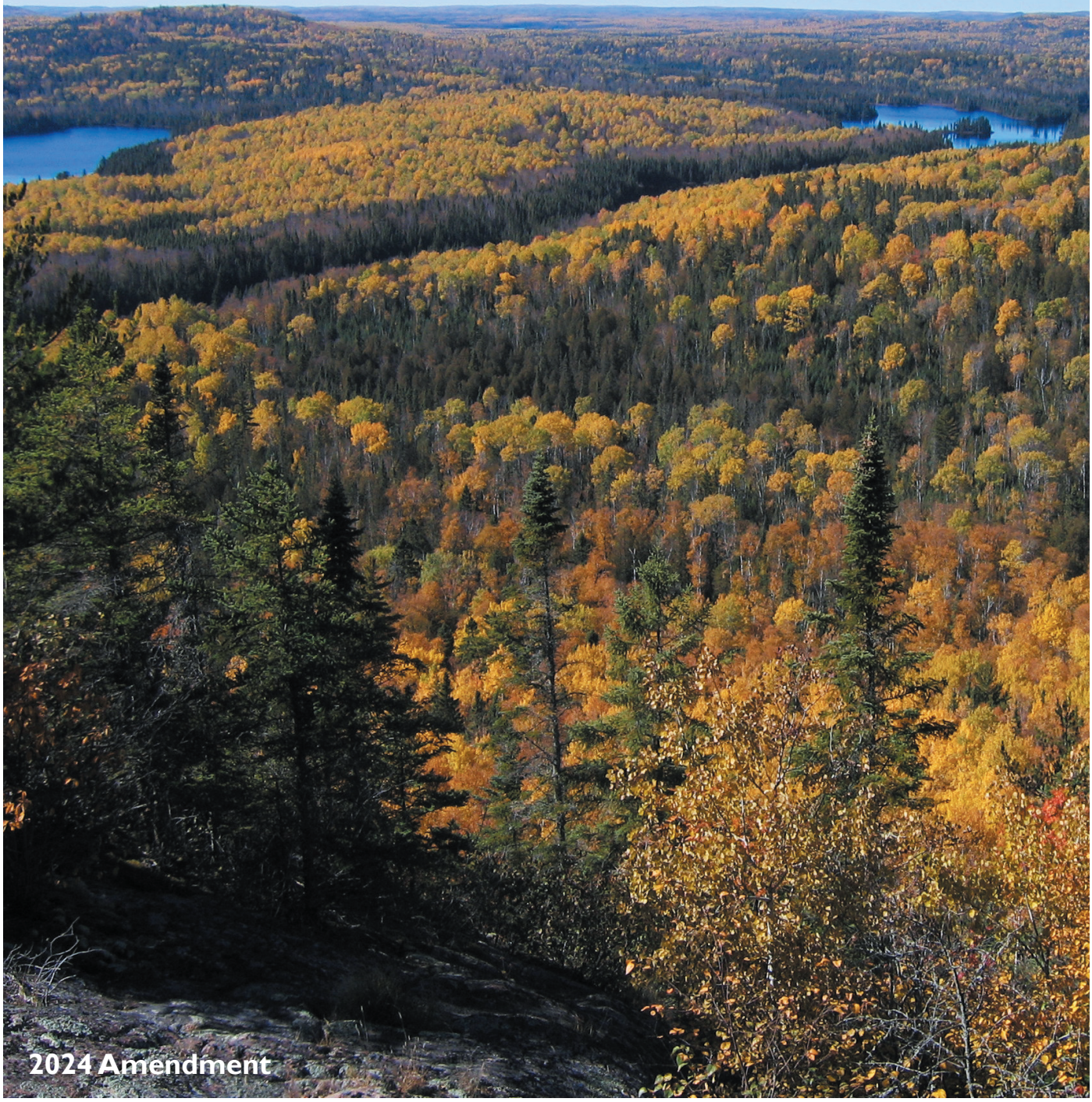
LAKE SUPERIOR NORTH

Comprehensive Watershed Management Plan

CLEAN WATER LAND & LEGACY AMENDMENT



2024 Amendment

Cook and Lake Counties

Cook and Lake County Soil and Water Conservation Districts

water ecology community
Emmons & Olivier Resources, Inc.

This One Watershed, One Plan pilot project has received funding support from the Minnesota Board of Water and Soil Resources, Cook and Lake Counties, and the Cook and Lake County Soil and Water Conservation Districts.

Amended in 2024 in collaboration with Houston Engineering, Inc.

Cover Photo: View from Honeymoon Bluff - Cook County MN Credit: Sonya Carel

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ACKNOWLEDGEMENTS

The Lake Superior North One Watershed, One Plan was developed with the participation of numerous people. Cook County, Lake County, the Cook County Soil and Water Conservation District (SWCD) and the Lake County SWCD wish to acknowledge the following groups and individuals for their involvement in the planning process. Without their hard work and dedication, this Plan would not have been possible.

Cook County Board of Commissioners
- Frank Moe
- Garry Gamble
- Jan Sivertson
- Heidi Doo-Kirk
- Ginny Storlie

Lake County Board of Commissioners
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- Derrick L. Goutermont
- Brad Jones
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- Rich Sve

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ACRONYMS

ACOE	Army Corps of Engineers
BMP	Best Management Practice
BWSR	Board of Water and Soil Resources
CIP	Capital Improvement Program
EPA	Environmental Protection Agency
FEMA	Federal Emergency Management Agency
GI	Green Infrastructure
GIS	Geographic Information Systems
GLC	Great Lakes Commission
GLRI	Great Lakes Restoration Initiative
HUC	Hydrological Unit Code
IBI	Indices of Biological Integrity
LID	Low Impact Development
LiDAR	Light Detection and Ranging
LSNW	Lake Superior North Watershed
LSS	Lake Superior South
LSN1W1P	Lake Superior North One Watershed, One Plan
MBS	Minnesota Biological Survey
MDA	Minnesota Department of Agriculture
MDH	Minnesota Department of Health
MNDNR	Minnesota Department of Natural Resources
MNDOT	Minnesota Department of Transportation
MNGeo	Minnesota Geospatial Commons
MOA	Memorandum of Agreement
MPCA	Minnesota Pollution Control Agency
MPCA 401	Minnesota Pollution Control Agency 401 Water Quality Certification Process for Federal 404 Permits
NA	Not Applicable
NLCD	National Land Cover Database
NPFP	Nonpoint Priority Funding Plan
NOAA	National Oceanic and Atmospheric Administration
NWI	National Wetland Inventory
PCSD	Priority Concerns Scoping Documents
PWI	Public Waters Inventory
SGCN	Species in Greatest Conservation Need
SNA	Scientific and Natural Area
SNF	Superior National Forest

SPCC	Spill Prevention, Control, and Countermeasure Plans
SSURGO	Soil Survey Geographic Data Set from the Natural Resources Conservation Service
STATSGO	State Soil Geographic Data Base for the Conterminous United States
SWCD	Soil and Water Conservation District
SWM	Stormwater Management
SWPPPS	Stormwater Pollution Prevention Plans
SWUDS	Site-Specific Water Use Database
TMDLs	Total Maximum Daily Loads
USCOE	U.S. Army Corps of Engineers
USCOE 404	U.S. Army Corps of Engineers Section 404 of the Clean Water Act
USGS	United States Geologic Survey
WCA	Wetland Conservation Act
WRAPS	Watershed Restoration and Protection Strategy
1W1P	One Watershed, One Plan

GLOSSARY

Aggregate - A broad category of particulate material used in construction, including sand, gravel, crushed stone, slag, recycled concrete and geosynthetic aggregates, and available in various particulate size gradations.

Anthropogenic - Of, relating to, or resulting from the influence of human beings on nature.

Aquifer - A body of permeable rock that can contain or transmit groundwater.

Best Management Practice (BMP) - One of many different structural or non–structural methods used to treat runoff, including such diverse measures as ponding, street sweeping, filtration through a rain garden and infiltration to a gravel trench.

Climate Change - A long-term change in climate measures such as temperature and rainfall. Changes in climate have a large impact on water quality as well as lake and wetland water levels and stream and river flows.

Digitize - To measure the geographic boundaries of a landscape feature and to determine its geospatial size and orientation. This is typically done on-screen in Geographic Information System (GIS)

E. coli **–** *Escherichia coli* (abbreviated as *E. coli*) is a fecal coliform bacteria that comes from human and animal waste. The Environmental protection agency uses *E. coli* measurements to determine whether fresh water is safe for recreation.

eLINK - Web-based conservation tracking system hosted by the Board of Water and Soil Resources.

Environmental Stressors - Natural or anthropogenic causes that constrain or put pressure on the environment.

Filtration - The technique of removing pollutants from runoff as it infiltrates through the soil.

Forestry - The industry involving the cultivation and harvest of trees.

Flow Regime - Term typically used to define the characteristic flow patterns of a stream or river.

Geomorphology - The study of the processes responsible for the shape and form, or morphology, of watercourses; describes the processes whereby sediment (e.g., silt, sand, gravel) and water are transported from the headwaters of a watershed to its mouth.

Green Infrastructure - Green Infrastructure (GI) incorporates the natural environment and constructed systems in an integrated network to provide multiple benefits and support resilient communities. GI is designed to reduce the effects of development on stormwater by maintaining or engineering some of the flood reduction functions of predevelopment conditions. Examples of GI include: underground storage, tree trenches along roads and sidewalks, bioswales along unimproved roads, permeable pavement, blue roofs and green roofs, retention ponds in open areas, wetland preservation and restoration, stream re-meandering, vegetation management in upland areas.

Groundwater - Water located below ground in the spaces present in soil and bedrock.

Groundwater Recharge - Water moving through the soil surface and deeper underground to become groundwater.

Hydrology - The movement of water. Often used in reference to water movement as runoff over the soil after a rainfall event as it contributes to surface water bodies.

Hydrologic Soil Groups -

A soil classification system based on the ability to convey and store water; divided into four groups:

a) Well drained sands and gravel, high infiltration capacity, high leaching potential and low runoff potential;
b) Moderately drained fine to coarse grained soils, moderate infiltration capacity, moderate leaching potential and moderate runoff potential;
c) Fine grained, low infiltration capacity, low leaching potential and high runoff potential;
d) Clay soils, very low infiltration capacity, very low leaching potential and very high runoff potential.

Impervious Surfaces - Surfaces that severely restrict the movement of water through the surface of the earth and into the soil below. Impervious surface typically refers to manmade surfaces such as non-porous asphalt or concrete roadways, buildings, and heavily compacted soils.

Infiltration - Penetration of water through the ground surface.

Invasive Species - Organisms not endemic to a geographic location they often displace native species and have the potential to cause environmental change.

Lakeshed - A watershed including and immediately surrounding a lake; often small in size

Low Impact Development - A stormwater management strategy that seeks to mitigate the impacts of increased urban runoff and stormwater pollution by managing it as close to its source as possible. It comprises a set of site design approaches and small scale stormwater management practices that promote the use of natural systems for infiltration and evapotranspiration, and rainwater harvesting.

Mercury - A metal that recycles between land, air and water. The primary source of mercury in water bodies is air pollution. Mercury accumulates in fish and often results in fish consumption advisories for lakes and rivers. Mercury can have toxic effects on the nervous system of animals, including humans, that eat large quantities of fish.

MESBOAC - A culvert design procedure incorporating geomorphic simulation used most commonly in the northern forested region of Minnesota. MESBOAC stands for:

Match culvert width to bankfull stream width
Extend culvert length through the side slope toe of the road
Set culvert slope the same as the stream slope
Bury the culvert
Offset multiple culverts
Align the culvert with the stream channel
Consider headcuts and cutoffs

Normalize - To become the standard or normal condition.

Nutrients - A group of chemicals that are needed for the growth of an organism. Within surface water systems, nutrients such as phosphorus and nitrogen can lead to the excessive growth of algae.

Peak flows - Term typically used to define the characteristic high flow period of a stream or river.

Pollutant - A substance that makes land, water, air, etc., dirty and not safe or suitable to use.

Protection - Strategies that protect high quality and threated resources are essential to preventing further degradation and future impairment of Minnesota's waters.

Restoration - Strategies that seek to restore or improve the quality of a resource which is currently not meeting water quality standards and has been identified as being impaired.

Reforestation - The act of reestablishing a forest through active cultivation or succession.

Riparian - A vegetated ecosystem alongside a waterbody; characteristically have a high water table and are subject to periodic flooding.

Runoff - water from rain, snow melt, or irrigation that flows over the land surface.

Stream Channel - A natural waterway, formed by fluvial processes, that conveys running water.

Total Suspended Solids (TSS) - A measure of the amount of particulate material in suspension in a water column.

Turbidity - The cloudiness of the water that is caused by large numbers of individual particles that are generally invisible to the naked eye.

Significant Natural Resources - Unique, rare or culturally significant natural features, land cover or organisms.

Stormwater BMPs - Methods used to control the speed and total amount of stormwater that flows off a site after a rainstorm and used to improve the quality of the runoff water.

Stormwater Infrastructure - Methods used to control the speed and total amount of stormwater that flows off a site after a rainstorm and used to improve the quality of the runoff water.

Subwatershed - A smaller geographic section of a larger watershed unit with a typical drainage area between 2 and 15 square miles and whose boundaries include all the land area draining to a specified point.

Stream Connectivity - The term used to define the longitudinal connection a stream has along its length and the lateral connection a stream has with its floodplain and adjacent uplands.

Total Maximum Daily Loads (TMDLs) - The total amount of a pollutant or nutrient that a water body can receive and still meet state water quality standards. TMDL also refers to the process of allocating pollutant loadings among point and nonpoint sources.

Urban Nodes - Label assigned to one of the features, commercial urban areas, used in the development of the Zonation maps. These nodes represent areas that have higher densities and existing development with the potential for new development/redevelopment activity in the future.

Water Quality - Water quality is a term used to describe the chemical, physical, and biological characteristics of water, usually in respect to its suitability for a particular use. In the case of surface waters, uses are typically swimming and fishing.

Zonation - A model that uses geographic information and user input weighting to identify locations on the landscape that have varying degrees of environmental sensitivity or management priority.

Section 1.
Executive Summary

1 EXECUTIVE SUMMARY

The One Watershed, One Plan (1W1P) legislation passed by the State of Minnesota in 2013 provided authorization and funding to the Board of Water and Soil Resources (BWSR) for assistance and grants to local governments to transition local water management plans to a watershed-based approach. Based on this legislation, BWSR sought nominations in early 2014 and selected five watershed areas for piloting the program on June 25, 2014. The Lake Superior North Watershed (LSNW) was one of the five watersheds selected for this pilot program.

The LSNW was selected to develop a Comprehensive Watershed Management Plan. This all-inclusive Plan leverages the existing requirements for local government comprehensive water management plans and has the highest standards of the three options for 1W1P pilot plan development. A Comprehensive Watershed Management Plan should address surface water and groundwater resources, water quality and quantity and land use. The implementation actions identified in the Plan will use a broad range of tools, including capital improvements, official controls, and various programs and initiatives to achieve the goals of the Plan.

The LSNW 1W1P identifies the priorities, management goals, and implementation activities that Cook and Lake Counties and the Cook and Lake County Soil and Water Conservation Districts (SWCDs) intend to address over the next ten years within this watershed. Water management planning and activities in areas of both Lake and Cook Counties outside the LSNW boundary will continue to be directed by the current Local Water Management Plan that is in place for each county. As Lake and Cook Counties transition to comprehensive watershed planning processes in all watersheds within the counties, these watershed-scale plans will replace the Local Water Management plan in those areas.

1.1 LAKE SUPERIOR NORTH VISION STATEMENT

The LSNW contributes to a globally significant freshwater body. People world-wide value the area and recognize the numerous challenges facing its unique and sensitive resources. The goal of the Plan is to maximize the ecosystem services provided by a healthy Lake Superior watershed, and to maintain or increase the resiliency of the LSNW for continued social, environmental, and economic well-being. The LSNW Comprehensive Watershed Management Plan takes a targeted, prioritized, measurable, and sustainable approach to resource protection. By integrating collaborative governance, leveraged partnerships, and active stewardship by local residents, businesses, and visitors, the ecological health and economic vitality of the LSNW will be maintained for generations to come.

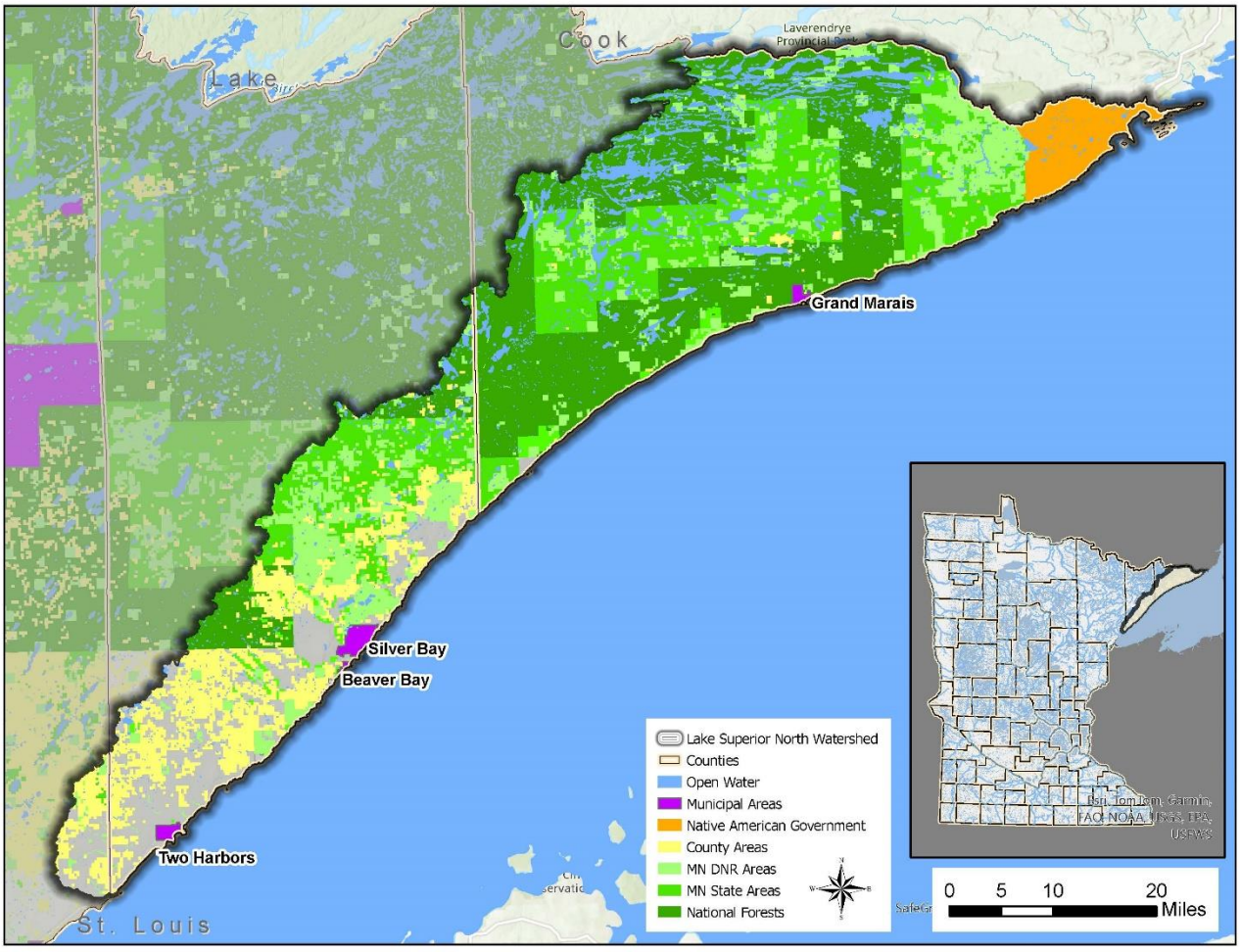
1.2 RESOURCE AREA DESCRIPTION

The LSNW is part of the Northern Lakes and Forest ecoregion. Various species of birch, fir, pine, and spruce are the dominant trees in the watershed, found throughout a varied landscape exhibiting

elevation changes of over 1,000 vertical feet. Heavy clay soil conditions dominate the watershed and are generally low in nutrients. The area has pristine wetlands that are relatively undisturbed by development as well as exposed bedrock outcroppings, lakes, and streams. Most of the streams and rivers of the watershed begin away from the shore of Lake Superior in relatively flat, forested, and wetland-dominated conditions. A majority of these rivers are designated trout streams and prized as coldwater fisheries. As these waterways flow towards Lake Superior, they encounter the ridge parallel to the Lake Superior shoreline, gaining energy and momentum as they drop in elevation, cut through red clay deposits, and spill through bedrock channels near the Lake Superior shoreline. Most of the water resources within the watershed are pristine, and the area houses some of the highest quality water resources in the United States. Building a thorough understanding of these natural resource assets among land managers, decision-makers, and constituents in the watershed are important parts of this Plan.

