCDs			■	■	■	$200,000◈
Land Cover Use—Goal 2: Improve watershed's stormwater control through robust planning and installation of 2–8 stormwater BMPs										
LC-7	Minimize stormwater generation from land use changes by educating residents	Cities without stormwater assessment reports (Pine City, McGrath, others)	10 contact hours	Communities / SWCDs		■	■	■		$40,000◈
LC-8	Install shoreland buffers, un-mowed buffers, buffer demonstrations, and rain gardens or similar urban BMPs	Goal 2 Priority Areas (**Figure 3-8)**	400–2,400 linear feet buffers installed, 2–6 rain gardens installed	SWCDs / City of Mora, Counties, SWCDs	■	■	■	■	■	$220,000◈
LC-9	Education and Outreach around stormwater and shoreland BMPs	Goal 2 Priority Areas (**Figure 3-8)** and McGrath	10–30 educational contact hours	SWCDs/ Communities	■	■	■	■	■	$40,000◈

KEY: ✦ Outside Funding Needed | ◈ Outside and WBIF Funding Needed

Action ID	Action	Priority Area	Measurable output/outcome	Lead/Supporting Entities	2023–2024	2025–2026	2027–2028	2029–2030	2031–2032	Estimated Cost (Outside Funding Needed)
LC-10	Increase stormwater BMP implementation to include both new development and/or redevelopment projects	Goal 2 Priority Areas (**Figure 3-8**)	450 lbs. TP reduced	Communities / Counties, SWCDs			■	■	■	$250,000◈
LC-11	Develop stormwater management plans including extreme weather resiliency provisions in cities without plans for future stormwater management	Cities without stormwater assessment reports (Pine City, McGrath, others)	2 stormwater assessment reports	Pine City, McGrath/ SWCDs		■	■	■		$50,000◈
Land Cover Use—Goal 3: Within already identified priority areas, implement BMPs to increase and improve continuous cover on 600 acres while partnering with other agencies and program										
LC-12	Increase continuous cover (perennials, trees, pasture, etc.)	Goal 1 Priority COAs (**Figure 3-7**) & Goal 3 Priority Watersheds (**Figure 3-9**)	600 acres of continuous cover planted	SWCDs		■	■	■	■	$100,000◈
LC-13	Outreach/education to landowners on benefits to increased continuous cover	Goal 1 Priority COAs (**Figure 3-7**) & Goal 3 Priority Watersheds (**Figure 3-9**)	20–30 contact hours of outreach	SWCD	■	■	■	■	■	$15,000◈

KEY: ✦ Outside Funding Needed | ◈ Outside and WBIF Funding Needed

3.3 SURFACE WATER QUANTITY

Issue Statement

Recent flooding events have led to increased impacts to communities and ecosystems in the watershed. Fluctuations in lake levels in particular have been extreme, leading to increases in shoreline erosion and damage to aquatic communities. Likewise, altered hydrology—especially when combined with extreme rainfall events—reduces the ability of water bodies to store water, leading to increased, earlier peak flows, as well as flash flooding and ponding of water beyond surface water bodies.

Two goals were developed to address the Surface Water Quantity Issue Statement (**Table 3-6**). Goals are focused on understanding water quantity issues and maintaining watershed storage.

Table 3-6. Surface Water Quantity Goals

Goal 1	Develop a report on flooding impacts and risk to property and infrastructure with a focus on the area between Mora and the St. Croix River.
Goal 2	Maintain existing watershed storage, as measured by Snake River flow (CFS) and adjusted for annual precipitation.

In discussing Surface Water Quality, the TAC relied heavily on precipitation trends identified in DNR watershed climate summaries, historic lake level data (DNR data), DNR Watershed Health Assessment Framework (WHAF) maps, BWSR's Bank Service Area 6 Compensation Planning Framework, and the DNR's Evaluation of Hydrologic Change report (draft 2021) to evaluate Surface Water Quantity goals and actions.

Altered waterbodies such as ditched streams and drained wetlands reduce the watershed's ability to retain and slow water. Increasing duration and frequency of rain events in recent years exacerbates the problem, resulting in increased pollutant runoff, erosion, and lake level bounce. The Snake River Watershed has many altered waterbodies (see **Figure 2-7**) and has experienced the impacts of reduced storage in recent years - a flood in 2018 impacted infrastructure across the watershed – but despite the number of altered waterbodies, the watershed remains resilient. The acreage of intact wetlands and forested land helps the watershed adjust to increased rainfall.

The Partnership recognized common flooding and lake level issues connected to the mainstem Snake River. The Snake River and connected water bodies from Mora to the confluence at the St. Croix River regularly experience flooding and high-water levels. To better understand the issue, the Partnership developed Goal 1. No map is provided for Goal 1.

The Evaluation of Hydrologic Change report used discharge data from the Snake River and precipitation data to evaluate trends in river discharge over time. The report identified the Snake River as a healthy watershed under increased pressure from development and increased frequency and duration of precipitation events. Based on these results, the Partnership wanted to focus efforts in the watershed on maintaining current storage levels as development of the watershed continues. Goal 2 was developed to address storage in the watershed. The Partnership intends to track progress on Goal 2 using discharge data, measured in cubic feet per second (CFS), from the United States Geological Survey (USGS) gage on the Snake River to calculate watershed storage on an annual basis in acre-feet. To prioritize areas for water storage projects under Goal 2, the Partnership

used data from BWSR. As part of the Bank Service Area 6 Compensation Planning Framework, priority wetland restoration areas were identified and are repurposed for Goal 2 (Figure 3-10). See Appendix D for details on BWSR's analysis of priority wetland restoration areas and a list of the weighted data used in the analysis.

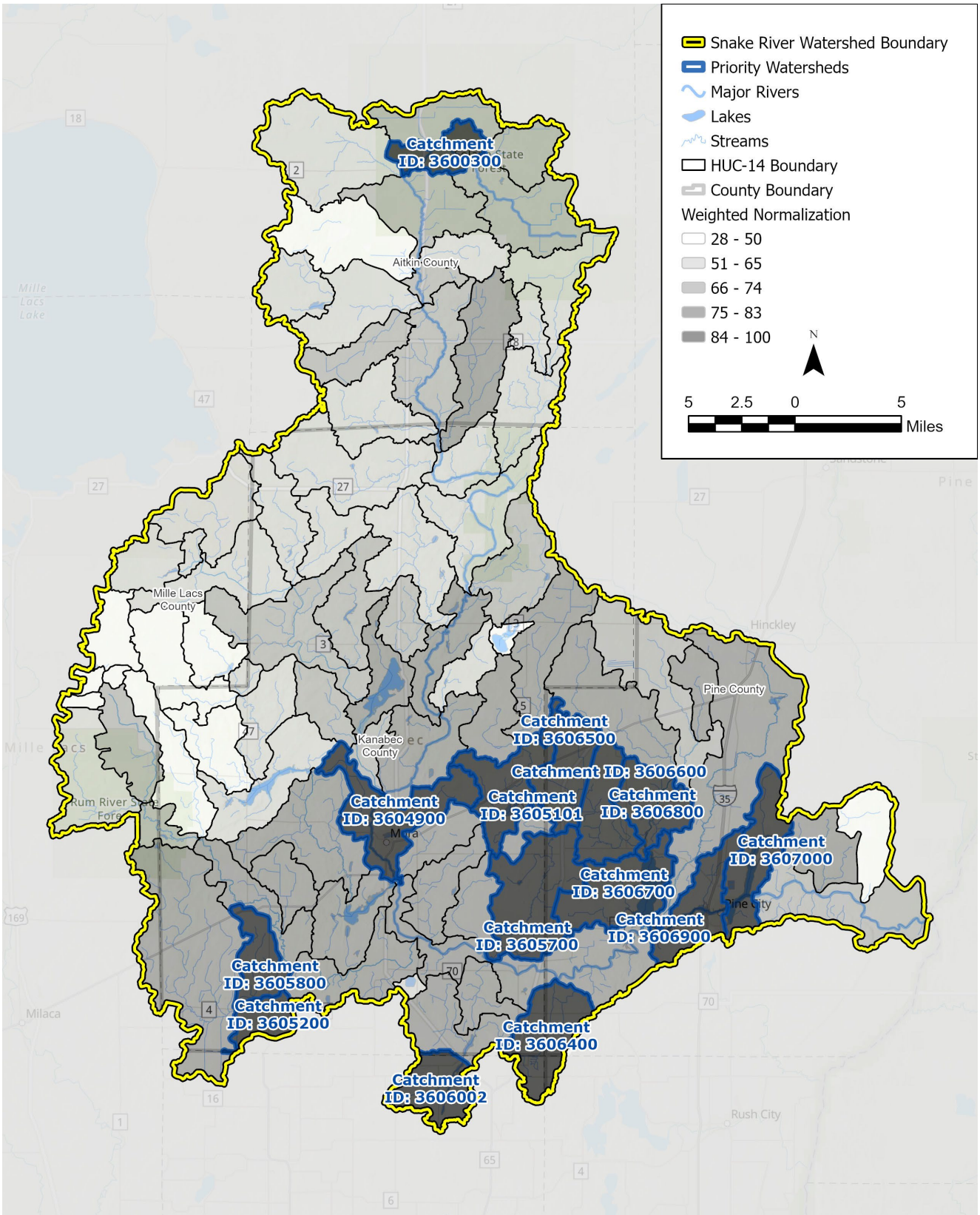


Figure 3-10. Surface Water Quantity Goal 2: Priority watersheds for maintaining current water storage.

Table 3-7. Surface Water Quantity Implementation Table.

Action ID	Action	Priority Area	Measurable output/outcome	Lead/Supporting Entities	2023–2024	2025–2026	2027–2028	2029–2030	2031–2032	Estimated Cost (Outside Funding Needed)
Water Quantity—Goal 1: Develop a report on flooding impacts and risk on property and infrastructure with a focus on the area between Mora and the St. Croix River										
SWQuan-1	Develop a report to investigate the flooding causes and impact areas between Mora and the Snake River's outlet with the St. Croix and provide outreach/education to the stakeholders on the report's results	Snake watershed, including Mora and downstream of Mora to the St. Croix River outlet; Landowners in this priority area (Fish, Pokegama, Cross; mainstem Snake River between Fish and Cross)	1 report completed, 10–20 contact hours in outreach/education	SWCDs, Counties/ LAs		■	■	■		$90,000
SWQuan-2	Complete updated FEMA flood mapping	Kanabec Co.	1 report completed	Kanabec Counties, DNR/ FEMA						$75,000✦
SWQuan-3	Update and amend policies to stay current with state mandates and local land use issues to support smart building within floodplain/flood prone areas	Fish, Pokegama, Cross Lakes; mainstem Snake River between Fish and Cross)	0–2 ordinances updated or written	Counties				■	■	$10,000
SWQuan-4	Establish permanent streamflow monitoring locations at outlets on the mainstem Snake River	Snake River mainstem	3–6 new hydrology monitoring sites	SWCDs	■					$50,000✦
Water Quantity—Goal 2: Maintain existing watershed storage, as measured by Snake River flow (CFS) and adjusted for annual precipitation.										
SWQuan-5	Implement water storage BMPs and/or restore/ enhance wetlands	Goal 2 Priority Watersheds (**Figure 3-10**)	5 acres restored (at least 5 wetland banking credits)	SWCDs/ Co. ditch staff—drainage authorities, DNR		■	■	■	■	$100,000✦
SWQuan-6	Increase wetlands restored and enrollment into wetland banking (BSA 6) as needed.	Goal 2 Priority Watersheds (**Figure 3-10**)	5 acres restored	WCA–LGU–TEP boards in each county	■	■	■	■	■	$100,000✦
SWQuan-7	Complete sub-watershed analysis to identify priority areas for the above actions.	Goal 2 Priority Watersheds (**Figure 3-10**)	1 report completed	SWCDs	■	■				$30,000
SWQuan-8	Install lake and stream shoreland restoration projects with a focus on retention and infiltration within the floodplain areas	Goal 2 Priority Watersheds (**Figure 3-10**)	2,500–5,000 ft of buffers (~26-50 projects)	SWCDs	■	■	■	■	■	$60,000

KEY: ✦ Outside Funding Needed | ◈ Outside and WBIF Funding Needed

20 Action ID	Action	Priority Area	Measurable output/outcome	Lead/Supporting Entities	2023–2024	2025–2026	2027–2028	2029–2030	2031–2032	Estimated Cost (Outside Funding Needed)
SWQuan-9	Research opportunities for multipurpose drainage as part of other projects and identify opportunities providing at least 5 acre-feet of storage	Goal 2 Priority Watersheds (**Figure 3-10**) and public ditches	1 report completed and restoration results listed in goal above, (part of 5-acre feet goal)	SWCDs, Co. ditch staff—drainage authorities/ DNR		■	■	■	■	$20,000
SWQuan-10	Update and amend policies to stay current with state mandates and local land use issues to encourage water retention/ storage/infiltration/ pervious surfaces.	Watershed-wide	0–2 ordinances updated	Counties	■	■	■	■	■	$10,000
SWQuan-11	Partner with agencies on the voluntary preservation/protection of intact wetland complexes	Goal 2 Priority Watersheds (**Figure 3-10**)	100 wetland acres protected (about 5 projects)	SWCDs/Counties, Partners (TNC, MN Land Trust, DNR, PF, USFWS)	■	■	■	■	■	$1,000,000✦
SWQuan-12	Increase education and coordination around water storage and/or wetland compliance	Watershed-wide	20–40 contact hours	Counties, SWCD	■	■	■	■	■	$20,000

KEY: ✦ Outside Funding Needed | ◈ Outside and WBIF Funding Needed

3.4 DRINKING WATER & GROUNDWATER

Issue Statement

Well testing in the watershed has shown increasing nitrate and arsenic levels, and there are concerns about quality. There is also concern from residents about whether drinking water supply will keep pace with increased demand. Additionally, surface water-groundwater interaction, especially as it relates to groundwater-dependent surface water bodies, needs to be better understood and managed.

Two goals were developed to address the Drinking Water & Groundwater Issue Area (Table 3-8). Goals are focused on preventing groundwater contamination through BMP implementation and education and outreach.

Table 3-8. Drinking Water & Groundwater Goals.

Goal 1	Prevent nitrate levels in groundwater from increasing.
Goal 2	Increase public entity understanding of groundwater trends and public understanding of contamination issues.

Drinking water and groundwater were identified as important issue areas during the planning process. Groundwater comprises 100% of the watershed's drinking water, yet public understanding of groundwater contamination issues in the watershed is unknown. The Snake River Watershed GRAPS (DNR 2020) and input from MDH and other stakeholders were key resources used for discussing drinking water and groundwater related issues in the watershed.

Through review of data presented in the GRAPS, the Partnership concluded that nitrate in groundwater was a key goal they wanted to pursue. They also identified increasing public understanding of groundwater issues was important. Concerns around drinking water quantity were first included in the issue statement and later removed due to the lack of current scientific evidence supporting drinking water quantity issues in the watershed. Future watershed planning and implementation efforts may consider including groundwater quantity goals as more data become available.

Priority locations for Drinking Water & Groundwater Goal 1 were identified through a HUC12 subwatershed analysis scoring each watershed by four layers related to nitrate contamination and health risks. These four layers are:

- Drinking water well density
- Feedlot density
- Pollution sensitivity of near surface materials
- Nitrate concentrations

Scores for each layer were combined in Figure 3-11. Subwatersheds with a high score may have high well or feedlot density, high sensitivity to pollution, or high nitrate concentrations. Subwatersheds with the two highest score classifications were chosen for prioritization under Goal 1. See Appendix E for individual maps that were used to score subwatersheds.

Drinking Water and Groundwater Goal 2 is a watershed-wide priority and no map is provided.

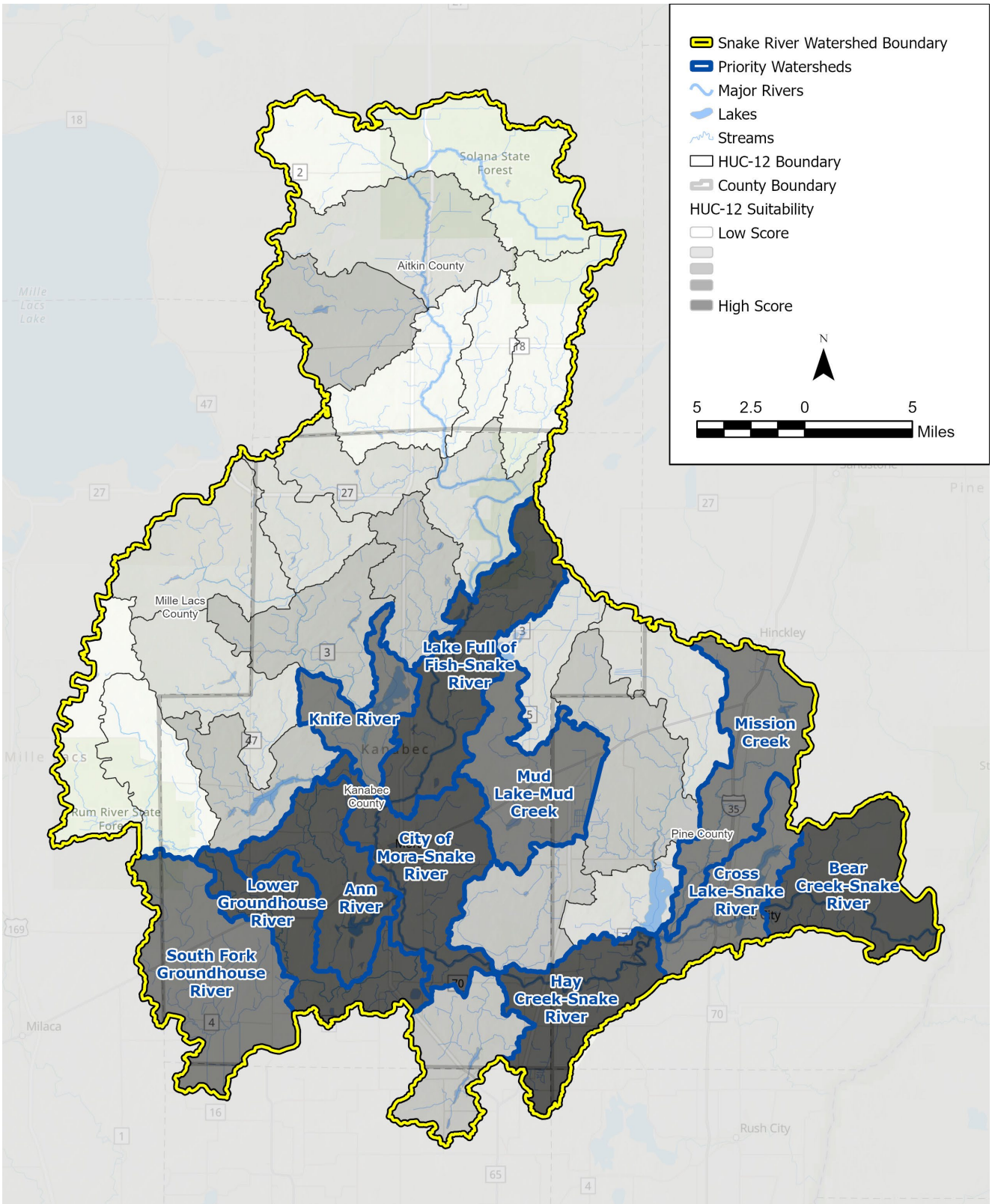


Figure 3-11. Drinking Water & Groundwater Goal 1: Priority watersheds for nitrate contamination prevention, identified through an analysis of geospatial data.

Table 3-9. Drinking Water & Groundwater Implementation Table.

Action ID	Action	Priority Area	Measurable output/outcome	Lead/Supporting Entities	2023–2024	2025–2026	2027–2028	2029–2030	2031–2032	Estimated Cost (Outside Funding Needed)
Groundwater — Goal 1: Prevent nitrate levels in groundwater from increasing										
GW-1	Complete Study to identify Recharge Areas. Prioritize Water Quality Improvements for BMP implementation within identified areas	Drinking Water and Groundwater Goal 1 Priority Watersheds (**Figure 3-11**)	1 study (2 components)	SWCDs		■				$25,000
GW-2	Implement livestock waste management BMPs to reduce nitrates, including but not limited to feedlot BMPs and manure pit closures	Drinking Water and Groundwater Goal 1 Priority Watersheds (**Figure 3-11**)	15–20 practices	NRCS / SWCDs			■	■	■	$1.5-2 million◈
GW-3	Implement non-structural BMPs to reduce nitrates in groundwater	Drinking Water and Groundwater Goal 1 Priority Watersheds (**Figure 3-11**)	15–20 practices	SWCDs / NRCS, MDA			■	■	■	$500,000◈
GW-4	Seal unused wells	Drinking Water and Groundwater Goal 1 Priority Watersheds (**Figure 3-11**)	15–25 wells sealed	SWCDs	■	■	■	■	■	$30,000-50,000◈
GW-5	Promote and increase external technical support for nutrient management and feedlot run-off projects	Watershed-wide	1–2 new certified plan writers in the watershed	K-SWCD / MDA		■	■			$5,000
GW-6	Increase education and outreach to producers to promote the implementation of nutrient management or its components	HUC12s with Highest Row Crop Acres (see Land Cover and Use Goal 3 (**Figure 3-9**) & Erosion, Soil, Health, and Soil Loss Goal 2 (**Figure 3-13**))	15–25 contact hours	SWCDs / MDA		■	■	■	■	$12,500◈
GW-7	Increase perennial vegetation or protection of priority lands to protect nitrates from entering our drinking water	Drinking Water and Groundwater Goal 1 Priority Watersheds (**Figure 3-11**)	25–100 acres planted	SWCDs / MDA		■	■	■	■	$50,000-200,000◈
GW-8	Assess ordinances in place and update as needed across jurisdictions to further protect groundwater connected features from future land use impacts for their long-term sustainability and use	Drinking Water and Groundwater Goal 1 Priority Watersheds (**Figure 3-11**)	Policy Committee Ordinance Recommendation to JPE	Counties		■	■	■	■	$5,000

GW-9	Promote septic upgrades to reduce excess nitrate in groundwater	Drinking Water and Groundwater Goal 1 Priority Watersheds (**Figure 3-11**), Shallow wells, Vulnerable DWSMAs	15–20 septic systems updated	Counties / SWCDs	■	■	■	■	■	$300,000◈

KEY: ✦ Outside Funding Needed | ◈ Outside and WBIF Funding Needed

Action ID	Action	Priority Area	Measurable output/outcome	Lead/Supporting Entities	2023–2024	2025–2026	2027–2028	2029–2030	2031–2032	Estimated Cost (Outside Funding Needed)
Groundwater — Goal 2: Increase public entity understanding of groundwater trends and public understanding of contamination issues										
GW-10	Provide information and more understanding for the general public on groundwater contamination issues including but not limited to: Pesticides, Chloride, Nitrate, Arsenic and CEC Promote roles for everyone to act.	Drinking Water and Groundwater Goal 1 Priority Watersheds (**Figure 3-11**), Floodplain Areas, Shallow Wells	10–30 contact hours outreach (events and individual meetings)	SWCDs			■	■	■	$75,000◈
GW-11	Outreach to communities to promote better understanding around DWSMAs	Communities w/ DWSMAs	3–5 (of 9) DWSMA public workshops, 30-40 contact hours of outreach	Communities / SWCDs			■	■	■	$80,000
GW-12	Continue Annual Private Well Testing, gather location data, share data with MDH for better targeting focus	Testing watershed-wide, Outreach focus on Drinking Water and Groundwater Goal 1 Priority Watersheds (**Figure 3-11**)	15–25 wells tested/ year; update location data annually	SWCDs, Counties / MDH, MDA's Nitrate Township Testing Program	■	■	■	■	■	$10,000✦
GW-13	Increase the social capacity of producers in reducing nitrate contribution to the watershed by developing a farmer-led council	HUC12s with Highest Row Crop Acres (see Land Cover and Use Goal 3 (**Figure 3-9**) & Erosion, Soil, Health, and Soil Loss Goal 2 (**Figure 3-13**))	1 farmer-led group formed and functioning; 20–40 contact hours of outreach	SWCDs		■	■	■	■	$30,000

KEY: ✦ Outside Funding Needed | ◈ Outside and WBIF Funding Needed

3.5 EROSION, SOIL HEALTH, & SOIL LOSS

Issue Statement

Overland and shoreline erosion is degrading aquatic habitat and water quality, and poor soil health management contributes to loss of soil and nutrients, as well as water and carbon storage capacity.

Two goals were developed to address the Erosion, Soil Health, & Soil Loss Issue Statement (**Table 3-10**). Goals are focused on protecting land from erosion and implementing BMPs that prevent erosion.

Table 3-10. Erosion, Soil Health & Soil Loss Goals.

Goal 1	Protect areas prone to erosion from continuous erosion by saving 750 tons of sediment from eroding over the 10-year plan.
Goal 2	Increase adoption of soil health practices in agricultural areas by 4,500 acres over the 10-year plan.

Eroding shorelines, streambanks, and agricultural lands emerged as priorities to be addressed under the Erosion, Soil Health, & Soil Loss issue Area. Sediment enters waterbodies in runoff, from bank erosion, and from erosion of overland soils and contributes to impairments and habitat stressors. The Partnership wanted to take preemptive steps to restore and protect areas with highly erodible soils to prevent the soil from being eroded into waterbodies through runoff, as well as shoreline areas with active erosion. The Partnership reviewed watershed sediment loads using the HSPF watershed model and land use data to evaluate priority areas to work in and ultimately chose to focus efforts in watersheds with the highest sediment loading (**Figure 3-12**) and the highest acreage of row crops (**Figure 3-13**).

A main implementation action under the Erosion, Soil Health, & Soil Loss issue is to provide education to landowners in priority areas with the highest row crop acres through peer-to-peer learning and educational events. Other actions included under this goal are BMP targeting through subwatershed analysis, structural and non-structural agricultural BMPs, and shoreline plantings. For the additional promotion of soil health practices; the Kanabec SWCD has 16 acres of cropland available on a 120 acre parcel for potential soil health or other conservation demonstrations or educational opportunities.

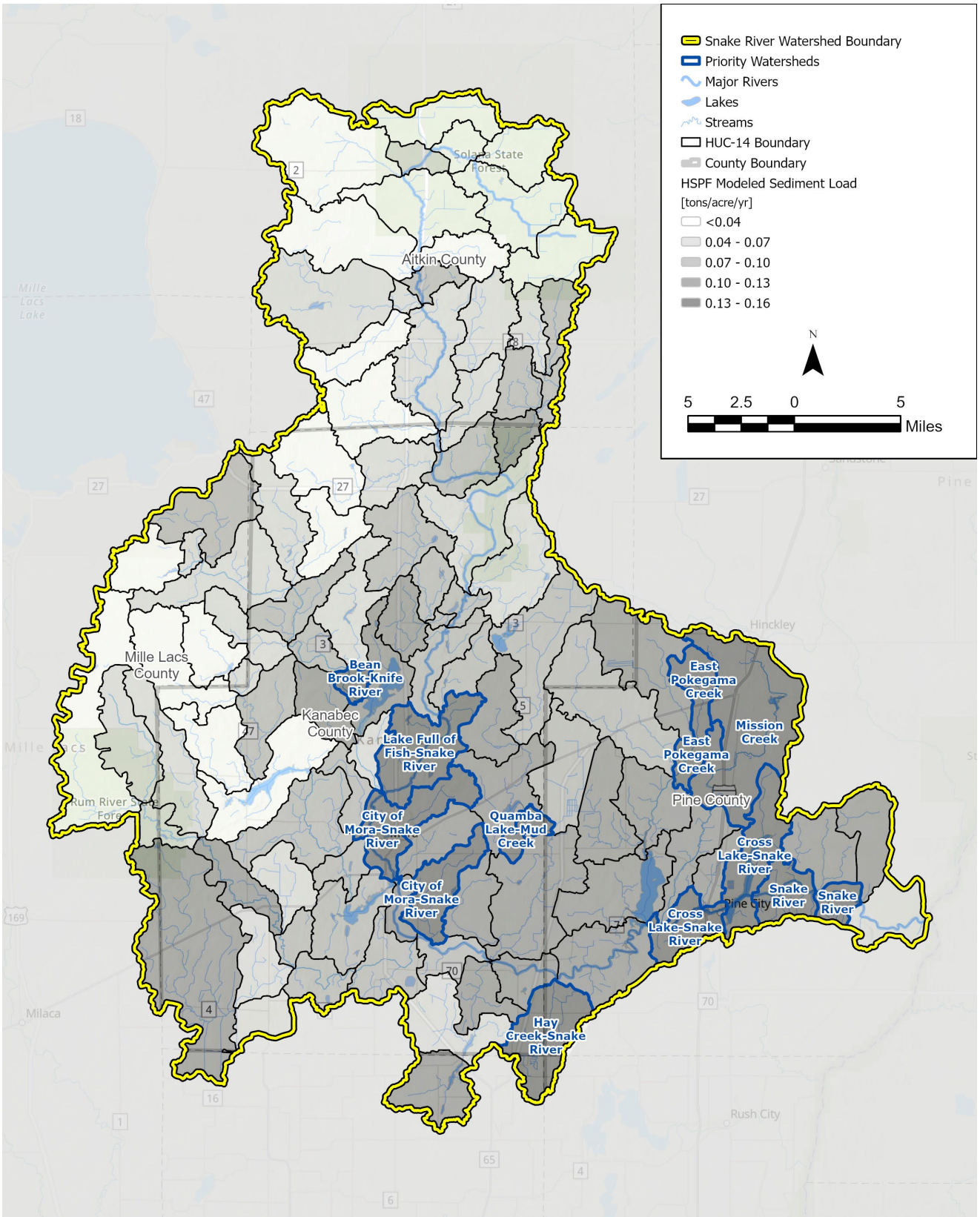


Figure 3-12. Erosion, Soil Health & Soil Loss Goal 1: Priority watersheds for protection from erosion.

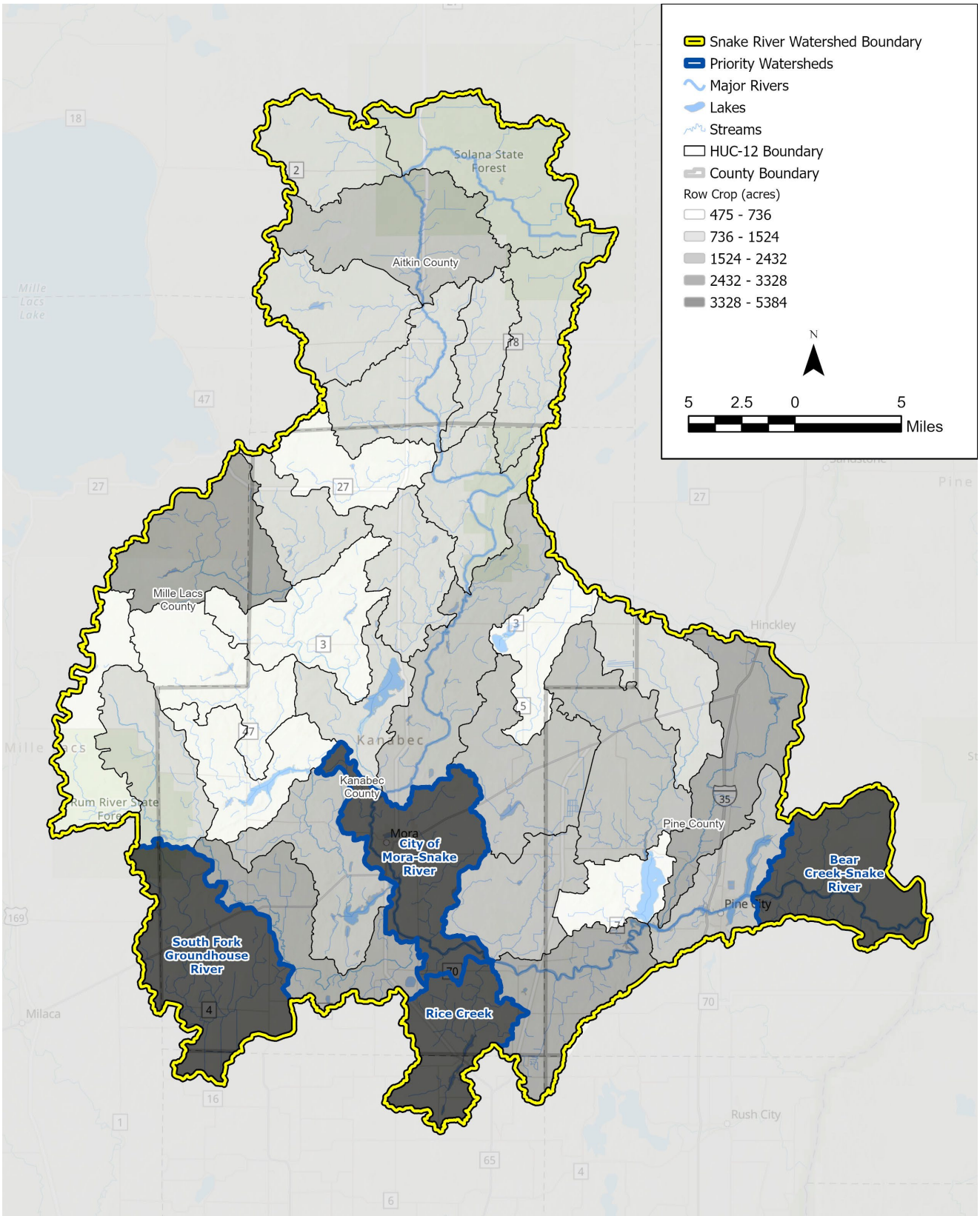


Figure 3-13. Erosion, Soil Health, & Soil Loss Goal 2: Priority watersheds for soil health practices.

Table 3-11. Erosion, Soil Health, & Soil Loss Implementation Table.

Action ID	Action	Priority Area	Measurable output/outcome	Lead/Supporting Entities	2023–2024	2025–2026	2027–2028	2029–2030	2031–2032	Estimated Cost (Outside Funding Needed)
Erosion—Goal 1: Protect areas prone to erosion from continuous erosion by saving 750 tons of sediment from eroding over the 10-year plan.										
E-1	Complete sub-watershed analysis to identify priority BMP locations	Goal 1 Priority Watersheds (**Figure 3-12**)	1 sub-watershed assessment completed	SWCDs	■	■		■		$15,000✧
E-2	Install or adopt 5–7 restoration/soil saving BMPs (shoreland buffers, forest riparian plantings, etc.)	Goal 1 Priority Watersheds (**Figure 3-12**)	TSS reduced by 750 T total	SWCDs	■	■	■	■	■	$85,000✧
E-3	Promote/educate around responsible shoreline (lakes and rivers) plantings/buffers/setbacks	Goal 1 Priority Watersheds (**Figure 3-12**)	30-50 contact hours in education/outreach	SWCDs	■	■	■	■	■	$25,000✧
Erosion—Goal 2: Increase adoption of soil health practices in agricultural areas by 4,500 acres over the 10-year plan.										
E-5	Complete subwatershed analysis to identify priority BMP locations	Goal 2 Priority Watersheds (**Figure 3-13**)	2–5 sub-watershed assessment completed	SWCDs	■	■				$30,000✧
E-6	Promote and install non-structural BMPs (i.e., cover crops, reduced tillage, prescribed grazing, etc.)	Goal 2 Priority Watersheds (**Figure 3-13**)	TSS reduced by 1,000 T total	SWCDs/ NRCS, MAWQCP, MDA	■	■	■	■	■	$50,000✧
E-7	Promote Soil Health Practices through outreach events and one-on-one meetings	Goal 2 Priority Watersheds (**Figure 3-13**)	20–30 contact hours, 1–2 soil health demos	SWCDs/ NRCS, MAWQCP, MDA, UMN MOSH	■	■	■	■	■	$500,000✧
E-8	Increase peer-to-peer learning opportunities	Goal 2 Priority Watersheds (**Figure 3-13**)	20–50 contact hours	SWCDs /NRCS, MAWQCP, MDA		■	■	■	■	$50,000✧

KEY: ✦ Outside Funding Needed | ✧ Outside and WBIF Funding Needed

3.6 HABITAT

Issue Statement

High quality habitats and key ecological corridors should be protected or restored to maintain and improve connectivity, as well as support healthy upland and wetland ecosystems. Healthy aquatic habitats, especially for sensitive species, also need to be protected and restored. For both, invasive species threaten water quality, sensitive species, desired ecosystems, quality of life, and local economies.

Three goals were developed to address the Habitat Issue Statement (**Table 3-12**). Goals are focused on preventing the spread of AIS and protecting important aquatic and riparian habitats.

Table 3-12. Habitat Goals.

Goal 1	Maintain or increase vigilance against continued spread of AIS and terrestrial invasive species.
Goal 2	Protect in-stream habitat and maintain or improve habitat connectivity by maintaining or improving fish and macroinvertebrate IBI scores.
Goal 3	Increase protection of river riparian areas through land protection on 330 acres.

The Snake River Watershed supports many high-value, native terrestrial and aquatic species, including a diverse mussel community in the Snake River, sturgeon, and the endangered butternut tree. Human alteration, invasive species, and other factors like extreme weather threaten the diversity and quality of terrestrial and aquatic habitats in the watershed. Protection and improvement of high-quality habitats for valued species emerged as a priority of the Partnership. The Partnership reviewed DNR maps and data, including WHAF data such as watershed mussel scores, biodiversity quality, and areas of biodiversity significance. The Partnership decided to use the WHAF Terrestrial Habitat Quality score as an indicator of high-quality habitats for Plan administration. See the glossary for more detail on Terrestrial Habitat Quality scores. Fish and macroinvertebrate Index of Biological Integrity (IBI) scores collected by the MPCA to identify impairments were reviewed. The Snake River Watershed LSP was a key document used to identify areas for protection.

Implementation actions under the Habitat goals include planning and responding to invasive species, stream reconnection and restoration, and increasing the cover of native vegetation, particularly in riparian areas. The Partnership agreed that tackling an issue as widespread as invasive species under Goal 1 would require watershed-wide understanding and cooperation, thus education and outreach is a main action. There is no map for Goal 1.

Priority streams for habitat protection under Goal 2 are shown in **Figure 3-14**. Streams and rivers in this figure were chosen based on biological impairments or because of their known recreational value. For example, Mission Creek is impaired for Fish IBI and is a high value stream because it is the only cold-water stream in the watershed.

The Lower Snake COA priority area under Goal 3 is shown in **Figure 3-15**. The LSP referenced in **Section 3.2 Land Cover & Use** identified priority COAs and private parcels within each area for protection (see **Figure 3-7**). The Lower Snake COA area is repurposed for Habitat Goal 3. Goal 3 is focused on protection of the Lower Snake riparian areas. This plan considers protected lands to include public/tribal land, public waters, wetlands, easements, and SFIA lands.

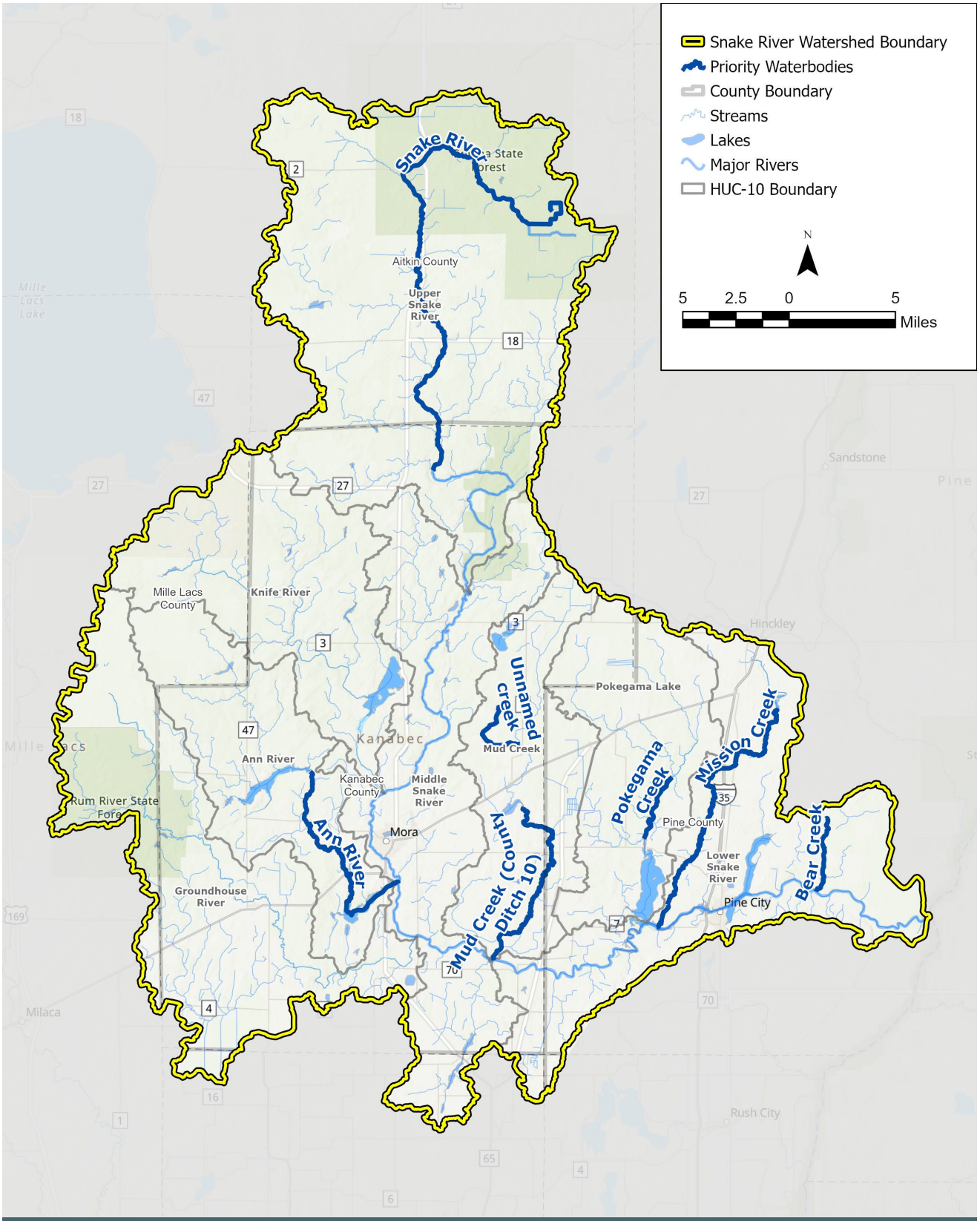


Figure 3-14. Habitat Goal 2: Priority streams for habitat improvements.

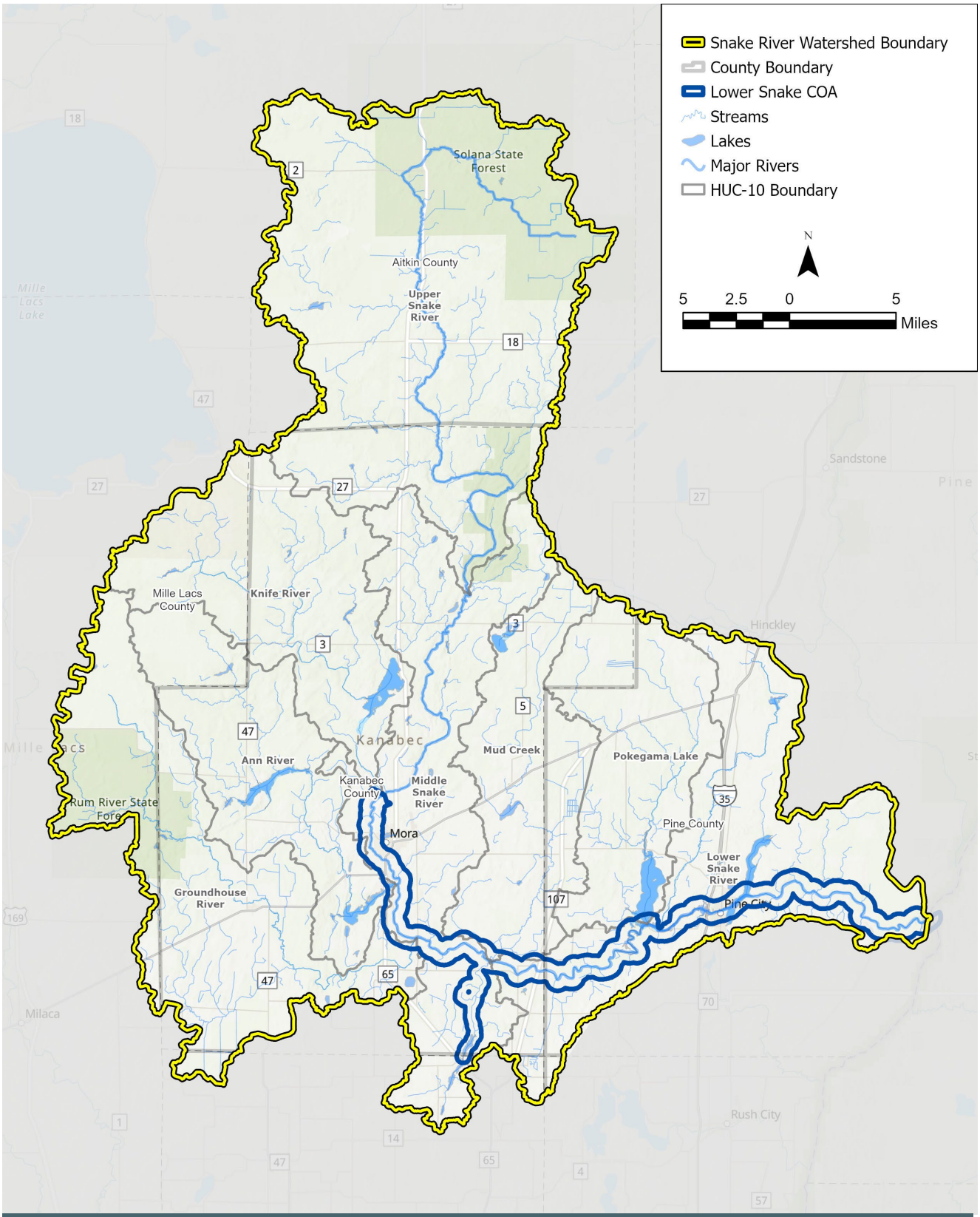


Figure 3-15. Habitat Goal 3. Priority area (Lower Snake COA) for riparian protection.

Table 3-13. Habitat Implementation Table.

Action ID	Action	Priority Area	Measurable output/outcome	Lead/Supporting Entities	2023–2024	2025–2026	2027–2028	2029–2030	2031–2032	Estimated Cost (Outside Funding Needed)
Habitat—Goal 1: Maintain or increase vigilance against continued spread of AIS and terrestrial invasive species										
H-1	Continue annual management of aquatic invasive species	Watershed-wide	100 contact hours, 4 boat inspectors per year, 2–5 lake or stream surveys	AIS LGU staff/ LA	■	■	■	■	■	$100,000✦
H-2	Increase educational opportunities to promote better understanding around native vs. invasive aquatic vegetation and the benefits of native vegetation	Knife Lake	10–30 contact hours	KSWCD	■		■			$15,000
H-3	Complete AIS management plans and/or surveys	Watershed-wide	2–7 plans and/or surveys completed	SWCD			■	■	■	$40,000
H-4	Compare AIS Plans and look for watershed wide collaboration opportunities	Watershed-wide	Comparison study with recommendations for collaboration	AIS LGU staff		■	■			$7,000
H-5	Increase educational opportunities to promote terrestrial invasive species control	Watershed-wide	20–50 contact hours	SWCDs		■	■	■	■	$25,000✦
H-6	Develop Rapid Response Plans for aquatic and terrestrial invasive species	Watershed-wide plans and/or water body specific	Complete 2–5 rapid response plans	SWCDs, AIS LGU staff		■	■	■	■	$40,000✦
H-7	Investigate and start a watershed-wide Cooperative Terrestrial Weed Management Group		Complete investigation	SWCDs			■	■		$20,000✦
Habitat—Goal 2: Protect in-stream habitat and maintain or improve habitat connectivity by maintaining or improving fish and macroinvertebrate IBI scores										
H-8	Carry out dams and culverts inventory, where incomplete	Goal 2 Priority Streams (**Figure 3-14**)	1–4 surveys completed in priority areas	SWCD/ DNR	■	■				$15,000⟐

KEY: ✦ Outside Funding Needed | ⟐ Outside and WBIF Funding Needed

Action ID	Action	Priority Area	Measurable output/outcome	Lead/Supporting Entities	2023–2024	2025–2026	2027–2028	2029–2030	2031–2032	Estimated Cost (Outside Funding Needed)
H-9	Reconnect streams by removing barriers created by culverts (undersized, perched, misaligned) (assist townships, private landowners and other road authorities with culvert/road projects by providing technical assistance and funding)	Goal 2 Priority Streams (**Figure 3-14**)	1–4 culvert barriers replaced	DNR/ SWCDs, Trout Unlimited, Road Authorities	■		■	■	■	$2,500–100,000◈ depending on size/material
H-10	Research opportunities of multipurpose drainage management as part of other projects	Public ditch system	1 report completed	SWCD/ DNR, UMN		■		■		$20,000◈
H-11	Provide education/outreach around dam/ culvert improvements (for improved hydrology and fish passage) to townships or other authority on culvert replacements	Townships within the priority area—DNR partner training	1 informational meeting—all annual township mtg. [Kanabec]	KSWCD/ K-Co, DNR		■		■		$10,000◈
H-12	Complete stream restoration projects	Goal 2 Priority Streams (**Figure 3-14**)	1–2 stream restorations	SWCDs, DNR		■	■	■	■	$250,000◈
H-13	Complete feasibility studies for stream restoration projects	Goal 2 Priority Streams (**Figure 3-14**)	1–2 feasibility studies	SWCDs/ Counties, DNR Fisheries	■	■	■			$35–70,000◈
H-14	Supplement BMP installations with native vegetation for habitat improvement	Goal 2 Priority Streams (**Figure 3-14**)	2–5 plantings	SWCDs	■	■	■	■	■	$50,000
Habitat—Goal 3: Increase protection of stream riparian areas through land protection on 330 acres										
H-15	Promote and enroll high quality lands into Voluntary Conservation Easements or other state incentive programs	As directed by technical panel, Goal 3 Priority COA (**Figure 3-15**)	200-330 acres	SWCDs/ BWSR, NRCS	■					$800,000◈
H-16	Update and amend policies to stay current with state mandates and local land use issues	Goal 3 Priority COA (**Figure 3-15**)	0–4 policies updated and/or amended	county		■	■	■	■	$35,000◈

KEY: ✦ Outside Funding Needed | ◈ Outside and WBIF Funding Needed

Action ID	Action	Priority Area	Measurable output/outcome	Lead/Supporting Entities	2023–2024	2025–2026	2027–2028	2029–2030	2031–2032	Estimated Cost (Outside Funding Needed)
H-17	Increase native vegetation cover in riparian areas	Goal 3 Priority COA (**Figure 3-15**)	2–5 acres planted	SWCDs	■	■	■	■	■	$120,000◈
H-18	Educate landowners on the benefits of native vegetation	Goal 3 Priority COA (**Figure 3-15**)	2 educational documents produced and disseminated	SWCDs	■	■	■	■	■	$75,000◈
H-19	Implement 10 stream restoration and channel stabilization projects	Goal 3 Priority COA (**Figure 3-15**)	10 projects completed	SWCDs				■	■	$50,000◈

KEY: ✦ Outside Funding Needed | ◈ Outside and WBIF Funding Needed

3.7 EXTREME WEATHER

Issue Statement

Extreme weather is leading to warming temperatures and more extreme precipitation events and drought in and around the watershed. This will continue to lead to a shifting of habitat zones as well as amplification of other issues in the watershed.

One goal was developed to address the Extreme Weather Issue Statement (**Table 3-14**). The goal is focused on increasing education on extreme weather in the watershed.

Table 3-14. Extreme Weather Goal.

Goal 1	Engage with LGUs, partners, and the public to inform everyone about how extreme weather will affect the Snake River watershed and to understand how we can plan for those changes while improving the stability of implementation projects.

Minnesota is experiencing the impacts of extreme weather and the impacts are felt on a local scale too. The Partnership reviewed data on land use, watershed resiliency (Landscape Stewardship Plan), HSPF models, flood risk, and the 2020 State Water Plan to identify areas and actions to tackle Extreme Weather goals. Goal 1 was developed as the Partnership recognized an opportunity to increase extreme weather literacy across the watershed, including within LGUs, their partners, and the public. Goal 1 does not have a geographic priority area and is instead prioritized for LGUs, then partners, then the public.

The Partnership used the following definitions of adaptation and resilience to guide discussions of extreme weather in the watershed:

Resilience	Adaptation
"Ability to anticipate, prepare for, and respond to hazardous events, trends, or disturbances related to climate (Center for Climate and Energy Solutions)."	"Even if we stopped emitting greenhouse gas, enough is in the atmosphere to change climate for potentially decades to come (Impakter)."
"Climate-proofing our economic and social systems for the future (UN Climate Change conference 2017-18)."	"Taking steps to live with the effects of global warming (UN Climate Change conference 2017-18)."