Resources within the area are both privately and publicly owned. Private landownership is 24% and public land ownership is 76% (see Figure 1-ES). Cook County has 9% of land ownership as private land. Lake County has 17% of land ownership as private land. Private ownership is scattered throughout the watershed with pressure of development along the shoreline and riparian areas as this is where a majority of the private land is located. This Plan has been developed to address the direct impact land use has on the resources as part of protection and restoration activities presented.

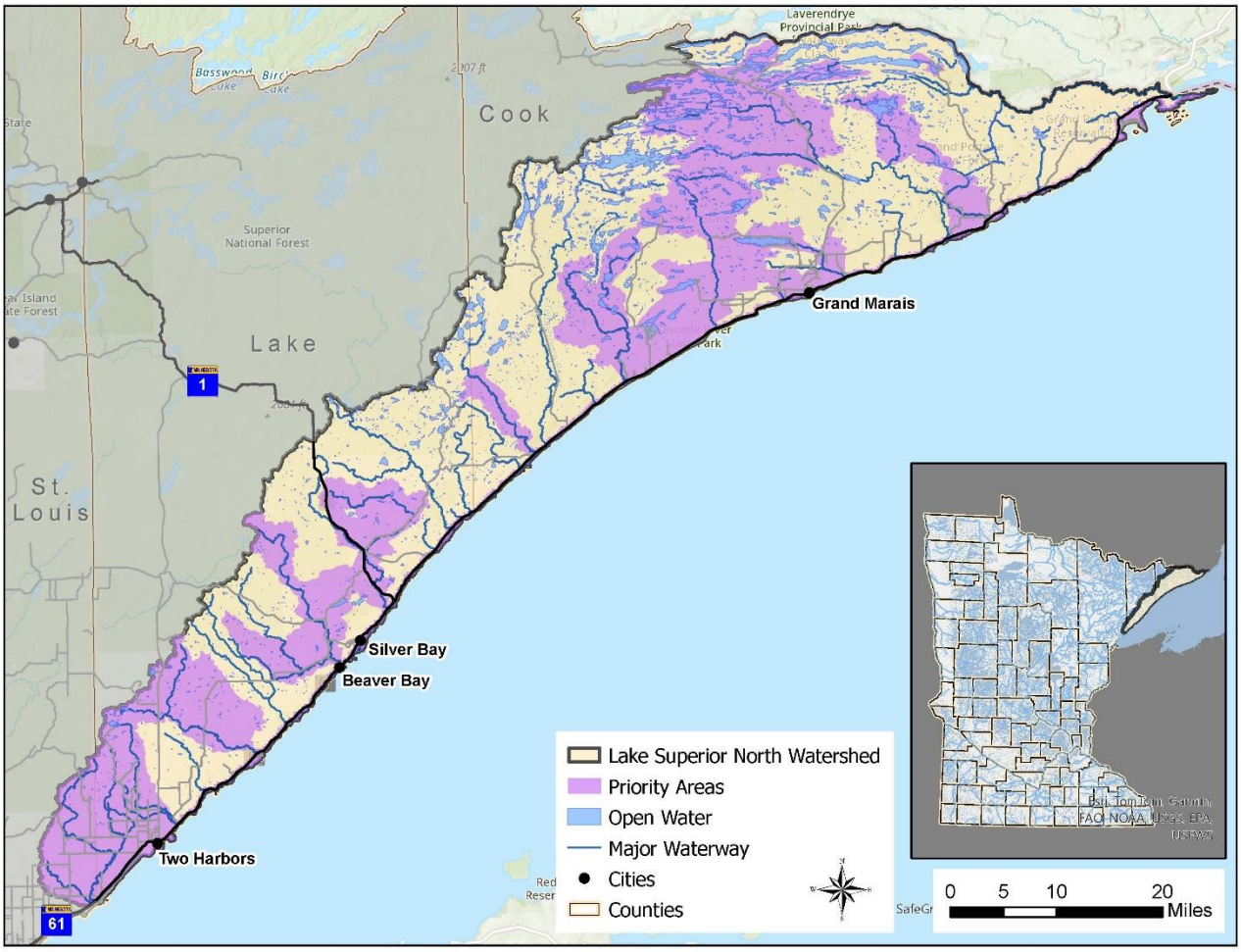
Figure 1-ES. Generalized Land Ownership in the LSNW



1.3 PLANNING BOUNDARY

The LSNW boundary (Figure 2-ES), for the purposes of 1W1P planning efforts, was delineated by the Board of Soil and Water Resources (BWSR) and includes an area larger than the LSNW delineated by the Minnesota Pollution Control Agency (MPCA). To facilitate planning efforts on a watershed scale, the boundary was extended from the northeastern tip of the State of Minnesota (near Grand Portage) to the southwest. The total area captured subwatersheds draining to Lake Superior within Lake County, ending at and including the Knife River watershed with a small portion extending into St. Louis County.

Figure 2-ES. Project Location Map



1.4 SUMMARY OF PRIORITY ISSUES AND GOALS

The process of identifying the natural resource priority issues and concerns in the LSNW included examining information from a variety of different sources. These included assessing current local and regional management plans, creating opportunities for the public to inform plan priorities, incorporating the regional expertise of partnering agencies and organizations, and utilizing a prioritization decision support tool called Zonation in a process facilitated by staff from the Minnesota Department of Natural Resources (MNDNR). Zonation is a value-based model that uses a combination of individual landscape features and analyzed spatial information about these criteria to prioritize places on the landscape for conservation and restoration. A more detailed description of the Zonation process can be found in Appendix E. The MNDNR's five-component healthy watershed conceptual model provided an organized process that was used to assess and review watershed problems and solutions. The five components of this model are: biology, hydrology, water quality, geomorphology, and connectivity, and all were taken into consideration as the Plan was developed. At the end of this stage of the plan development process, 11 Priority Concerns and 18 Priority Areas were identified. The 11 Priority Concerns are identified in *Section 2.3 Priority Concerns* and addressed more thoroughly in *Section 3. Issues, Goals and Implementation Actions*. Figure 2-ES (see *Section 1.3 Planning Boundary*) identifies the location of the Priority Areas within the LSNW while Table 1-ES describes each of the priority areas (described in more detail in *Section 2.4 Priority Areas*).

Table 1-ES. Summary of Priority Areas following 2024 Amendment

Priority Areas	Description of Priority Area
Two Harbors	One of the two largest municipalities in the watershed; experiencing increased land development pressure; includes areas within the Lake Superior shoreline erosion hazard zone; includes areas of biological significance; susceptible to groundwater contamination; Skunk Creek system in Two Harbors impaired for both turbidity and *E. coli*. Agate Bay Beach and Burlington Beach are both on the EPA 303(d) list of impaired waters for E. coli. Skunk Creek was identified as a priority watershed in the Lake County 2005-2015 Local Water Management Plan. Source Water Assessment Area for the four Community Public Water Suppliers identified as a high priority by MDH.
Poplar River	Delisted in 2018 from the EPA 303(d) list of impaired waterbodies; includes designated trout streams; identified as catchments of rivers vulnerable to pollution; includes areas of biological significance; susceptible to groundwater contamination.
Near Shore Lake Superior	Area with strong potential for future land development, known septic issues, and significant shoreline management issues, including the presence of a number of erosion hazard zones; a number of trout catchments flow through this area; includes a significant number of rare features and sites of biological significance. Twin Points Public Access Beach is on the EPA 303(d) list of impaired waters for E. coli.
City of Grand Marais	One of the two largest municipalities in the watershed; experiencing increased land development pressure; includes area within the Lake Superior shoreline erosion hazard zone; includes areas of biological significance; susceptible to groundwater contamination; Source Water Assessment Area for the four Community Public Water Suppliers identified as a high priority by MDH.
Flute Reed River	On the EPA 303(d) list of impaired waterbodies; includes designated trout streams; identified as catchments of rivers vulnerable to pollution; includes areas of biological significance; susceptible to groundwater contamination.
Knife River	On the EPA 303(d) list of impaired waterbodies for turbidity; includes designated trout streams; identified as catchments of rivers vulnerable to pollution; includes areas of biological significance; susceptible to groundwater contamination; identified as a priority watershed in the Lake County 2005-2015 Local Water Management Plan.
Beaver River	Includes areas of biological significance; susceptible to groundwater contamination; identified as a priority watershed in the Lake County 2005-2015 Local Water Management Plan; Source Water Assessment Area for the four Community Public Water Suppliers (including Beaver Bay and Silver Bay) identified as a high priority by MDH. Beaver River is on the EPA 303(d) list of impaired waters for turbidity.
Stewart River	Impact of this watershed's discharge on the source water quality for the Two Harbors municipality; identified as a priority watershed in the Lake County 2005-2015 Local Water Management Plan.
Devil's Track Lake	Highly developed watershed; historical alteration from logging and development within watershed; aggregate mining impact on water resources; shoreland development on lakes.

Priority Areas	Description of Priority Area
Baptism River Watershed	Includes high-quality natural areas; areas of high biological significance; Tettegouche State Park; susceptible to groundwater contamination; includes vulnerable catchments.
Mid Trail Lakesheds	Shoreland development on Poplar and Hungry Jack lakes; Boundary Waters Canoe Area Wilderness entry access; superfund site within watershed; some lakes within watershed have up to 90% privately owned lakeshed and possibility of increased developmental impact.
Cascade Lower River	Includes high-quality natural areas; areas of high biological significance; Cascade State Park; susceptible to groundwater contamination; includes vulnerable catchments.
McFarland Lakeshed	Shoreland development on McFarland Lake; Boundary Waters Canoe Area Wilderness entry access; historical lots have land use practices that are a source of possible impact to water quality.
Cross River Watershed	Coldwater stream with brook and rainbow trout; moderate potential for groundwater contamination.
Cascade River Upper and Mid	Moderate potential for groundwater contamination; significant degrees of shoreland development.
Gooseberry HUC 10	Considered a vulnerable watershed; priority cold water resource and brook trout habitat; Gooseberry State Park.
Mid Trail Lakesheds West/East Bearskin	Strong development pressure; evidence of nutrient loading; includes sites of biological significance within the lakesheds.
Greenwood Lake	Strong development pressure; evidence of nutrient loading; includes sites of biological significance within the lakesheds.

1.5 MEASURABLE GOALS AND TARGETED IMPLEMENTATION ACTIONS DEVELOPMENT

Priority concerns to be addressed in the LSNW Comprehensive Watershed Management Plan were identified through assessment of local and regional management plans, input from the LSNW Advisory Committee, Zonation, and public input. Existing studies and plans were used to promote implementation by highlighting previously identified, overlapping goals of counties, state and federal agencies, and potential project partners. Using existing studies also leverages past work and accomplishments within the LSNW. Measurable outcomes were determined by utilizing information contained in the existing plans for the region. Using these resources, concerns were defined, measurable goals developed, and implementation activities assigned to address the goals in combination with local knowledge of the specific resource protection and restoration needs.

1.6 SUMMARY OF IMPLEMENTATION ACTIONS AND PROGRAMS

The LSNW Targeted Implementation Schedule is a 10-year plan with identified actions to complete conservation work (see *Section 4. Targeted Implementation Schedule*). Due to data gaps within the watershed, some activities are designed to be completed before other actions are completed, building upon each other to utilize information to make informed decisions. Within the Plan, the activities to complete include on the ground conservation practices, data collection for data gap fulfillment, outreach to stakeholders, partners, property owners, etc. and implementation of protection and restoration strategies. The estimated cost to implement all of the action items within the LSNW Targeted Implementation Schedule is approximately $8 million over 10 years.

Work in the Plan will be completed by different entities/agencies. Actions in the Targeted Implementation Schedule are focused on activities that Cook County, Lake County, and the Cook and Lake SWCDs plan to undertake in the 10-year time frame of the plan. It is important to note that other activities will also make progress towards plan goals. This plan summarizes these activities in Appendix A as the LSNW Secondary Implementation Plan and Regional Implementation Activities.

1.7 RESPONSIBILITIES OF PARTICIPATING LOCAL GOVERNMENTS

Upon adoption of the LSNW Comprehensive Watershed Management Plan, Cook County SWCD, Lake County SWCD, Cook County, and Lake County will adopt a Memorandum of Agreement (MOA), to stay in place for a minimum of ten years. By entering this MOA, the group will ensure ongoing collaborative efforts towards implementation of this Plan. Cook and Lake SWCDs will be responsible for maintaining, tracking, and coordinating updates of the Plan. The SWCDs will work with the counties and other entities to pursue funding, implement the Plan, and ensure efforts are consistently being made towards measurable outcomes. Cook and Lake Counties will collaboratively assist the SWCDs in completing the actions and take the lead for actions where identified. Both counties and SWCDs will collaborate with other entities when appropriate or necessary to implement Plan activities.

Section 2. Analysis and Prioritization of Issues and Resource Concerns

2 ANALYSIS AND PRIORITIZATION OF ISSUES AND RESOURCE CONCERNS

2.1 SUMMARY OF ISSUES AND RESOURCE CONCERNS IDENTIFIED

This section of the Plan summarizes the process that planning partners used to identify Priority Areas and Priority Concerns addressed within the lifespan of the Plan. Figure 1 (located at the end of this section) illustrates the various components of the process that identified and developed priority concerns and priority areas for the Plan. This figure illustrates how the information used to identify priority concerns was also used to establish measurable goals, identify implementation activities, and prioritize these activities by priority area (as described in latter sections of the Plan).

2.2 IDENTIFICATION AND PRIORITIZATION OF ISSUES AND RESOURCE CONCERNS

The process of identifying natural resource priority issues and concerns in the LSNW involved examining information from a variety of different sources. These included assessing current local and regional management plans for compatibility with the 1W1P process in LSNW, creating opportunities for the public to inform Plan priorities, incorporating the regional expertise of partnering agencies and organizations and utilizing the Zonation prioritization tool.

2.2.1 Plan Review Agency Notification and Involvement

As part of the local water management process, and pursuant to Minnesota Statutes: 103B.304-103B.355, a notification letter is required to be sent to plan review authorities and other stakeholders of the One Watershed, One Plan (1W1P) development process. This notification letter invites plan review authorities and other stakeholders to submit priority issues and concerns for consideration in the plan development process. The LSNW Comprehensive Watershed Management Plan notification letter was distributed by the Cook and Lake Soil and Water Conservation Districts (SWCDs) on December 17, 2014. Responses were received from the following entities:

- Advocates of the Knife River Watershed
- Board of Water and Soil Resources (BWSR)
- Minnesota Department of Health (MDH)
- Minnesota Department of Natural Resources (MNDNR)
- Minnesota Pollution Control Agency (MPCA)
- North Shore Forest Collaborative
- Superior National Forest (SNF)

2.2.2 Local and Regional Management Plans

Prior to initiating the 1W1P planning process in the LSNW in August of 2014, both Cook and Lake SWCDs had recently been engaged in re-writing the Local Water Management plans for their respective counties. These processes were in accordance with the regular 10-year update schedule as part of the Comprehensive Local Water Management Act, Minnesota Statutes: 103B.304-103B.355. Through these activities, both counties developed Priority Concerns Scoping Documents (PCSD), which involved significant review and incorporation of local and regionally relevant plans to help identify priority water resource concerns as well as public and advisory committee input. As part of the Land and Water Resources Inventory/Gap Analysis process for the LSNW, the PCSDs from both

Cook and Lake County local water management planning processes were reviewed. In addition, newer (2006 to present) local and regionally relevant plans were identified, reviewed, and compiled to create a comprehensive list of plans to inform the LSNW Comprehensive Watershed Management Plan planning process. The North Shore Management Plan offers regulatory authority with the North Shore Management zone. Future revisions to this plan in terms of policy and ordinance recommendations will be considered for inclusion within the LSNW Comprehensive Watershed Management Plan during subsequent annual review processes. The information contained in these plans was used to highlight potential goals, objectives, and action items identified in other management planning efforts in the LSNW.

2.2.3 Public Engagement

In addition to drawing from existing local and regional plans, incorporating agency input, and integrating additional public and stakeholder priority concerns, significant efforts were made to incorporate public comment and input into the planning process. Public meetings were scheduled in both Grand Marais and Two Harbors, respectively on February 23 and 24, 2015, as opportunities for constituents to help identify local priority concerns. At each meeting, attendees were provided with background information and an overview of the 1W1P process. Participants were informed of the efforts made to date by the Advisory and Policy Committees. Maps dividing the LSNW into eight sections were provided and participants were asked to identify, highlight, and make note of water resource issues they were aware of within the watershed. Five broad natural resource issues were provided to help guide the group's conversation, including:

1. Protecting and restoring shoreland and riparian zones;
2. Reducing erosion and runoff;
3. Protecting/improving waters of concern;
4. Protecting/improving fish and wildlife habitat; and
5. Protecting/focusing on lands of concern.

A number of comments were received that helped to frame constituent concerns within the LSNW. Identified issues included specific areas of erosion, failing culverts, contaminated soils, and areas with high conservation value as well as general comments on what issues may be of concern or interest at a watershed scale. After these meetings, all public comments associated with a specific spatial area on the landscape were digitized and incorporated into a geographic information system (GIS) layer. The spatial layout of these public comments was then overlaid with information from different sources including agency-provided and Zonation input (Tables 5a and 5b; see Appendix A). In this way, a comprehensive analysis of the collective body of information could more easily be performed. A list was developed that included issues identified at a larger, watershed-wide scale, such as the importance of forestry practices or general concerns associated with septic system function and maintenance. These items would be addressed and incorporated at future meetings of the Advisory

Committee. A full summary of comments received through public and agency input processes is available in Appendix D.

2.2.4 Regional Expertise of Partnering Agencies and Organizations

The LSNW Advisory Committee is made up of numerous state and federal agencies as well as special interest groups. Routine meetings with the Advisory Committee allowed for the collection of local knowledge about the resources and their unique protection and/or restoration needs. Additional information was provided by connecting with the regional natural resource community through the many professional networks present within the Advisory and Policy Committees.

The priority concern input received from agencies and stakeholders was compiled, and comments associated with specific spatial areas on the landscape were digitized and incorporated into a GIS layer containing both data sets. The spatial layout of these comments was overlaid with information received through public or Zonation input, and a comprehensive analysis of all information received could easily be performed.

2.2.5 Integration of Zonation Results

The Zonation model results were presented, interpreted, and reviewed during the public participation and advisory committee review processes. Zonation model results were generated on a 30 x 30-meter resolution. The feature-specific weights used in the model reflect social valuation. A survey of pairwise comparisons of conservation features was administered to members of the Advisory and Policy Committees. Features used in the survey were based loosely on the MNDNR's five component healthy watershed approach, with the addition of alternative land uses or economic features representing a social component. Each individual taking the survey was asked to provide their input on the relative importance of important conservation features that had been previously identified.

The final step in identifying areas for potential protection and restoration included an additional mapping exercise. The Advisory Committee and members of the public used their knowledge and experiences within the watershed to revise the Zonation output maps to create a final map that identified areas within the watershed that were priorities for potential future conservation investments. This synthesis step captured the wisdom of the group of people interested and knowledgeable about the stresses, risks, and vulnerability of water resources within the watershed. A more detailed Zonation process description can be found in Appendix E: Targeting and Prioritization of Geographic Areas.

2.2.6 Success of Implementing Previous Plans

Cook County updated their Comprehensive Local Water Management Plan in 2014. The newly adopted Plan was built on the successful completion of previously implemented actions. Highlighted accomplishments and continuing work towards Plan implementation include Sub-surface Sewage Treatment System (SSTS) inspections, low-interest loans for property owners bringing their SSTS into compliance, coordinating a volunteer lake monitoring program, providing watershed forums on various topics to community members, and stream bank stabilization projects for sediment reduction into streams. The Water Plan is reviewed annually for new tasks to be completed.