Extreme weather was identified and is maintained as a separate issue area in this plan; however, the Partnership acknowledged that extreme weather will have an impact on many aspects of the watershed. Factoring changes in precipitation and warming temperatures into all issues will be key to maintaining watershed resiliency across all issue areas in the face of extreme weather.

During plan implementation, the Partnership would like to consider extreme weather for all implementation actions, particularly:

- Habitat projects, especially those that encourage native, resilient tree growth in the watershed
- Shoreline projects, especially those that encourage native, resilient tree and plant growth

- Water quantity projects, especially those that consider lake level bounce and direct impacts to homeowners
- Water quality projects, especially those that may be impacted by extreme weather like longer summer growing seasons or reduced duration of ice cover.

Table 3-15. Extreme Weather Implementation Table.

Action ID	Action	Priority Area	Measurable output/outcome	Lead/Supporting Entities	2023–2024	2025–2026	2027–2028	2029–2030	2031–2032	Estimated Cost (Outside Funding Needed)
Extreme Weather—Goal 1: Engage with LGUs, partners, and public to inform everyone around how extreme weather will affect the Snake River Watershed to understand how we can plan for those changes and increase stability of implementation and projects										
EW-1	Increase education on Extreme Weather within our Watershed Partnership and with our external partners and the public	LGUs, Partners, Public	LGUs attend 8–15 education events on Extreme Weather and share info with partners; 30–60 contact hours	SWCDs/ Counties & Boards, CAC	■	■	■	■	■	$40,000

4.0 Looking Forward

Some issues discussed during the planning process did not have sufficient data to be included in the plan; however, the State and partners are constantly collecting and evaluating new data. To keep up with changes in data availability, the Partnership identified a few items to check in on during implementation of the Plan.

Table 4-1. 5-Year check-in reminders for items that did not have sufficient data at the time of plan publication.

Issue Area	5-Year Check-in
Surface Water Quality	• If *E. coli* source tracking data has been collected by State agencies, use that information to inform BMP adoption.
Drinking Water & Groundwater	• Investigate if the DNR or MDH has released any new information on groundwater quantity issues in the State or watershed? If so, consider amending plan actions to cover groundwater quantity.
Extreme Weather	• Revisit options for implementation actions to address Extreme Weather. Some suggestions may include actions to address flooding impacts, wetland restoration, water storage, soil health practices, plant trees/perennials or small community funding opportunities for creating resiliency against extreme weather.
All areas	• Review work completed under Plan in Years 1-5. Use experiences to adjust work plans for Years 6-10. • During implementation the partnership will plan to discuss the best local examples of land control use available to protect the healthy resources in the Snake River Watershed. • Review the Plan's population and income watershed distribution data for the inclusion of more details to aid in equal outreach/implementation efforts

During implementation, the Partnership will plan to do the following, as suggested recommendations on the plan:

- Early focus on staff capacity to ensure robust goal implementation
- Plan to discuss the best local examples of land control use available to protect the healthy resources in the Snake River Watershed
- For Erosion Action E-5 or for other BMP sub-watershed analysis' consider using targeting tools such as PTM App and ACPF when available for targeting and siting BMPs at the field scale for effective environmental and economic impacts. MDA can provide technical support.
- Bring in topical experts to support implementation efforts
- Reach out to the USFWS as a partner for wetland restoration projects
- Review the policy for incentives on soil health practices to possibly increase the payment rate for those certified through the MAWQCP

- Evaluate the opportunity in Mora for 2023 for promoting smarter development around the south side of Mora Lake with the old high school being torn down and sold off for residential lots
- Review cost-benefit analysis ahead of large project implementation, including capital improvement projects
- Sometime mid-plan spend time addressing concerns over staff retention and continuity of our plan with turnover of staff and boards
- Revisit Section 6.8 of the plan on assessment, evaluation, and reporting to ensure this is discussed and a plan put in place to tackle these items.

5.0 Plan Implementation Programs

The following section will provide an overview of existing and new programs that support the Plan's implementation actions and are necessary to ensure that the Plan's goals are accomplished. Only the participating counties programs are included (Aitkin County, Kanabec County, Mille Lacs County, and Pine County).

5.1 INCENTIVE PROGRAMS

Incentive programs encourage community stakeholders to implement the Plan's strategies, such as adopting conservation practices and changing certain behaviors. Many incentive programs include financial or technical assistance to assist willing people to adopt or continue conservation practices.

5.1.1 Cost Share

In a cost-share program, state, local, or federal governments share costs with landowners and residents who are implementing practices designed to protect and improve water quality, groundwater, habitat, forest health, and soil-and-water resources. The following cost share programs assist landowners in three broad areas: agriculture, forested areas, and lakes.

Minnesota Agriculture Water Quality Certification Program (MAWQCP)

The Minnesota Department of Agriculture (MDA) administers the Minnesota Agricultural Water Quality Certification Program (MAWQCP). MAWQCP increases acceptance and implementation of BMPs on farms that can protect Minnesota's waters through providing technical and financial assistance to producers. MAWQCP prioritizes grants and technical assistance for producers seeking certification, and once certified, producers can obtain regulatory certainty for ten years. Within the Snake River Watershed, producers enroll in MAWQCP to carry out nutrient management practices, livestock practices (e.g., waste management, fencing and alternative watering supply), grazing plans, maintenance of healthy native vegetation on shoreland and riparian areas, and other similar agrarian conservation practices. In some counties, MAWQCP collaborates with local government staff, such as Pine County's Agricultural Technician and SWCD, to more effectively recruit and support producers. Looking forward, multiple counties in the watershed would like to see an expansion of MAWQCP participation and funding through Watershed Based Implementation Funding (WBIF) focused on agriculture BMPs for erosion and livestock management.

Environmental Quality Incentives Program (EQIP)

The United States Department of Agriculture's Natural Resource Conservation Service (NRCS) often works closely with counties and other local government units to administer the Environmental Quality Incentives Program (EQIP). EQIP offers financial incentives and individualized support to producers and non-industrial forest managers carrying out conservation practices that protect water quality, increase soil health, reduce soil erosion and sedimentation, improve wildlife habitat, and other environmental benefits. Examples of these conservation practices include cover crops, prescribed grazing, irrigation, and forest stand improvements. Within the Snake River Watershed, EQIP funding is already helping residents practice cover crops, tillage management, erosion control measures for shorelines and riparian areas, encouraging cultivation of native plants, and other conservation practices. Looking forward, Kanabec County and other counties hope that with the hiring of more SWCD staff members, these new staff members will enable NRCS and EQIP funds to reach out to even more residents interested in carrying out nutrient management plans, erosion control, and

other conservation practices. Counties note that feedlot and manure storage projects are very expensive, and they usually redirect this work to NRCS. NRCS's capacity to carry out feedlot and manure storage technical assistance is also currently limited due to funding constraints.

Reinvest in Minnesota (RIM) Reserve Program

BWSR works with county SWCDs to administer the Reinvest in Minnesota (RIM) Reserve program (*Minnesota Statutes* 2021, section 84.95). The RIM Reserve program is intended to protect marginal agricultural land and improve these lands' soil health and water health by focusing on increasing permanent wetland restoration, native grassland, wildlife habitat complexes, and permanent riparian buffers. The RIM Reserve program compensates landowners for enrolling land in conservation easements and protecting lands that are highly erodible, environmentally sensitive, in flood-prone areas, or home to native vegetation habitats. BWSR and SWCDs support protection, restoration, and management of these critical lands, while keeping these lands in private ownership with landowners responsible for maintaining them and paying applicable real estate taxes and assessments.

Kanabec County, Mille Lacs County, and Pine County are all participating in the RIM Reserve program, and in Pine County, their Pheasants Forever wildlife biologist is running the RIM Reserve program.

Conservation Reserve Program

The NRCS has another program that county staff are interested in but have not seen high rates of participation yet in the watershed. This is the Conservation Reserve Program (CRP), program producers voluntarily enter and then are financially compensated for converting some of their environmentally sensitive farmland into conservation cover for ten-to-fifteen-year contracts. Both Pine County and Kanabec County have identified that the lower rates of compensation in this watershed might be causing lower participation in CRP. One future avenue to explore is how to increase CRP rates to make CRP more competitive and appealing to producers. Current CRP work in this watershed includes the Pheasants Forever Farm Bill Biologist partnership position in Pine County that enhances wildlife habitat and conservation efforts.

DNR Forestry Cost-Share Programs

The DNR's Forestry Division supports private forested landowners adopting conservation practices by providing education, technical assistance, cost-share programs, and drafting of forest stewardship plans that help landowners keep their woods healthy for the future. Examples of cost-share programs that the DNR carries out include:

- *Minnesota Statutes* 2021, section 88.79 which empowers the Forestry Division to provide up to 75% of the actual cost of the conservation practice for forested landowners with less than 5000 acres.
- *Minnesota Statutes* 2021, section 290C which covers SFIA for forested lands that are at least 20 contiguous acres. The DNR here provides financial incentives for forested land covered by a stewardship plan prepared by a DNR-approved plan writer. Landowners choose different agreements that keeps enrolled land under SFIA for 8, 20, or 50 years.

Other landowners following a forest management plan may opt instead to pay reduced property taxes, or 0.65% of the worth of eligible land, by qualifying as a Class 2c Managed Forest Classification. Counties' assessor offices administer this classification for properties with 20 acres or more. Within the watershed, some counties and SWCDs (e.g., Pine and Aitkin) employ in-house foresters, who can write forest stewardship plans for private landowners and work with landowners

to renew stewardship plans that are expiring. Pine County SWCD sought a grant to start this forestry program and hire a forester. Other counties, like Kanabec, rely on DNR staff and private sector foresters to help write stewardship plans and offer general forestry assistance. Looking forward, Aitkin County is seeking more part-time forester positions to be filled. These new staff will help landowners in the Snake River Watershed and eastern Aitkin County. A goal of this plan is to fund more forestry technicians to help their residents. Finally, residents would like to see if the Partnership would explore creative ways to help cover forested landowners owning less than 20 contiguous acres. There is currently a gap in financial and individualized technical assistance offered to landowners that fail to meet this threshold. Incidentally, there are also forest stewardship opportunities that are not cost-share programs. One example is the Forest Stewardship Council's Forest Certification Program previously administered by Aitkin County SWCD. Enrollment in this program meant customers were aware that wood products from these private landowners follow good forest stewardship, and thus, could increase market interest and demand for them.

COMPASS

COMPASS is an active community of people dedicated to protecting the overall health of Mille Lacs Lake. The COMPASS program is implemented by the Mille Lacs and Aitkin SWCDs in collaboration with the Mille Lacs Lake Watershed Management Group. SWCD staff and property owners work together to create lake stewardship plans, free of cost to the property owner. Compass membership is voluntary, and participants get recognized for their conservation role and best management practices. Plans may include proposed projects that promote lake health like installing rain barrels, designing rain gardens, or planting shoreline buffers with native plants to help filter runoff and control erosion. Besides technical assistance, this program has some grant funds that may cover up to 75% of project costs.

Miscellaneous Cost-Share Supports

Minnesota Statutes 2021, section 103C.501 empowers BWSR to allocate cost-sharing funds for conservation practices addressing erosion, sedimentation, water quality problems, or water quantity problems due to altered hydrology. BWSR grants these funds to SWCDs that then provide financial assistance to help landowners and residents adopt new conservation practices. BWSR has approved the following conservation practices for this program: critical area stabilization; diversions; grassed waterway; wastewater and feedlot runoff control; filter strips slowing down velocity of stormwater; sediment basins; streambank or shoreland stabilization; strip-cropping; terraces; and unused well sealing. Ultimately, these practices may reduce nutrient runoff, divert nutrient runoff, and protect critical areas, including shorelines, from further erosions. SWCDs have partnered with local funding sources on BWSR approved conservation practices previously, those entities being townships and lake associations.

The following table lists the many conservation practices covered by different counties relying on state and local funding sources that will help make progress on this Plan's goals.

Table 5-1. Existing cost-share support and programs provided by counties and Soil Water Conservation Districts		
Areas	**Counties (includes SWCDs)**	**Examples or details if available**
Shorelines, streambanks, and riparian areas	Aitkin, Pine, Mille Lacs, and Kanabec	Shoreland and streambank restoration, shoreline landscaping, buffer enhancements, erosion control practices, native vegetation plantings, stormwater practices for riparian owners, and stabilizing critical areas. For instance, Pine County carries out one to three streambank restorations per year.
Pasture improvement practices	Aitkin and Kanabec (mix of local funding for smaller projects and NRCS funding)	Fencing and use exclusion, prescribed grazing, and finding alternative watering supply.
Livestock management practices	Mostly NRCS funding in Kanabec	Nutrient management plans, feedlot or manure storage, and feedlot runoff treatment and control.
Nonstructural land management and erosion practices	Kanabec (mix of local and NRCS funding) Mille Lacs relies primarily on NRCS for funding but do promote these practices	Water and sediment control basins, cover crops, and tillage management (no-till or strip-till).
Wetland restorations on private lands (e.g., farms)	Pine	Pine SWCD restored and reconnected a 9.5-acre wetland complex in the Lower St. Croix Watershed
Sealing unused wells for private landowners	Pine, Mille Lacs, Kanabec, and Aitkin	For instance, Pine County offers 50% cost-sharing rate for most wells and for large wells, 75% cost-sharing rate. Mille Lacs SWCD receives funding from a Minnesota Department of Health (MDH) grant focusing on groundwater.
Rain barrel & gardens	Kanabec (limited), Aitkin, Mille Lacs, and Pine	Pine SWCD incentivizes landowner installation of rain barrels by providing a reimbursement program.
Closing abandoned manure pits	Kanabec	Drawing on the Clean Water Fund in 2018, Kanabec closed six abandoned manure storage pits, which led to significant phosphorous, nitrogen, and sediment reductions.

5.1.2 Low Interest Loans & Grants

Low-interest loans encourage the watershed's residents to take on more ambitious conservation practices than they could otherwise afford with market-rate loans. Mille Lacs SWCD also offers low-interest loans for producers, landowners, and agriculture supply businesses to prevent and reduce

water pollution; some of these practices include rain gardens, stabilizing bank and shores, and other practices to control soil erosion and mitigate sedimentation. Similarly, Kanabec County also offers low-interest loans for agricultural BMPs, including purchasing no-till planting equipment.

Most counties have low-interest loans or grants for updating septic systems or individual SSTS's, and many of these loans prioritize helping low-income homeowners repair, improve, and modernize their SSTS. Below is a table showing some of the different programs that exist across the watershed. Table 5-2 provides examples of some low interest loans and grants offered in the watershed.

Table 5-2. Existing low-interest loans and grants provided by counties and SWCDs.

Type	Counties	Prioritize Low-Income Households	MDA's Agriculture BMP Loan Program	Examples or details if available
Grant	Aitkin			Fix SSTSs that are Imminent Threat to the Public Health or Failing to Protect Groundwater (i.e., have been issued a Notice of Noncompliance). There is a grant application process, and funding is determined on a first come first served basis.
Low-interest loan	Aitkin		■	Offer septic system replacement loans sponsored by the Security State Bank, Aitkin SWCD, Department of Agriculture, MPCA, and Aitkin County.
Low-interest loan	Pine	■		The Forgivable Loan Program is offered for low-income households. A low interest loan program is available county-wide for households of any income level.
Low-interest loan	Kanabec		■	Offer low-interest (3%) loans for septic system upgrades.
Low-interest loan	Mille Lacs		■	Offer loans through MDA's Agriculture BMP loans.

5.1.3 Free or Reduced Fee Services

Counties and SWCDs offer in-house services for free or at reduced fees to encourage conservation practices. Examples of free or reduced fee services in the watershed include County tree sales, private well testing for contaminants, equipment rental services, and boat cleaning stations for AIS control.

The first grouping of these services are tree sales carried out by all counties (i.e., Aitkin, Kanabec, Pine, and Mille Lacs). Trees serve as windbreaks that help reduce erosion and contribute to healthy vegetative habitats, which are reflected in this Plan's Habitat; Land Cover & Use; and Erosion, Soil Health, & Soil Loss Goals.

The second grouping of these services include county health departments and SWCDs offering to test residents' private wells for nitrates and other contaminants sometimes for free or for reduced prices. Kanabec County's Public Health Department offers free well testing to families with babies and expectant mothers as daily consumption of drinking water high in nitrates increases health risks in infants and newborns. Kanabec County also provides well testing for a fee; containers for testing are readily available for county residents, and the county keeps to a regular schedule when collected water samples are sent for testing twice a week. Similarly, Pine County provides drop off locations for well tests.

The third grouping is that all counties (i.e., Aitkin, Pine, Mille Lacs, and Kanabec) offer low-cost rentals for equipment including:

- Tree planters to plant trees that help reduce soil erosion and filter surface water.
- No-till drills help reduce farmers' reliance on plowing and reduce soil erosion.
- Wildlife plot equipment helps landowners increase wildlife habitats and vegetation that also helps reduce soil erosion and filter surface water.
- Weed wrenches to remove buckthorn and other invasive species.

Finally, Pine County and others maintain boat cleaning stations for owners of recreational watercraft to use that help reduce the spread of aquatic invasive species.

5.1.4 Technical Assistance to Residents

SWCDs and counties offer technical assistance to landowners in addition to financial assistance. SWCDs and counties rely on local funding to hire staff that can provide technical assistance on a case-by-case basis.

Some examples of technical assistance currently offered include:

- Advice for feedlot improvements and manure management plans, in partnership with NRCS.
- Advice for planting vegetation and other erosion control techniques for shorelines, riparian areas, and other areas at water's edge. They also give advice for decisions like changing one's building setback zone in the shoreland impact zone or any clearing, cutting, planting, grading, or filing taking place there.
- Advice for producers that includes, but is not limited to, seed sampling, Pesticide Applicator License Exam, plant science and management, and noxious weeds that may be harmful or injurious to ecosystems, livestock, and humans.
- Advice for installation of rain gardens and barrels.
- Advice for forested landowners from a forester on how to control for terrestrial invasive species.
- Write Forest Stewardship Plans and assist with entrollment in SFIA
- Advice for landowners interested in planning to develop property.
- Advice on how to plan with climate resiliency in mind

These examples of technical assistance offered throughout the watershed all contribute to goals in Surface Water Quality; Drinking Water & Groundwater; Erosion, Soil Health, & Soil Loss; Land Cover & Use; Surface Water Quantity; Habitat and Extreme Weather.

To carry out these types of assistance, a variety of county designated or SWCD's staff are available, such as agricultural inspectors and water resources technicians. State staff, such as the DNR's hydrologists and TSA Environmental Engineers, also assist in counselling landowners and residents on erosion control and other issues. Hiring more staff or increasing staff time is likely to increase

access to technical assistance across the watershed along with directly benefiting residents living in the priority areas targeted by goals in the above issue areas.

5.1.5 Future Directions for Incentive Programs

Encouraging residents and landowners to volunteer in adopting more conservation and BMPs to protect water has been identified as a top priority for the Partnership. Directions for the coming years to increase landowner practice adoptions include:

- Increasing cost-share support or programs.
    - Multiple counties and the Natural Resources Conservation Service have brought up the need for additional financial assistance to help more producers adopt nutrient management plans. There is not enough funding and staff capacity to fulfill existing needs.
    - Other counties would like to see more cost-share opportunities to help landowners install rain gardens.
    - Some counties would like to increase the number and size of streambank restoration projects through cost-share supports and programming. Besides existing cost-share agreements, there is a need to create additional standard documents to communicate better to landowners on required practices they need to maintain progress over time.
    - Expand cost share on cover crops
- Increasing availability of wetland bank credit funds through BWSR funds (Minnesota Statutes 2021, section 130G.2251); or landowner investment funds. When there are unavoidable impacts to wetlands, landowners can purchase credits that fund the restoration, creation, or enhancement of wetlands at another location. Counties have brought up the need for more wetland bank credit funds for both agricultural producers and road construction, including the widening of roads.
- Increasing opportunities for SWCDs to offer and provide flooded well tests. Offering flooded well tests for free or at a reduced price would encourage residents to share results with SWCDs, so that local government units have a better understanding of nitrates and other contaminants' concentration throughout the watershed's groundwater.
- Increasing capacity of county governments and SWCDs through private sector assistance. This private assistance can range from engineering support in agricultural BMPs, including reducing E. coli runoff from feedlots and working with contractors to limit development harmful to lakes and other water bodies. Counties are interested in funding these collaborations through competitive grants from BWSR and the Clean Water Fund.
- Researching the need to purchase additional equipment, such as smaller no-till drills, so that more landowners can have access to the right tools needed to carry out soil health practices on their properties.
- Hiring agricultural technicians or expanding cost-share programs that fund privately completed nutrient management plans.
- Assembling a forestry technician team to serve the entire watershed and implement participatory forest management approaches including Land Stewardship Plans, SFIA, 2c classification, and RIM Reserve program.

5.2 PUBLIC PARTICIPATION & ENGAGEMENT

Throughout the planning process, the Partnership and the public who contributed their input noted the importance of public engagement. In fact, in the prioritization of issue statements, it was noted that successful outcomes would be incumbent on success in building relationships and partnering

with the public. Targeted outreach and engagement must take place to meet plan goals, especially where priority areas for implementation have been identified.

To that end, incentive programs, financial assistance, and technical assistance are necessary but not sufficient to motivate and energize landowners and residents to pursue behavioral change and adopt new conservation practices. Effective implementation of this Plan also requires government staff guiding and empowering residents and landowners to adopt new conservation practices or maintain these practices in the face of real financial and technical risks and challenges. Local government units and state agencies play important roles in communicating why new conservation practices ought to be adopted, training people to have the skills to carry out those practices, lowering financial and technical barriers that prevent people from implementing practices, and increasing confidence that they can be successful. Feeling intimidated, or as if one is on their own, can keep many people from starting or persisting until a practice is successful and without financial risk. That is why it is so important for County, SWCD, or other LGU staff to reach out to, connect, and build trust with residents and landowners to keep them motivated and supported through the process of experimenting on what works for their land. Residents and landowners, in turn, contribute to state and local government partners' successes by sharing input on how to improve current projects and programs in this Plan. Highly invested residents and landowners may also spread the word on a project and program to people they associate with, and this is a great benefit to government staff who are at capacity and may not be optimal in reaching everyone who is interested. Therefore, public participation and engagement lead to symbiotic and positive relationships between governments, private businesses (such as farms), and residents or landowners.

5.2.1 Ten Core Outreach Values

Through specific conversations on outreach ideas, the Steering Committee developed a summary list of Ten Core Outreach Values. The Partnership will strive to implement these core values:

1. Promote Do It Yourself projects, providing reference materials to landowners to proceed
2. Peer to peer learning
3. Strike a balance between outreach and technical project development
4. Inclusivity in outreach/project participation
5. Outreach prioritized and targeted
6. Relationship building
7. Work with partners (e.g., MAWQCP, lake associations, farmer groups, NRCS, etc.)
8. Evaluate efficacy of outreach and adapt as appropriate
9. Value one-on-one, meaningful conversations with landowners
10. Promote active participation – We all have a role to play to ensure we have clean water in the Snake River Watershed.

Through our outreach work the partnership will make a concerted effort to include and outreach to those individuals and/or groups that are normally not represented in our work.

5.2.2 Current and Future Public Participation and Engagement Actions

Within the Snake River Watershed counties, SWCDs, and state agencies already carry out effective public participation and engagement actions. Building from the strong existing public participation and engagement programs will help LGUs further reach out to, communicate with, and build positive relationships with the public to carry out this Plan. Many of these outreach activities that will continue, as well as new outreach actions are included here:

- Pine County and Kanabec County host soil health workshops which practices strip tilling along with cattle grazing that benefits soil.
- Kanabec SWCD offers nitrate testing for private wells annually at the County Fair and during a spring open house at their office. Aitkin County's Rivers & Lakes Fair features presentations on wildlife and water quality issues that appeal to persons of all ages.
- Pine County and Kanabec County support the community partners and stewards through collaborations with the Coalition of Lake Associations (COLA), which carries out a wide variety of activities including education on aquatic invasive species, in-lake vegetation management, and shoreline protection.
- Pokegama Lake Association organizes the Pokegama Water Fair in Pine City for the surrounding schools' fifth graders, providing education on a variety of environmental topics.
- Kanabec County carried out a "Shallow Lakes Workshop" in 2017 that provided education on realistic water expectations for shallow lakes.
- Kanabec County, Mille Lacs County, Pine County, and Aitkin County use a wide variety of mediums—such as social media, fact sheets, and videos— to share information on water quality, invasive species, and wildlife topics with residents.
- Do It Yourself Project Workshops
- Priority Lake education on lake management
- Peer to Peer Learning Opportunities
- Development of a Farmer Led Council
- Annual Watershed-Wide Stakeholder meetings to provide updates on the Plan's Progress (encourage diverse landowners to cross communicate at these events)
- Contractor/Developer Workshops promoting conservation BMPs

Besides watershed-wide staff, additional financial and technical support would be required for the Partners to carry out the public participation and engagement actions within their own jurisdictions. Local staff provided estimates for financial and technical support for public participation and engagement actions in the Plan.

The Partnership developed participation and engagement actions associated with all seven issue areas of the Plan (See Section 3.0). Many of the public participation and engagement actions take place across county lines and some require watershed-wide collaboration, which will require additional financial and technical support for LGUs, state agencies, and others in the Partnership. To meet this need, the Partnership identified a desire to build in funding for a watershed-wide staff person to assist in conducting outreach to meet Plan goals. The duties of this position are to coordinate the Plan's activities (i.e., project coordination) across the watershed with our various local governmental partners, state agencies and other conservation partners such as NRCS and TNC, to name a few. They would also be responsible for providing updates on the Plan's progress to all partners and especially the various partnership committee members. The coordinator position may also lead our outreach activities in an effective manner to continually funnel interested parties to technical staff for conservation project development. This outreach work may include our various partners such as: the lake associations in the watershed, various agriculture groups such as Cattleman's Associations and the Farm Bureau and municipalities and townships within the watershed.

5.3 CAPITAL IMPROVEMENT PROJECTS

Capital improvement projects (CIPs) are typically costly, more time intensive, and have a longer lifespan than projects completed under incentive programs. CIP projects require more technical expertise than incentive program projects and responsibilities of installing and maintaining CIP

projects may be shared across LGUs. At the time of plan writing, CIP projects are less common in the Snake River Watershed than incentive program projects.