Lake County and Lake County SWCD have completed many of the action items put forth in the current Lake County Local Water Management Plan. These accomplishments include consistent work with education and outreach in activities; addressing erosion issues along streams, rivers, and

lakes in Lake County; coordinating the Natural Resource Field Day for all Lake County 6th Graders (28 consecutive years); participating annually in the Envirothon; both leading and supporting activities at the Lake County Demonstration Forest; distributing the Lake County Property Owner's Resource Guide; providing educational resources and workshops to local contractors; and being a consistent outreach and educational presence at the Lake County Fair.

2.3 PRIORITY CONCERNS

As stated in Section 2.2, priority concerns were identified by reviewing plan review agency notification letters, local and regional management plans, and input received from the Advisory Committee as well as the general public. In 2024, an amendment process was conducted to capture new data and information, including:

- Lake Superior - North Watershed Restoration and Protection Strategy Report (WRAPS) (2018),
- Lake Superior South Watershed Restoration and Protection Strategy Report (2018), and
- Discussions and outcomes from the 2023 Performance Review and Assistance Program (PRAP).

Priority concerns were rephrased during the 2024 amendment process to better capture terminology from this new data, while still reinforcing original priority concerns established. A brief description of the priority concerns selected for inclusion in the LSNW Comprehensive Watershed Management Plan is provided in Table 1. The original priority concerns from 2017 are available as reference in Appendix G.

Table 1. Priority Concerns for LSNW Comprehensive Watershed Management Plan following 2024 Amendment

Priority Concern	Description of Concern
Stormwater Management	Unmanaged or poorly managed land development can have adverse impacts on groundwater recharge and stormwater runoff quality and quantity.
Impaired and Nearly Impaired Waters	There are lakes and streams within the watershed that are considered impaired because they do not meet the requirements for their designated uses (e.g., swimmable, drinkable, fishable, consumable). Nearly impaired waterbodies are not on the impaired waters list but have declining water quality that may put them on the list in the near future.
Subsurface Sewage Treatment Systems	Trends in lakes in northern Minnesota have shown an increase in nutrient loading that correlates with development and septic system densities. These non–compliant or failing septic systems pose a threat to public health and natural resources.
Forest Management	The decline of forest health due to insects and disease, climate change, lack of age-class diversity, and past management practices alter peak flows affecting the stability of streams and rivers. Private owners of small parcels (under 20 acres) have very few publicly-funded resources available to them to address forest management, including reforestation.
Aggregate Materials	The extraction of aggregate materials, a high value resource, has the potential to negatively impact ecological resources and increase susceptibility to groundwater pollution.
Stream Connectivity	Improperly designed or installed road crossings tend to dam streams and prevent fish passage, which often disconnect the floodplains, creates streambank erosion, and disturbs migration of aquatic life necessary to support fisheries throughout the Watershed.
Invasive Species	Invasive species alter native ecosystems by reducing biodiversity and degrading wildlife habitat and can negatively impact commercial, recreational, and cultural activities and harm human health.
Groundwater and Drinking Water	Increasing development pressure and existing land use practices have the potential to adversely impact groundwater quantity and quality resulting in reduced groundwater recharge and impacts to receiving water and drinking water supplies. There are four Community Public Water Suppliers in the LSNW with a number of Non-Community Public Water Suppliers, private wells and lakes (including Lake Superior) which provide surface drinking water supplies.
Wetland Management	Wetlands provide valuable ecosystem functions and services that can be lost through impacts from development, extreme weather events and invasive species. The majority of the wetlands in Lake and Cook County are relatively pristine and intact, yet susceptible to degradation from development and high volumes of stormwater.
Unique/High Value Resources	The LSNW contains some of the most unique and rare natural resources in the State of Minnesota that are also susceptible to degradation from environmental stressors. Unique and high value resources include but are not limited to forests, coastal wetlands, exceptional quality waterbodies, wild rice waters, fisheries, and bluffs.
Altered Hydrology and Resiliency	Altered hydrology can result in flashy streams, low baseflow, and streambank degradation. Addressing altered hydrology will build watershed resilience to flooding and changing climate conditions.

2.4 PRIORITY AREAS

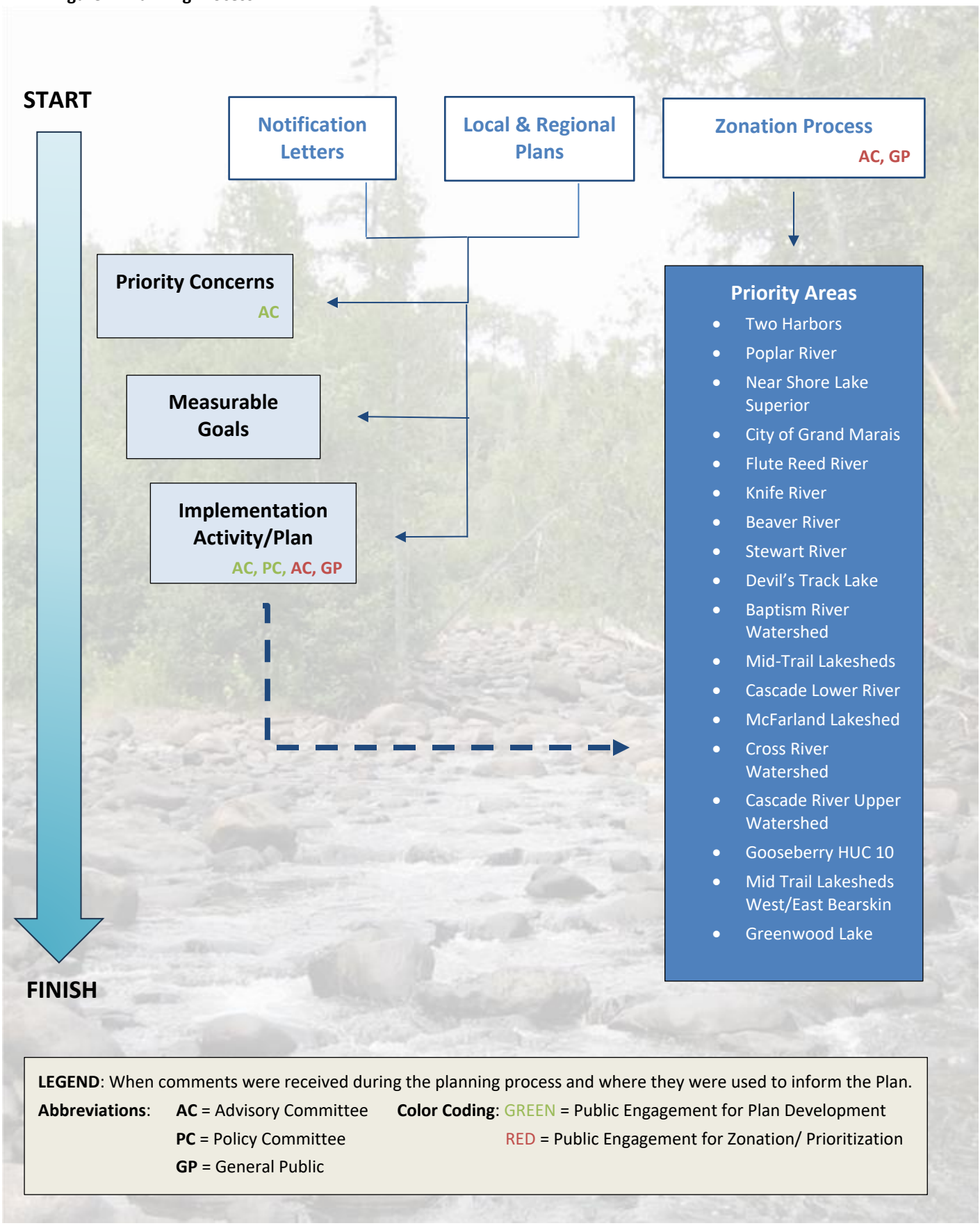
As stated in Section 2.2, priority areas were determined by identifying important conservation features within the watershed and then inputting these weighted data into the Zonation model. Upon development of the final/synthesis map and incorporating input from the Advisory Committee and the public, the Advisory Committee met to rank the identified priority areas. Advisory Committee members were asked to develop a list of five priority resource areas within the LSNW. Each Advisory Committee member shared their priority locations of concern and provided background and support for why this area was selected. In many cases, multiple individuals selecting the same area supported identifying that area as a priority. Eighteen areas were identified as priorities for water resource management, protection, and restoration within the LSNW. The main factors used to assign the priority areas and a summary of the priority areas selected is provided in Table 2 below. In addition, a series of Priority Area Summary sheets were developed to further illustrate how the priority areas

were selected for inclusion in the LSNW Comprehensive Watershed Management Plan (see Appendix C).

Table 2. Summary of Priority Areas following 2024 Amendment

Priority Areas	Description of Priority Area
Two Harbors	One of the two largest municipalities in the watershed; experiencing increased land development pressure; includes areas within the Lake Superior shoreline erosion hazard zone; includes areas of biological significance; susceptible to groundwater contamination; Skunk Creek system in Two Harbors impaired for both turbidity and *E. coli*. Agate Bay Beach and Burlington Beach are both on the EPA 303(d) list of impaired waters for E. coli. Skunk Creek was identified as a priority watershed in the Lake County 2005-2015 Local Water Management Plan. Source Water Assessment Area for the four Community Public Water Suppliers identified as a high priority by MDH.
Poplar River	Delisted in 2018 from the EPA 303(d) list of impaired waterbodies; includes designated trout streams; identified as catchments of rivers vulnerable to pollution; includes areas of biological significance; susceptible to groundwater contamination.
Near Shore Lake Superior	Area with strong potential for future land development, known septic issues, and significant shoreline management issues, including the presence of a number of erosion hazard zones; a number of trout catchments flow through this area; includes a significant number of rare features and sites of biological significance. Twin Points Public Access Beach is on the EPA 303(d) list of impaired waters for E. coli.
City of Grand Marais	One of the two largest municipalities in the watershed; experiencing increased land development pressure; includes area within the Lake Superior shoreline erosion hazard zone; includes areas of biological significance; susceptible to groundwater contamination; Source Water Assessment Area for the four Community Public Water Suppliers identified as a high priority by MDH.
Flute Reed River	On the EPA 303(d) list of impaired waterbodies; includes designated trout streams; identified as catchments of rivers vulnerable to pollution; includes areas of biological significance; susceptible to groundwater contamination.
Knife River	On the EPA 303(d) list of impaired waterbodies for turbidity; includes designated trout streams; identified as catchments of rivers vulnerable to pollution; includes areas of biological significance; susceptible to groundwater contamination; identified as a priority watershed in the Lake County 2005-2015 Local Water Management Plan.
Beaver River	Includes areas of biological significance; susceptible to groundwater contamination; identified as a priority watershed in the Lake County 2005-2015 Local Water Management Plan; Source Water Assessment Area for the four Community Public Water Suppliers (including Beaver Bay and Silver Bay) identified as a high priority by MDH. Beaver River is on the EPA 303(d) list of impaired waters for turbidity.
Stewart River	Impact of this watershed's discharge on the source water quality for the Two Harbors municipality; identified as a priority watershed in the Lake County 2005-2015 Local Water Management Plan.
Devil's Track Lake	Highly developed watershed; historical alteration from logging and development within watershed; aggregate mining impact on water resources; shoreland development on lakes.
Baptism River Watershed	Includes high-quality natural areas; areas of high biological significance; Tettegouche State Park; susceptible to groundwater contamination; includes vulnerable catchments.
Mid Trail Lakesheds	Shoreland development on Poplar and Hungry Jack lakes; Boundary Waters Canoe Area Wilderness entry access; superfund site within watershed; some lakes within watershed have up to 90% privately owned lakeshed and possibility of increased developmental impact.
Cascade Lower River	Includes high-quality natural areas; areas of high biological significance; Cascade State Park; susceptible to groundwater contamination; includes vulnerable catchments.
McFarland Lakeshed	Shoreland development on McFarland Lake; Boundary Waters Canoe Area Wilderness entry access; historical lots have land use practices that are a source of possible impact to water quality.
Cross River Watershed	Coldwater stream with brook and rainbow trout; moderate potential for groundwater contamination.
Cascade River Upper and Mid	Moderate potential for groundwater contamination; significant degrees of shoreland development.
Gooseberry HUC 10	Considered a vulnerable watershed; priority cold water resource and brook trout habitat; Gooseberry State Park.
Mid Trail Lakesheds West/East Bearskin	Strong development pressure; evidence of nutrient loading; includes sites of biological significance within the lakesheds.
Greenwood Lake	Strong development pressure; evidence of nutrient loading; includes sites of biological significance within the lakesheds.

Figure 1. Planning Process



LEGEND: When comments were received during the planning process and where they were used to inform the Plan.

Abbreviations: **AC** = Advisory Committee
PC = Policy Committee
GP = General Public

Color Coding: GREEN = Public Engagement for Plan Development
RED = Public Engagement for Zonation/ Prioritization

Section 3. Issues, Goals, and Implementation Actions

3 ISSUES, GOALS, AND IMPLEMENTATION ACTIONS

After identifying the priority concerns to be addressed in the LSNW Comprehensive Watershed Management Plan, issue statements were defined, measurable goals were developed, and implementation actions were assigned to address the goals. Local and regional management plans were used to identify measurable goals and implementation actions supplemented with local knowledge of the specific resource protection and restoration needs. Using existing studies and plans promotes implementation by highlighting previously identified, matching goals by counties, state and federal agencies, and other entities as well as potential project partners.

3.1 ISSUES, GOALS, AND IMPLEMENTATION ACTIONS

Each of the priority concerns is summarized in this section. Each summary includes:

- an issue statement,
- a description of the concern,
- a summary of how the priority areas were impacted by the concern,
- a measurable goal, and
- implementation actions that will be implemented as part of this Plan.

Implementation actions listed in this section are activities that Cook County, Lake County, and the Cook and Lake SWCDs plan to undertake in the 10-year time frame of the plan and are therefore included as part of the LSNW Targeted Implementation Schedule (see Section 4).

It is important to note that other activities will also make progress towards plan goals. This plan summarizes these activities in Appendix A as the LSNW Secondary Implementation Plan and Regional Implementation Activities.

LSNW Secondary Implementation Plan (Appendix A- Table 8)

This Plan identifies the implementation activities that the counties and SWCDs hope to accomplish if additional sources of funding or staff expertise become available over the 10-year time frame of the Plan (see Appendix A). The activities identified in this Plan will be reviewed on a bi-annual basis, reprioritized as appropriate and completed as time and funding allows.

Regional Implementation Activities (Appendix A – Table 9)

This list of activities tracks additional implementation activities identified during the plan development process that are the responsibility of state and/or federal agencies or are better suited to other entities in the LSNW. This list of activities can be found in Appendix A. The activities identified in this list will be reviewed on a bi-annual basis to reprioritize as appropriate and to make sure opportunities to partner on implementation are not being missed.

3.1.1 STORMWATER MANAGEMENT (SM)

ISSUE STATEMENT:

Unmanaged or poorly managed land development can have adverse impacts on groundwater recharge and stormwater runoff quality and quantity.

DESCRIPTION:

Development in the Lake Superior North Watershed is occurring near streams, lakes, wetlands, and other types of high-functioning natural areas. If development does not consider stormwater runoff, it has the potential to impact both surface water and groundwater resources. Failing sewer and stormwater infrastructure could lead to increased fecal contamination within stormwater systems, causing water quality impairments and beach closures. Increased coverage by roads, roofs, and other impervious surfaces alters the natural flow of stormwater runoff through a watershed. Changes in the rate and volume of stormwater runoff can negatively impact the quality and quantity of water being delivered to downstream waterbodies. Increased impervious coverage also reduces groundwater recharge. The proximity of development to the numerous waterbodies located in the watershed, combined with anticipated changes in climate, increases the flood damage potential of existing and new infrastructure (Cook County Priority Concerns Scoping Document with modifications). Both infrastructure upgrades and/or innovative solutions (e.g., biochar) need to be considered to prevent water quality impairments.

PRIORITY AREA SUMMARY:

All 18 of the Priority Areas were flagged for stormwater management via the Zonation Process. The indices for stormwater management include Lake Superior shoreline with high erosion potential, areas with high erosive potential (measured using stream power index), the amount of roadway, the amount of shoreland (land within 1,000 feet of the shoreline), and the amount of stream riparian area.

GOAL:

Reduce sedimentation and pollutant loading to surface water and groundwater resources through effective stormwater management and restoration practices while promoting compatibility between LSNW 1W1P and existing land use plans, ordinances, etc.

SM 1	Develop one stormwater management plan in urban nodes and developed areas within each county, one per county every five years. Stormwater management plan development activities will include completing steps of stormwater infrastructure inventory, hydrologic analysis, BMP-recommendation including green stormwater infrastructure options and locations, and development of stormwater and erosion and sediment control standards for municipal ordinance and policy inclusion, using MN Stormwater Manual as a guide as part of this assessment. Support plan updates as needed by municipalities.

SM 2 Complete stormwater water quality and quantity projects or retrofits, including green infrastructure projects that will be identified and prioritized in each of the stormwater management plans created by municipalities.

SM 3 Review local ordinances, permitted and conditional uses, subdivisions, stormwater issues, and shoreland issues and provide best management recommendations for the protection of surface water and groundwater resources, including utilizing the most recent precipitation projections for engineered project design to integrate within municipal and local government policy and ordinance documents. Promote MIDS and LIDS standards within these ordinances.

SM 4 Address existing erosion problems by conducting targeted erosion control projects using current green infrastructure methodologies in order to reduce sedimentation and nutrient loading into surface waters and wetlands.

SM 5 Inventory, maintain, and re–vegetate road/roadway ditches with native species with the goal of transitioning 10% of inventoried ditches in each county to native vegetation by 2025. Work with County Hwy Departments to prioritize ditches that are in riparian areas and areas with impaired waters.

SM 6 Annually lead one community conversation on stormwater management BMPs as well as promoting opportunities and options for green stormwater infrastructure.

3.1.2 IMPAIRED AND NEARLY IMPAIRED WATERS (INW)

ISSUE STATEMENT:

There are lakes and streams within the watershed that are considered impaired because they do not meet the requirements for their designated uses (e.g., swimmable, drinkable, fishable, consumable). Nearly impaired waterbodies are not on the impaired waters list but have declining water quality that may put them on the list in the near future.

DESCRIPTION:

Lake Superior North Watershed contains many high-quality lakes, streams, and wetlands. However, there are lakes and streams that are impaired because they do not meet the requirements for their designated uses (e.g., swimmable, drinkable, fishable, consumable). The number of impaired waters and the types of impairments are summarized in the Table 3 and Figure 2, as updated during the 2024 amendment process.

Flute Reed River; Visit Cook County

Table 3. Summary of 2024 Impaired Resources in the LSNW

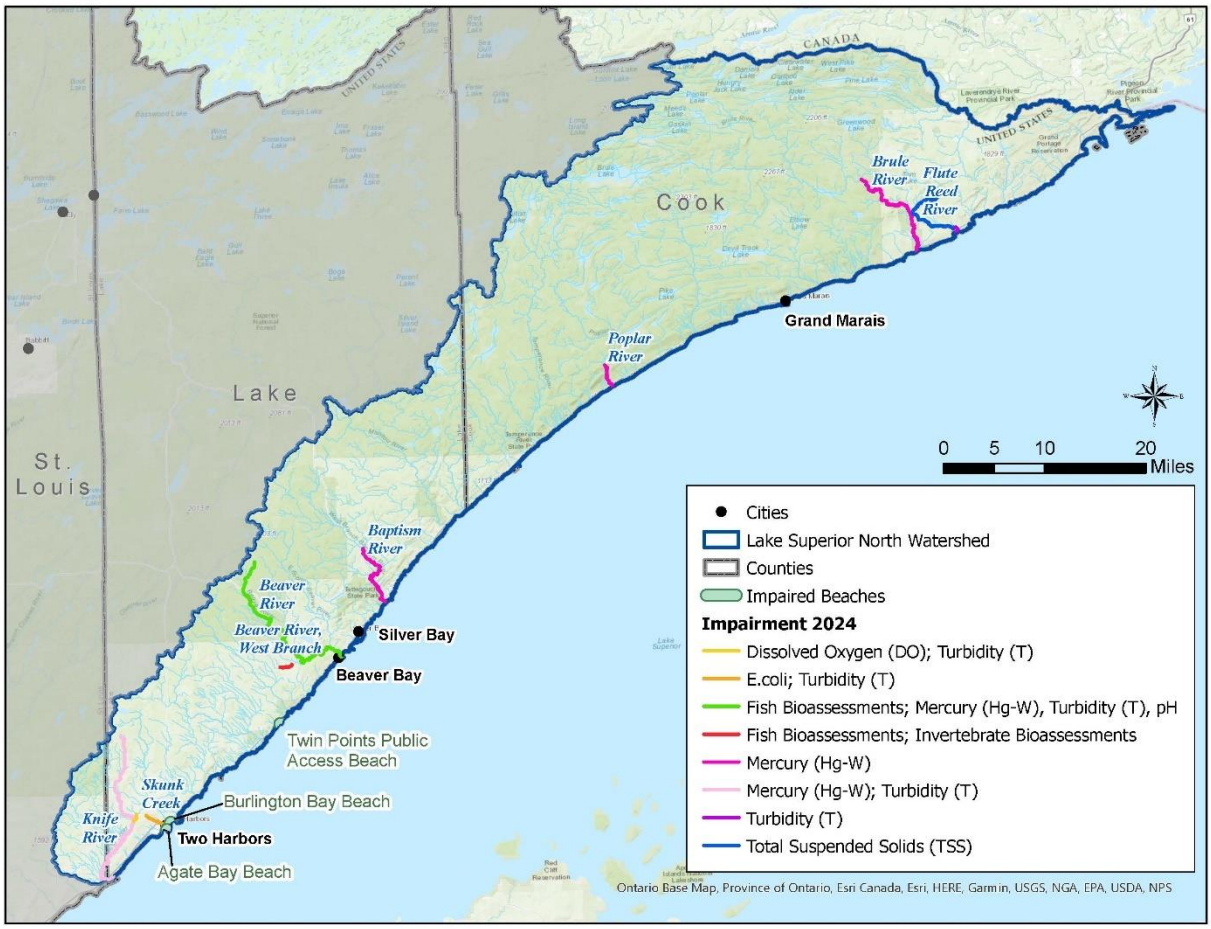
County	Hg-Fish	Hg-Water	PCB-Fish	E. coli	pH	Turbidity	D. O.	TSS	Fish	Inverte-brates
Cook	84	9	2			1		1		
Lake	24	2		1	1	4	1		2	1

Note: Table excludes Lake Superior impairments.

Total Maximum Daily Loads (TMDLs) are established for turbidity (Knife River, and Skunk Creek), total suspended solids (TSS) (Flute Reed River), and *E. coli* (Skunk Creek). Waters with impairments for mercury in fish tissue or in the water column are addressed through the statewide mercury TMDL effort.

The Lake Superior North Watershed also contains numerous surface water resources that are at risk, which can take various forms. To some extent, erosion and high runoff volumes have been historic trends in LSNW, however, significant changes in land use have exacerbated runoff volumes and rates. The WRAPS process identified Tom, Devil Track, Hungry Jack, Birch, Deer Yard, Divide, and Superior as at-risk lakes that should be prioritized for protection. Additionally, some watershed streams were identified as potentially at-risk based on fish and macroinvertebrate data, and include: East Branch, West Branch, and main Baptism River, East and West Branch Beaver River, Cedar Creek, Cross River, Crow Creek, Dago Creek, Encampment Creek, Flute Reed, Greenwood River, Hockamin Creek, Houghtaling Creek, Little Gooseberry River and Gooseberry River, Little Knife River and West Branch Knife River, Little Stewart River and Stewart River, Manitou and South Branch Manitou River, Mistletoe Creek, Palisade Creek, Silver Creek, Six Mile Creek, Skunk Creek, Temperance River, Two Island River, an unnamed tributary to Split Rock River, and Wilson Creek. Historic pollution of surface waters has been known to impact commercial fisheries in the Great Lakes, including Lake Superior.

Figure 2: Impaired waters (MPCA, 2024) in the Lake Superior North Watershed



PRIORITY AREA SUMMARY:

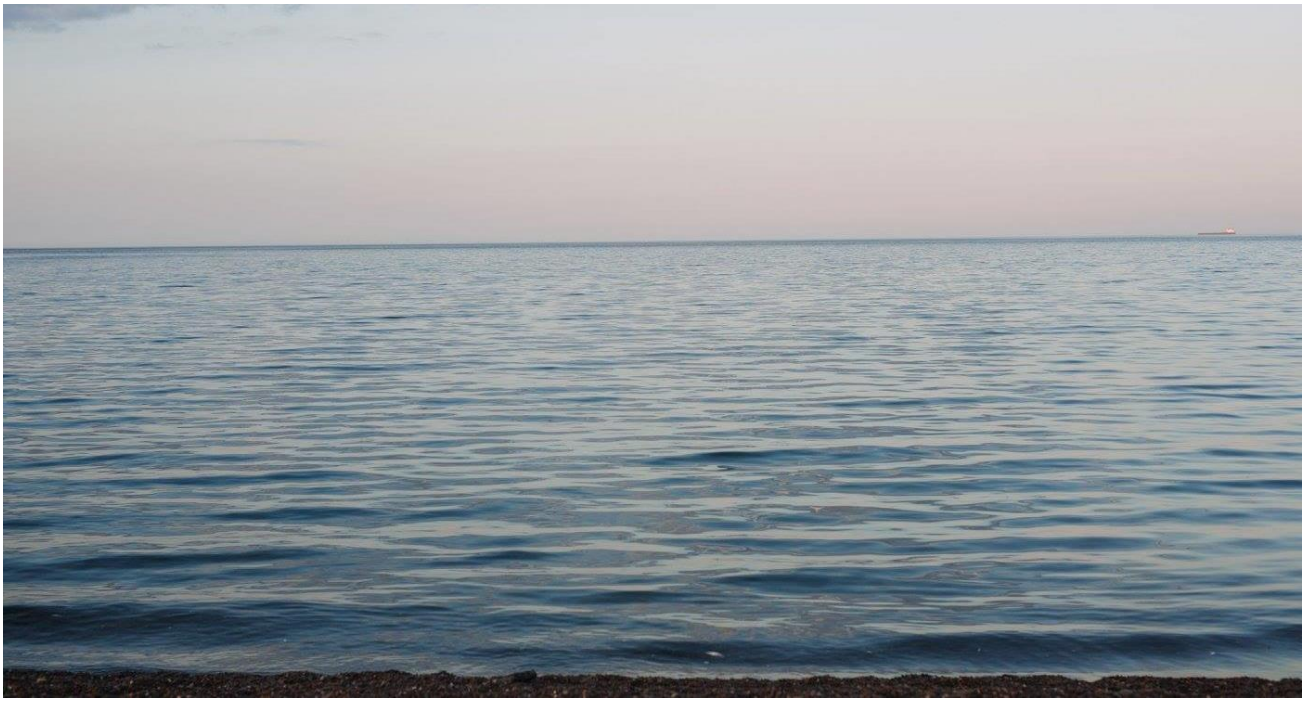
The indices for impaired waters in the Zonation Process were catchments of lakes with declining water quality, catchments of rivers vulnerable to pollution, and catchments upstream of impaired waters. Streams identified as vulnerable to pollution are streams that are within catchments of stream reaches with low-scoring streams (based on fish and macroinvertebrate IBI, and stream habitat scores provided by MPCA). Five Priority Areas are identified as having impaired water resources: Two Harbors, Poplar River, Flute Reed River, Knife River, and Beaver River. Three Priority Areas were ranked high for containing rivers vulnerable to pollution: Baptism River, Cascade River Lower, and Flute Reed River Priority Area.

At risk waters are waterbodies in the LSNW that are currently unimpaired but potentially threatened by impacts associated with activities taking place in their contributing drainage areas. These unimpaired resources were identified by the “declining water quality” and "lakes vulnerable to nutrient addition" data layers used in the Zonation Process and feedback provided by the Advisory Committee and the public.

GOAL:

Protect lakes and rivers that are nearly impaired and restore impaired resources to meet water quality and biological standards.

INW 1	Continue work with MDH and MPCA in monitoring beaches along Lake Superior for *E. coli*, including evaluating sources of contamination.
INW 2	Restore waters that are impaired and/or have a completed TMDL and protect waters near impairment through targeted and prioritized best management practices.
INW 3	Address highest TSS loading areas through protection strategies, natural channel design, improving trail and stream crossings, and installing livestock exclusion fencing.
INW 4	Encourage and promote riparian and shoreline buffers following recommended Minnesota Vanishing Natural Shorelines document.
INW 5	Secure funding to support water quality monitoring of lakes and streams.
INW 6	Continue to support and secure financial assistance for training SWCD staff and additional citizen groups in volunteer monitoring program and expand program to monitoring for additional, parameters, such as phosphorus and nitrogen.
INW 7	Work with landowners and agencies to conduct and compile the assessment data of existing conditions in priority subwatersheds, including land most sensitive to runoff, riparian forest conditions, presence, and locations of wetlands in headwaters areas, and locations of contributing sediments and pollutant load. **See also in Forest Management and Wetlands sections.*



3.1.3 SUBSURFACE SEWAGE TREATMENT SYSTEMS (SSTS)

ISSUE STATEMENT:

Trends in lakes in northern Minnesota have shown an increase in nutrient loading that correlates with development and septic system densities. These non–compliant or failing septic systems pose a threat to public health and natural resources.

Picture: MPCA

DESCRIPTION:

Minnesota surface and ground waters are subjected to increased nutrient loading from development. Septic systems in particular have the potential to increase loads to water resources, and failing systems can be a threat to public health.

PRIORITY AREA SUMMARY:

The index for Subsurface Sewage Treatment Systems (SSTS) in the Zonation Process included areas potentially impacted by SSTS. All 18 of the Priority Areas were triggered for SSTS via the Zonation Process.

GOAL:

Address water quality problems stemming from inadequate wastewater treatment by implementing best management practices, enforcing regulations, and managing funds for the local SSTS ordinances.

SSTS 1	Coordinate with Cook and Lake County to develop and continue use of a GIS based-SSTS database.
SSTS 2	Based on the SSTS database information, prioritize developed lakes and riparian areas in order to identify imminent public health threats and failing systems, with efforts targeted to areas of highest septic densities.
SSTS 3	Complete SSTS inspections as prioritized by the counties to identify non-compliant systems.
SSTS 4	Implement a financial assistance program for SSTS upgrades across the watershed, with the goal of upgrading 10 SSTS systems per year.

SSTS 5	Procure funding to provide additional training, resources, and staffing/contractors for increased workloads to implement SSTS ordinance and system inspections.
SSTS 6	Educate landowners on SSTS maintenance and best management practices.

3.1.5 FOREST MANAGEMENT (FM)

ISSUE STATEMENT:

The decline of forest health due to insects and disease, climate change, lack of age-class diversity, and past management practices alter peak flows affecting the stability of streams and rivers. Private owners of small parcels (under 20 acres) have very few publicly-funded resources available to them to address forest management, including reforestation.

DESCRIPTION:

The forest communities in the LSNW are healthy and diverse. Forests and forest management is a common land use in Cook and Lake Counties and forest products will continue to be an important resource into the future. Ensuring the sustainability of the forests and the forest products industry will require proactive management. Planting species suited to a changing climate such as yellow birch, oak, and American elm will be a vital aspect of forest management. Forestry on public land follows specific regulations and may benefit from local government support. Disturbance on private land greater than 20 acres has support through various programs, like Forest Stewardship Plans and tax incentive programs. Development and logging on private property, often less than 20 acres, has limited assistance options for property owners wishing to complete reforestation and re–vegetation activities at these sites (Cook County Priority Concerns Scoping Document, 2015 with modifications).

PRIORITY AREA SUMMARY:

Information collected through Zonation could not be used to identify forestry priority areas within the LSNW. Forest management was a concern raised by the Advisory Committee and the public because of its effects on wildlife, watershed hydrology and surface water resources.

GOAL:

Assist landowners in the management of their properties through planning, education, and cost-share programs which will have measurable results in keeping the lands in a healthy present and future forested condition with a focus on water quality, biodiversity and climate resiliency.

FM 1	Assist NRCS staff with identifying, planning, and executing forestry management activities in the LSNW, and securing resources to make this possible, including hiring staff.

FM 2	Apply technical, educational and financial assistance to install forestry best management practices that limit or correct nonpoint source pollution or improve forested land within the LSNW. This includes promoting the development of forest management plans for private and public landowners who own forest lands between 1 and 1,000 acres.
FM 3	Restore and/or protect 2 miles riparian and/or shoreline forest land in the next 10 years within priority subwatersheds on private lands and assist with facilitation of these activities on public land, utilizing pertinent existing data (thermal cover, flow accumulation, areas more susceptible to erosion) to target implementation areas to reduce riparian and shoreline erosion and surface runoff entering these systems.
FM 4	Facilitate the planting of conifers, climate resilient species, and planting/replanting of other species within the area of decline (birch, black ash, spruce, balsam, aspen) to create a diverse mix of age, species and densities.
FM 5	Hold two annual private forestry workshops (one in each County) for landowners, with targeted outreach in priority spatial areas.
FM 6	Work with landowners to consider easements and tax incentives to protect high conservation value forests from land use impacts and environmental stressors that degrade the quality of the resource.
FM 7	Work with landowners and agencies to conduct and compile the assessment data of existing conditions in priority subwatersheds, including land most sensitive to runoff, riparian forest conditions, presence and locations of wetlands in headwaters areas, and locations needed to protect water quality, such as areas contributing sediments and pollutant load. **See also in Impaired and Nearly Impaired Waters and Wetlands sections.*
FM 8	Draft and implement a Landscape Stewardship Plan for the LSN Watershed.
FM 9	Review current forest management guidelines/ordinances for opportunities to revise them to build resiliency to climate change.
FM10	Support urban nodes and assist small communities with forest health practices such as disease and pest mitigation, tree planting, and tree inventories and planning.

3.1.6 AGGREGATE MATERIALS (AM)

ISSUE STATEMENT:

The extraction of aggregate materials, a high value resource, has the potential to negatively impact ecological resources and increase susceptibility to groundwater pollution.

DESCRIPTION:

Aggregate material mining in the LSNW includes the extraction of sand and gravel resources from the landscape. These materials are and will continue to be important both privately and commercially in construction and development activities. Extraction of these resources has the potential to impact surface water resources and cold water recharge areas through contributions of sediment from extraction and processing sites. Aggregate extraction results in excavating below the groundwater level, which has impacts on water quality and quantity for groundwater fed streams and wetlands. Responsible extraction of these materials and appropriate oversight of the process is vital to maintaining water quality in subwatersheds where these activities occur.

PRIORITY AREA SUMMARY:

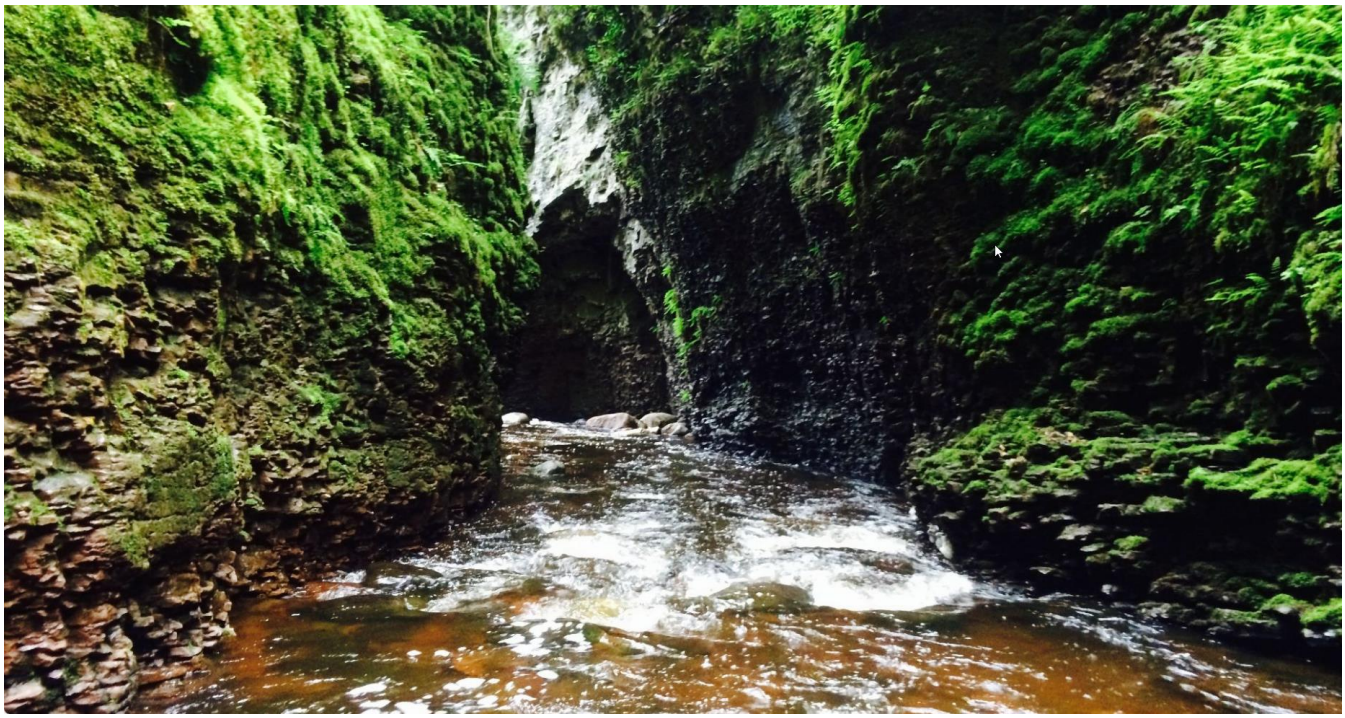
Information collected through Zonation could not be used to identify priority areas for aggregate material extraction management in the LSNW. Aggregate material is extracted near various surface water features throughout the LSNW. Areas that are mined are disturbed areas that create a habitat suitable for terrestrial invasive species. Aggregate mining was a concern raised by the Advisory Committee and the public because of its effects on surface water resources and the potential for terrestrial invasive species dispersal through aggregate mining and activities and facilities.

GOAL:

Protect groundwater, groundwater dependent natural resources, surface water, and the rare/high quality plant communities associated with aggregate-rich glacial features from extraction and dewatering processes associated with the aggregate industry.

AM 1	Prior to issuing a permit for the extraction of aggregate materials, evaluate impacts to natural resources and conservation of unique/significant features. Permits issued should identify an extraction operation sunset date, and require that a restoration plan be prepared, implemented to the specifications in the restoration plan, and inspected to attain proper closure status.

AM 2	Partner with the MNDNR and MN Geological Survey to map and prioritize aggregate mining locations to ensure resources from aggregate mining are available for use in roads and septic systems, while ultimately safeguarding clean water and sensitive systems (e.g. coldwater streams).
AM 3	Create guidance documents on restoration efforts of closed mines and operation and management of open gravel pits.



3.1.7 STREAM CONECTIVITY (SC)

ISSUE STATEMENT:

Improperly designed or installed road crossings tend to dam streams and prevent fish passage, which often disconnect floodplains, creates streambank erosion, and disturbs migration of aquatic life necessary to support fisheries throughout the Watershed.

DESCRIPTION:

Stream connectivity is critical for resilient, healthy watersheds to sustain aquatic organism movement, water quality, sediment movement, and for maintaining or enhancing aquatic habitats. Connectivity is also critical to provide aquatic organisms access to essential cold water resources. Road, railroad, snowmobile and ATV trail crossings, and particularly perched culverts, are common barriers to stream connectivity (Lake County Priority Concerns Scoping Document, 2015 with modifications). Streams may also become disconnected from their natural floodplains (incised). This reduces in–stream and floodplain habitat along the stream corridor.

The disturbance to the natural flow regime has historically impacted fisheries in the LSNW. In recent years, changes in climate and flow regimes have provided low–flow streams during the summers, enabling stream temperatures to increase to levels that are stressful or lethal for trout and aquatic organisms (Lake County Priority Concerns Scoping Document). Changes in climate and flow regimes can also create flashy/high flow streams, which can lead to flooding and degradation of aquatic habitat.

PRIORITY AREA SUMMARY:

Stream connectivity was a concern raised by the Advisory Committee and the public and is an activity that requires attention in a majority of the Priority Areas. The Ecological Connection input layer to Zonation identified important terrestrial connections, and the Riparian input layer identified critical stream corridor areas important to maintaining ecological connectivity in the Watershed.

The indices for fisheries management in the Zonation Process were primarily trout catchments. Most of the Priority Areas were identified as having trout catchments in the Zonation Process. There are also Priority Areas that have high lakes of biological significance ranking.

GOAL:

Develop and maintain road construction and maintenance practices that assure stream–accessible floodplains and free-flowing riparian systems that promote fisheries and connect Lake Superior with the headwater lakes, streams and wetlands.