Examples of potential CIP projects outlined in this Plan include:

- Multipurpose drainage management in areas of priority wetlands or public ditches.
- Stream and river restoration
- Urban stormwater management projects (i.e., large ponds and infiltration basins)

5.4 OPERATIONS & MAINTENANCE

Regular inspections and maintenance of project sites are often necessary following project completion. Operation and Maintenance (O&M) plans are completed before project completion to outline requirements for periodic inspections and maintenance. The entity responsible for O&M will depend on location, project type, funding source, and contractual requirements. O&M plans typically include guidance over expected activities; timing of activities; inspection schedules; and procedures for enforcing compliance (e.g., penalties); or scheduling regular maintenance over the lifespan of a project. This includes inspections carried out on a regular basis and after significant weather events throughout the life of the project to ensure that the project's structures or practices are performing as designed. Site inspections should include a written record, photographs, and a report recording any status change of the structure or practices during that inspection. Inspection records also document repairs or maintenance required and these records should be updated throughout the life of the practice to verify maintenance activities.

Minnesota Rules 2021, chapters 8400.1700 and *8400.1750* outline program requirements for projects funded through state cost-share programs.
BWSR has recommendations for O&M plans including:

- Conservation practice with a minimum effective life of 10 years: the years that end in 1, 3, and 9 following the certified completion.
- Capital-improvement projects having a minimum effective life of 25 years: the years that end in 1, 8, 17, and 24 following certified completion is a recommended minimum. If easement encroachments or maintenance requirements are not corrected within the designated timeframe, the authorities vested in local governmental units, as well as state and funding agencies, will be used to compel compliance.

The O&M plans of capital improvement projects in this watershed will incorporate regulations, state agencies' recommendations, and LGUs' ideas based on experience working on similar projects to those proposed in this plan. In terms of specific O&M recommendations to the CIP or nonstructural restoration projects, the Technical Advisory Committee are still considering whether those project's O&M plans will be different from the general advice provided above. One early suggestion that is based on experience in this watershed is to be more mindful in scheduling regular check-ins on restoration projects to ensure progress.

5.5 REGULATIONS

Many different LGUs are responsible for land use controls and administering programs that are required under local, state, and federal regulations. LGUs that implement regulations and regulatory programs include counties, cities, and townships. The following sections provide detail on watershed regulations.

5.5.1 Land Use Management

Developing and converting lands without compromising surface and groundwater quality or habitats in the future is dependent on organized land use management. County Comprehensive Plans capture residents' vision of the future through policy frameworks for land use changes, public investments, infrastructure improvements, and intergovernmental cooperation. **Table 5-3** describes each county's current Comprehensive Land Use Management Plan.

Land Use Management Plans

Table 5-3. County Comprehensive Land Use.

County	Type	Year of Plan Adoption	Examples of future goals or recommendations
Aitkin	Comprehensive Land Use Plan	2000	Goals and recommendations for: natural resources; water resources; economy (including residential and non-residential development); transportation; sense of community; and government (e.g., promote close and consistent working relationships between different levels of governments).
Kanabec	Comprehensive Plan: 2050 Navigating our Future	2022	Goals and recommendations for zoning and enforcement, growth management, economic development, county assets, and natural resources.
Mille Lacs	Comprehensive Plan: Strategic Planning for the Future	2013	Goals and recommendations for agriculture and forestry; environment and energy; land use; economic development; recreation and tourism; transportation; public safety; social programs, public health, and quality of life; and intergovernmental relations.
Pine	Comprehensive Plan 2017 – 2030	2017	Goals and recommendations for agriculture, economic and community development, recreation, natural resources, education, and transportation and infrastructure.

5.5.2 Shoreland Management

Shoreland ordinances guide land development and activities occurring on shoreland along rivers and lakes to reduce human impacts on shoreland habitat and surface water quality. Many municipalities and counties have their own shoreland ordinances, and the DNR reviews and ensure that these ordinances, and any new amendments to them, at the minimum comply with or exceeds what the state requires in *Minnesota Rules 2021, chapters 6120.2500 to 6120.3900*. Therefore, each county's ordinances include similar provisions to what is required under state statutes, and some of these include:

- Shore impact zone for parcels with permitted agricultural land uses that are 50 feet and above from the ordinary high-water level, or the highest water level maintained long enough to leave evidence on the landscape (*Minnesota Statutes 2021, section 103F.48*).
- Lot area and width standards for residential uses for lakes that have access to sewers versus lakes without sewers.
- Required setbacks and placements of buildings.
- Minimum setback for septic systems.
- Limitations on impervious surface.
- Allowed grading or filling in shoreline areas that also include wetlands. There are also requirements to mitigate land alterations, such as limiting the amount and time of bare ground exposure, replacing vegetation cover as soon as possible, and requirements for carrying out sediment, traps, vegetated buffer strips, and natural rock riprap.
- Requirements for stormwater management, including planning future development to minimize disturbed areas and reduce or slow down runoff volumes after snowmelt or rainfall.
- Requirements on future development that manages the effects of shoreland and water surface crowding.
- Development of erosion control and stormwater management plans, and depending on the size, some plans may require approval from the local SWCD.

Kanabec County, Aitkin County, and Pine County have their own stand-alone shoreline management ordinances, whereas Mille Lacs County's shoreline ordinances can be found in its general Development Ordinance. While all county ordinances align with what is required by the state, many counties' ordinances differ based on local needs and visions. At the municipal and township level, the Cities of Mora and Pine City, and Pokegama Township have their own ordinances. Some counties, such as Pine County, receive state grants to help administer its shoreland ordinance. All counties provide a designated Shoreline Zoning Administrator.

5.5.3 Wetland Management

Most wetland management regulations are focused on protecting wetlands from adverse environmental impacts due to discharge of dredged or fill materials. Regulatory protection for wetlands exists on the federal, state, and local levels in the Snake River Watershed.
At the federal level, the United States Department of Agriculture (USDA) implements the Farm Bill policies that regulates draining or filling of wetlands for farms participating in that program. Most other activities concerning wetlands are covered under the following federal laws:

- Section 401 of the *Clean Water Act* (33 U.S. Code § 1344) allows states and authorized Tribes to receive certification of water quality compliance measures. This certification allows them to protect the water quality of federally regulated waters, including wetlands, within their borders in collaboration with federal agencies. In the Snake River Watershed, the MPCA implements this.
- Section 404 of the *Clean Water Act* (33 U.S. Code § 1344) regulates the discharge of dredged or fill material in any waters or wetlands.
- Section 10 of the *Rivers and Harbors Act* (33 U.S. Code § 403) places regulatory authority over any navigable waters in the hands of the Army Corps of Engineers. Large projects, such as highway projects through wetlands or large dredging projects, require a full public interest review.

The Wetland Conservation Act (WCA) in *Minnesota Statutes 2021, section 103A.201* protects wetlands from direct or indirect human activities that could contribute to net loss of quality, quantity, and biological diversity of Minnesota's current wetlands. WCA is primarily administered by local

government units (LGUs) with oversight by the Board of Water & Soil Resources (BWSR). The DNR provides enforcement for the regulatory provisions of WCA.

Within the Snake River Watershed, Aitkin County, Kanabec County, Mille Lacs County, and Pine County are WCA LGUs. Each LGU has technical support from an associated Technical Evaluation Panel, which is made up of their county staff, a BWSR wetland specialist, and representatives from DNR and the local SWCD. Some counties, like Aitkin County, have their own Wetland Ordinance that goes into detail on administrative procedures and enforcement processes to carry out the WCA at the local level. Counties, like Kanabec County, have a designated Wetland Administrator to enforce and support landowners in complying with wetland regulations. In addition, under *Minnesota Statutes 2021, section 103F.05*, BWSR may provide financial assistance or technical assistance (e.g., hydrologist or engineer) to LGUs to cover the costs of water storage projects. These water storage projects could include wetland restoration, creation, or enhancement.

Relevant local regulations: Aitkin County Wetland Ordinance

5.5.4 Floodplain Management

Floodplain management takes place on multiple levels. At the federal level, the Federal Emergency Management Agency (FEMA) regulates and carries out federal floodplain management, mapping, insurance, and flood-assistance programs. Currently, there are completed Digital Flood Insurance Rate Maps for Pine County and Mille Lacs County. While paper maps exist for Kanabec County and Aitkin County, these counties currently only have specific cities and unincorporated areas available as Digital Flood Insurance Rate maps.

At the state level, the Floodplain Management Policy, *Minnesota Statutes 2021, section 103F.105*, provides the DNR with the authority to carry out floodplain management programs and to coordinate federal, state, and local floodplain management activities. For instance, the DNR offers the National Flood Insurance Program. This program provides access for communities interested in participating in the national flood insurance programs and helps more Minnesotans prepare for future floods by purchasing and maintaining flood insurance.

At the local level, Kanabec County, the City of Mora in Kanabec County, Pine County and Pine City, and Aitkin County have stand-alone floodplain management ordinances. Mille Lac County's floodplain management is incorporated in its Development Ordinance. Floodplain management regulations typically include information such as establishing various zoning districts (e.g., floodway district, flood fringe district, and general flood plain district) with each district having different permitted uses. County staff are available to answer landowners' questions on construction, permitting, and building placement or restrictions according to regulations. County and municipal zoning and planning departments typically approve and enforce permits and conditional uses in floodplain areas.

Relevant local regulations: Aitkin County Flood Plain Management Ordinance, Kanabec County Ordinance No. 9 Flood Plain Management Ordinance, Mille Lacs County Development Ordinance, and Pine County Floodplain Management Ordinance

5.5.5 Buffers and Erosion

The Minnesota Buffer Law in *Minnesota Statutes 2021, section 103F.48* requires perennial vegetative buffers (i.e., an average width of 50 feet and a minimum of 30 feet) and ditches (i.e., 16.5 feet) on public waters and drainage systems. The statute allows for practices with similar water

quality benefits as buffers to substitute for this requirement. There are also exceptions to this regulation including in areas that are covered by buildings, roads, and other structures; areas enrolled in EQIP; public-water accesses; and municipalities following state and federal stormwater requirements. BWSR provides funding and technical assistance to SWCDs in implementing and enforcing buffer requirements.

Planting Ditches with Perennial Vegetation under *Minnesota Statutes 2021, section 103E.021* requires ditch side slopes to have permanent grass, and ditches to have permanent strips of perennial vegetation, preferably of native species, at each side. Some buffers are publicly owned, and the drainage authority is responsible for its upkeep and necessary reseeding to keep the perennial vegetation healthy. Landowners with buffers on private property are responsible for the buffer's upkeep. The drainage authority is responsible for enforcement.

Aitkin County, Mille Lacs County, and Pine County have non-shoreland buffer ordinances that are adopted pursuant to *Minnesota Statutes 2021, sections 103F and 103E*. According to these ordinances, Aitkin County, Mille Lacs County, and Pine County have similar procedures, with their SWCDs first investigating noncompliance and issuing a Notice of Noncompliance before their county governments take over with further enforcement. Kanabec County encourages healthy vegetation planted at shorelines through its platting requirements, and reviews shoreland vegetation requirements with permits. Kanabec County enforces its buffer ordinances through aerial imagery, roadside surveys, and site visits.

Relevant local regulations: Aitkin County Buffer Ordinance, Mille Lacs County Buffer Ordinance, Pine County Buffer Ordinance, and #4 Plats & Subdivisions

5.5.6 Wellhead Protection

Regulations are in place to protect aquifer recharge areas from contamination. Wellhead protection plans are written to comply with the 1986 Federal Safe Drinking Water Act (*42 U.S.C. §300f et seq.*), and Minnesota adopted the State Wellhead Protection Program (*Minnesota Rules 2021, chapters 4720.5100 to 4720.5590*). The MDH is primarily responsible for administering the State Wellhead Protection Program, and this program requires municipal and non-municipal public water systems to develop and implement a plan to protect its drinking water source. The main components of the public water system's plan include:

- Delineating recharge area
- Determining how vulnerable the aquifer is to land use and human activities
- Identifying existing and potential contaminants
- Creating a plan to mitigate or stop contamination in the aquifer
- Devising a contingency plan to provide drinking water in the event of a significant interruption

Ten of the twelve community water suppliers in the Snake River Watershed are engaged in the wellhead protection planning process or are implementing their plans.

5.5.7 Groundwater: Public & Private Wells

Groundwater is managed and enforced by various state agencies. **Figure 5-1** outlines each agencies role in groundwater management.

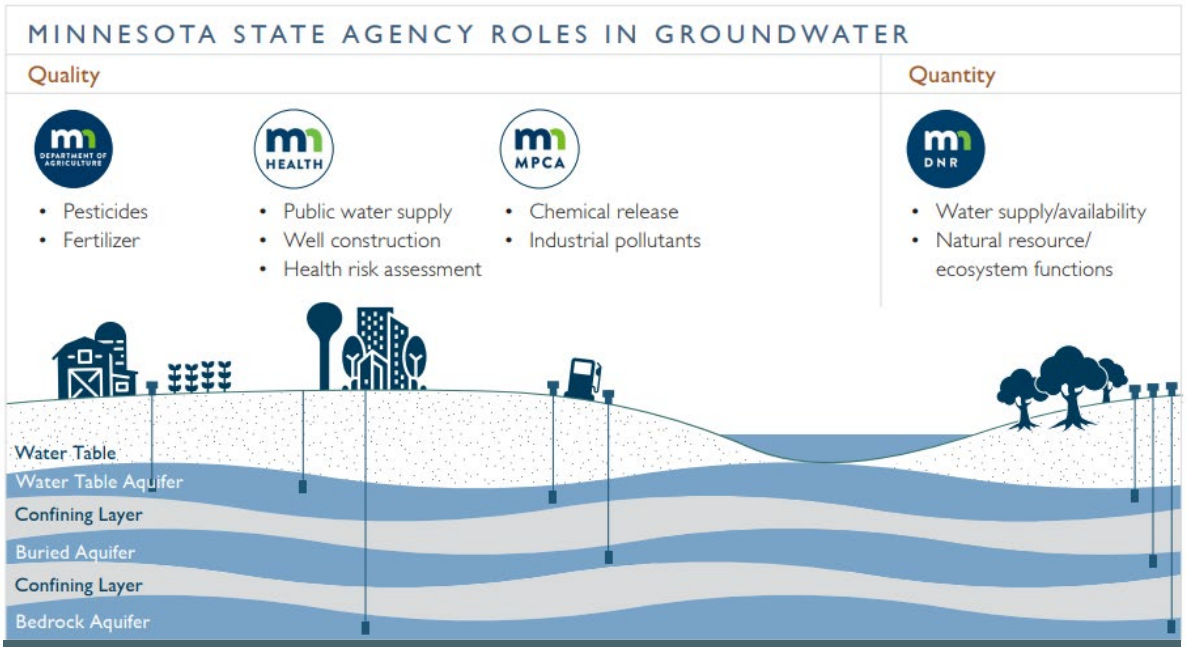


Figure 5-1. Minnesota State Agency Roles in Groundwater.

The MDH administers and enforces the Well Management Program through the Minnesota Statutes 2021, section 103I and Minnesota Rules 2021, chapters 4725 to 4727 to protect human health and the environment from contaminated water. These cover legal requirements for public and private wells' construction, sealing of abandoned wells, and water quality testing. Some of these requirements include:

- *Minnesota Statutes 2021, section 103I.301* requires property owners to seal abandoned wells
- *Minnesota Statutes 2021, section 103I.335* gives BWSR the authority to financially assist individual landowners who apply for funding to seal wells.
- *Minnesota Rules 2021, chapter 4720.5550* specifies criteria for assessing well vulnerability. These include classifying a public water supply well as vulnerable if the nitrates or nitrites in the well water tests at 10 mg/L. Another criterion is if an enriched tritium analysis of well water has not been performed within the past ten years, and there is either no information on the well's construction or the well is located in an area of vulnerable hydrogeology.
- *Minnesota Rules 2021, chapter 4725.4350* covers protections of wells in flood areas. It also requires that water-supply wells prevent the entry of floodwater into the well through measures, such as extending casing at least five feet above the regional flood level.
- *Minnesota Rules 2021, chapter 4725.4350* requires water-supply wells not to be located down slope or down gradient from a contamination source, such as a landfill or wastewater system.

Other state agencies also play a regulatory role in protecting groundwater through various permitting processes for specific actions. According to *Minnesota Statutes 2021, section 103H.101*, these include:

- The DNR in consultation with the United States Geological Survey monitors groundwater availability and ecological impacts.
- The MDA, sometimes with assistance from the MPCA, monitors for pesticides and fertilizer contamination [*Minnesota Rules 2021, Chapter 1573.0030*].
- The MPCA monitors groundwater that has been or could be affected by industrial pollutants and/or chemical releases.

5.5.8 Publicly Managed Drainage & Ditch Systems

Public drainage and ditches across government boundaries have many benefits including promoting commerce, protecting roadways, reducing stagnant waters that can be harmful to public health, and making land viable for agricultural activities. Drainage and ditch systems are managed by drainage authorities.

Within the Snake River Watershed, Mille Lacs County Board of Commissioners, Kanabec County Public Works, Pine County Board, and Aitkin County Board serve as the Drainage Authorities. *Minnesota Statutes 2021, sections 103E* empowers the Drainage Authority to:

- construct and maintain drainage ditches;
- deepen, widen, straighten, or change the channel or bed of a natural waterway that is part of a drainage system or at the outlet of such a system;
- extend a drainage system; and
- construct dikes, dams, and control structures or power appliances and pumps.

Ditches that occur within wetlands are subject to the WCA mentioned in Section 5.5.3. However, the general Minnesota drainage law remains largely prescriptive without associated rules, even if state courts have found that Drainage Authorities must follow the law carefully.

For work on or impacted by public waters, the Drainage Authority would need to receive permission from the DNR to carry out activities that drain any portion of public waters, lowers the level of public waters, or affects the public waters through the building dams and altering hydrology. In Mille Lacs County, landowners fund drainage system repairs, system administration, and construction costs because they benefit from drainage. Landowners start the process by petitioning to the Drainage Authority, which then inspects the drainage system to decide whether to initiate the repair.

5.5.9 Zoning

Along with separate shoreland ordinances, Aitkin County, and Mille Lacs, have countywide zoning or development ordinances. Kanabec and Pine Counties have ordinances for plats and subdivisions. Pine County has developed a zoning ordinance that townships and cities may opt in to at their discretion. The City of Mora also has an entire chapter in its municipal code devoted to zoning.

Relevant local regulations: Aitkin County Zoning Ordinance; Mille Lacs County Development Ordinance; Title XV: Land Usage, Chapter 150: Zoning Code from the City of Mora Code of Ordinances; Kanabec County Ordinance No. 4 Subdivision Platting Ordinance; and Pine County Zoning Ordinance

5.5.10 Stormwater

Stormwater management is important for reducing and slowing runoff to ponds, lakes, streams, and rivers. Without stormwater management, high runoff can lead to flash floods, and spread harmful contaminants to neighborhoods and eventually flow into surface waters.

There are no Municipal Storm Sewer Systems (MS4s) in the Snake River Watershed. Some local municipalities and counties do address or touch on stormwater in their ordinances. Some examples include:

- The City of Mora has a Storm Water Utility Chapter in its Code of Ordinances. This chapter addresses how the storm water utility operations are a part of the city's Public Works Department and paid for in part by imposition of special assessments and ad valorem taxes.
- Not all counties in the Snake River Watershed have ordinances addressing stormwater systems. Here are some examples from counties that do include stormwater systems' considerations in their zoning or zoning related ordinances.
    - In Kanabec County's Subdivisions Platting Ordinance all plots and developments are required to have stormwater management plans.
    - Mille Lacs County specifies in its Development Ordinance that Planned Urban Developments (PUDs) must have erosion control plans approved by the SWCD or engineer depending on project size, and this plan must be designed and constructed to manage expected quantity and quality of stormwater runoff. It also specifies in its Land Development Standards that adequate stormwater retention facilities should comply with the National Pollution Discharge Elimination Standards (NPDES).
    - Pine County's Zoning Ordinance only mentions stormwater permits in reference to salvage yards and requiring manufactured or mobile home parks to retain natural drainage ways for stormwater. Pine County's Subdivision and Platting Ordinance has more mentions of stormwater when considering where roads or highways are built and in ensuring that stormwater naturally passes through subdivisions with required actions, such as maintaining or replacing the natural watercourse.

Relevant local regulations: Mille Lacs County Development Ordinance, Title V: Public Works, Chapter 51: Storm Water Utility from the City of Mora Code of Ordinances, Kanabec County Ordinance No. 4 Subdivision Platting Ordinance, and Pine County Zoning Ordinance

5.5.11 Subsurface Sewage Treatment Systems

SSTSs are commonly known as septic systems. Substandard or poorly functioning SSTSs can lead to inadequate dispersal and treatment of domestic sewage that pollutes surface and groundwater and causes public health problems.
Most SSTSs fall under *Minnesota Statutes 2021, section 115.55* that requires:

- all counties must adopt ordinances complying with this section unless there are cities or towns that have adopted ordinances as strict as the county it resides in;
- the MPCA shall adopt rules containing minimum standards and criteria for design, location, installation, use, maintenance, and closure of SSTSs;
- enforcement of this section may be carried out by LGUs; and
- inspections by local government units, complying criteria, and disclosure at property transfer.

SSTSs are also governed by administrative rules under the MPCA, and these include:

- *Minnesota Rules 2021, chapter 7080* is for individual SSTSs. This specifies detail such as treatment requirements for new and existing systems, evaluation standards for systems that factor in proximity to a groundwater supply or lake, different requirements based on design flow or gallons per day, and other such considerations.
- *Minnesota Rules 2021, chapter 7081* is for midsized SSTSs. Similar to above but for larger systems.
- *Minnesota Rules 2021, chapter 7082*: Administrative Requirements of Local SSTS Programs. The MPCA will provide framework for local SSTS ordinances and provide minimum

administrative procedures or strategies for effective permitting and inspections. The agency will also review local ordinances to ensure adequate compliance.
    - All counties must adopt and implement their own SSTS ordinances. Cities and townships may develop their own ordinances too as long as they also conform to this administrative rule.
    - All local government units administering SSTS programs must have at least one certified inspector and one government staff who has received accredited training on administration of local SSTSs. For instance, Kanabec County has a County Septic Inspector.
- *Minnesota Rules 2021, chapter 7083* provides standards for SSTS professionals' adequate training, experience, continuing education, insurance, and bonding. The MPCA and local government units license and enforce based on this administrative rule or local ordinances that meet or exceed this rule's requirements.

Most counties' SSTS ordinances only differ slightly from each other. Some examples of how local ordinances distinguish themselves from the rest include:

- Mille Lacs County's SSTS ordinance requires inspection prior to the sale or transfer of property.
- Kanabec County requires point of sale inspections and upgrades for all shoreland properties' septic systems.
- Pine County's ordinance requires a compliance inspection for a transfer or sale of properties if the last certificate of compliance on file with the county is within three years for systems older than five years, or within five years if the system is less than five years old prior to this transfer of property.

Some counties, such as Pine County's Planning and Zoning Department, receive state grants to help administer the SSTS. Kanabec County enforces violations through its county attorney.

Relevant local regulations: Aitkin County Subsurface Sewage Treatment System Ordinance; Kanabec County Subsurface Sewage Treatment System Ordinance –County Ordinance #6; Ordinance No. 5 for the Management of Shoreland Areas of Kanabec County, Minnesota; Mille Lacs County Subsurface Sewage Treatment Ordinance; and Pine County Subsurface Sewage Treatment Systems Ordinance

5.5.12 Invasive Species

Invasive species management is shared across multiple state agencies. The Minnesota Noxious Weed Law, *Minnesota Statutes 2021, section 18.75-18.91*, gives regulatory authority for MDA to minimize the spread of noxious terrestrial plants. Noxious plants are defined as native and non-native species with the potential to cause harm to humans, animals, cultivated crops, and wider ecosystems. Some of these noxious, non-native plants are invasive plant species. The MDA administers this law and provides the public with information or education campaigns to increase regulatory compliance and voluntary efforts to control or eliminate invasive plants. To enforce this law, the MDA works with county, city, and township staff, such as agricultural inspectors. Typically, LGUs' inspectors go out to monitor landowners' properties for noxious weeds in their jurisdiction. If noxious weeds are found, an inspector or staff from a LGU will require the landowners to control or eradicate that noxious weed. Any noncompliance is a violation of the Noxious Weed Law, and the county might then contract the work at the expense of the landowners or summon the landowner to a district court. Within the Snake River Watershed, some LGUs specify how they carry out this process. The Mille Lacs County Public Works and the Mille Lacs SWCD work together to control

roadside noxious weeds. The Mille Lacs SWCD has a County Agricultural Inspector that enforces the noxious weed regulations and helps townships and Local Weed inspectors. For Kanabec County, the County Agricultural Inspector is part of the county government and works out of the Kanabec County Environmental Services.

Under *Minnesota Statutes 2021, chapter 84D* and *Minnesota Rules 2021, chapter 6216,* the DNR is given regulatory authority to carry out a statewide program to prevent and curb the spread of invasive species of aquatic plants and animals along with terrestrial vertebrates. It is a misdemeanor to possess, import, purchase, transport, or introduce prohibited species except for permitted uses, such as disposal, control, research, or education. Eurasian watermilfoil, curly-leaf pondweed, grass carp, largescale silver carp, silver carp, and Prussian carp are all prohibited invasive species. There are also prohibitions to transporting all aquatic plants to reduce the spread of Eurasian watermilfoil and zebra mussels (*Minnesota Statutes 2021, section 84D.09*). Finally, all water-related equipment, such as bait containers and drain plugs, are required to be cleaned after use to reduce cross-contamination of water bodies that can spread invasive species (*Minnesota Statutes 2021, section 84D.09*).

In the Snake River Watershed LGUs often work closely with lake associations to control and eradicate aquatic invasive species. For instance, Kanabec SWCD collaborates with the COLA made up of residents from Pomroy Lake, Knife Lake, Quamba Lake, Lewis Lake, Fish Lake, and Ann Lake. Pine County assists with chemical treatments of lakes or treatment evaluation programs with Pokegama Lake Association, Windmere Lake Association, and Cross Lake Association. Finally, counties have boat inspectors for lakes, such as Pokegama and Cross, to reduce the likelihood of cross-contamination of invasive species across different water bodies.

5.5.13 Feedlots

Minnesota Rules 2021, chapter 7020 gives the MPCA the role of regulating collection, storage, transportation, processing, and disposal of animal manure to ensure that manure on feedlots or storage areas do not contaminate surface and groundwater. The MPCA can delegate power to counties to administer the program on feedlots without a state or federal permit. No counties in the Snake River Watershed are delegated.

Some counties include feedlot management in their other ordinances. Examples of these ordinances include:

- Aitkin County's Shoreland Ordinance and Mille Lacs County's Development Ordinance ban new feedlots from being located on shoreland. For existing feedlots located within 300 feet of the ordinary high-water level, landowners can only make feedlot modifications or expansions if these new changes do not further encroach into the existing ordinary high water level setback or bluff impact zones.
- Kanabec County's Shoreland Ordinance requires no new animal feedlots on shoreland. It also bans expansions or resumptions of old feedlots on shoreland.
- Mille Lacs County's Development Ordinance and Pine County's Zoning Ordinance require animal feedlot setbacks. Pine County requires a minimum of 500 feet from a non-farming dwelling, whereas Mille Lacs County has different setback lengths ranging from 200 to 1,320 feet depending on proximity to an entity (e.g., lake or incorporated city).

Relevant local regulations: Aitkin County Shoreland Management Ordinance; Mille Lacs County Development Ordinance; Ordinance No. 5 for the Management of Shoreland Areas of Kanabec County, Minnesota; and Pine County Zoning Ordinance

5.5.14 Future Regulations

The local governments within the Snake River Watershed have independent authority to adopt land use regulations in accordance with statutory authorities. This is true not only of counties operating under MN Chapter 394, but townships and cities as well, operating under MN Chapter 462. Further, several townships and cities have taken advantage of their authority to regulate zoning in shoreland areas, including riparian areas to the Snake River and its tributaries, as authorized under MN 6120.3900.

There has been consistent land use regulation in the headwater communities of Mille Lacs County and Aitkin County, as zoning is more often regulated through counties. Zoning within Kanabec County and Pine County has been more segmented amongst the counties and townships. This plan may serve as a vehicle for increased coordination between zoning authorities for improved land use outcomes to improve protection of the watershed. The state shoreland rules, *Minnesota Rules 2021, chapters* 6120, often provide for vague protections, which can have an array of administrative outcomes amongst the communities. There is a strong desire by the Partnership to maintain local authority to interpret land use regulations independently. However, idea sharing and training throughout the watershed may improve overall land use protections for greater consistency and effectiveness.

5.6 DATA COLLECTING AND MONITORING

Data collection and monitoring is an important component of executing a successful watershed plan. During the planning process, LGUs recognized the lack of data on certain water bodies and other watershed resources as a limitation to identifying areas for future work. For example, many lakes in the watershed had little to no water quality data to quantify their status and identify potential improvements. Collecting targeted data will help LGUs identify areas of opportunity for projects, track changes over time, and evaluate progress. This section of plan describes current data collection and monitoring programs in the watershed and outlines potential future programs.

Data collection will be shared across entities and any data collected by LGUs will follow industry standards and be submitted for storage to the proper agencies.

5.6.1 Surface Water

MPCA collects surface water quality data from lakes and streams within the Snake River Watershed on a 10-year cycle through their Intensive Watershed Monitoring Program Strategy. The watershed has been monitored once under this program (2017) and is scheduled to be monitored next in 2028. The MPCA also coordinates two citizen monitoring programs, the Citizen Lake Monitoring Program and the Citizen Stream Monitoring Program, that depend on local volunteers for data collection. The MPCA Watershed Pollutant Load Monitoring Network (WPLMN) collects data to calculate pollutant loads from major rivers and their tributaries throughout Minnesota. The MPCA uses data from this program to develop restoration and protection strategies with local partners. In the Snake River Watershed, there are four WPLMN sites: Snake River near Warman (CSAH 3, tributary site), Snake River at Mora (MN65, tributary site), Snake River at Grasston (MN107, tributary site), and Snake River near Pine City (major watershed site). Surface water quality data collection on the local level is done primarily through volunteers. Some lake associations collect data or participate in the MPCA's volunteer programs.

Surface water quantity is mainly measured by the USGS at gage 05338500 near Pine City, Minnesota. Water level and river discharge is measured every 15 minutes and is available online at waterdata.usgs.gov.

5.6.2 Drinking Water & Groundwater

Figure 5-1 outlines Minnesota State Agency roles in groundwater quality and quantity monitoring. Monitoring drinking water quality in public water supply systems is a shared responsibility of MDH and the public water supply system. MDH tests drinking water for contaminants that pose a threat to human health, particularly through the testing of new wells for bacteria, nitrate, and arsenic. LGUs in the watershed currently distribute to and collect kits from residents to sample well water for contamination. Some LGUs do testing in-house or send samples back to MDH for analysis.

MDA monitors groundwater for pesticides and other agricultural contaminants like nitrate and has monitoring sites within the watershed. MPCA monitors groundwater for industrial contaminants. Groundwater quantity is monitored cooperatively by the DNR and counties through the Cooperative Groundwater Monitoring (CGM) program.

5.6.3 Habitat

Biological data, including fish and macroinvertebrate communities, is collected through MPCA's Intensive Watershed Monitoring program. Results of MPCA's biological monitoring is reported in Monitoring and Assessment Reports and SID Reports. The DNR collects some lake shoreland data through their Score Your Shore Program and has regularly scheduled fish surveys on many large lakes in the watershed, including Pokegama, Ann, Cross, and Fish.

5.6.4 Future Monitoring

Additional data collection and monitoring will be necessary to better assess watershed conditions and track changes during implementation of the Plan. Historically, funding for monitoring has been difficult to procure. As a result of lack of funding, there is no longstanding monitoring data collection program administered by LGUs. The Partnership would like to make a concerted effort during the implementation of this Plan to collect data that can help inform future actions. The Partnership identified diagnostic monitoring and lake sediment core collection on priority lakes as priority data collection efforts for this Plan. Table 5-4 lays out future data collection and monitoring plans to support implementation actions described in Section 3.0.

Table 5-4. Future data collection and monitoring efforts.

Area	Future efforts
Surface Water Monitoring	▪ Diagnostic monitoring for priority lakes and streams ▪ Collect sediment data in priority lakes, particularly Pokegama ▪ Continuously monitor flow and sample phosphorus on priority lakes, as appropriate ▪ Monitor phosphorus concentrations in agricultural ditches ▪ Monitor water quality and quantity to collect baseline data in priority rivers and streams ▪ In areas of the Plan where the Partnership struggles to see improvements– seek out funds for more water monitoring to better identify how to target pollution sources or BMP effectiveness (e.g., *E. coli* source testing) ▪ During next round of MPCA's Intensive Watershed Monitoring (2028-2029), seek out Surface Water Assessment Grants (SWAG) ▪ Monitor blue-green algae at public beaches for public safety ▪ *E. coli* source testing as needed
Drinking Water & Groundwater Monitoring	▪ Collect and compile existing monitoring data from MDH and other sources ▪ Provide *E. coli*, nitrate and arsenic testing kits to residents with private wells ▪ Offer incentives (such as cost-share for treatment) for people to voluntarily share their well test results ▪ Continue annual private nitrate well testing. Use collected data for better targeting of areas to reduce groundwater contamination ▪ Use data collected through the Cooperative Groundwater Monitoring Program to understand groundwater quantity at 5-year mark of Plan ▪ Research to identify areas where surface water to groundwater connections are for better targeting of areas to reduce groundwater contamination

Area	Future efforts
	▪ Carry out targeted stable isotope analysis to better target groundwater contaminant sources ▪ Partner with local municipalities that provide public drinking water to monitor contaminants
Habitat Monitoring	▪ Assess and quantify priority lake shorelands using DNR Score Your Shore methods ▪ Track forest areas protected/created using online inventory and database ▪ Complete culvert and bridge inventory to identify areas of concern over fish and hydrologic passage ▪ Compile MPCA fish and macroinvertebrate IBI scores as they are collected ▪ Partner with DNR Center for Aquatic Mollusk Programs (CAMP) to understand opportunities for mussel population restoration
Studies	• In-lake internal load treatment feasibility studies on Cross and Knife Lakes • AIS Rapid Response Plan (Kanabec and Pine SWCD) • Stormwater feasibility study for Pine City and MacGrath • Lake vegetation management plan and/or surveys, as needed • Investigate opportunities for improved septic system compliance rates • Lake sediment cores for paleoecological investigations on priority lakes, as needed • Study the effectiveness of control efforts on curly-leaf pondweed for alternative management (AIS activities) • Seek out a BWSR – Performance Review and Assessment Program (PRAP) grant to analyze recommendations for improved staff retention.

6.0 Plan Administration & Coordination

This section describes how the watershed Partners envision how the Plan will be administered, implemented, monitored, and funded.

The mission of the Snake River Watershed Plan Partnership (SRWPP) is to provide watershed-based management utilizing the Snake River Comprehensive Watershed Management Plan to achieve a coordinated planning effort to evaluate the water quality of all sub-watersheds of the Snake River, determine actual problems, set priorities and work cooperatively towards the implementation of solutions. Along with these goals, the Partnership seeks to improve the quality of the area's natural resources and associated concerns for the enjoyment and well-being of the surrounding communities.

6.1 DECISION-MAKING

While planning, the Policy Committee selected to form of a newly revised Joint Powers Entity, to take the place of the already watershed-wide Joint Powers Entity, formerly called the 'Snake River Watershed Management Board (SRWMB)'. The newly revised Joint Powers Entity is to be named the SRWPP. The SRWMB was formed in the early 1990's and has been in existence since. It was formed as a result of a local petition for the development of a watershed district. It does not function as a watershed district. The group is already composed of our main planning partners within the Snake River Watershed; namely the counties and SWCDs from each, of the Counties of Aitkin, Kanabec, Mille Lacs and Pine. The SRWMB has a (JPA), by-laws, and a routine of meeting regularly. Their mission has been to collaborate in the implementation of their collective county water plans to improve the quality of the watershed's natural resources.

A revised JPA is in development to include the wishes of the planning partnership with content decisions made by the policy committee, to be renamed the Board under the JPA. By-laws for the new Snake River Watershed Plan Partnership and Board (or Policy Committee) will be developed.

6.2 COMMITTEES AND BOARD

The decision-making board for the SRWPP will to be referred to as the Board. The Board is to be composed of one voting member representative (and alternate) from each of the JPA signatory parties. The meeting schedule has yet to be determined. It is to be composed of one representative from each of the JPA signatory parties. The Board is to be composed of one voting member representative. The term of each representative is to be for two years. For decisions made by the Board a majority vote is needed of a quorum of its' members. A supermajority vote of 75% is needed for amendments to the JPA. The Functions of the Board include:

- Act as governing body of the SRWPP
- Review annual reports and implementation progress
- Review and consider recommendations from the Steering Committee on budgets, staffing, administration, work plans, and grant applications
- Develop recommendations for consideration by the governing boards of the SRWPP, as needed
- Approve budgets, work plans, agreements with local entities, grant agreements, and fiscal responsibility, etc. to implement the Plan

A Citizen Advisory Committee (CAC), which acts in an advisory capacity to the Board will continue to be part of the SRWPP. To date, the CAC is to be composed of two delegates from each of the counties represented (currently Aitkin, Kanabec, Mille Lacs and Pine Counties). This committee is to be composed of a diverse group of people and to include lake association representatives. The two delegates from each county are to be nominated, one from each county's SWCD board and the other from the county board. This committees' meeting schedule and how they are to interact with other committees has yet to be determined. The functions of the CAC include:

- Provides a link between the Board and the public through a select group of representatives
- Provide citizen input on the use of public funds
- Responsibilities for reporting back to those they represent on a routine basis on the progress of the Plan and the SRWPP activities.

A Technical Advisory Committee (TAC) will continue similar to the same TAC formed during the planning phase of the Plan. It will be composed of one representative from each of the five state agencies: the DNR, BWSR, MDA, MDH, and the MPCA. It will also include one staff representative from each of the JPA signatory parties. This committee may include other technical stakeholders and partner members (e.g., representatives from drainage authorities, municipalities, townships, or others) as needed for consultation and as approved by the Board. This committees' meeting schedule and how they are to interact with other committees has yet to be determined, but the Partnership will aim for the TAC to meeting twice yearly. The functions of the TAC include:

- Provide input on implementation programs, as requested
- Assist with technical analyses, data gathering, and studies
- Assist with avoiding duplication of efforts

The Steering Committee will continue similar to the same Steering Committee formed during the planning phase of the Plan. It will be composed of one agency staff from each of the JPA signatory parties. BWSR staff will be invited to attend Steering Committee meetings, as needed. This committees' meeting schedule and how they are to interact with other committees has yet to be determined. A liaison has been discussed to help in the communication between the Board and various committees. The Functions of the Steering Committee include:

- Assist in evaluating and tracking progress, and report on implementation outcomes
- Use adaptive management as new data, analyses, and progress tracking are reported
- Develop annual work plans and biennial budget requests for WBIFs for administration, shared services, data gathering & analysis; review and recommend WBIF projects to the Board
- Prioritizes and targets projects and programs with project scoring criteria matrix
- Draft collaborative grant applications
- Make recommendations to the Board on work plans, budgets, grant applications, etc.

6.3 SHARED STAFF AND SERVICES

As LGUs within this watershed have limited staffing capacity to implement projects identified under this Plan; the Partnership has discussed a wish for 1-3 new employees to assist in the Plan's implementation. Staff are crucial in this process as most of the work identified in the Plan is with private landowners on a voluntary basis. Local staff time is needed for project development and developing landowner relationships. A full time Coordinator has been discussed as needed to coordinate the Plan's activities, assist in technical project development and lead in outreach activities throughout the watershed with our various partners. The need for added technical assistance for project development will be evaluated over the first few years of the plan. A part-time Forester is being requested to work on the Land Cover & Use goals for added protection in the upper watershed. The shared staffing needs for the watershed may be re-evaluated every year or as

needed to meet the needs for the Plans' implementation. Shared watershed services provided by any of the SRWPP partners will include a contract for services agreement between the two parties.

6.4 COLLABORATION

To a large degree, the success in achieving the Plan goals will depend on the local support at the individual to community level because implementation of the strategies is voluntary. The Steering Committee members may collaborate with NRCS to convene local working groups to align Federal and Plan priorities and actions. The SRWPP is committed to proactively working with nongovernmental entities including individual and lake associations, civic groups, nonprofit entities, public and private schools, universities, private businesses, volunteers, individuals, and foundations, many of which are already involved in protecting and improving the Snake River Watershed's resources. Under the SRWMB, the four member counties currently contribute an annual allocation to go toward administration expenses associated with the work of implementing water plan actions. Each counties contribution is divided out based on the area each county occupies within the watershed. We hope for this local contribution to continue, especially as we anticipate more coordinated efforts to continue in the implementation of our new Comprehensive Watershed Management Plan.

6.5 FUNDING

6.5.1 Local

Local funding sources that may be used to implement this Plan include property taxes levied by counties, townships, and cities on properties within their jurisdictions. SWCDs do not have taxing authority. Instead, SWCDs use a variety of funding streams including funding from counties, grant funding, and fees for contracted services. These SWCD funding streams may not always be stable or consistent because they rely on agreements with other entities, successful grant applications, and allocations by other entities.

6.5.2 State

State funding includes funds derived from the State tax base, as well as funds derived from all State implemented grant programs. Examples of such programs include projects and practices grants and state easement programs. Examples of state agencies which administer grant programs include BWSR, MPCA, MDA, DNR, and MDH. Watershed Based Implementation Funding will be a key grant program for implementation of projects identified in this Plan, however, there are additional state funding sources that may be used for plan implementation. Minnesota's Clean Water, Land and Legacy Amendment and Environment and Natural Resources Trust Fund also provide significant sources of funding for projects. Funds under the Legacy Amendment include the Arts & Cultural Heritage Fund, Clean Water Fund (which includes Watershed Based Implementation Funding), Outdoor Heritage Fund, and Parks & Trails Fund. SWCD Local Capacity Service grants originating from the Clean Water Fund are non-competitive funds from BWSR to help build the capacity of local soil and water conservation districts in the areas of soil erosion, riparian zone management, water storage and treatment, and excess nutrients. The State's zero-interest Clean Water Partnership (CWP) loan program presents another option for obtaining advance funding for implementation, and there are small grants available to landowners certified through the Minnesota Agriculture Water Quality Certification Program. State funding excludes general operating funds obtained from BWSR, counties, service fees, and grants or partnership agreements with the federal government or other conservation organizations.

WBIFs are State funds that originate from the Clean Water Land and Legacy Amendment (Clean Water Funds) and will be used to help implement this Plan through an allocation from BWSR to the SRWPP Partnership.

6.5.3 Federal

Federal funding includes all funds derived from the Federal tax base. For example, this includes programs such as EQIP, CRP, Conservation Innovation Grants (CIG), Fish and Wildlife Service (FWS) funding for habitat projects, and EPA Section 319 funds which are often used to improve water quality. State dollars may be leveraged through various federal cost share programs. Partners may seek federal dollars for projects in this Plan that align with objectives of a given federal agency. For example, EPA Section 319 funds may be used for efforts in a smaller sub-watershed to clean up the water and eventually remove water quality impairments.

6.5.4 Other Sources

Non-governmental organization (NGO) funding sources may be used to fund the Plan implementation, in addition to federal, state and local sources. Examples of NGOs that offer grant programs for water related initiatives include the McKnight Foundation, Jeffers Foundation, Initiative Foundation, and Mortenson Foundation. NGOs such as Pheasants Forever, The Nature Conservancy and Ducks Unlimited may coordinate with SRWPP Partners to implement projects and initiatives that meet shared goals. Educational organizations such as the University of Minnesota may provide in-kind services to support initiatives such as AIS research and management, water monitoring, lake sediment sampling, and community education and outreach. Particularly, the University of Minnesota's Nonpoint Education for Municipal Officials (NEMO) and MN Aquatic Invasive Species Research Center (MAISRC) can be valuable partners for implementing projects within this Plan.

Private sector companies, such as those engaged in agribusiness (e.g., seed companies, tool manufacturers) or technology (e.g., GIS), may also be a potential source of funding or in-kind services for implementation. For example, Esri, a GIS company, offers a cost share grant program for government and nonprofit agencies to purchase GIS software. Incorporating economics and cost-benefit analysis into implementation practices is key to ensuring project efficiency. Working with private companies can provide further emphasis on these topics. Partners will seek partnerships with private sector businesses as such opportunities arise.

6.5.5 Collaborative Grants

The SRWPP will allocate WBIFs across different program areas in order to leverage other funding sources, and to advance progress in multiple areas through a variety of actions. For other funding needs outside of the WBIF it is anticipated that partner collaboration will continue as it has under the SRWMB, in seeking watershed-wide grant funds from all outside sources. Any variety of outside funding sources may be identified from which to seek grant funds, depending on the Plan's objectives in working to meet our shared goals.

6.6 WORK PLANNING

Implementation of the Plan is based on collaboration and coordination among the members of the SRWPP. Deciding how and where to seek additional funds as well as how to spend WBIF funding are critical steps in accomplishing the outcomes of the Plan. This section describes how an annual work plan will be developed to allocate WBIFs to various activities and how the funds will be targeted to

get the right projects and programs in the right places, at the right time to capitalize on opportunities and maximize impact given cost benefit. Each year, the Steering Committee, with input from the CAC, will develop an annual work plan to be recommended to the Board for their consideration. The annual work plan will be based on a variety of factors which could include:

- Priority level for WBIFs
- Commitments from previous years
- Implementation of planned activities previously delayed
- Staff capacity
- Funding availability and/or partnering/cost share opportunities
- Consistency with Plan goals
- Distribution of activities across resource areas
- Feasibility and readiness
- Multiple benefits across Issue Areas
- “Cost/benefit” ratio of project

Annual work plans will identify the SRWPP Partners responsible for carrying out each activity, along with a budget for each proposed activity. The work plan will be used to develop a biennial budget request for WBIF to BWSR. The work plan and budget request will promote local water management priorities for state funding requests. The SRWPP Partners may also pursue funding from other sources including state, federal, or other funds based on the work plan to accomplish the Plan’s Implementation Actions (see Section 3.0).

Approval of the work plan will coincide with execution of agreements with individual SRWPP Partners to carry out the activities specified in the work plan. The work plan process will proceed in this order; starting with the Steering Committee, to the Board for approval and finally to the Local Staff to carry out the work. See below for the actions for each group in this process.

Steering Committee (with Advisory Committee Input)

- Set guidance, direction, and budget for shared staff positions
- Decide on analyses, mapping, and modeling needs
- Set budget and expectations for administrative work with fiscal agent and day-to-day contact
- Decide on specific project, program, or a "set of projects" for implementation; answer gatekeeper questions
- Develop annual work plan with appropriate budget line items and responsible parties

Board

- Review and approve annual work plan
- Approve agreements with partnering entities to carryout work

Local Staff

- Carry out approved work plan components through agreements/contracts
- Score projects against our scoring criteria matrix (see below), concentrating all or most funds on only those that score in the top 25%

6.7 PROJECT TARGETING AND SCORING

During annual work plan development, the Steering Committee will review and discuss possible projects and programs for use of WBIFs in the next fiscal year. Each Steering Committee member will

bring information and analyses related to their proposed projects (such as projects identified in a sub-watershed analysis), or programs. Only activities that meet the scoring criteria matrix will be further reviewed for WBIFs.

Examples of analyses used to target and prioritize projects include a sub-watershed analysis (SWA), diagnostic study, feasibility study, etc. These analyses will include spatial and desktop analysis (including historical aerial photo review), possibly water quality modeling or monitoring for pollution reduction analysis, field evaluation, and cost effectiveness per estimated reduction planned.

Part of the initial work plan development process completed by the Steering Committee will include the formation of project criteria scoring matrix. This matrix will be used to assess projects toward eligibility for WBIF. The existing SRWMB already has an approved core project ranking sheet for both restoration and protection practices (see **Appendix F**). This may be used and modified to include a quantifiable project scoring matrix following the Plan's implementation tables' criteria. The existing SRWMB also has a few existing policies that may be considered for continuing under the SRWPP such as a non-structural practices policy and a shoreland policy as related to shoreland restoration projects.

6.8 ASSESSMENT, EVALUATION AND REPORTING

Each year, the SRWPP will evaluate their collective accomplishments and report their progress on implementation activities and outcomes to the SRWPP Board. The report will include feedback requested from agencies on the TAC. Results of this assessment and report will be used to support future work plan development, facilitate adaptive management decisions, and may indicate necessary plan amendments.

A consistent method for annual tracking and reporting progress toward Plan goals will be developed by the SRWPP. Methods may include one or more of the following: standard reporting form, spreadsheet, map-based database, annual state of the watershed report, and/or individualized waterbody report cards. Required baseline information will include a summary of activities completed during the reporting period, dollars spent, budget balance remaining, measurable output achieved, and progress toward the Plan goals. Pollutant load reduction estimates from the tools used to identify practices will be used to track progress toward goals. Grant reporting, including BWSR e-Link reporting, is estimated to be led and coordinated by new shared watershed staff. However, reporting will be a team effort with each partner helping to gather our accomplishment details.

As Partners implement activities to address local priorities (beyond those identified in the targeted Implementation Table), progress will be made in the watershed beyond what is covered under the reports described above. Reporting on such progress should align with the WBIF Assurance Measures, though may not necessarily be tracked in e-LINK.

6.9 FIVE YEAR EVALUATION

Five years into the Plan, the SRWPP Partners will collaboratively perform a thorough assessment of the Implementation Tables. The purpose of this evaluation is to determine implementation progress and consider whether staying the course or resetting direction is necessary. Revisions may be made to the Implementation Table as a result of this assessment, which must consider new information and data. Previous years' annual and biennial reporting will help inform this evaluation. The SRWPP Partners should consider updated information such as revisions to models and new monitoring data, as available. If a WRAPS has been revised since the Plan was originally adopted, this evaluation

must include an assessment of any changes necessary due to the WRAPS. During the planning phase some items have already been identified to be re-evaluated at the Plan's five-year evaluation period as more data is needed to better understand or address these concerns. (Concerns such as targeting our Drinking Water & Groundwater issue and addressing our Extreme Weather issue.)

6.10 AMENDMENTS

During the time that the Plan is in effect, new data will be generated that will provide a better understanding of watershed issues and solutions. Administrative authorities, state policies, and resource concerns may also change. Changes, additions, or clarifications to the Plan may be necessary to address the new and changing information. A plan amendment will be required when the requested change to the Plan includes revising a goal, or deletion or adding a priority area, this does not include adding Prioritized Targeted & Measurable (PTM) information to an already identified priority area. The Partnership will consult with BWSR staff to determine when an amendment is needed.

Revision requests that will not warrant an amendment process are listed below.