SC 1	Conduct one subwatershed stream network inventory every two years to identify and prioritize contributing physical and biologic stressors and map barriers to stream connectivity.

SC 2	Based on the stream network inventory and /or culvert inventory results, initiate implementation of projects that address barriers, aquatic organism passage, and erosion with the goal of addressing three barriers within ten years.
SC 3	Collaborate with stakeholders to define riparian management zones (RMZ) and promote compliance with regulations on soil disturbance and tree harvesting that are specific to the RMZ.
SC 4	Complete, maintain, and update a culvert inventory in the Lake Superior North Watershed.
SC 5	Update County and SWCD culvert standards (MESBOAC) to those that accommodate fish passage and promote climate resilience to address the increased frequency and magnitude of storm events.
SC 6	Improve riparian buffers to provide shade, riparian stabilization, and aquatic habitat.

3.1.8 INVASIVE SPECIES (IS)

ISSUE STATEMENT:

Invasive species alter native ecosystems by reducing biodiversity and degrading wildlife habitat and can negatively impact commercial, recreational, and cultural activities and harm human health.

DESCRIPTION:

Terrestrial and aquatic invasive species (AIS) can significantly disrupt the ecological stability and function of a watershed. Once invasive species are introduced and established they can be difficult and costly to remove. The DNR maintains a list of invasive species that includes both terrestrial and aquatic species. Human travel corridors and lake/stream access points are the most common locations for invasive species to be introduced. For example, the well-known terrestrial invasive species, tansy (*Tanacetum vulgare*), is prevalent along roadways within the LSNW. Rusty crayfish and spiny water fleas are aquatic invasive species known to exist in Cook and Lake Counties.

A much more extensive list of AIS is known to exist in Lake Superior. The list of aquatic invasive species affecting the stream, rivers and lakes of Minnesota is tracked by the Department of Natural Resources (Lake Co. Priority Concerns Scoping Document with modifications, 2015).

PRIORITY AREA SUMMARY:

Input layers such as roadways and development nodes do identify areas more likely for invasive species to be or become established. Invasive species were identified as a concern by the Advisory Committee and the public because of the enormous negative impact they can have on both land and water natural resources, including outcompeting and displacing native species of flora and fauna. This can be especially important in ecologically sensitive resources, such as lakes of biological significance.

GOAL:

Reduce impacts of existing aquatic and terrestrial invasive species and prevent the spread and introductions of new ones.

IS 1	Provide educational information at harbors and marinas along the near shore Lake Superior area, evaluate options for improving boat launch sites to incorporate BMPs and site upgrades to prevent the spread of AIS.
IS 2	Partner with agencies and organizations to support and expand the development of standardized invasive species monitoring, assessment, control and outreach activities as specified by county AIS and terrestrial invasive species plans.

IS 3	Using monitoring and assessment data, conduct outreach activities by hosting or coordinating one invasive species workshop per year, per county, online or in person.
IS 4	Educate people about best management practices to prevent the spread of aquatic and terrestrial invasive species.

3.1.9 ALTERED HYDROLOGY AND RESILIENCY (AHR)

ISSUE STATEMENT:

Altered hydrology can result in flashy streams, low baseflow, and streambank degradation. Addressing altered hydrology will build watershed resilience to flooding and changing climate conditions.

DESCRIPTION:

The Lake Superior North Watershed supports an abundance of aquatic and terrestrial communities that are extremely vulnerable to changing climatic conditions. While the Lake Superior North ecosystem is generally in good condition, it has a number of resources that are susceptible to degradation from climatic stressors, and it faces a variety of ongoing challenges that will be further exacerbated by climate change. Extreme rainfall events and flooding have increased during the last century, and these trends are expected to continue (LSS MPCA, 2014). Expectations are for more intense, less frequent rainfall events, meaning longer periods of dry conditions interrupted infrequently by heavier rainfall events than have been historically experienced in the watershed.

Impacts associated with these changes in precipitation patterns include increased erosion from a landscape with high soil erosion susceptibility (steep slopes and shallow depth to bedrock), declining water quality and negative impacts to infrastructure, human health, wildlife, and high-quality natural habitat. The Great Lakes have experienced higher water temperatures and less ice cover as a result of changes in regional climate. These changes have severe implications for cold water fisheries and groundwater dependent natural resources that rely on a constant source of cold baseflow to maintain their ecological function and value. Higher temperatures, increases in precipitation, and lengthened growing seasons favor the production of blue–green and toxic algae that can harm fish, water quality, habitats, and aesthetics. As Lake Superior fluctuates more often between high and low water levels than it did historically, it affects coastal wetlands and nearshore aquatic habitats, and creates flooding and erosion risks and challenges for shoreland property owners. Many of these factors will also serve to promote the spread of invasive species in the area.

PRIORITY AREA SUMMARY:

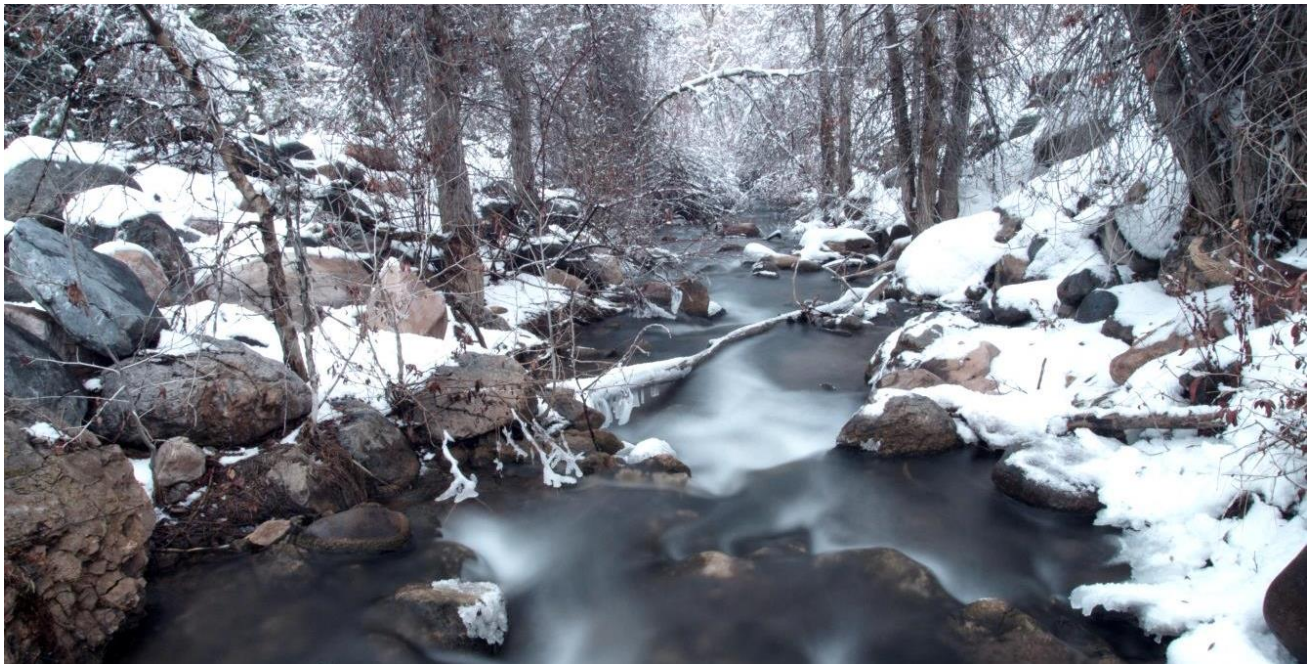
Altered drainage patterns and land use changes can reduce infiltration and groundwater recharge, resulting in low baseflow. Flashy streams are characterized by sudden high flows resulting from precipitation and followed by low baseflow. These are undesirable as the large and quick variation in flow regimes degrades available habitat and powerful flows erode streambanks, further degrading habitat and water quality.

The effects of climate change are being seen across the LSNW and region in changes in weather patterns and trends, spatial shifts in bird and plant populations, and dramatic shifts in the timing of natural events such as ice-over and ice-out events. Integration of tools, ordinances, and policies in the region's infrastructure and governance will be important in enhancing communities and resources to be resilient in the face of changing climate conditions and associated changes in weather.

GOAL:

Address altered hydrology by integrating climate change scenarios and vulnerability assessments into land use and resource management planning efforts and implement projects aimed at building climate resiliency.

AHR 1	Integrate climate change scenarios and vulnerability assessments into planning and infrastructure designs.
AHR 2	Identify and implement opportunities for green stormwater infrastructure to slow and retain stormwater runoff, reduce flooding, and disconnect impervious surfaces.
AHR 3	Identify and implement temporary or permanent storage (e.g., detention, retention) to increase resiliency to storm events.



3.1.10 GROUNDWATER AND DRINKING WATER (GDW)

ISSUE STATEMENT:

Increasing development pressure and existing land use practices have the potential to adversely impact groundwater quantity and quality resulting in reduced groundwater recharge and impacts to receiving water and drinking water supplies. There are four Community Public Water Suppliers in the LSNW with a number of Non-Community Public Water Suppliers, private wells, and lakes (including Lake Superior) that provide surface drinking water supplies.

DESCRIPTION:

The public drinking water supply for the communities of Two Harbors, Silver Bay, Beaver Bay, and Grand Marais is from Lake Superior and adjacent minor watersheds. The Cities of Beaver Bay and Silver Bay share a source water protection area that includes the lower portion of Williams Creek and the lower portion of the Beaver River minor watershed. The City of Two Harbors' protection area includes upper Skunk Creek minor watershed and the Stewart River minor watershed. The City of Grand Marais protection area includes the Devil Track River minor watershed, Rosebush Creek minor watershed, and a small eastern portion of the Cascade River minor watershed. These surface water–based drinking water systems are highly susceptible to potential contaminants entering the public water supply at a level that may result in an adverse human health impact (MDH, 2015). Private wells are also used as a drinking water source for many residents in the watershed and are also susceptible to contamination. Less rigorous monitoring of these private wells points to the need to protect them from potential contaminants that may impact this important drinking water source.

The LSNW has limited but important groundwater resources. Groundwater is found in bedrock fractures and small glacial aquifers that often have a limited capacity for groundwater pumping. Still, clean groundwater is important as a drinking water supply for many residents within the watershed and a vital component of the unique natural resources along the shore, and therefore requires protection.

PRIORITY AREA SUMMARY:

The index for groundwater and drinking water in the Zonation Process was Source Water Areas and groundwater quality contamination susceptibility. Most of the information used to identify the issues, goals and implementation activities was provided by the Minnesota Department of Health (MDH).

GOAL:

Protect groundwater and surface water drinking water sources by sealing wells and promoting Source Water Protection for Public Water Supplies.

GDW 1	Conduct an unused, unsealed well inventory and implement well water monitoring program to supplement efforts that seal abandoned wells.

GDW 2	Develop and maintain a cost share program to financially assist property owners in sealing unused, unsealed wells on their property, including the public water suppliers in the watershed.
GDW 3	Develop a well monitoring program assistance program, in collaboration with the MDH and Minnesota Geological Survey, to assist landowners with contaminant concerns.

3.1.11 WETLAND MANAGEMENT (WM)

ISSUE STATEMENT:

Wetlands provide valuable ecosystem functions and services that can be lost through impacts from development, extreme weather events and invasive species. The majority of the wetlands in Lake and Cook County are relatively pristine and intact, yet susceptible to degradation from development and high volumes of stormwater.

DESCRIPTION:

Wetlands provide valuable ecosystem functions and services that can be lost when impacts to wetlands occur from development, catastrophic weather events and invasive species. Lake Superior North Watershed contains high valued Coastal wetlands and flowages, and wetland mosaics. (MPCA comment, 2015). These high functioning wetlands provide many ecosystem services and impacts to these resources are regulated under local, state and federal laws.

PRIORITY AREA SUMMARY:

The index for wetland management in the Zonation Process was the National Wetland Inventory (NWI). As the Zonation process indicated, all Priority Areas contain wetlands identified on the NWI.

GOAL:

Preserve and restore/rehabilitate high quality wetland resources.

WM 1	Support and pursue financial assistance for a watershed-wide wetland inventory of private land. Coordinate with the NWI update.
WM 2	Initiate collaborative efforts among regional jurisdictions of local communities to promote a watershed-wide Resource Management plan to ensure wetland functions are not lost in the LSNW.
WM 3	Work with landowners and agencies to conduct and compile the assessment data of existing conditions in priority subwatersheds, including land most sensitive to runoff, riparian forest conditions, presence and locations of wetlands in headwaters areas, and locations of contributing sediments and pollutant load. **See also in Impaired and Nearly Impaired Waters and Forest Management sections.*
WM 4	Conduct wetland function assessment and determine priority locations for protection and improvement..

3.1.12 UNIQUE AND HIGH VALUE RESOURCES (UHVR)

ISSUE STATEMENT:

The LSNW contains some of the most unique and rare natural resources in the State of Minnesota that are also susceptible to degradation from environmental stressors. Unique and high value resources include but are not limited to forests, coastal wetlands, exceptional quality waterbodies, wild rice waters, fisheries, and bluffs.

DESCRIPTION:

The Lake Superior North Watershed contains some of the most unique and rare natural resources in the State of Minnesota. For that reason, this region of the state is very highly valued by the public. The MPCA Tiered Aquatic Life Use (TALU) framework will protect waters based on their biological potential. This means that high value or Exceptional Use waters will be given additional protection to ensure that the conditions of these habitats are maintained. These pristine and sometimes rare resources of the LSNW are treasured by the public for their recreational, aesthetic, intrinsic, and cultural value. For example, wild rice is a highly valued cultural resource as well as an important food supply for humans and resource for wildlife. Continued collaboration among various partners is needed to ensure the sustainability of the unique and highly valued resources in the LSNW.

This plan recognizes that many surface waters in the watershed are high value and surpass State water quality standards. This plan also acknowledges that the Grand Portage Band of Lake Superior Chippewa has different water quality standards, some of which are more stringent than State standards. This will be considered during the next plan update. During this update, the plan will also include consideration of mercury, recognizing the differing standards between the Band and the State. There is an ongoing relationship with the Band, and the Band was a valued partner in the 2024 amendment process.

PRIORITY AREA SUMMARY:

The index for Unique/High Value Resources in the Zonation Process was ecological connectivity, high value forest, Minnesota Biological Survey (MBS) and Natural Heritage Data. All Priority Areas were triggered uniformly for these features via the Zonation Process while areas with rare features (Natural Heritage Data) were only located in some.

The input layer in Zonation for Lakes of Biological Significance and the 1854 Treaty Authority list of wild rice waters included wild rice lakes among several other indicators such as waterbodies that support trout. Wild rice was a priority raised through the advisory process.

GOAL:
Work with agency partners, landowners, and the Grand Portage Band of Lake Superior Chippewa to protect unique and high value resources such as wild rice waters, forests, wetlands, fisheries, and bluffs.

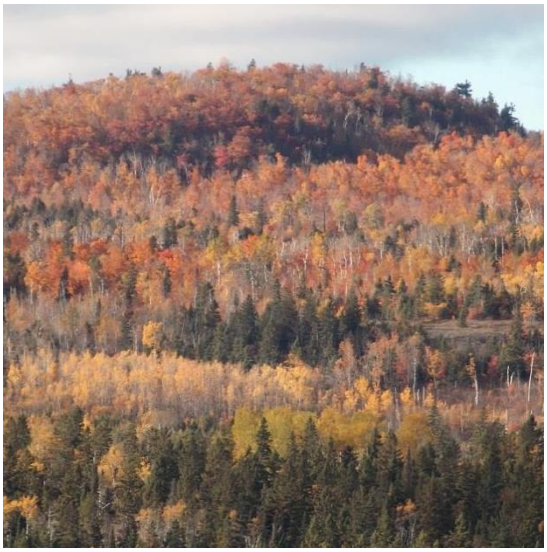
UHVR 1	Secure funding to support water quality monitoring of lakes and streams.
UHVR 2	Continue to support and secure financial assistance for training SWCD staff and additional citizen groups in volunteer monitoring program and expand program to monitoring for additional, parameters, such as phosphorus and nitrogen.
UHVR 3	Work with landowners and agencies to conduct and compile the assessment data of existing conditions in priority subwatersheds, including land most sensitive to runoff, riparian forest conditions, presence and locations of wetlands in headwaters areas, and locations of contributing sediments and pollutant load. **See also in Impaired Waters and Forest Management.*
UHVR 4	Assist watershed residents and landowners in development of Watershed Advocacy groups with a focus on developing these groups within priority watersheds where they are not already established.
UHVR 5	Encourage community members to participate in conservation projects by attending public meetings and events, coordinating community activities around conservation projects including water quality and AIS monitoring, establishing community leadership roles within priority subwatersheds, and establishing communication tools to allow both agencies and citizens to participate in watershed conservation issues.
UHVR 6	Secure funding to and provide educational opportunities on conservation BMPs design and implementation, including road maintenance, roadside ditch maintenance, development impacts, stormwater management, source and/or groundwater protection, wetlands, etc. to a minimum of one relevant audience per year within LSNW. Relevant audiences may include but are not limited to landowners, LGU staff, Planning and Zoning Boards, real estate, and contractors.
UHVR 7	Encourage collaboration with MNDNR for projects occurring in areas of known rare, threatened and endangered species to consult with the natural heritage database.
UHVR 8	Support the activities to prevent the net loss of wild rice in the LSNW and restore where appropriate.
UHVR 9	Protect the existing high-quality waters from becoming impaired through targeted and prioritized best management practices.
UHVR 10	Protect and stabilize lakeshores by conducting shoreland surveys to identify areas of disturbance and areas to install best management practices, including Lake Superior.
UHVR 11	Support the North Shore's unique fishing opportunities by promoting enhancement and restoration of habitat for coldwater fisheries.

UHVR 12	Enroll land in conservation easements to protect forests, wetlands, wild rice waters, and high-quality upland areas.
UHVR 13	Protect watershed resources by adding educational signs, trash receptacles, dog waste stations, and monitor popular sites for illegal dumping of waste.

Section 4.
Targeted Implementation Schedule

4 TARGETED IMPLEMENTATION SCHEDULE

4.1 INTRODUCTION



The implementation section of the LSNW Management Plan is presented as a series of tables that includes action descriptions, priority areas of work, timeframes, partners, funding options, and outcomes for each of the 11 priority concerns and measurable goals. The Targeted Implementation Schedule identifies the specific, measurable actions necessary to achieve the goals identified in the Plan. While numerous actions were identified over the course of the plan development process, actions included in the Targeted Implementation Schedule reflect what the counties and SWCDs can commit to over the 10-year timeframe of the Plan. The Targeted Implementation Schedule considers the SWCDs technical skills and capabilities, available resources and local interest in implementation.

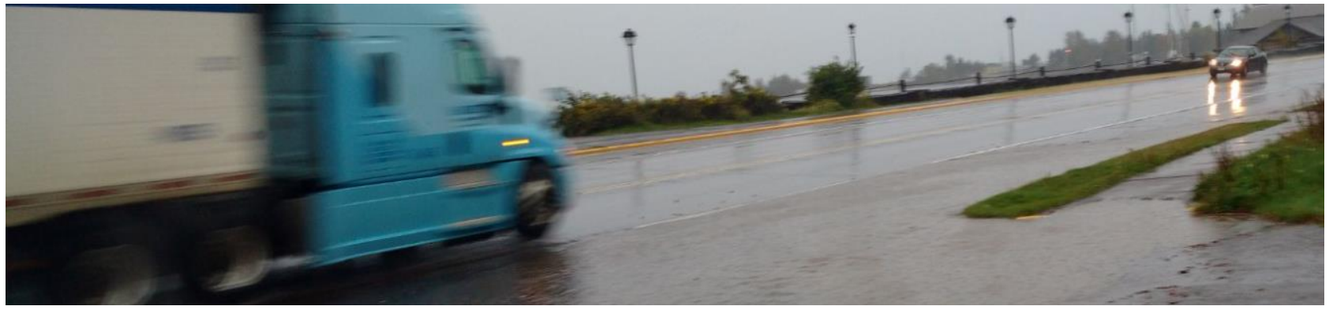
The inclusion of an action in the Targeted Implementation Schedule is a statement of intent by the LSNW Policy Committee members. Final decisions on implementation rest with future decisions by Cook and Lake Counties and Cook and Lake SWCDs to budget for and authorize initiatives. In many cases, implementation may require further action and/or the approval and participation of other parties.