- Formatting of the Plan
- Revision of a procedure meant to streamline plan administration
- Clarification of existing plan goals or policies
- Inclusion of additional data not requiring interpretation
- Expansion of public process
- Adjustments to how activities will be carried out within the discretion of the JPA, including adding more specific prioritized, targeted, or measurable locations and outcomes for activities
- References to or incorporation of prioritization studies completed since Plan approval

7.0 References

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APPENDIX A

Snake River Watershed Inventory of Existing Plans and Studies

Appendix A
Snake River Watershed Inventory of Existing Plans, Studies, & Data

Document Name	Agency	Year
Snake River Watershed Management Plan	Snake River Watershed Management Board	1997
Aitkin County Water Management Plan June 2009	Aitkin County, Aitkin County SWCD	2009
Chisago County Local Water Management Plan 2013-2023	Chisago County	2013
Isanti County Local Water Management Plan 2018-2027	Isanti County, Isanti SWCD	2018
Kanabec County Water Plan 2019-2028	Kanabec County, Kanabec SWCD	2019
Mille Lacs County Local Water Management Plan 2018-2027	Mille Lacs County	2018
Pine County Local Water Management Plan 2015-2020	Pine County SWCD	2015
Snake River Watershed Zonation Analysis	DNR	2012
Groundwater Atlas of Kanabec County, Minnesota	DNR	2020
Climate Summary for Watersheds – Snake River	DNR	2019
DNR Statewide Plans/Studies/Tools/Programs/Resources: • DNR Infested Waters List (updated 7/17/2020) • DNR Recreational Compass (map tool) • FEMA floodplain mapping and hydraulic models • Native Plant Community Mapping • Natural Heritage information • DNR nongame plan • Climate Trends • DNR Forest Stewardship Program • DNR Restore Your Shore • Invasive Species Training and Permits • DNR River Ecology Unit • Wildlife Action Network (WAN) GIS layers: composite population viability/persistence maps of Species In Greatest Conservation Need (SGCN), species richness hotspots of SGCN, spatially prioritized MBS Sites of Biodiversity Significance, cores and corridors of the MN Prairie Conservation Plan, High Conservation Value Forests, Lakes of Biological Significance, and Rivers/Streams with an exceptional index of biological integrity (IBI) score • Shoreland Regulations Resources • DNR Guide for Buying and Managing Shoreland • DNR Shallow Lakes Program • DNR Planning Your Buffer Zone	DNR	

Appendix A

Snake River Watershed Inventory of Existing Plans, Studies, & Data

Document Name	Agency	Year
Snake River State Water Trail Guide	DNR	
Bank Service Area 6 Compensation Planning Framework – Watershed Based Approach to Wetland Compensatory Mitigation	BWSR	
BWSR TSA 8 Watershed Landcover Data Spreadsheet (covers Snake River Watershed)	BWSR, Mitch Brinks	2019
BWSR TSA 8 Watershed Protection Quality Risk Data Spreadsheet (covers Snake River Watershed)	BWSR, Mitch Brinks	2019
Environmental Benefits Index (EBI) (GIS layer/analysis)	BWSR	2014
DRAFT Snake River Watershed Groundwater Restoration and Protection Strategies Report	MDH	2020
Minnesota Department of Health Geospatial Data Files: • DWSMAs (surface and GW, vulnerability) • Sealed Wells • Source Water Assessment Areas (surface and GW) • WHPAs Additional MDH Geospatial Layers Available in WHAF (and upon request from MDH): • Max Arsenic & Nitrate results for drinking water wells • Wells located within flood zones • Regional aquifers • Well density of drinking water wells • Geologic sensitivity at wells • MDA GW Protection Rule DWSMAs • Pollution Sensitivity of Near-Surface Materials (DNR layer) • Township testing final Nitrate Results • Township testing Initial Nitrate Results	MDH	
Fish Lake Assessment Report	MPCA, DNR	1994
Screening Level Causal Analysis and Assessment of an Impaired Reach of the Groundhouse River, MN	MPCA, USEPA	2004
Groundhouse River Fecal Coliform and Biota (Sediment) TMDL Implementation Plan	MPCA	2009
Groundhouse River TMDL for Fecal Coliform and Biota (Sediment) Impairments	MPCA	2009
Ann River Stressor ID Report	MPCA	2011
Ann River Watershed TMDL Restoration Plan	MPCA	2013
Ann River Watershed Bacteria, Nutrient, and Biota TMDL	MPCA	2013
Mud Creek Stressor ID Report	MPCA	2013
Snake River Watershed TMDL Report	MPCA	2013

Appendix A

Snake River Watershed Inventory of Existing Plans, Studies, & Data

Document Name	Agency	Year
Snake River Watershed WRAPS Report	MPCA	2014
Snake River Watershed Monitoring and Assessment Report (Cycle 1)	MPCA	2017
Snake River Watershed Water Assessment and Trends Update	MPCA	2020
Article: Snake River Watershed is resilient, allowing sensitive species to thrive	MPCA	2020
Phosphorus Loading in the Snake River Watershed (Generalized Watershed Loading Functions (GWLF) Model and GIS layer)	MPCA/Wenck	2014
Aquatic Ecosystem Protection Efforts in Minnesota's Snake River Watershed: Summary and Recommendations	The Cadmus Group, USEPA	2013
Snake River Watershed Landscape Stewardship Plan	Nature Conservancy	2018
Nature Conservancy Geospatial Layers for Snake River: • Snake River Ditch Analysis • Aquatic biodiversity targets • Terrestrial biodiversity targets	Nature Conservancy	2014
City of Mora Subwatershed Assessment Report	Wenck, Kanabec SWCD	2018
Ann Lake Internal Load Feasibility Study	Wenck, Kanabec SWCD	2018
Pokegama Lake Internal Load Feasibility Study	Wenck, Pine County, Pokegama Lake Assoc.	2018
State of the St. Croix River Report	St. Croix River Association	2020

APPENDIX B

Complete List of Issue Areas

Appendix B
Full List of Issue Areas

- **Forests:** Forest management and stewardship is needed, especially for working forested lands, to protect water quality and forest ecosystems.

- **Agricultural Lands:** Sediment and nutrients from farmland runoff pollutes surface water, and groundwater in the watershed has elevated nitrate. Cropland, pastureland, and manure management all need to be addressed, and generally speaking, farmland nutrient management, restoration of altered hydrology, and erosion control are all needed, including improvements in soil health.

- **Development:** Development and land conversion in the watershed needs to be planned for and accordingly managed to reduce negative impacts to water and other natural resources.

- **Aquatic Habitat:** Healthy aquatic habitats, especially for sensitive species, need to be protected and restored.

- **Habitat:** High quality habitat and key corridors (including streams) should be protected or restored to maintain and improve connectivity and support healthy upland ecosystems.

- **Invasive Species:** Invasive species threaten existing ecosystems and quality of life.

- **Shoreline Restoration:** Restoration of shorelines, including shoreline buffers, is needed to reduce loading to surface waters.

- **Wetlands:** Existing wetlands should be protected for their water resource and habitat benefits, and degraded and altered wetlands should be restored to reduce releasing of phosphorus.

- **Drinking Water and Groundwater**: Well testing in the watershed has shown elevated nitrate and arsenic levels. Additionally, there is concern from residents that drinking water resources are being depleted faster than they are being replenished.

- **Erosion:** Overland and shoreline erosion is degrading aquatic habitat and water quality.

- **Water Quality:** Internal nutrient loads and runoff contribute to algae, weed growth, and water quality and aquatic habitat degradation. Management of runoff across land uses is needed to reduce impacts to surface waters.

- **Septic Systems:** Non-compliant and failing septic systems negatively impact the quality of both surface and groundwater.

- **Extreme weather:** Extreme weather is leading to more extreme precipitation events.

- **Flooding:** The watershed is not able to appropriately respond to flooding events.

- **Lake Bounce:** Fluctuations in lake levels have been extreme, leading to increases in shoreline erosion and damage to aquatic communities.

Appendix B
Full List of Issue Areas

- **Recreation:** Recreation in the watershed, while a treasured part of living or visiting the area, can degrade habitat and water quality when done irresponsibly, without certain precautions, or too intensively.

- **Collaboration:** Consistency and coordination between different local governments is needed to improve efficiency, ensure progress towards goals, and support the common goal of a healthy watershed.

- **Stewardship:** Everyone has a role to play to protect water and natural resources, but there is concern that there is a declining environmental ethic in the watershed.

- **Understanding:** The source of water quality and quantity impairments is not always known. Increased understanding is needed in order to better target and prioritize efforts.

APPENDIX C

Desired Future Conditions

Appendix C
Desired Future Conditions

Desired future conditions were developed for most issue areas to guide the planning process and discovered a shared vision for the future of the watershed within and beyond the 10-year plan. The desired future condition for each issue area guided identification of priority resources and implementation actions.

Issue Area	Desired Future Condition
Surface Water Quality	Impaired waters have been removed from the impaired waters list. There are no new impairments, and conditions continue to be protected or improved. High quality and unimpaired waters remain protected.
Drinking Water & Groundwater	There is clean, abundant, and drinkable groundwater, and people understand groundwater and connectivity with surface water, and understand how their actions can benefit or degrade this resource.
Land Cover & Use	Economic value of developed lands is balanced with the preservation of natural and water resources, and communities are supported in making cutting-edge sustainable land use and water-related practice decisions.
Habitat	Degraded or lost habitat has been restored closer to natural conditions. High quality habitats and key ecological corridors remain protected and thrive.
Erosion, Soil Health, & Soil Loss	All lands within the watershed will be managed within tolerable soil loss thresholds over all land use types. Soils are in a healthy condition to support water retention, reduced erosion, and increased carbon storage.
Surface Water Quantity	Watershed and communities living within the watershed function in a way that it is able to adapt to increased precipitation and peak storm events. This can include increased wetland storage, soil storage, ditch management. A watershed able to manage increased average volume and peak storm events with limited impact to social/built environment.

*Note that a desired future condition was not generated for the Extreme Weather Issue Area

APPENDIX D

Priority Wetland Restoration Areas Criteria

Appendix D
Priority Wetland Restoration Areas Criteria

Priority wetland restoration areas were developed as part of the *Bank Service Area 6 Compensation Planning Framework-Watershed Based Approach to Wetland Compensatory Mitigation* report and process. Twelve parameters weighted by subwatershed and used to prioritize areas for wetland restoration. The parameters used were:

- Soil erosion
- Perennial cover
- Habitat connectivity
- Ditched wetlands
- Altered watercourses
- Impaired streams
- Impaired lakes
- Phosphorus risk
- Priority restoration areas
- Permitting frequency
- Proximity to high-quality habitat
- Groundwater recharge

Below is the final map created from weighted data.

Appendix D
Priority Wetland Restoration Areas Criteria

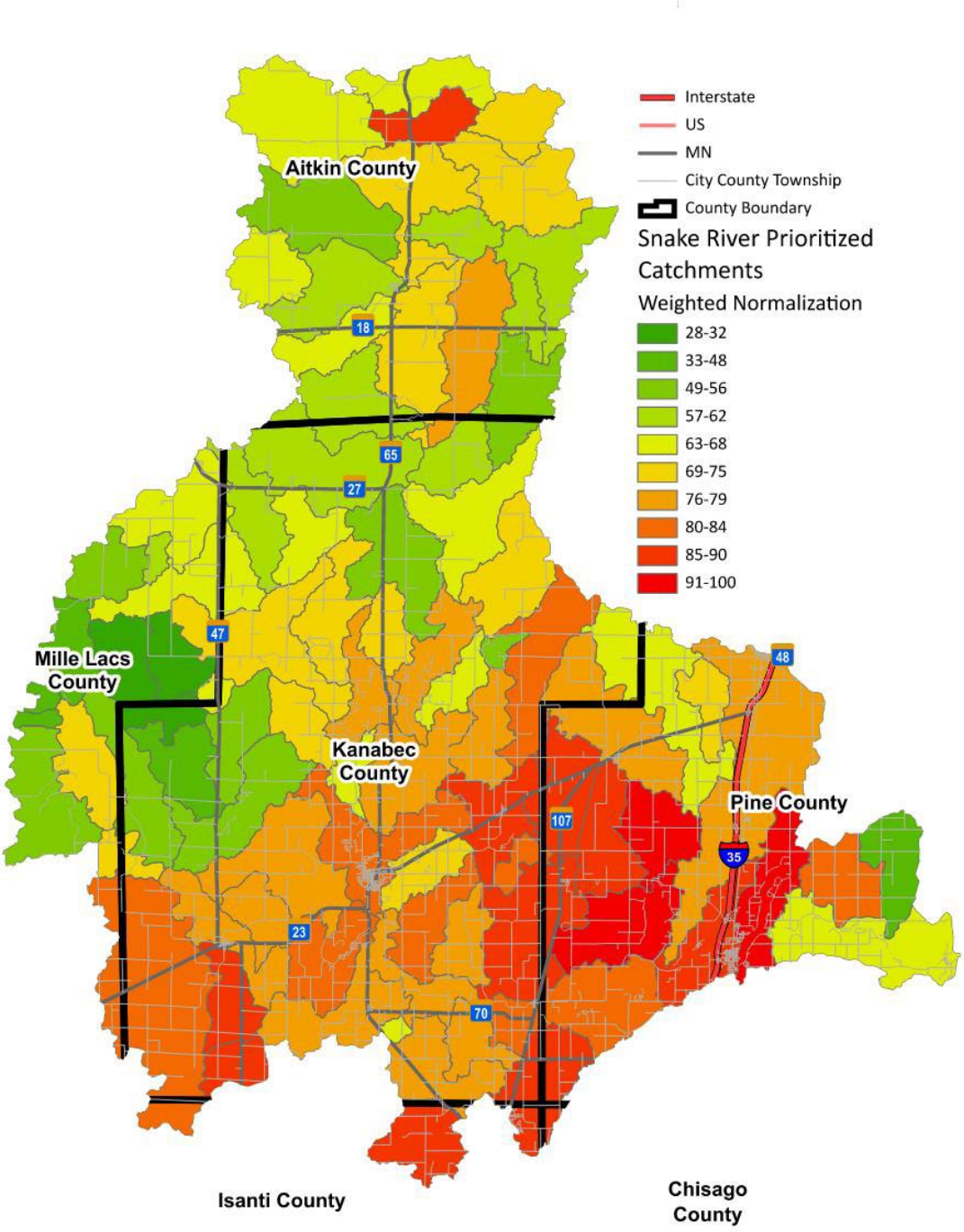

Figure D-1. Snake River Watershed weighted normalization analysis to identify high priority subwatersheds for wetland restoration.

APPENDIX E

Drinking Water & Groundwater GIS Analysis

Appendix E
Drinking Water & Groundwater GIS Analysis

The Partnership identified the need to prioritize drinking water and groundwater projects based on multiple datasets. Drinking Water & Groundwater Goal 1 priority watersheds were identified through an analysis of existing geospatial data related to groundwater sensitivity and contamination. Four layers were used in the analysis:

- Drinking water well density (data: County Well Index, **Figures E-1 and E-2**)
- Active feedlot locations (data: MPCA, **Figures E-3 and E-4**)
- Groundwater nitrate concentration data (data: County Well Index, MN Drinking Water Information System, MDH Water Chemistry, MDH Well Management, **Figures E-5 and E-6**)
- Pollution sensitivity of near surface materials (data: DNR, **Figures E-7 and E-8**)

Each layer was analyzed by HUC12 subwatershed, Each subwatershed received a score 1-5 based on the data from each layer, and scores from all layers were aggregated to get a final score (see **Figure E-9**). Higher final scores are designated in red and represent watersheds with higher priority for groundwater-related projects. Lower final scores are designated in green and represent watersheds with lower priority for groundwater-related projects. Below are maps showing the raw data of each layer and the results of the subwatershed scoring.

Appendix E
Drinking Water & Groundwater GIS Analysis

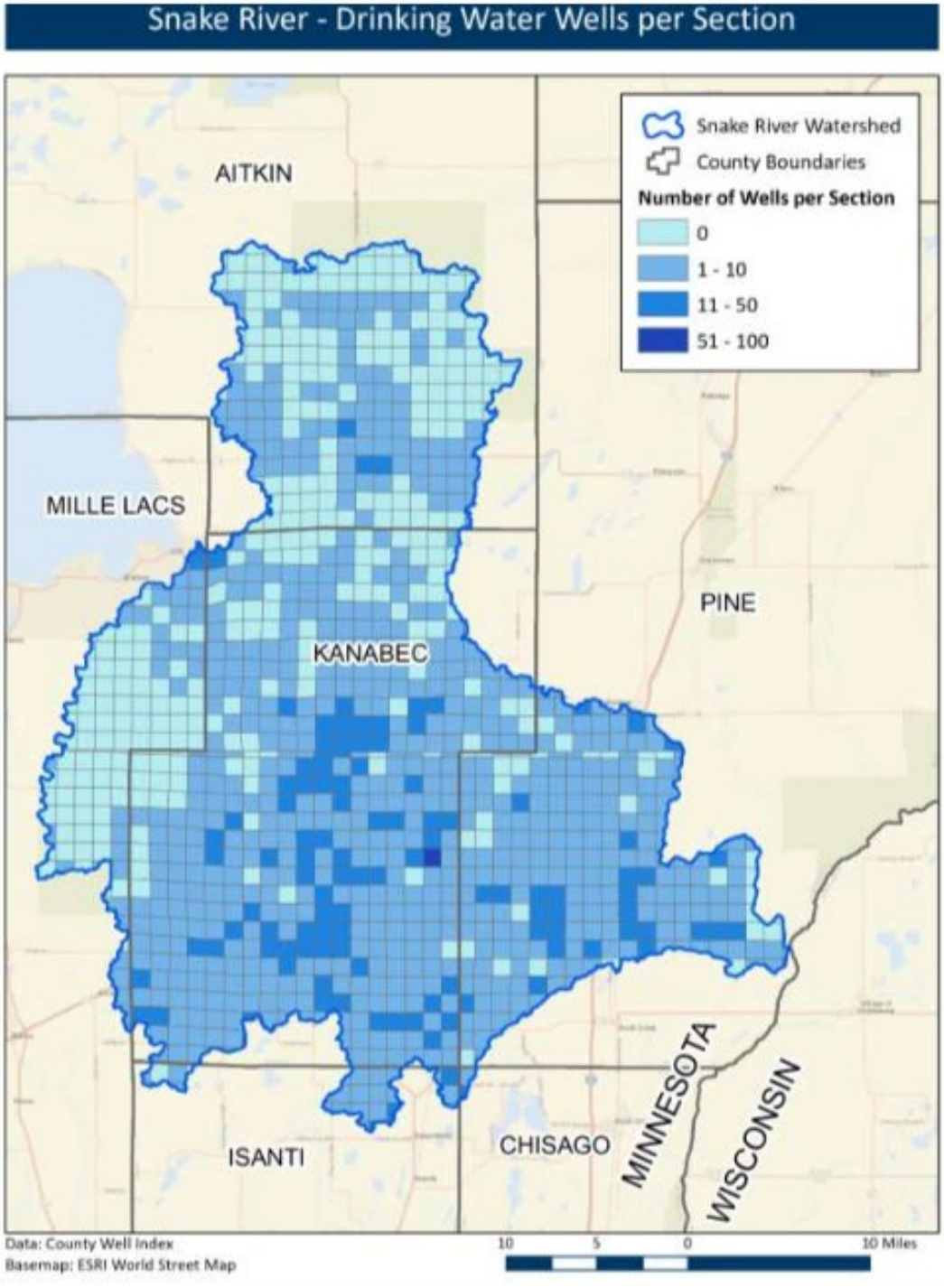

Figure 11: Snake River Watershed - Density of drinking water wells per section. There are 4,104 private wells identified.

Figure E-1. Drinking water wells per section (source: Snake River Watershed GRAPS, 2020).

Appendix E
Drinking Water & Groundwater GIS Analysis

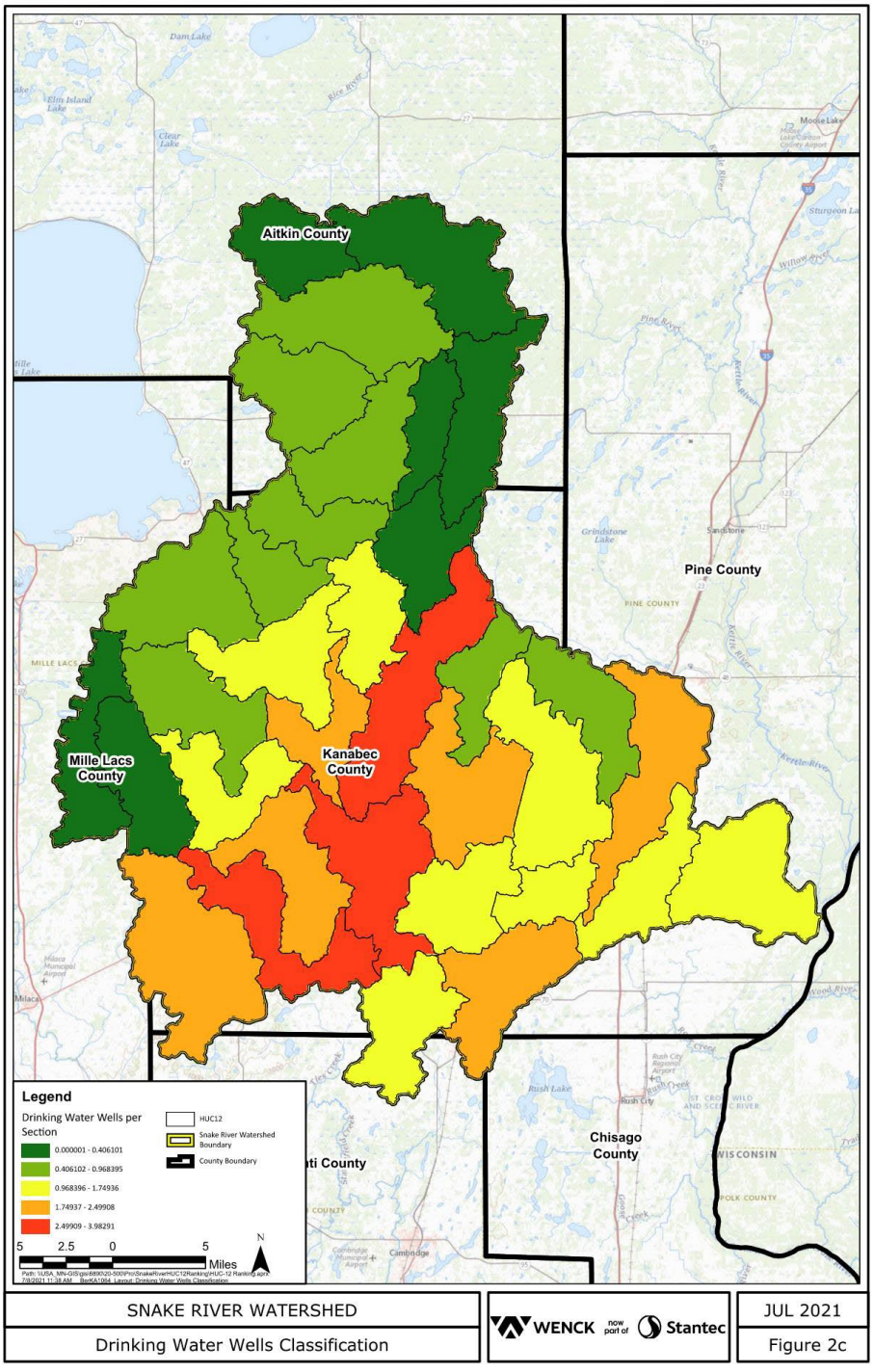

Figure E-2: Drinking Water Wells Classification.

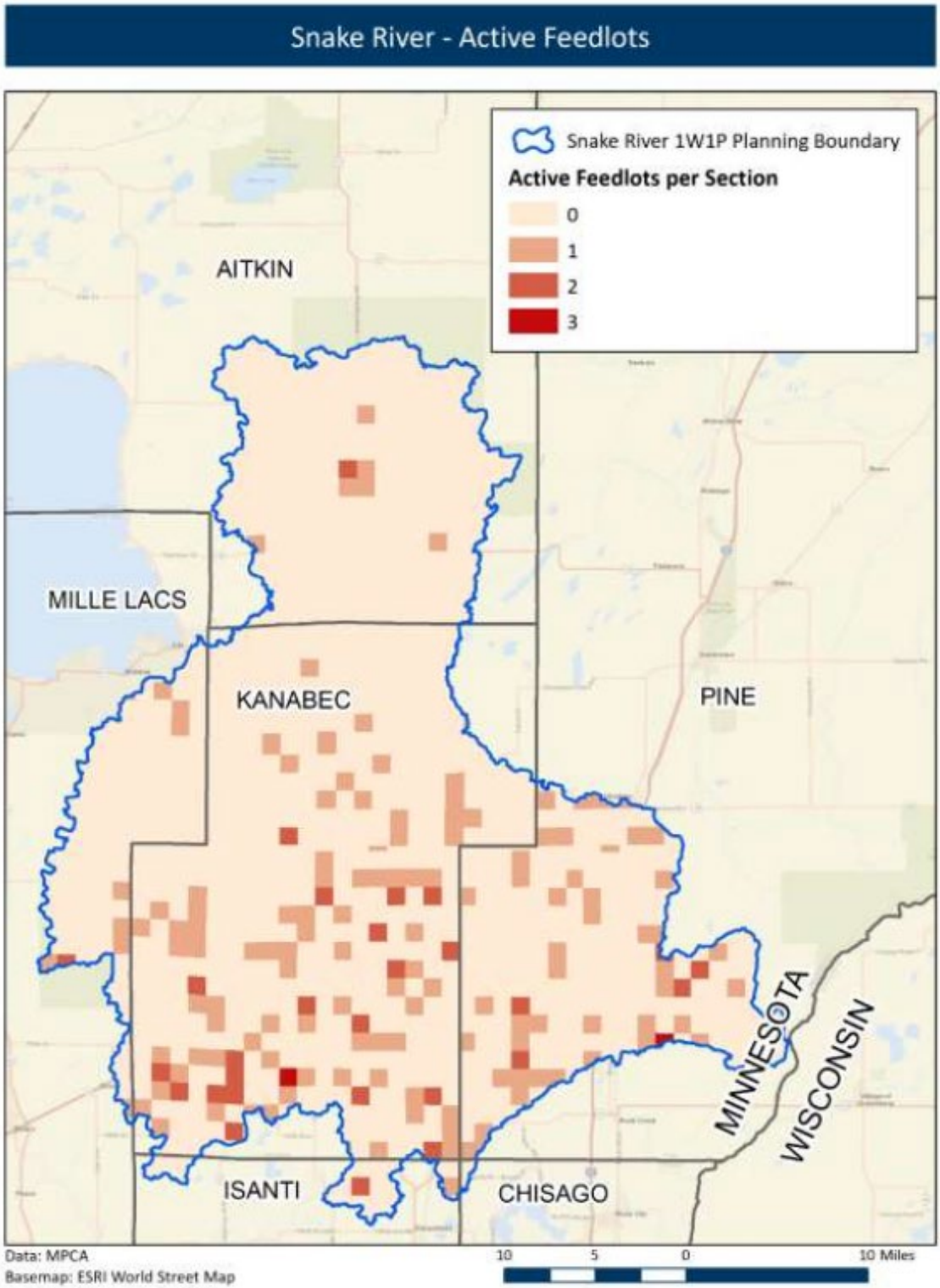

Figure 17: Snake River Watershed – Active Feedlots. There are 173 active feedlots within the watershed

Figure E-3: Active feedlots per section (source: Snake River Watershed GRAPS, 2020).

Appendix E
Drinking Water & Groundwater GIS Analysis

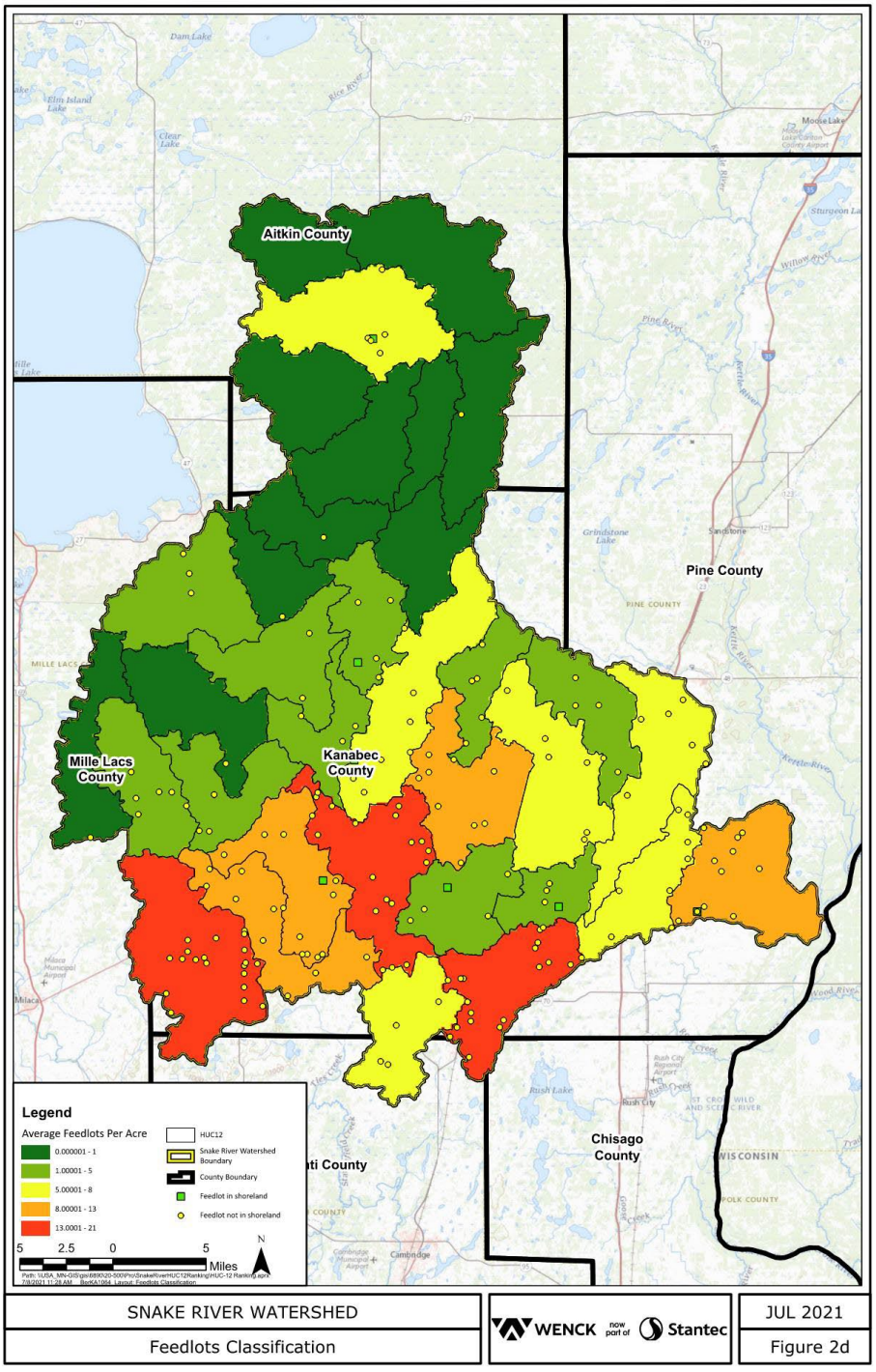

Figure E-4: Feedlots Classification.

Appendix E
Drinking Water & Groundwater GIS Analysis

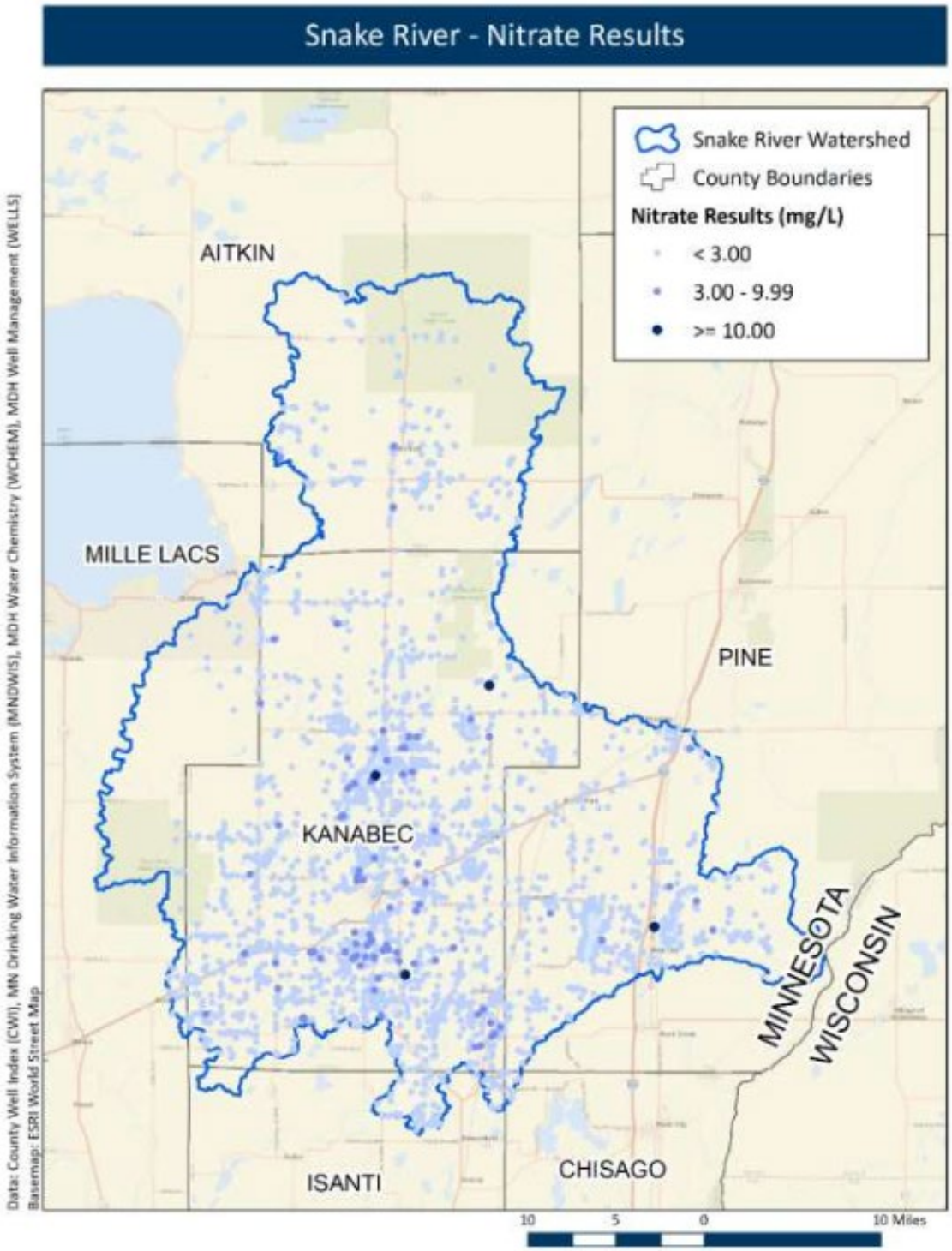

Figure E-5: Nitrate results (source: Snake River Watershed GRAPS, 2020).

Appendix E
Drinking Water & Groundwater GIS Analysis

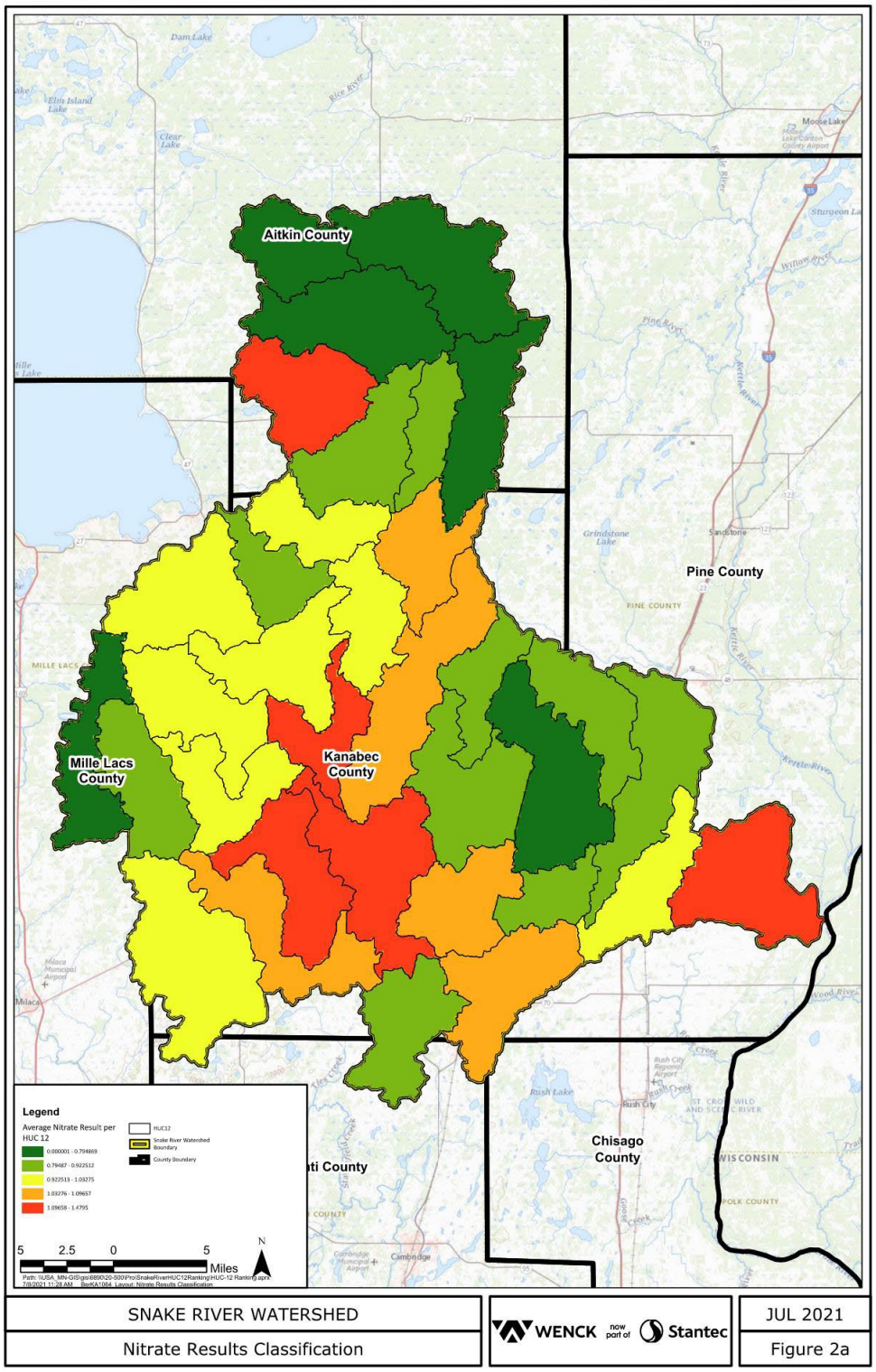

Figure E-6: Nitrate Results Classification.

Appendix E
Drinking Water & Groundwater GIS Analysis

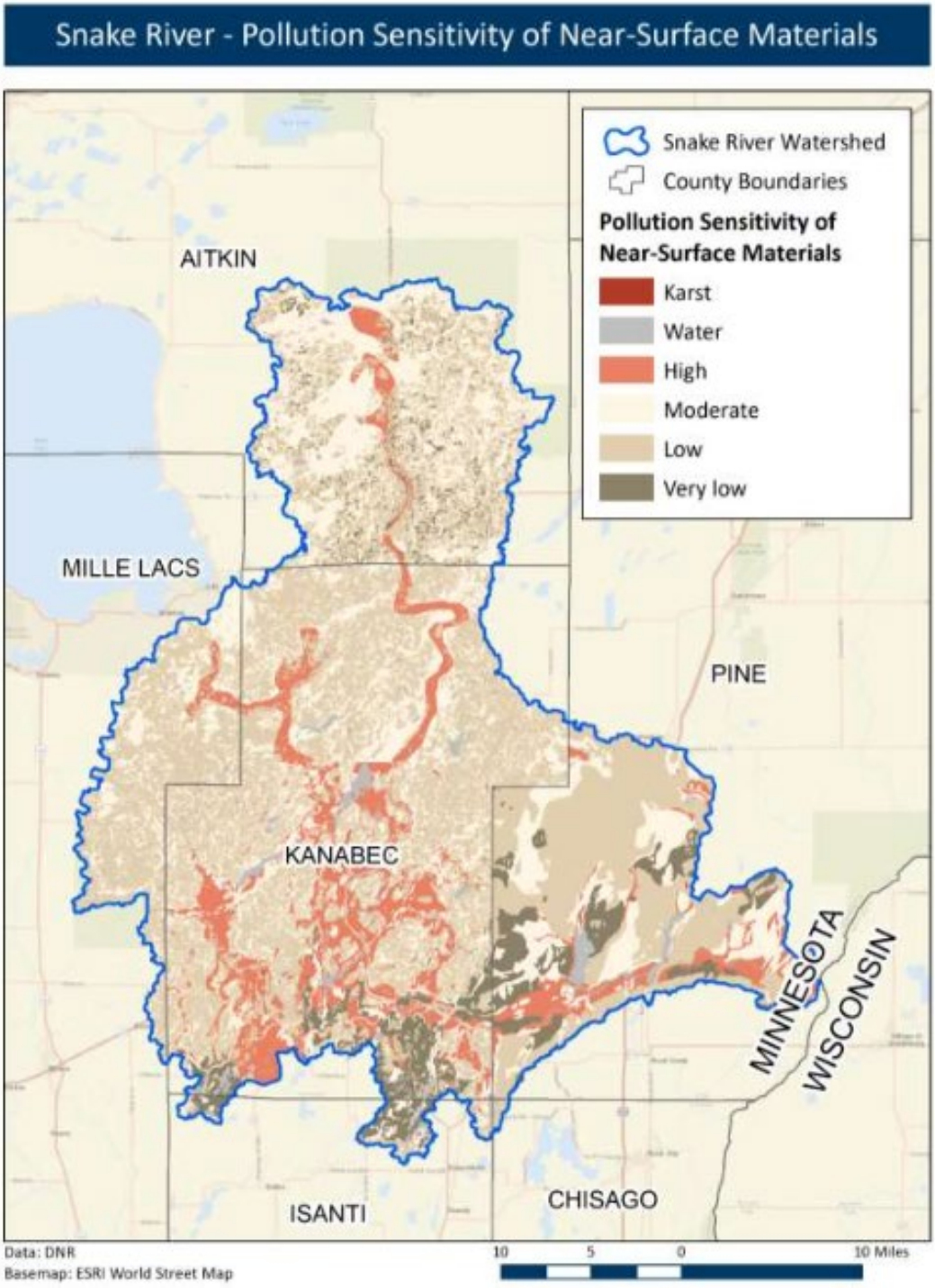

Figure E-7: Pollution sensitivity of near surface materials (source: Snake River Watershed GRAPS, 2020).

Appendix E
Drinking Water & Groundwater GIS Analysis

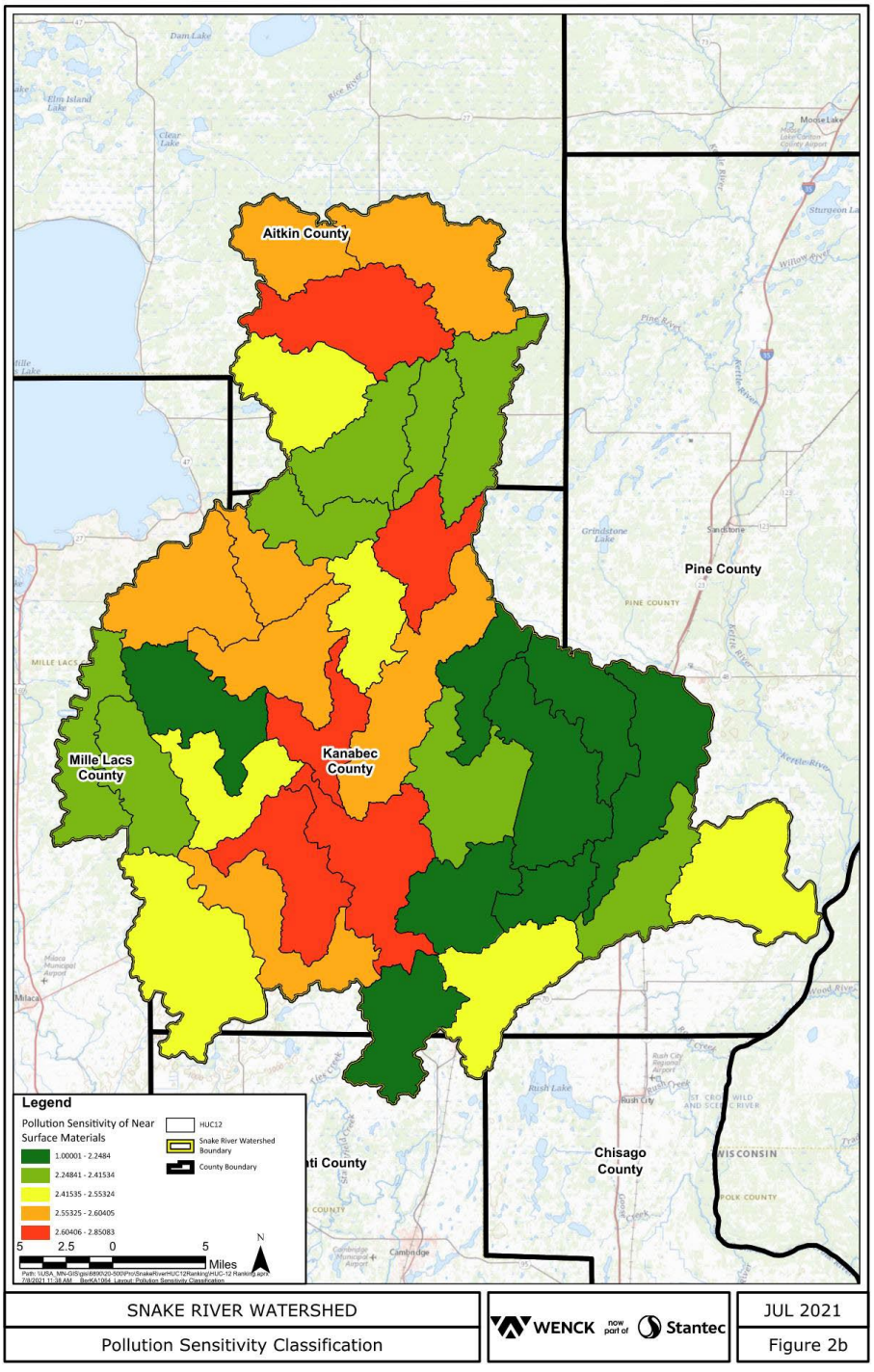

Figure E-8: Pollution Sensitivity Classification.

Appendix E
Drinking Water & Groundwater GIS Analysis

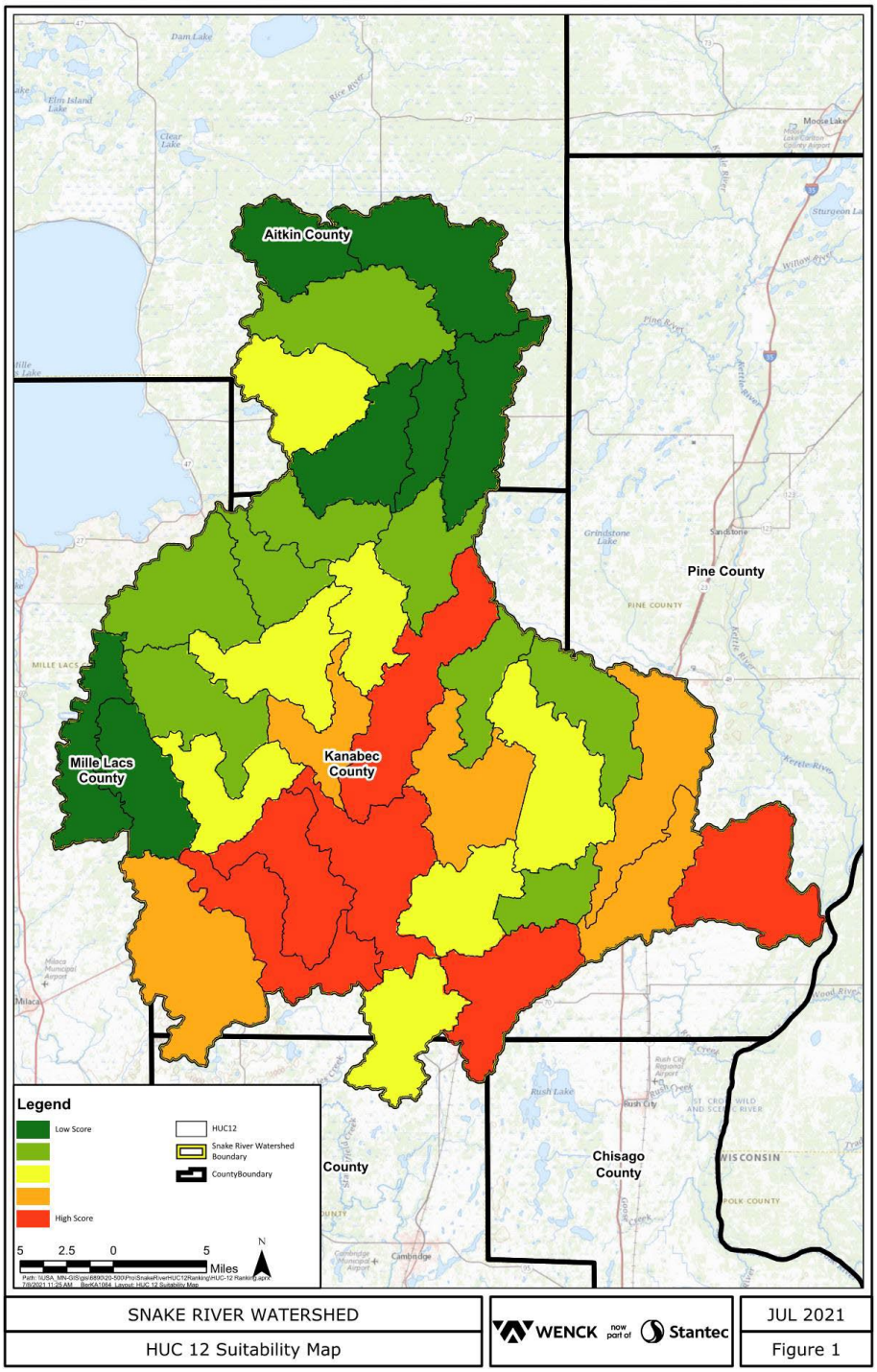

Figure E-9: HUC 12 Watershed Suitability Map.

APPENDIX F

SRWMB Existing Project Selection Criteria

SNAKE RIVER
WATERSHED MANAGEMENT BOARD

"Working to enhance and protect the water resources of the Snake River Watershed"

Shoreland Restoration Policy - Final

- May 20, 2019

This policy is in reference to shoreland (lake and stream) restoration projects in conjunction with the Snake River Watershed Management Board. This policy is to provide consistency across the Snake River Watershed and across various grant funded projects, as funding is available.

Policy Guidelines:

1. A 25-foot average minimum native vegetative buffer strip will be required on the landward side on all shoreline restoration projects to receive funding for the project. The vegetative buffer strip will be planted/seeded using only native plant species. In some cases, less than the 25' required buffer may be used, see item #4 for this exception.

2. A minimum of 75% of the planting area shall remain un-mowed. Maintenance mowing to control woody vegetation may be allowed.

3. When rock rip-rap or hard structure erosion control is preferred for use; funding for rock rip-rap may only be offered when recommended by our Technical Service Area (TSA) engineers, as being necessary for the success of the project. Rock rip-rap not recommended by TSA engineers will not be eligible for financial assistance, but technical assistance may still be offered.

4. Each site will need to be considered on a case by case basis, depending on the topography, existing vegetation, location of structures, size of lot and distance to surface waters, etc., which may change the width of the buffer required.

5. This policy does not supersede any local, County or State standards or ordinances.

Approved by the Snake River Watershed Management Board

Date: May 20, 2019

Signature: JW Aitkin SRW Coordinator

Snake River Watershed Management Board Nonstructural Practices Policy 6/2021

- Nonstructural land management practices – incentive payments to encourage practice implementation:
  - cover crop practice (340)
  - residue & tillage management no till (329)

- To ensure the benefits of soil health can be observed, the producer would be required to do the same non-structural management practice for 3-5 years (minimum 3 years) on the same piece of ground, regardless of funding offered. There may or may not be funding for all three years; dependent on the funding sources. As requested, the funds may be set-up for up-front payment as the funding source allows. Where the three years of incentive flat rate payments are paid out after the completion of the practice implementation of the first year. The remaining two years must be completed; if not, the producer will be required to pay back the expended funds not implemented.
- Staff to complete follow-up site inspections in years 1-5, as contracted and completed.

- Flat rates funding is proposed to be used, based on the current Minnesota NRCS Environmental Quality Incentive Program (EQIP) flat rates for both the 340 & 329 practice standards. There will be no requirement on number of species seeded for the 340 practice, but higher diversity will be encouraged and rank higher.
  - ~$22-42 / acre (see below for details) cover crop practice (340)
  - ~$11-18 / acre (see below for details) residue & tillage management no till (329)
- Cap on Soil Health Incentive Payments per year - $3,000 per producer

- Sign-up deadlines will be used toensure sufficient time for planning activities prior to practice implementation.
  - June 1 - cover crop practice (340)

    (Amended for 2021 only – deadline June 15, 2021)
  - Feb. 1 - residue & tillage management no till (329)

- Eligibility: Fields that have or will receive non-structural management practice incentive funding through other cost share programs (ex: SWCD, NRCS) for the same practice are not eligible for funding through SRWMB funding programs. As an incentive, if the producer has used this soil health practice for 10 years or greater, then they would not be eligible.

- SWCD staff will provide technical assistance, compiling the site- specific job sheet, planting plans and other required conservation plan requirements for the landowner conservation practice management plan. In circumstances where the SWCD staff does not have sufficient job approval authority or technical capacity, staff will seek assistance or sign-off from NRCS staff.

- Once a producer is found to be in noncompliance (within their control, not including justifiable weather-related causes) with a soil health practice; they will no longer be eligible for any future SWCD / SRWMB non-structural management practice incentive payments.