Actions that the counties and SWCDs would like to implement, if existing capacity is broadened and/or additional funding resources become available, are identified in a secondary Implementation Plan, available in Appendix A. Neither the counties nor the SWCDs are committing to the actions identified in this Implementation Plan; rather these entities acknowledge that resources are limited and if additional resources become available over the 10-year timeframe of the 1W1P they will begin implementing these actions. A number of other important resource protection and restoration activities identified during the plan development process are included in Appendix A of the Plan. These activities were identified as the responsibility of state and/or federal agencies or are better suited to other entities in the watershed. While the counties and the SWCDs do not have a lead role in the implementation of these activities, they support the implementation of these activities and have included them in the LSNW Management Plan for future reference.

The counties and SWCDs commit to regular assessment of their programs, projects, and capital improvements and intend to engage the LSNW Advisory Committee in periodic review of progress towards plan implementation. New information, changes in priorities, new technical approaches, or other pertinent factors may warrant modifications to the Plan moving forward. Counties and SWCDs may revise the implementation plan through public input and the required watershed management Plan amendment process. The counties and SWCDs are committed to providing clear communication and documentation of Plan implementation to allow for clear evaluation of progress and opportunities for improvement in achieving the goals of the Plan.

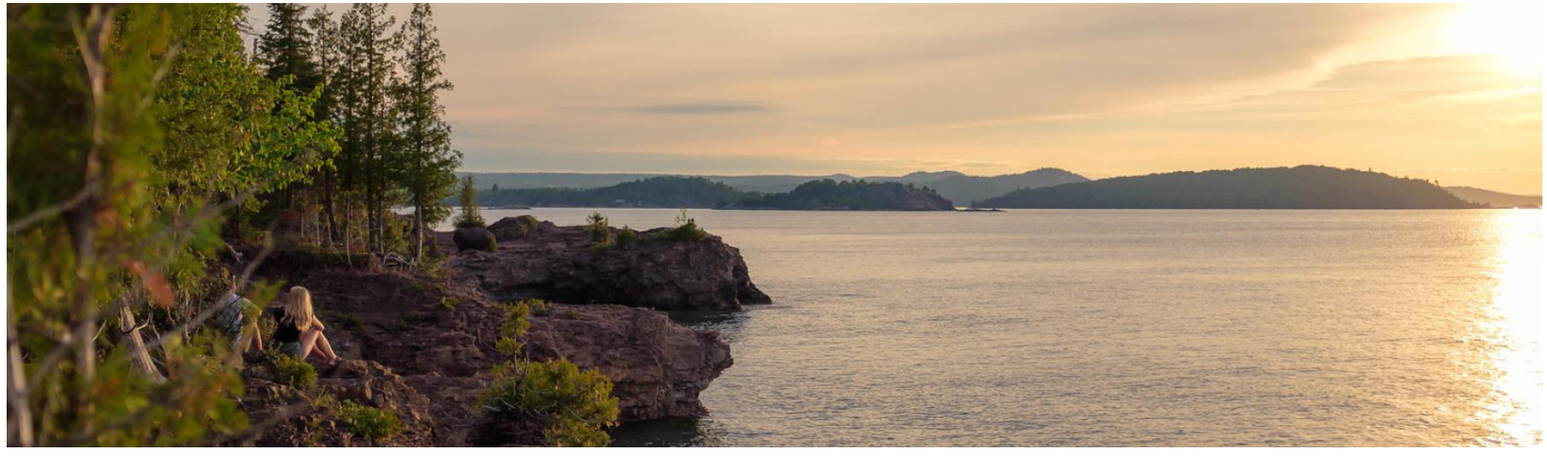
Stormwater Management (SM): Targeted Implementation Schedule

Action ID	Implementation Activities	Priority Area	Ten Year Targeted Implementation Schedule										Project Cost (one-time cost)	On-going Activities (annual costs)	Project Lead	Project Partners	Activity Outcome Measurability
			'17	'18	'19	'20	'21	'22	'23	'24	'25	'26					
SM 1	Develop one stormwater management plan in urban nodes and developed areas within each county, one per county every 5 years. Stormwater management plan development activities will include completing steps of stormwater infrastructure inventory, hydrologic analysis, BMP-recommendation including green stormwater infrastructure options and locations, and development of stormwater and erosion and sediment control standards for municipal ordinance and policy inclusion, using MN Stormwater Manual as a guide as part of this assessment. Support plan updates as needed by municipalities.	Near Shore Lake Superior	L	L+C	L+C	C		L	L+C	L+C			$250,000 each municipality	N/A	SWCD	Municipality, BWSR, TSAIII, Cook County Planning and Zoning	Development and adoption of 2 stormwater management plans; collaboration between municipalities, counties, LGUs; identification of existing and future stormwater issues, non-point and point source pollutant loads, recommendations for the adoption of stormwater management, erosion and sediment control, and lake, stream and wetland buffer standards designed to address resource-specific needs and the identification of and prioritization of BMPs needed to meet the goals of the SWMP.
SM 2	Complete stormwater water quality and quantity projects or retrofits, including green infrastructure projects that will be identified and prioritized in each of the stormwater management plans created by municipalities.	Near Shore Lake Superior; Cook County: City of Grand Marais; Lake County: Silver Bay, Two Harbors				L	L+C	C			L+C	L+C	$750,000 each for 5 BMPs	N/A	Municipality/SWCD	Municipality, MPCA, BWSR, County	5 completed projects to reduce nutrient loading by stormwater; collaboration to complete BMPs to treat pollutants from transportation infrastructure, maintenance areas, refueling areas, storage yards, sand and salt storage areas, and waste transfer stations.
SM 3	Review local ordinances, permitted and conditional uses, subdivisions, stormwater issues, and shoreland issues and provide best management recommendations for the protection of surface water and groundwater resources, including utilizing the most recent precipitation projections for engineered project design, to integrate within municipal and local government policy and ordinance documents. Promote MIDS and LIDS standards within these ordinances.	Watershed-wide	C	L+C	L								$5,000; $15,000 per consultant-led review	N/A	County	SWCD	Change in local ordinances to be better coordinated to address consistency across the watershed to reduce nutrient and sediment loading from point and non-point sources, stormwater BMPs, and land use practices.
SM 4	Address existing erosion problems by conducting targeted erosion control projects using current green infrastructure methodologies in order to reduce sedimentation and nutrient loading into surface waters and wetlands.	Cook County: Poplar River, Flute Reed River; Cascade River Lower; Cascade River Upper and Mid; Lake County: Beaver River / Knife River/ Skunk Creek		L	C	L	L	L	L	L	C	L+C	$2,000; $300,000/year every 2 years	N/A	SWCD/TSA III or consultants	County, MPCA, DNR, TSA III, BWSR, LSSA, TU	5 bank stabilization projects completed; reduction in sediment and nutrient loading within identified subwatersheds; Poplar River sediment reduction of 165 tons/year with work on critical stream repairs, ravines/flowpaths/streambank stabilization; Knife River work on major areas is estimated to reduce sedimentation by approx. 900 tons/year
SM 5	Inventory, maintain, and re–vegetate road/roadway ditches with native species with the goal of transitioning 10% of inventoried ditches in each county to native vegetation by 2025. Work with County Hwy Departments to prioritize ditches that are in riparian areas and areas with impaired waters.	Roads within Priority Subwatersheds		L+C	L+C	L+C	L+C	L+C	L+C	L+C	L+C	L+C	5000 (reallocation of existing resources within Hwy Dept. budgets)	N/A	County, MNDOT	SWCD/TSA III or consultants	Increase in native species diversity, decrease in ditch maintenance costs, increased resiliency to erosion in ditch systems; 10% of inventoried ditches revegetated to native plant species; fulfillment of known data gap
SM 6	Annually lead one community conversation on stormwater management BMPs as well as promoting opportunities and options for green stormwater infrastructure.	Watershed-wide	L+C	L+C	L+C	L+C	L+C	L+C	L+C	L+C	L+C	L+C	$1,000	$1,500/yr.	SWCDs, Counties	MNDNR	10 conversations/county/year for life of plan; reach 200 watershed constituents



Impaired and Nearly Impaired Waters (INW): Targeted Implementation Schedule

Action ID	Implementation Activities	Priority Area	Ten Year Targeted Implementation Schedule										Project Cost (one-time cost)	On-going Activities (annual costs)	Project Lead	Project Partners	Activity Outcome Measurability
			'17	'18	'19	'20	'21	'22	'23	'24	'25	'26					
INW 1	Continue work with MDH and MPCA in monitoring beaches along Lake Superior for *E. coli,* including evaluating sources of contamination.	Near Shore Lake Superior	L+C	L+C	L+C	L+C	L+C	L+C	L+C	L+C	L+C	L+C	N/A	$10,000/yr.	SWCDs, MDH	MPCA, Municipalities, Counties, EPA	*E. coli* and WQ data from beaches on Lake Superior targeted for monitoring, including likely sources and mitigation of at least 1 source.
INW 2	Restore waters that are impaired and/or have a completed TMDL and protect waters near impairment through targeted and prioritized best management practices.	Priority Subwatershed									L+C	L+C	$5,000-$300,000	N/A	SWCDs, Counties	MPCA, DNR, BWSR, NRCS	Projects implemented to make progress towards TMDL goal or protect from impairment.
INW 3	Address highest TSS loading areas through protection strategies, natural channel design, improving trail and stream crossings, and installing livestock exclusion fencing.	Priority Subwatershed									L+C	L+C	$5,000-$200,000	N/A	SWCDs, Counties	DNR, BWSR, NRCS, MPCA	Projects implemented to reduce TSS loading to surface waters.
INW 4	Encourage and promote riparian and shoreline buffers following recommendations in Minnesota Vanishing Natural Shorelines document.	Watershed-wide									L+C	L+C	N/A	$5,000/yr.	SWCDs, Counties	DNR	Discussions with landowners; feet of shoreline protected or managed.
INW 5	Secure funding to support water quality monitoring of lakes and streams. **See also in Unique and High Value Resources*	Priority spatial areas	L+C	L+C	L+C	L+C	L+C	L+C	L+C	L+C	L+C	L+C	$2,000/yr.; $10,000/yr. monitoring/lab costs	$18,000/yr.	SWCDs/MPCA/DNR	Counties, MPCA, BWSR, Coastal, Special interest groups.	Data sets of water quality.
INW 6	Continue to support and secure financial assistance for training SWCD staff and additional citizen groups in volunteer monitoring program and expand program to monitoring for additional parameters, such as phosphorus and nitrogen. **See also in Unique and High Value Resources*	Watershed-wide, focus in priority spatial areas	L+C	L+C	L+C	L+C	L+C	L+C	L+C	L+C	L+C	L+C	$1,000	$1,500/yr.	SWCD	MPCA, Coastal	Data sets of water quality; support of efforts for local citizen groups for water monitoring; increase volunteers by 50 within life of the plan
INW 7	Work with landowners and agencies to conduct and compile the assessment data of existing conditions in priority subwatersheds, including land most sensitive to runoff, riparian forest conditions, presence and locations of wetlands in headwaters areas, and locations of contributing sediments and pollutant load. **See also in Forest Management and Wetlands sections.*	Priority Subwatersheds	L+C	L+C	L+C	L+C	L+C	L+C	L+C	L+C	L+C	L+C	$2,000	$2,500/yr.	SWCD/Counties	DNR/USFS/SWCD/1854 Treaty Authority, University	Compilation of more holistic data set to better support location and types of BMPS prescribed for an area.



Subsurface Sewage Treatment Systems (SSTS): Targeted Implementation Schedule

Action ID	Implementation Activities	Priority Area	Ten Year Targeted Implementation Schedule										Project Cost (one-time cost)	On-going Activities (annual costs)	Project Lead	Project Partners	Activity Outcome Measurability
			'17	'18	'19	'20	'21	'22	'23	'24	'25	'26					
SSTS 1	Coordinate with Cook and Lake County to develop and continue use of a GIS based- SSTS database.	Watershed-wide				L+C	L+C	L+C	L+C	L+C	L+C	L+C	$5,000	N/A	Counties	SWCD, BWSR, MPCA	Completed SSTS inventory of existing systems; 100% of parcels of SSTS identified; database used to track system locations both compliant and non-compliant systems; fulfillment of known data gap
SSTS 2	Based on the SSTS database information, prioritize developed lakes and riparian areas in order to identify imminent public health threats and failing systems, with efforts targeted to areas of highest septic densities.	Determined from inventory results, most likely will correlate with Zonation areas triggered by SSTS; Flute Reed, Knife watersheds; near shore Lake Superior; Two Harbors /Larsmont areas					L+C						$5000/ *$14,000 Seasonal Tech Assistance Cook Cnty as part of Item 4	N/A	Counties	SWCD	County has prioritized areas for SSTS focused work in areas reflecting the most need.
SSTS 3	Complete SSTS inspections as prioritized by the counties to identify non-compliant systems.	Flute Reed, Knife watershed, Near Shore Lake Superior; Two Harbors/Larsmont areas					L+C	L+C	L+C				$130,000	N/A	Counties	SWCD, BWSR, MPCA	County complete SSTS inspections identified in priority areas; identify 100% of non-compliant systems in prioritized areas; reduction in nutrient loading in water bodies; reduction of pathogens in surface water used for drinking water consumption; additional staff will need to be hired due to workload during and following inspections.
SSTS 4	Implement a financial assistance program for SSTS upgrades across the watershed, with the goal of upgrading 10 SSTS systems a year.	Watershed-wide	C	C	L+C	L+C	L+C	L+C	L+C	L+C	L+C	L+C	$5000/$14,000 Seasonal Tech Assistance Cook Cnty	$30,000/yr (low income grants); $300,000/yr (AgBMP Loans)	Counties	SWCD, MDA, local banks	Counties implementing financial assistance program; 100 SSTS systems updated across LSNW over 10 years; bring 10% of systems into compliance watershed-wide each year; reduce nutrient loading
SSTS 5	Procure funding to provide additional training, resources, and staffing / contractors for increased workloads to implement SSTS ordinance and system inspections.	Watershed-wide						L+C	L+C	L+C			TBD/$20,000 Seasonal Tech Assistance Cook Cnty	N/A	Counties	SWCD, BWSR, MPCA, Coastal	Counties provided with additional staffing to assist with additional workload during and following up inspections.
SSTS 6	Educate landowners on SSTS maintenance and best management practices.	Watershed-wide									L+C	L+C	$2,000	$2,500/yr.	Counties	SWCDs, MPCA	Guide created, number distributed

Forest Management (FM): Targeted Implementation Schedule

Action ID	Implementation Activities	Priority Area	Ten Year Targeted Implementation Schedule										Project Cost (one-time cost)	On-going Activities (annual costs)	Project Lead	Project Partners	Activity Outcome Measurability
			'17	'18	'19	'20	'21	'22	'23	'24	'25	'26					
FM 1	Assist NRCS staff with identifying, planning, and executing forestry management activities in the LSNW, and securing resources to make this possible, including hiring staff.	Watershed-wide		L+C	L+C	L+C	L+C	L+C	L+C	L+C	L+C	L+C	$3,000	$2,500/yr	SWCD	NRCS, DNR Forestry	Increased forestry management and BMP activities within the watershed. Better leveraging of federal forestry BMP implementation resources; 5 plans reviewed; and landowners assisted.
FM 2	Apply technical, educational, and financial assistance to install forestry best management practices that limit or correct nonpoint source pollution or improve forested land within the LSNW. This includes promoting the development of forest management plans for private and public landowners who own forest lands between 1 and 1,000 acres.	Watershed-wide	L+C	L+C	L+C	L+C	L+C	L+C	L+C	L+C	L+C	L+C	$10,000	$4,000/yr	SWCD/County	NRCS, Joint Chief's Forester, MFRC (BMP guideline developer), MN Forester Logger Edu. Program	Decreased pollution and increased implementation of forestry BMPs; transition 2% of private open land into forested land within priority sub watersheds
FM 3	Restore and/or protect 2 miles riparian and/or shoreline forest land in the next 10 years within priority subwatersheds on private lands and assist with facilitation of these activities on public land, utilizing pertinent existing data (thermal cover, flow accumulation, areas more susceptible to erosion) to target implementation areas to reduce riparian and shoreline erosion and surface runoff entering these systems.	Watershed-wide					L+C	L+C	L+C	L+C	L+C	L+C	$100,000	$5,000/yr	SWCD	NRCS, Lake Co. Forestry, DNR Forestry, NSFC	Increased riparian stability and ecological connectivity in priority watersheds; using work previously completed protect or restore 2 miles of shoreline.
FM 4	Facilitate the planting of conifers, climate resilient species, and planting/replanting of other species within the area of decline (birch, black ash, spruce, balsam, aspen) to create a diverse mix of age, species and densities.	Areas of declining birch; Near Shore Lake Superior; Beaver River, Baptism watersheds					L+C	L+C	L+C	L+C	L+C	L+C	N/A	$2,000/yr	SWCD	NRCS, USFS, MNDNR	20 acres of trees planted within the priority areas; increase in diversity of trees within watershed
FM 5	Hold two annual private forestry workshops (one in each County) for landowners, with targeted outreach in priority spatial areas.	Priority spatial areas	L+C	L+C	L+C	L+C	L+C	L+C	L+C	L+C	L+C	L+C	$1,000	$2,000/yr	SWCD	NRCS/USFS, DNR Forestry	20 workshops over the lifespan of the plan; increase resources provided to landowners; connecting to 100 private landowners
FM 6	Work with landowners to consider easements and tax incentives to protect high conservation value forests from land use impacts and environmental stressors that degrade the quality of the resource.	Priority spatial areas									L+C	L+C	$1,000	$2,000/yr	SWCD / County	NRCS, DNR Forestry	Increased number of forested acres protected by easements and other covenants.
FM 7	Work with landowners and agencies to conduct and compile the assessment data of existing conditions in priority subwatersheds, including land most sensitive to runoff, riparian forest conditions, presence and locations of wetlands in headwaters areas, and locations needed to protect water quality, such as areas contributing sediments and pollutant load. **See also in Impaired and Nearly Impaired Waters and Wetlands sections.*	Priority Subwatersheds	L+C	L+C	L+C	L+C	L+C	L+C	L+C	L+C	L+C	L+C	$2,000	$2,500/yr.	SWCD/Counties	DNR/USFS/SWCD/1854 Treaty Authority, University	Compilation of more holistic data set to better support location and types of BMPS prescribed for an area
FM 8	Draft and implement a Landscape Stewardship Plan for the LSN Watershed.	Watershed-wide									L+C	L+C	$50,000	N/A	SWCD/ Counties	USDA Forest Service, DNR, NRCS	1 plan completed
FM 9	Review current forest management guidelines/ordinances for opportunities to revise them to build resiliency to climate change	Watershed-wide									L+C	L+C	$1,000	N/A	Counties	DNR, USFS, SWCD	Accomplished review of documents
FM 10	Support urban nodes and assist small communities with forest health practices such as disease and pest mitigation, tree planting, and tree inventories and planning.	Watershed-wide	L+C	L+C	L+C	L+C	L+C	L+C	L+C	L+C	L+C	L+C	$10,000	$4,000/yr	SWCD/County	NRCS, Joint Chief's Forester, MFRC	Decreased pollution and increased implementation of forestry BMPs

Aggregate Materials (AM): Targeted Implementation Schedule

Action ID	Implementation Activities	Priority Area	Ten Year Targeted Implementation Schedule										Project Cost (one-time cost)	On-going Activities (annual costs)	Project Lead	Project Partners	Activity Outcome Measurability
			'17	'18	'19	'20	'21	'22	'23	'24	'25	'26					
AM 1	Prior to issuing a permit for the extraction of aggregate materials, evaluate impacts to natural resources and conservation of unique/significant features. Permits issued should identify an extraction operation sunset date and require that a restoration plan be prepared, implemented to the specifications in the restoration plan, and inspected to attain proper closure status.	Watershed-wide	L+C	L+C	L+C	L+C	L+C	L+C	L+C	L+C	L+C	L+C	NA	$2,000/yr.	County	MPCA, MN DNR, BWSR, USACOE	Develop best management practices documents for areas of extraction of aggregate material.
AM 2	Partner with the MNDNR and MN Geological Survey to map and prioritize aggregate mining locations to ensure resources from aggregate mining are available for use in roads and septic systems, while ultimately safeguarding clean water and sensitive systems (e.g., coldwater streams).	Watershed-wide									L+C	L+C	NA	$2,000/yr.	County	DNR, MN Geological Survey	Locations mapped and prioritized
AM 3	Create guidance documents on restoration efforts of closed mines and operation and management of open gravel pits.	Watershed-wide									L+C	L+C	$5,000	N/A	County	DNR, MDH, MPCA	Guidance document created

Stream Connectivity (SC): Targeted Implementation Schedule

Action ID	Implementation Activities	Priority Area	Ten Year Targeted Implementation Schedule										Project Cost (one-time cost)	On-going Activities (annual costs)	Project Lead	Project Partners	Activity Outcome Measurability
			'17	'18	'19	'20	'21	'22	'23	'24	'25	'26					
SC 1	Conduct one subwatershed stream network inventory every two years to identify and prioritize contributing physical and biologic stressors and map barriers to stream connectivity.	Where this has not occurred.		L+C			L+C			L+C			$5,000/ stream network inventory	N/A	SWCD	DNR, County, Mn/DOT, MPCA	5 stream network inventories; identification of barriers, sediment sources, and nutrient loading assisting in identification of future projects; fulfillment of known data gap.
SC 2	Based on the stream network inventory and /or culvert inventory results, initiate implementation of projects that address barriers, aquatic organism passage, and erosion with the goal of addressing three barriers within ten years.	Cook Co: Poplar River, Flute Reed River; Cascade River Lower; Brule River Watershed; Cascade River Upper and Mid; Lake County: Beaver River/Knife River/Skunk Creek		L	C	L	C	L	C	L	C	L+C	$2,000; $75,000/project/year	N/A	SWCD, Cnty/Hwy. Depts.	DNR, MPCA	Restore fish and benthic macro invertebrate habitat; complete three barrier removal projects within LSNW, including dam and culvert improvements.
SC 3	Collaborate with stakeholders to define riparian management zones (RMZ) and promote compliance with regulations on soil disturbance and tree harvesting that are specific to the RMZ.	Watershed-wide				L+C	L+C						$5,000	N/A	Counties	SWCD/County, MPCA	Increased riparian area protection; standardized definition of RMZ across the watershed.
SC 4	Complete, maintain, and update a culvert inventory in the Lake Superior North Watershed.	Watershed-wide	L+C	L+C	L+C	L+C	L+C	L+C	L+C	L+C	L+C	L+C	$60,000/county	$1,000/yr	SWCD	County, USFS, DNR, MPCA	100% of county, state, USFS, and federal roads inventoried for culverts; completed inventory of culverts in LSNW, inventory to be shared with other agencies; provide information for development, stream and ditch connectivity; fulfillment of known data gap.
SC 5	Update County and SWCD culvert standards (MESBOAC) to those that accommodate fish passage and promote climate resilience to address the increased frequency and magnitude of storm events.	Watershed-wide; Lake and Cook County wide			L	L	C	C					$5,000	N/A	Cnty/Hwy. Depts.	SWCD, MPCA	Counties/Highway Depts. update culvert standards to accommodate ATLAS 14 rainfall measurements and insure infrastructure standards can accommodate them; upgrade and replace existing infrastructure identified as compromised or causing water quality issues to handle more frequent and intense precipitation events; using information, prior to culvert design, perform stream and site data collection in addition to hydrologic and hydraulic calculations to ensure water; sediment, and aquatic organism passage.
SC 6	Improve riparian buffers to provide shade, riparian stabilization, and aquatic habitat.	Watershed-wide									L+C	L+C	$5,000- $75,000	$1,000/yr	SWCD	Counties, DNR, Cities, MPCA	Numbers of buffers improved

Invasive Species (IS): Targeted Implementation Schedule

Action ID	Implementation Activities	Priority Area	Ten Year Targeted Implementation Schedule										Project Cost (one-time cost)	On-going Activities (annual costs)	Project Lead	Project Partners	Activity Outcome Measurability
			'17	'18	'19	'20	'21	'22	'23	'24	'25	'26					
IS 1	Provide educational information at harbors and marinas along the near shore Lake Superior area, evaluate options for improving boat launch sites to incorporate BMPs and site upgrades to prevent the spread of AIS.	Near Shore Lake Superior	L+C	L+C	L+C	L+C	L+C	L+C	L+C	L+C	L+C	L+C	$3,000	$3,000/yr	County/SWCD collaborative, Cook County AIS Coordinator	DNR/Sheriff's Dept.	Better regional understanding of the impacts of invasive species and what citizens can do to help with the effort; completed 2 informational outreach products annually and distributed; consistence presence at 9 marinas and harbors; reduce number of violations by 50%
IS 2	Partner with agencies and organizations to support and expand the development of standardized invasive species monitoring, assessment, control, and outreach activities as specified by county AIS and terrestrial invasive species plans.	Watershed-wide	L+C	L+C	L+C	L+C	L+C	L+C	L+C	L+C	L+C	L+C	$1,000	$3,000/yr	SWCDs, County IS Coordinator	MNDNR, MN Sea Grant, CCIT, LCIT	Better regional understanding of the impacts of invasive species and what citizens can do to help with the effort; manage 3 invasive species sites; local source of native vegetation; distribute 5 outreach products
IS 3	Using monitoring and assessment data, conduct outreach activities by hosting or coordinating one invasive species workshop per year, per county, online or in person.	Watershed-wide	L+C	L+C	L+C	L+C	L+C	L+C	L+C	L+C	L+C	L+C	$1,000	$2,000/yr.	SWCDs, County IS Coordinator	County IS Teams	10 workshops/county/life of the LSNW Management Plan; reach 100 constituents about invasive species
IS 4	Educate people about best management practices to prevent the spread of aquatic and terrestrial invasive species.	Watershed-wide	L+C	L+C	L+C	L+C	L+C	L+C	L+C	L+C	L+C	L+C	$5,000	$2,000/yr.	SWCDs, Counties, County AIS Coordinator	MNDNR, Sea Grant	Better regional understanding of the impacts of invasive species and what citizens can do to help with the effort; Complete 1 workshop annually; reach 300 constituents

Altered Hydrology and Resiliency (AHR): Targeted Implementation Schedule

Action ID	Implementation Activities	Zonation Priority Area	Ten Year Targeted Implementation Schedule										Project Cost (one-time cost)	On-going Activities (annual costs)	Project Lead	Project Partners	Activity Outcome Measurability
			'17	'18	'19	'20	'21	'22	'23	'24	'25	'26					
AHR 1	Integrate climate change scenarios and vulnerability assessments into planning and infrastructure designs.	Watershed-wide					L+C	L+C	L+C				$5,000; $50,000	N/A	Counties, SWCDs	Municipalities, MNDNR, USFS	More resilient infrastructure and regional ecological areas in the face of climate change; decrease of infrastructure vulnerability.
AHR 2	Identify and implement opportunities for green stormwater infrastructure to slow and retain stormwater runoff, reduce flooding, and disconnect impervious surfaces.	Priority Subwatersheds									L+C	L+C	$5,000-75,000	N/A	Counties, SWCDs	Municipalities, MPCA, MNDNR	Number of green stormwater infrastructure projects implemented
AHR 3	Identify and implement temporary or permanent storage (e.g., detention, retention) to increase resiliency to storm events.	Watershed-wide									L+C	L+C	$150,000	N/A	Counties, SWCDs	Municipalities, MPCA, BWSR, MNDNR	Acre-feet or gallons of water stored to build resiliency to climate change; decrease of erosive impact of streams

Groundwater and Drinking Water (GDW): Targeted Implementation Schedule

Action ID	Implementation Activities	Priority Area	Ten Year Targeted Implementation Schedule										Project Cost (one-time cost)	On-going Activities (annual costs)	Project Lead	Project Partners	Activity Outcome Measurability
			'17	'18	'19	'20	'21	'22	'23	'24	'25	'26					
GDW 1	Conduct an unused, unsealed well inventory and implement well water monitoring program to supplement efforts that seal abandoned wells.	Watershed-wide		L+C	L+C								$5,000; $50,000	N/A	Christine McCarthy, Lake Co. Environmental Services, Cook County	MPCA, MDH, MGS, DNR, U of M, NRRI, Coastal, Other SWCDs, LGUs with experience in this, Local Contractors. SWCDs	Counties reduce abandoned wells; well monitoring program established; inventory completed; 100% of wells identified, 25% of abandoned wells converted to monitoring wells, 75% abandoned wells sealed; fulfillment of data gap.
GDW 2	Develop and maintain a cost share program to financially assist property owners in sealing unused, unsealed wells on their property, including the public water suppliers in the watershed.	Watershed-wide			L+C	L+C	L+C	L+C	L+C	L+C	L+C	L+C	$3,000; TBD	N/A	Lake Co. will accomplish through Ag-BMP program	Cook SWCD, MDA, MPCA, MDH	Enhanced groundwater protection.
GDW 3	Develop a well monitoring program assistance program in collaboration with MDH and Minnesota Geological Survey, to assist landowners with contaminant concerns.	Watershed-wide									L+C	L+C	$3,000	N/A	Counties	MDH, Minnesota Geological Survey	Well monitoring program established.

Wetland Management (WM): Targeted Implementation Schedule

Action ID	Implementation Activities	Zonation Priority Area	Ten Year Targeted Implementation Schedule										Project Cost (one-time cost)	On-going Activities (annual costs)	Project Lead	Project Partners	Activity Outcome Measurability
			'17	'18	'19	'20	'21	'22	'23	'24	'25	'26					
WM 1	Support and pursue financial assistance for a watershed-wide wetland inventory of private land. Coordinate with the NWI update.	Watershed-wide					L+C	L+C	L+C	L+C	L+C	L+C	N/A	$1,000/yr.	Counties	BWSR, SWCD, ACOE	Complete accurate wetland inventory of private lands; better information available to inform WAC decisions.
WM 2	Initiate collaborative efforts among regional jurisdictions of local communities to promote a watershed-wide Resource Management Plan to ensure wetland functions are not lost in the LSNW.	Watershed-wide			L+C	L+C	L+C	L+C	L+C	L+C	L+C	L+C	$3,000	$1,500/yr	BWSR	Investigate additional opportunities	Within 10 years have a wetland management resource plan to coordinate wetland jurisdiction within the watershed.
WM 3	Work with landowners and agencies to conduct and compile the assessment data of existing conditions in priority subwatersheds, including land most sensitive to runoff, riparian forest conditions, presence and locations of wetlands in headwaters areas, and locations of contributing sediments and pollutant load. **See also in Impaired and Nearly Impaired Waters and Forest Management sections.*	Priority subwatersheds	L+C	L+C	L+C	L+C	L+C	L+C	L+C	L+C	L+C	L+C	$2,000	$2,500/yr.	SWCD/Counties	DNR/USFS/SWCD/1854 Treaty Authority, University	Compilation of more holistic data set to better support location and types of BMPS prescribed for an area.
WM 4	Conduct wetland function assessment and determine priority locations for protection and improvement.	Watershed-wide									L+C	L+C	$15,000	N/A	SWCD	Counties, DNR, BWSR	Acres of priority locations identified

Unique and High Value Resources (UHVR): Targeted Implementation Schedule

Action ID	Implementation Activities	Priority Area	Ten Year Targeted Implementation Schedule										Project Cost (one-time cost)	On-going Activities (annual costs)	Project Lead	Project Partners	Activity Outcome Measurability
			'17	'18	'19	'20	'21	'22	'23	'24	'25	'26					
UHVR 1	Secure funding to support water quality monitoring of lakes and streams. **See also in Impaired and Nearly Impaired Waters*	Priority spatial areas	L+C	L+C	L+C	L+C	L+C	L+C	L+C	L+C	L+C	L+C	$2,000/yr.; $10,000/yr. monitoring/lab costs	$18,000/yr.	SWCDs/MPCA/DNR	Counties, MPCA, BWSR, Coastal, Special interest groups.	Data sets of water quality.
UHVR 2	Continue to support and secure financial assistance for training SWCD staff and additional citizen groups in volunteer monitoring program and expand program to monitoring for additional parameters, such as phosphorus and nitrogen.	Watershed-wide, focused in priority spatial areas	L+C	L+C	L+C	L+C	L+C	L+C	L+C	L+C	L+C	L+C	$1,000	$1,500/yr.	SWCD	MPCA, Coastal	Data sets of water quality; support of efforts for local citizen groups for water monitoring; increase volunteers by 50 within life of the plan.
UHVR 3	Work with landowners and agencies to conduct and compile the assessment data of existing conditions in priority subwatersheds, including land most sensitive to runoff, riparian forest conditions, presence and locations of wetlands in headwaters areas, and locations of contributing sediments and pollutant load. **See also in Impaired Waters and Forest Management.*	Priority subwatersheds	L+C	L+C	L+C	L+C	L+C	L+C	L+C	L+C	L+C	L+C	$2,000	$2,500/yr.	SWCD/Counties	DNR/USFS/SWCD/1854 Treaty Authority, University	Compilation of more holistic data set to better support location and types of BMPS prescribed for an area.
UHVR 4	Assist watershed residents and landowners in development of Watershed Advocacy groups with a focus on developing these groups within priority watersheds where they are not already established.	Two Harbors; Poplar River; Near Shore Lake Superior; City of Grand Marais; Flute Reed River; Beaver River		L+C	L+C	L+C	L+C	L+C	L+C	L+C	L+C	L+C	N/A	$1,800/yr	SWCD	Special Interest Groups, MPCA	Increase citizen group presence and activity advocating for responsible water management; establish 2 watershed advocacy groups in areas they are not already established.
UHVR 5	Encourage community members to participate in conservation projects by attending public meetings and events, coordinating community activities around conservation projects, including water quality and AIS monitoring, establishing community leadership roles within priority subwatersheds, and establishing communication tools to allow both agencies and citizens to participate in watershed conservation issues.	Priority spatial areas	L+C	L+C	L+C	L+C	L+C	L+C	L+C	L+C	L+C	L+C	$5,000	$2,000/yr	SWCD	MPCA, Counties, BWSR	Increased public participation in natural-resource related programs and activities; interact and reach 500 people within the watershed.
UHVR 6	Secure funding to and provide educational opportunities on conservation BMPs design and implementation including road maintenance, roadside ditch maintenance, development impacts, stormwater management, source and/or groundwater protection, wetlands, etc. to a minimum of one relevant audience per year within LSNW. Relevant audiences may include but are not limited to landowners, LGU staff, Planning and Zoning Boards, real estate, and contractors.	Watershed-wide	L+C	L+C	L+C	L+C	L+C	L+C	L+C	L+C	L+C	L+C	$3,000 - $5,000	$5,000/yr.	County/SWCD collaborative	N/A	Increased educational opportunities to a minimum of one relevant audience per year whose activities have potential to impact water quality.

Action ID	Implementation Activities	Priority Area	Ten Year Targeted Implementation Schedule										Project Cost (one-time cost)	On-going Activities (annual costs)	Project Lead	Project Partners	Activity Outcome Measurability
			'17	'18	'19	'20	'21	'22	'23	'24	'25	'26					
UHVR 7	Encourage collaboration with MNDNR for projects occurring in areas of known rare, threatened, and endangered species to consult with the natural heritage database.	Watershed-wide									L+C	L+C	N/A	$1,000/yr.	County / SWCD	MNDNR	Protocol developed; increased protection of rare, threatened, and endangered species.
UHVR 8	Support the activities to prevent the net loss of wild rice in the LSNW and restore where appropriate.	Watershed-wide									L+C	L+C	$25,000	$1,000	County /SWCD	1854 Treaty Authority, DNR, USFWS	Ongoing collaboration to protect; number of projects to restore as needed
UHVR 9	Protect the existing high-quality waters from becoming impaired through targeted and prioritized best management practices.	Watershed-wide									L+C	L+C	$5,000-$100,000	N/A	County/SWCD	Municipalities, BWSR, NRCS, DNR, MPCA	Projects identified and implemented
UHVR 10	Protect and stabilize lakeshores by conducting shoreland surveys to identify areas of disturbance and areas to install best management practices, including Lake Superior.	Watershed-wide									L+C	L+C	$75,000	N/A	SWCD	Counties, DNR, BWSR, USFS	Number of lakeshore surveys conducted
UHVR 11	Support the North Shore's unique fishing opportunities by promoting enhancement and restoration of habitat for coldwater fisheries.	Watershed-wide									L+C	L+C	$10,000-$150,000	N/A	DNR	MPCA, SWCD, County	Number of stream habitats restored/supported
UHVR 12	Enroll land in conservation easements to protect forests, wetlands, and high-quality upland areas.	Priority Subwatersheds									L+C	L+C	N/A	$10,000 / yr.	SWCD	BWSR, County	Acres enrolled in easements
UHVR 13	Protect watershed resources by adding educational signs, trash receptacles, dog waste stations, and monitor popular sites for illegal dumping of waste.	Watershed-wide									L+C	L+C	N/A	$2,000/yr.	Counties/ Municipalities	Cities, SWCD	Number of waste stations added

Section 5. Implementation Programs

5 IMPLEMENTATION PROGRAMS

This section describes the overarching programs that will be used to implement actions identified in the Targeted Implementation Schedule. It also describes how these programs will be coordinated between the counties and the SWCDs.

5.1 PLAN ADMINISTRATION AND COORDINATION

5.1.1 DECISION-MAKING AND STAFFING

Upon adoption of the LSNW Comprehensive Watershed Management Plan, Cook County SWCD, Lake County SWCD, Cook County, and Lake County will adopt a Memorandum of Agreement (MOA)—to stay in place for a minimum of 10 years—that will ensure ongoing collaborative efforts towards implementation of the Plan. This MOA will be reviewed during a 5-year evaluation of the Plan to ensure that the structure established in the agreement facilitates progress towards Plan implementation. Cook and Lake SWCDs will be responsible for maintaining, tracking, and coordinating updates of the Plan. The SWCDs will work with their County and other entities to secure funding, implement the Plan, and ensure measurable outcomes are accomplished. Cook County and Lake County will assist the SWCDs in completing the actions and take the lead for actions where identified. Both of the SWCDs will collaborate with other entities when necessary to implement the Plan. The MOA will maintain the structure of the Policy and Advisory Committees that were established for plan development.

5.1.1.1 Policy Committee

The purpose of the Policy Committee is to recognize, maintain, and leverage the important partnerships in place to plan and implement protection and restoration efforts within the LSNW.

The Policy Committee is made up of elected officials from the Cook County Board of Commissioners, Lake County Board of Commissioners, Cook County SWCD Board of Supervisors, and Lake County SWCD Board of Supervisors. Policy Committee member terms are 1 year, to run concurrently with each member's term on his/her respective board. An action item included within the Plan will ensure regular meetings of Policy Committee members (annual, at a minimum) throughout the 10-year life of the Plan.

Lake County, Cook County, Cook County SWCD, and Lake County SWCD have all passed Board resolutions to collaboratively work towards accomplishing the goals of the LSNW Comprehensive Watershed Management Plan. Upon completion and adoption of the Plan by the four abovementioned entities, the group will establish an MOA. The Minnesota Counties Intergovernmental Trust and County Attorneys will be consulted as necessary for direction on the development of this MOA.

5.1.1.2 Advisory Committee

The purpose of the Advisory Committee is to provide technical input on projects, programs, and plans and to assist in implementation of Plan action items. A wide range of agencies, entities, and stakeholders were represented on the Advisory Committee and have been identified as partners to assist with implementation items throughout the Plan.

The Advisory Committee is made up of local, tribal, state, and federal agencies and special interest groups. The following is a list of agencies currently participating on the Advisory Committee: Minnesota Department of Health (MDH), Minnesota Department of Natural Resources (MNDNR), Minnesota Pollution Control Agency (MPCA), Board of Water and Soil Resources (BWSR), Minnesota Department of Transportation (MNDOT), 1854 Treaty Authority, Cook County Planning and Zoning, Lake County Planning and Zoning, Natural Resources Conservation Service (NRCS), and United States Fish and Wildlife Service (USFS). An action item has been included within the Plan to have the Advisory Committee meet regularly throughout the ten year life of the Plan.