SRWMB Approval: 6/28/2021

Environmental Quality Incentives Program

2021 - Minnesota Supplement for:
Practice Standard 340 – Cover Crop

Supplemental Criteria

1.**There is a maximum payment cap of $15,000 per year for this practice.** Consult **General Provisions 8** for additional details.
2.Payment for Cover Crop (340) can be a maximum of 3 separate payments during the term of a single contract on the same acres; per policy. **Exception:** Payment for Cover Crop (340) can be a maximum of 5 separate payments during the term of a single contract on the same acres when Cover Crop (340) is planned and applied as a component of a complete conservation system to address resource concerns related to **soil health** (such assoil erosion and soil quality degradation).
3.Cover crops can be certified for payment when the cover crop has been verified it was planted. **Exception**: For the scenario "**Cover Crop – Adaptive Management**", prior to payment, data results from the replicated plots must be sent to Area Office according to the guidance outlined in the technical note. Consult your Area Resource Conservationist (ARC) for assistance.
4.**Do not contract the "Basic" or "Multiple Species" scenarios and the "No-Till, Strip-Till with Herbicide and No Cover Crop (329)" scenario for the same installation.** There is a herbicide component in each payment, and this would cause an erroneous duplicate payment.
5.Cover crops can be used for ***supplemental*** forage by grazing or mechanical harvest as long as sufficient biomass is left for resource protection. Cover corps planted for the purpose of ***supplemental*** forage must be considered a secondary purpose. Cover crops do not entirely address inadequate feed and forage resource concerns. Consult your Area Grazing Specialist and the Minnesota Agronomy Technical Note 33 for more information.
6.These payment scenarios are not to be used as a nurse crop.
7.Any soil disturbance for nutrient (including Commercial Fertilizer) or manure application must meet the residue management no-till/strip till (329) standard. Manure can be applied on cover crops and incorporation is allowed. Follow Best Management Practices (BMP) for your area.

Scenarios

Cover Crop - Adaptive Management

The practice scenario is for the implementation of cover crops in small, replicated plots to allow the producer to learn how to manage cover crops on their operation. Scenario includes implementing replicated strip trials on a field plot to evaluate, identify and implement a particular cover crop management strategy (e.g., cover crop vs. no cover crop, multiple species vs., single species, evaluate different termination methods or timings, using a legume vs. no legume for nitrogen credits). This will be done following the guidance in the NRCS National Agronomy Technical Note 10 - Adaptive Management.

MN NRCS Practice Lifespan: 1 year October - 2020

Cover Crop - Basic (Organic and Non-organic)

Single Species will be planted as a cover crop and will be followed by a row crop that will utilize the residue as mulch.

Cover Crop - Multiple Species (Organic and Non-Organic)

Multiple Species (2 or more) mixture will be planted as a cover crop and will be followed by a row crop that will utilize the residue as mulch.

Cover Crop – No Termination Needed, Basic and organic/non-organic

The cover crop chosen will be species that will effectively winter kill which will avoid the labor and expense involved in mechanically or chemically terminating the crop.

340	Cover Crop	Cover Crop - Adaptive Management	No	$1,367.05
340	Cover Crop	HU-Cover Crop - Adaptive Management	No	$2,323.98
340	Cover Crop	Cover Crop - Basic (Organic and Non-organic)	Ac	$34.61
340	Cover Crop	HU-Cover Crop - Basic (Organic and Non-organic)	Ac	$58.84
340	Cover Crop	Cover Crop - Multiple Species (Organic and Non-organic)	Ac	$42.29
340	Cover Crop	HU-Cover Crop - Multiple Species (Organic and Non-organic)	Ac	$71.90
340	Cover Crop	Cover Crop - No Termination Needed, Basic and organic/non-organic	Ac	$22.33
340	Cover Crop	HU-Cover Crop - No Termination Needed, Basic and organic/non-organic	Ac	$37.95

The SRWMB will not be offering any of the above Highly Under-served (HU) - payment rates.

Environmental Quality Incentives Program

2021 - Minnesota Supplement for:

Practice Standard 329 – Residue and Tillage Management - No Till

Supplemental Criteria

1.**There is a maximum payment cap of $15,000 per year for this practice.** Consult **General Provisions 8** for additional details.

2.This practice requires increased SCI and decreased STIR. Required tillage, degree of soil disturbance and residue to be maintained after planting will be specified in the conservation plan and supported with a RUSLE2 printout or NRCS most current erosion tool documenting before and after soil erosion rates.

3.Prior to payment for the scenario "**No-Till Adaptive Management**", data results from the replicated plots must be sent to Area Office according to the guidance outlined in the technical note. Consult your Area Resource Conservationist (ARC) for assistance.

4.**Do not contract Cover Crop (340) scenarios (Basic and Multiple Species) and the "No-Till, Strip-Till with herbicide and No Cover Crop" (329) scenario for the same installation.** There is a herbicide component in each payment, and this would cause an erroneous duplicate payment.

5.An annual payment is authorized on eligible acres, not to exceed 3 payments.

Scenarios

No-Till Adaptive Management

The practice scenario is for the implementation of no till, strip till in small, replicated plots to allow the producer to learn how to manage no till, strip till on their operation. Scenario includes implementing replicated strip trials on a field plot to evaluate, identify and implement a particular no till, strip till management strategy (e.g., no till vs conventional till, drill vs planter, strip till vs no till, residue row cleaners vs no row cleaners, etc.) This will be done following the NRCS National Agronomy Technical Note 10 - Adaptive Management.

No-Till, Strip-Till

This practice typically involves conversion from a clean-tilled (conventional tilled) system to no-till or strip-till system on cropland. This scenario will be used for both conventional and organic farming systems.

No-Till, Strip-Till with Herbicide and No Cover Crop

This practice typically involves conversion from a clean-tilled (conventional tilled) system to no-till or strip-till system on cropland. Herbicide treatment is to burndown weeds in the residue prior to planting the crop. This treatment is only when a cover crop is not present. Herbicides to be used should follow Agronomy Technical Note Number 5 guidelines.

329	Residue and Tillage Management, No Till	No Till Adaptive Management	No	$1,835.96
329	Residue and Tillage Management, No Till	HU-No Till Adaptive Management	No	$3,121.14
329	Residue and Tillage Management, No Till	No-Till/Strip-Till	Ac	$10.80
329	Residue and Tillage Management, No Till	HU-No-Till/Strip-Till	Ac	$18.36
329	Residue and Tillage Management, No Till	No-Till/Strip-Till with Herbicide and No Cover Crop	Ac	$17.72
329	Residue and Tillage Management, No Till	HU-No-Till/Strip-Till with Herbicide and No Cover Crop	Ac	$30.12

The SRWMB will not be offering any of the above Highly Under-served (HU) - payment rates.

SRWMB - Protection Project Application

					Date:		
Name:							
Address:					County:		
City/State/Zip:					Township Name:		
Phone:					Twp./Range/Section:		
Email:					Legal Description:		
					Sub-Watershed:		
Resource Concern Description:							

Practice Name, description (NRCS code):							

Protection Practice							
(Restoration & Protection Practices compared separately.)							
Estimated Cost:		$					
Funding Source:							
% Funding:		%			Amount Requesting:		$
					CAC Action:		
					SRWMB Action:		
					Date:		

			SRWMB - Protection Ranking Form					Page 2 of 2
	Name:	0				Date:	0	
						Points:	Eligible	Awarded
	1) Priority Watershed						15	
	2) Sub-Watershed:		Impaired				3	
			Not-Impaired				5	
	3) Sub-Watershed:		Restoration High Rating				3	
			Restoration Moderate Rating				5	
			Protection Area				10	
	4) Distance to Open Water		0-300'				15	
			301-1000'				10	
			1001'+				5	
	5) Part of a Conservation Plan						10	
	Example: Multiple Practice Planning							
	6) Conservationist Professional Judgement - Site Priority:							
					High		10	
					Medium		5	
					Low		3	
	7) Landowner willingness/initiative					High	10	
	Example: stopped mowing shoreland					Medium	5	
						Low	3	
	Describe:							
	8) Cost Effectiness Rating					High	10	
	(comparable to like practice)					Medium	5	
						Low	3	
	Applicant Signature:							
						Date		
					Max. Points -		85	0

		SRWMB - Restoration Project Application					Page 1 of 2	
					Date:			
Name:								
Address:					County:			
City/State/Zip:					Township Name:			
Phone:					Twp./Range/Section:			
Email:					Legal Description:			
					Sub-Watershed:			
Resource Concern Description:								
Practice Name, description (NRCS code):								
Restoration Practice								
(Restoration & Protection Practices compared separately.)								
Reduction Numbers:				Sediment:			T/yr.	
(If Protection Practice, please leave blank.)				Soil Loss:			T/ac./yr.	
				Phosphorus:			lbs./yr.	
				Nitrogen:			lbs./yr.	
Estimated Cost:		$						
Funding Source:								
% Funding:		%			Amount Requesting:		$	
Cost Effectiveness:				Sediment:			$ /T/yr. reduced	
(If Protection Practice, please leave blank.)				Soil Loss:			$ /T/ac./yr. reduced	
				Phosphorus:			$ /lbs. P/yr. reduced	
				Nitrogen:			$ /lbs. N/yr. reduced	
Pollution Index								
MINNFARM rating:								
MINNFARM compliance index:								
					CAC Action:			
					SRWMB Action:			
					Date:			

		SRWMB - Restoration Ranking Form					Page 2 of 2	
Name:	0				Date:	0		
					Points:	Eligible	Awarded	
1) Priority Watershed						15		
2) Sub-Watershed:		Impaired				5		
		Not-Impaired				3		
3) Sub-Watershed:		Restoration High Rating				10		
		Restoration Moderate Rating				5		
		Protection Area				3		
4) Distance to Open Water			0-300'			15		
			301-1000'			10		
			1001'+			5		
5) Part of a Conservation Plan / Stewardship Plan						10		
Example: Multiple Practice Planning								
6) Conservationist Professional Judgement - Site Priority:								
				High		10		
				Medium		5		
				Low		3		
7) Landowner willingness/initiative					High	10		
Example: stopped mowing shoreland					Medium	5		
					Low	3		
Describe:								
8) Reduction Numbers				High		15		
(comparable to like practice)				Medium		10		
				Low		5		
9) Cost Effectiness Rating					High	10		
(comparable to like practice)					Medium	5		
					Low	3		
Applicant Signature:								
					Date			
				Max. Points -		100	0	Total Pts.

APPENDIX G

Lake TMDL Required Phosphorus Reductions

Appendix G
Lake TMDL Required Phosphorus Reductions

The following tables and graphs outline the phosphorus reductions by source required to meet the lake TMDL goals.

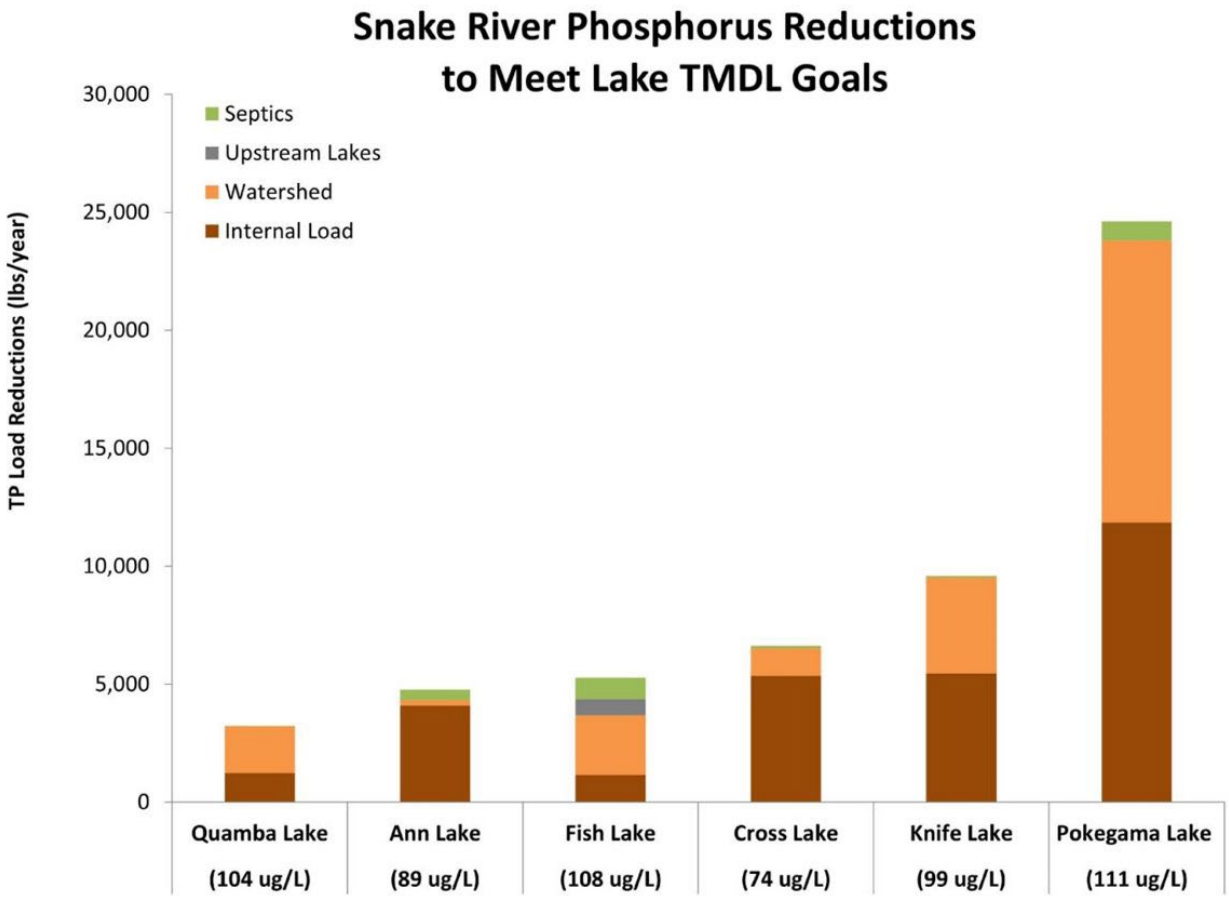

Figure G-1. Lake TMDL required phosphorus reductions by source.

Appendix G
Lake TMDL Required Phosphorus Reductions

Table G-1. Knife Lake TMDL allocations.

Allocation	Source	Existing TP Load [1]	TP Allocations		Load Reduction	
		(lbs/year)	(lbs/year)	(lbs/day)[2]	(lbs/year)[3]	%
Wasteload Allocation	Construction & Industrial Stormwater	121	121	0.3	0	0%
	Wahkon WWTF[4]	100	369	8.0	+(269)	0%
	Isle WWTF[4]	204	609	10.1	+(405)	0%
	ITPHS Septics	60	0	0.0	60	100%
Load Allocation	Watershed Load[5]	11,689	7,639	20.9	4,050	35%
	Internal	6,764	1,297	3.6	5,467	81%
	Atmosphere	301	301	0.8	0	0%
Reserve Capacity		--	47	0.1	--	
MOS		--	547	1.5	--	--
TOTAL		**19,239**	**10,930**	**45.3**	**9,577**	**50%**

[1] Existing load is the average for the years 2010 and 2011 based on monitored data and Discharge Monitoring Reports from the WWTF's.
[2] Annual loads converted to daily by dividing by 365.25 days per year accounting for leap years
[3] Net reduction from current load to TMDL is 8,309 lbs/yr; but gross load reduction from all sources must accommodate WWTF permitted conditions and the Reserve Capacity and MOS as well, and hence is 8,309 + 269 + 405 + 47 + 547 = 8,903 lbs/yr.
[4] The Wahkon and Isle WWTFs are controlled (pond) discharge facilities and daily effluent allocations were calculated using the 1,000 µg/L concentration assumption and the maximum permitted effluent flow rate of 6 inches/day over the area of each facility's discharging cell (MPCA and Wisconsin DNR, 2012). Controlled discharge facilities are designed to store 180 days' worth of influent flow and discharge during spring and fall during periods of relatively high stream flow and/or low receiving water temperature. Since this facility discharges intermittently, daily wasteload allocations do not represent their annual wasteload divided by 365.25 days. Rather they reflect the permitted daily effluent loads as described above.
[5] Watershed load consists of all non-regulated runoff from forest land, wetlands, rural land, agricultural land, failing septics within the shoreland area (59 lbs/yr), and non-regulated MS4 stormwater.

Table G-2. Ann Lake TMDL allocations.

Allocation	Source	Existing TP Load [1]		TP Allocations (WLA & LA)		Load Reduction[3]	
		(lbs/year)	(lbs/day)[2]	(lbs/year)	(lbs/day)[2]	(lbs/year)	%
Wasteload Allocation	Construction & Industrial Stormwater	115	0.3	115	0.3	0	0%
Load Allocation	Drainage Areas	5,613	15.4	5,402	14.8	211	4%
	SSTS	445	1.2	0	0.0	445	100%
	West Ann Lake	209	0.6	203	0.6	6	3%
	Atmosphere	185	0.5	185	0.5	0	0%
	Internal Load	5,496	15.0	1,400	3.8	4,096	75%
MOS		--	--	384	1.1	--	--
TOTAL		**12,063**	**33**	**7,689**	**21.1**	**4,758**	**39%**

[1] Existing load is the average for the years 2008 and 2009.
[2] Annual loads converted to daily by dividing by 365.25 days per year accounting for leap years
[3] Net reduction from current load to TMDL is 4,374 lbs/yr; but gross load reduction from all sources must accommodate the MOS as well, and hence is 4,374 + 384 = 4,758 lbs/yr.

Appendix G
Lake TMDL Required Phosphorus Reductions

Table G-3. Fish Lake TMDL allocations.

Allocation	Source	Existing TP Load [1]		TP Allocations (WLA & LA)		Load Reduction[3]	
		(lbs/year)	(lbs/day)[2]	(lbs/year)	(lbs/day)[2]	(lbs/year)	%
Wasteload Allocation	Construction & Industrial Stormwater	121	0.3	121	0.3	0	0%
Load Allocation	Drainage Areas	4,688	12.8	2,177	6.0	2,511	54%
	SSTS	904	2.5	0	0.0	904	100%
	Upstream Lakes	5,266	14.4	4,586	12.6	680	13%
	Atmosphere	100	0.3	100	0.3	0	0%
	Internal Load	1,425	3.9	258	0.7	1,167	82%
MOS				805	2.2	--	--
TOTAL		**12,504**	**34.2**	**8,047**	**22.1**	**5,262**	**42%**

[1] Existing load is the average for the years 2008 and 2009.
[2] Annual loads converted to daily by dividing by 365.25 days per year accounting for leap years
[3] Net reduction from current load to TMDL is 4,457 lbs/yr; but gross load reduction from all sources must accommodate the MOS as well, and hence is 4,457 + 805 = 5,262 lbs/yr.

Table G-4. Quamba Lake TMDL allocations.

Allocation	Source	Existing TP Load [1]	TP Allocations		Load Reduction	
		(lbs/year)	(lbs/year)	(lbs/day)[2]	(lbs/year)[3]	%
Wasteload Allocation	Construction & Industrial Storm water	55	55	0.2	0	0%
	ITPHS Septics	15	0	0.0	15	100%
Load Allocation	Watershed Load[4]	5,490	3,516	9.6	1,974	36%
	Internal	1,347	113	0.3	1,234	92%
	Atmosphere	54	54	0.1	0	0%
MOS		--	197	0.5	--	--
TOTAL		**6,961**	**3,935**	**10.7**	**3,223**	**46%**

[1] Existing load is the average for the years 2010 and 2011.
[2] Annual loads converted to daily by dividing by 365.25 days per year accounting for leap years.
[3] Net reduction from current load to TMDL is 3,026 lbs/yr; but gross load reduction from all sources must accommodate the MOS as well, and hence is 3,026 + 197 = 3,223 lbs/yr.
[4] Watershed load consists of all non-regulated runoff from forest land, wetlands, rural land, agricultural land, failing septics within the shoreland area (28 lbs/yr), and non-regulated MS4 stormwater.

Appendix G
Lake TMDL Required Phosphorus Reductions

Table G-5. Pokegama Lake TMDL allocations.

Allocation	Source	Existing TP Load [1]	TP Allocations		Load Reduction	
		(lbs/year)	(lbs/year)	(lbs/day)[2]	(lbs/year)[3]	%
Wasteload Allocation	Construction & Industrial Storm water	108	108	0.3	0	0%
	ITPHS Septics	808	0	0.0	808	100%
Load Allocation	Pokegama Brook Watershed Load[4]	9,631	5,777	15.8	3,854	40%
	Direct Watershed Load[4]	9,163	1,055	2.9	8,108	88%
	Internal	13,203	1,356	3.7	11,847	90%
	Atmosphere	362	362	1.0	0	0%
MOS		--	456	1.2	--	--
TOTAL		**33,275**	**9,114**	**24.9**	**24,617**	**74%**

[1] Existing load is the average for the years 2001, 2002, 2008 and 2010.

[2] Annual loads converted to daily by dividing by 365.25 days per year accounting for leap years.

[3] Net reduction from current load to TMDL is 24,161 lbs/yr; but gross load reduction from all sources must accommodate the MOS as well, and hence is 24,161 + 456 = 24,617 lbs/yr.

[4] Watershed loads consist of all non-regulated runoff from forest land, wetlands, rural land, agricultural land and non-regulated MS4 stormwater.

Appendix G
Lake TMDL Required Phosphorus Reductions

Table G-6. Cross Lake TMDL allocations.

Allocation	Source	Existing TP Load[1]	TP Allocations		Load Reduction	
		(lbs/year)	(lbs/year)	(lbs/day)[2]	(lbs/year)[3]	%
Wasteload Allocation	North & Central Basin Watershed Construction & Industrial Stormwater	21	21	<0.1	0	0%
	South Basin Diffusive Flux Construction & Industrial Stormwater[4]	21	21	<0.1	0	0%
	South Basin Diffusive Flux WWTFs[5]	45	29	<0.1	16	36%
	ITPHS Septics	111	0	0.0	111	100%
Load Allocation	South Basin Diffusive Flux	1,078	1,947	5.3	(+)869	--
	Direct Watershed Load[6]	2,356	1,220	3.3	1,136	48%
	Internal	8,408	3,053	8.4	5,355	64%
	Atmosphere	147	147	0.4	0	0%
Reserve Capacity		--	7	<0.1	--	--
MOS		--	339	0.9	--	--
TOTAL		**12,187**	**6,784**	**18.6**	**5,749**	**47%**

[1] Existing load is the average for the years 2010 and 2011 based on monitored data and Discharge Monitoring Reports from the WWTF's.

[2] Annual loads converted to daily by dividing by 365.25 days per year accounting for leap years.

[3] Net reduction from current load to TMDL is 5,403 lbs/yr; but gross load reduction from all sources must accommodate the Reserve Capacity and MOS as well, and hence is 5,403 + 7 + 339 = 5,749 lbs/yr.

[4] Construction and industrial stormwater allocation from the south basin includes construction and industrial stormwater for the entire Snake River watershed downstream of the other impaired lakes in the Snake River watershed (Ann, Fish, Knife,

ACRONYMS

1W1P – One Watershed One Plan
AIS – Aquatic Invasive Species
BMPs – Best Management Practices
BWSR – Minnesota Board of Soil and Water Resources
CAC – Citizen Advisory Committee
CAMP – Center for Aquatic Mollusk Programs
CFS – Cubic Feet Per Second
CIG – Conservation Innovation Grants
CIP – Capital Improvement Projects
CRP – Conservation Reserve Program
COA – Conservation Opportunity Area
COLA – Coalition of Lake Associations
CWP – Clean Water Partnership
DNR – Minnesota Department of Natural Resources
DWSMA – Drinking Water Supply Management Areas
EPA – Environmental Protection Agency
EQIP – Environmental Quality Incentives Program
FEMA – Federal Emergency Management Agency
FWS – Fish and Wildlife Service
GIS – Geographic Information System
GRAPS – Groundwater Restoration and Protection Strategies
HSPF-SAM - Hydrological Simulation Program FORTRAN– Scenario Application Manager
IBI – Index of Biological Integrity
LGUs – Local Government Units
MAISRC – Minnesota Aquatic Invasive Species Research Center
MAWQCP – Minnesota Agricultural Water Quality Certification Program
MDA – Minnesota Department of Agriculture
MDH – Minnesota Department of Health
MPCA – Minnesota Pollution Control Agency
MS4 – Municipal Separate Storm Sewer System
NEMO – Nonpoint Education for Municipal Officials
NGO – Non-Governmental Organization
NMP – Nutrient Management Plan
NPDES – National Pollution Discharge Elimination Standards
NRCS – Natural Resources Conservation Service
ORVW – Outstanding Resource Value Water
PUD – Planned Urban Developments
RIM – Reinvest in Minnesota
SFIA – Sustainable Forest Initiative Act
SID – Stressor Identification
SRWMB – Snake River Watershed Management Board
SRWPP – Snake River Watershed Plan Partnership
SSTS – Subsurface Sewage Treatment System
SWA – Sub-Watershed Analysis
SWAG – Surface Water Assessment Grants
SWCD – Soil and Water Conservation District
TAC – Technical Advisory Committee
TMDL – Total Maximum Daily Load
TNC – The Nature Conservancy
USGS – United States Geological Survey
WBIF – Watershed Based Implementation Funding
WCA – Wetland Conservation Act
WHAF – Watershed Health Assessment Framework

WMA - Wildlife Management Area
WPLMN - Watershed Pollutant Load Monitoring Network
WRAPS - Watershed Restoration and Protection Strategies
WWTP - Wastewater Treatment Plant

GLOSSARY

Conservation Opportunity Area (COA)	COAs are land areas in the Snake River Watershed that were identified in the Snake River Watershed Landscape Stewardship Plan as priorities to focus efforts on protecting habitat and water quality. Identification of these areas relied on a combination of data analysis and the firsthand knowledge of local natural resource professionals and stakeholders.
High quality habitat	The Partnership agreed to define high quality habitat using the DNR's Watershed Health Assessment Framework (WHAF) Terrestrial Habitat Quality score. https://www.dnr.state.mn.us/whaf/about/scores/biology/terr_habitat.html
Index of Biological Integrity (IBI)	IBIs are metrics used primarily by the MPCA to measure the health of a biological community. IBIs range from 0-100 where zero represents an unhealthy community and 100 represents a healthy community.
Hydrological Simulation Program – Scenario Application Manager (HSPF-SAM)	HSPF-SAM is a state-adopted, watershed-scale, lumped-parameter, process-based model for quantifying runoff and addressing water quality impairments associated with combined point and nonpoint sources. HSPF-SAM provides estimated pollutant reduction numbers based on several factors including BMP type and location in the watershed.
Outcome	An outcome describes the specific result of outputs. Outcomes in this Plan support the achievement of goals and may include things like pollutant reductions or a change in public understanding.
Output	An output describes the activities that contribute to an outcome. In this Plan, outputs can be the number of BMPs implemented or the number of hours spent during outreach.
Senesce	The aging or deterioration of a living organism, such as an aquatic plant.