5.1.1.3 Identification and Coordination of Shared Services

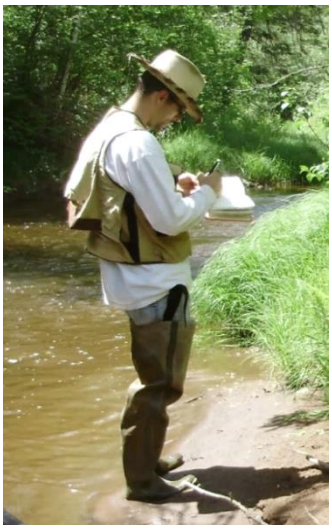
In an effort to enhance efficiencies and effectiveness, the LSNW natural resource community attempts to leverage collaborative and shared-services opportunities. This may be accomplished through contract of service, joint powers agreement, or another such cooperative agreement when formal contracting is appropriate. Technical Service Area 3 is also available to serve SWCDs in a number of program areas. The following paragraphs describe how the LSNW intends to coordinate activities within specific areas of expertise:

Forestry Services – LSNW will work with MNDNR, NRCS, and BWSR to utilize agency foresters; coordinate forestry service provision within the Area III TSA office; and hire a forester with collaboration between Cook and Lake SWCDs if necessary.

Terrestrial Invasive Species – The Lake and Cook County Invasives Team (soon to be "Arrowhead Invasives Team") Coordinator currently provides services to Lake and Cook County and works closely with the counties and SWCDs. Lake SWCD has in-house vegetation expertise that can be accessed and utilized by regional partners for invasive species management and native plant establishment projects and activities.

Aquatic Invasive Species - Lake County SWCD staff has regional AIS expertise; their experience and services may be solicited by Lake Superior North Watershed partners to support work on AIS within the watershed and region. Cook County has an AIS coordinator that is available for collaboration with Lake County SWCD.

Monitoring Services - Precipitation and water quality monitoring are both established programs occurring within the counties; volunteers are an essential part of making the programs successful; collaboration in monitoring efforts, recruitment, promotion, and acknowledgment of volunteers has been



successful in sustaining these programs; these efforts will continue over the life of the Plan to accomplish identified goals.

Funding Opportunities – As collaborative opportunities arise, funding will be sought to complete the implementation activities identified in the Plan in a collaborative manner; this may be accomplished by joint-entity grant development and submittal; services may be sub-contracted between collaborating entities to take advantage of expertise; and watershed partners will work to establish consistent funding sources to support long-term implementation items identified in the Plan.

Educational Outreach – Educational outreach throughout the watershed will be coordinated and shared in a collaborative effort between partners in the Lake Superior North watershed; project partners may share resources, expertise, and staffing to offer workshops, trainings, and civic engagement events in various areas of the watershed.

5.1.2 COLLABORATION WITH OTHER UNITS OF GOVERNMENT

Because a majority of the LSNW is managed by county, state, and federal governments as well as by public and private nonprofit agencies, it is important to continue coordination among these entities. A variety of state and federal agencies provide financial and technical assistance through various programs that will be beneficial to use and promote during plan implementation activities as well as participate on the ongoing Advisory Committee.

Over the course of plan implementation, other partners may be identified for collaboration. These partnerships may take various forms, including but not limited to providing matching funds or in-kind services for grant applications, sharing of staff expertise or resources, or collaborating on project administration tasks.

5.1.2.1 Comprehensive or Land Use Plans

The land use authorities within the LSNW are Cook County Land Services Department, Lake County Planning and Zoning, and Lake County Forestry and Lands Department. Cook County and Lake County both have comprehensive land use plans. In Lake County, the plan (ordinance #12) is overseen by the Planning and Zoning Department and was adopted in 2011. In Cook County, the plan (ordinance #28) is overseen by the Land Services Department and was adopted in 2016. The actions within the LSNW Plan are correlated with articles found in both County Comprehensive Land Use plans, and these documents will continue to be cross-referenced and reviewed during all subsequent updates to ensure ongoing compatibility.

5.1.3 WORK PLANNING

At the time of plan adoption, SWCD and county annual work plans will be revised and/or developed to include implementation activities identified in the Plan, with efforts made to coordinate these activities with other agency plans, projects, and timelines. Policy Committee members will be present for these work planning discussions and available to advise on budgeting activities associated with the planning effort. Work plans will be approved by the respective SWCD Boards at the time of their completion. As Implementation Activities are accomplished, annual work plans may be revised to reflect activity completion and initiation of new programs and projects that are priorities for the districts.

Work planning for Cook and Lake SWCDs generally occurs in conjunction with the annual budgeting process. These annual plans include budget projections, staff capacity assessments, project prioritization, planning, and scheduling details, and provide an overview of the district's priorities and objectives for the year. The annual budget sets the general framework for the activities that will occur that year. An SWCD's project or initiative emphasis may be reflected in budget allocations or pursuit of a grant tailored to a district goal. County governments undertake a similar planning process, led by their respective boards and administrative staff.

Once approved, work planning for the SWCDs will utilize the Implementation Schedule and focus work in specific priority areas where site-specific implementation activities have been developed. Some degree of workflow and planning will be dependent on timing and availability of funding resources. Adjustments to the schedule will be made accordingly. The county, where identified as the lead, will move forward with their projects in the same manner as the SWCDs.

The Implementation Schedule will be reviewed collaboratively with plan partners and with the information from the annual evaluations to complete and submit the BWSR biennial budget request (BBR) for the LSNW. The completion of the BBR will assist with future planning for the counties and SWCDs along with meeting BWSR planning requirements associated with grants.

5.1.4 FINANCING APPROACH

As identified in the annual plan of the SWCDs, general funds are used for work towards protecting land and stream water quality, board and staff leadership in local and regional planning, project identification, outreach, publishing annual plans, budgets, and reports, and education and technical support for property owners. The counties utilize general funding to support work related to and enforcing shoreland, SSTS, stormwater, and wetland ordinances. Natural Resource Block Grant (NRBG) funds are used for local water plan implementation, completing District administrative duties, and assisting the county with the Wetland Conservation Act (WCA). Counties utilize the NRBG for WCA implementation and completing SSTS and shoreland work. Cost-share and technical funding is dedicated to providing technical and financial assistance for erosion control and other natural resource projects with private landowners.

Additional work and staffing time is supported through successful grant awards from, but not limited to: GLRI, Minnesota's Lake Superior Coastal Program, MPCA, BWSR, GLC, and other funding opportunities as they become available. For example, Minnesota's Nonpoint Priority Funding Plan (NPFP) outlines a criteria-based process to prioritize Clean Water Fund investments. Moving forward, planning partners may consider utilizing Clean Water Fund dollars as a funding source to complete action items within this plan. In order to ensure competitiveness within this funding pool, entities applying for these funds will ensure that their proposed project aligns with high-level state priorities, key implementation items, and NPFP criteria prior to submitting a grant.

5.1.5 ASSESSMENT AND EVALUATION

Assessment and evaluation of the Plan implementation activities within the Plan are critical in tracking progress. Reporting documents, submitted quarterly, semi-annually, and/or annually, to various funding sources will provide a record of project performance and how funds were utilized. Reporting also occurs through the BWSR eLINK system and SWCD annual reports; these records will provide additional project documentation and tracking information. LGU departmental records will provide progress reports on implementation activities involving SSTS, well sealing, and land use ordinance changes.

5.1.5.1 Annual Evaluation

The purpose of the annual evaluation will be to assess progress towards each of the LSNW's stated goals. The Policy Committee members will participate in these annual meetings, with the role of revisiting priorities and focus areas, guide budgeting activities, advise on possible actions to be completed in the upcoming year, and relay the evaluation back to their respective boards. The Advisory committee will revisit priorities and focus areas, discuss and consider new data or findings that could be integrated into the Plan, and discuss areas of possible collaboration on future projects and funding. This annual evaluation will also include a discussion of the need for amendments to the Plan.

Following BWSR Performance, Review and Assistance Program (PRAP), Cook SWCD will complete required financial statements, audits and eLINK reporting, and ensure website content is in compliance and on time following the PRAP.

Additional evaluation will occur through annual plans, eLINK reporting, source funding documentation, and review of any resolutions that were passed by SWCD or County Boards that pertain to the Plan. This information will be used in the development of the Cook and Lake SWCD Annual Reports as well as the Biennial Evaluation.

5.1.5.2 Biennial Evaluation

Information collected during the annual evaluation will be used by Cook and Lake SWCDs to identify priority actions and financial assistance needs in response to the BWSR Biennial Budget Request. Both the Policy and Advisory Committee will follow the same roles as they did during the annual evaluation.

5.1.5.3 Five Year Evaluation

Committees will meet annually and after five years of plan implementation conduct a 5-year plan evaluation. A summary of information collected through annual evaluation meetings will be reviewed to assess plan progress. The review will be completed by both the Advisory and Policy Committees. Any necessary revisions will be discussed and included as appropriate. This 5-year evaluation will also enable the Committees to assess whether any new information, including data and the findings of completed projects such as the MPCA WRAPS, should be included to improve plan prioritization, targeting, and measurability. Amendments to the Plan may be made if

appropriate or necessary. The Policy Committee will be charged with recommending amendments and an updated plan to BWSR and their respective boards for final approval and adoption.

5.1.5.4 Reporting

Each SWCD and County is required to complete annual grant, website, and financial reporting to BWSR in order to maintain eligibility for BWSR grant funding. Annual reporting requirements for BWSR funding will be administered per the BWSR Grant Administration Manual. Funding administration requirements are:

- Annual eLINK grant reporting.
- Annual website reporting to include items listed in the Reporting section of the Grants Administration Manual, including grant reports and SWCD-specific organizational information.
- Financial Statements including combined balance sheet, income statement, budgetary comparison statement, notes to the financial statement, and Management's discussion and analysis.

Both Cook and Lake County and their respective SWCDs submit these reports to BWSR annually. There are also annual reporting requirements for other state funding agencies and for technical assistance from the USDA-NRCS. Internally, annual reports provide Cook and Lake County SWCDs with the information from which to assess progress towards District goals and evaluate staff and District performance.

5.1.6 PLAN AMENDMENTS

The LSNW Comprehensive Watershed Management Plan will be in effect from 2017 through 2026. During that time it is anticipated that the Plan will be amended. Plan amendments may be proposed by any one of the four local government units that form the Policy Committee. Plan amendments must be reviewed and approved by the committee in order to proceed forward. All amendments to the Plan will adhere to the review process provided in Minnesota Statutes, section 103B.314, subdivision 6. The following are general procedures that will be followed to amend the Plan:

1. The BWSR Board Conservationist will be consulted by the SWCD staff regarding the proposed amendment.
2. The County Boards and County SWCDs will pass a resolution indicating the intent to amend the Plan.
3. The Advisory Committee and Policy Committee will meet to create the draft amendment to the Plan.
4. Lake County, Cook County, Cook SWCD, and Lake SWCD will collaboratively submit a petition to the BWSR Board Conservationist explaining the intent to amend the Plan. The local government agencies will receive feedback from BWSR Board Conservationist after he/she has consulted with the BWSR Regional Manager, other BWSR staff, and Board members.
5. Lake County, Cook County, Cook SWCD, and Lake SWCD will collaboratively submit copies of the draft proposed amendment, date, time and place of the public hearing to partners identified within the Plan to BWSR.

6. A public hearing will be held, convened collaboratively by Lake County, Cook County, Cook SWCD, and Lake SWCD, regarding the plan amendment. Through this public hearing process, the group will solicit public comment.
7. The Advisory Committee and Policy Committee will consider all comments, amend the Plan and follow BWSR guidelines for plan amendment submittal.
8. The Counties and SWCDs will pass a resolution acknowledging the approved amendment after receiving notice from BWSR that it is approved.

Plan amendments may be initiated for reasons including, but not limited to:

- Completion of MPCA-led Watershed Restoration and Protection Strategies documents;
- Changes in existing land use and/or development within the watershed that affect priorities or action items included within the Plan; and/or
- New information or data becoming available to better inform, prioritize, target, or measure action items within the Plan.

5.2 PLAN IMPLEMENTATION PROGRAMS

This section describes the overarching programs that will be used to implement the actions identified in the Targeted Implementation Schedule and how these programs will be coordinated between the counties and the SWCDs.

5.2.1 CAPITAL IMPROVEMENT PROGRAM

The LSNW Targeted Implementation Schedule identifies structural solutions for attaining the surface water management goals that cannot be addressed by nonstructural, preventative actions. Projects identified through the stormwater management planning process will be examples of large-scale projects with an extended life and examples of possible capital improvement projects. Cook and Lake SWCDs will continue looking for opportunities to address surface water management goals by incorporating water quality and water quantity treatment on local and state-led capital improvement projects.

5.2.2 OPERATION AND MAINTENANCE PROGRAM

Municipal and county governments and administration are responsible for inspection, operation and maintenance of stormwater infrastructure projects completed or owned by the county or municipality. Operations and maintenance of any capital improvement implemented through this Plan will be the responsibility of the landowner where the practice is installed. Projects administered by the SWCD will be inspected on a 1-, 5-, and 10-year schedule. Any needed corrective actions or maintenance identified during these inspections will be the responsibility of the landowner where the project is installed, unless other formal arrangements have been made that transfer these responsibilities to another qualified party for completion.

5.2.3 INFORMATION, OUTREACH, AND EDUCATION PROGRAMS

Current outreach and education efforts in Cook and Lake Counties occur in many forms. Both Cook and Lake SWCDs work with rain and snow monitoring volunteers, also known as "weather watchers". The information collected by these volunteers is used by the state for precipitation monitoring and modeling processes. Monitoring also takes place on lakes and streams throughout

the counties by volunteers. The SWCDs support these efforts in various ways such as providing equipment and technical support, assisting with sample shipping logistics, and providing input on data collected. There are approximately 16 lake and/or watershed associations worked with and supported by the SWCDs in the counties. These associations are provided technical and informational support, monitoring assistance, help with lake or watershed management plan development, and are provided resources to use for outreach and growing the community of association members. Education, outreach, and information sharing take place during annual workshops, through newspaper articles and inserts, radio interviews, presentations at schools, coordination of field day events, and take-home outreach resources.

5.2.4 DATA COLLECTION PROGRAM

The Cook and Lake SWCDs are actively working to develop and maintain a comprehensive monitoring program to fully characterize the numerous surface water resources as well as the groundwater resources in the LSNW. Both the Cook County and Lake County SWCDs perform physical, chemical, and biological sampling on a regular basis and supplement this sampling with specific studies, synoptic surveys, or other analytics as needed. In addition, the Cook and Lake SWCDs cost share in the data collection efforts of other entities such as the United States Geological Survey (USGS) and the Minnesota Department of Natural Resources (MNDNR). Monitoring data is reviewed for quality control prior to annual submittal to the MPCA EqUIS STORET database and other agency databases. The MPCA Lake Superior North and Lake Superior South monitoring and assessment reports, WRAPS, and data information can be viewed at: https://www.pca.state.mn.us/business-with-us/watershed-information.

Ultimately, monitoring information will allow the counties, SWCDs and member communities to assess achievement of the Plan's goals to protect and restore the natural resources of the LSNW. In addition, monitoring helps guide the appropriate selection and design of BMPs, inform stormwater management projects and improvements and provides a mechanism to evaluate individual project performance. Closing data gaps also assists with more effective and targeted implementation efforts. For example, completed culvert inventories can assist with LiDAR derived hydrology projects to better inform implementation efforts.

Table 4 summarizes existing data collection and monitoring efforts of Cook and Lake SWCDs:

Table 4. Summary of Existing Cook County and Lake County SWCD Monitoring Programs

Monitoring Program	Location	Frequency	Parameter	Evaluation
Lake Superior Monitoring	5 nearshore locations	May - Oct. 2-3/month Funding dependent Volunteer dependent	pH,DO,temp, conductivity,e.coli, total phosphorus, total cholorphyll-a, TSS,VSS,chloride, total nitrogens (nitrate,nitrogen,nitrite)	Provides baseline information of water quality near shore; areas monitored are near stormwater outlets, providing insight to stormwater influences of water quality; possibility to support modeling.

Stream and Lake water quality monitoring	Inland lakes and streams	May- Sept 1-2/month Funding dependent Volunteer dependent Lake Association dependent	pH,DO,temp., conductivity, e.coli, total phosphorus, total cholorphyll-a	Provides baseline information of water quality; provides insight to impacts of water quality from land use; possibility to support modeling.
Beach Monitoring	12 beaches within Cook & Lake County	May - August 1xweek	e.coli	Does not provide information to support modeling. Provides information to support baseline data.
Precipitation Monitoring	Throughout the watershed	All year long, everyday	Precipitation and weather	Provides data to the state to support precipitation patterns and modeling.

To achieve the implementation activities and measurable outcomes identified in the Plan, the following inventory and monitoring activities will need to be completed in the LSNW:

Inventories - Culvert, stream network, municipal stormwater infrastructure, wetlands, unused and unsealed wells, invasive species, and ditch vegetation inventories all would provide valuable baseline information from which to plan and develop management plans. Efforts will be made to conduct a GIS-based inventory of these parameters. Additional gaps for inventories will be addressed as they arise in collaboration with other entities and/or agencies.

Monitoring - Increasing the number and density of storm water monitoring sites, citizen water quality monitoring volunteers, and well water monitoring programs would all benefit the dataset used to inform management activities in the LSNW. Additional monitoring is often necessary for pre and post monitoring at project sites, such as flow and sediment monitoring both before and after implementation of a river restoration or bank stabilization project.

5.2.5 REGULATORY PROGRAM

Both Cook and Lake Counties have comprehensive plans which serve as the legal basis for their official controls. These comprehensive plans were developed in accordance with Minnesota Statutes Chapter 394 which provides counties the regulatory authority to promote the "health, safety, moral and general welfare of the community" through the development and implementation of a comprehensive plan. Official controls include the planning, zoning, and subdivision regulations that the counties use to establish standards for development and regulate land use.

Both Cook and Lake County will ensure the LSNW Management Plan's implementation by revising and adopting stormwater management and land use ordinances. The ordinances are an important mechanism for direct plan implementation and in conjunction with other mechanisms

such as the Capital Improvement Program, establish the watershed management outcomes the Counties and SWCDs want to achieve. Development of these revised ordinances will ensure that they are understandable, achievable, adaptable, and enforceable. The framework for revising ordinances will include a review of current goals and objectives, assessment of the adequacy of current ordinances, and identification of gaps. In addition to updating county ordinances, the Counties and SWCDs will work with local communities to revise and adopt stormwater management and land use ordinances that will assist in achieving plan goals.

5.2.6 INCENTIVE PROGRAMS

Both Cook County and Lake County SWCDs have developed a number of programs to incentivize the protection, restoration and management of the LSNW's surface water, groundwater and natural resources. Efforts within these programs are accomplished through SWCD provision of technical assistance and cost-share programs to landowners, and enhanced by state and federal programs that offer similar incentives.

5.2.6.1 Technical Assistance

The Technical Assistance and Conservation Cost-Share Program is designed to support initiatives that improve water quality, reduce stormwater runoff, enhance habitat, and/or educate individuals about natural resource and water quality protection. This program provides incentives for individuals and organizations to become better stewards of their water resources through projects or activities that will help improve the landscape and its resources.

Cook and Lake SWCDs provide technical assistance designed to support initiatives that improve water quality, reduce stormwater runoff, enhance habitat and/or educate individuals about natural resource and water quality protection. These initiatives help to develop and leverage relationships with local residents, community groups, and program partners.

SWCD staff assist landowners by reviewing plans for roads, building sites, and vegetative practices. They also advise on restoration of damaged areas and recommend specific best management practices (BMPs) to manage stormwater and prevent erosion and soil loss.

The Technical Assistance program aims to accomplish the following:

a. Provide assistance for public demonstration projects that prevent erosion and protect water quality.
b. Provide technical and educational assistance to private and public entities to protect groundwater quality.
c. Encourage and support water conservation through implementation of watershed-wide water conservation strategies.
d. Encourage forest management practices in privately held upland forests.
e. Participate in the North Shore Forest Collaborative.
f. Support efforts to renew and implement adaptive forestry management practices that respond to climate change.
g. Conduct site assessments and maintain an inventory of public and private projects in need of funding and coordinate survey and design activities with TSA.
h. Give presentations to schools and community groups on SWCD priority topics.
i. Coordinate Rain Gauge and Snow Rules programs with community volunteers.
j. Communicate with other agencies to discuss available district programs and services.
k. Secure funding for and participate in the local and regional Envirothon program.
l. Coordinate the County Tree Sale.
m. Review and comment on County requests for variances, conditional use permit applications, shoreline plantings, seed mixes, gutter systems and other conservation related issues.
n. Review DNR water permits and provide input to minimize impacts to land and water resources.
o. Provide technical assistance, conservation education, and policy recommendations to local governments.
p. Assist landowners with developing restoration plans related to enforcement activities.
q. Assist other agencies with stormwater and erosion and sediment control policy development and training when appropriate.
r. Participate in the Minnesota Association of Soil and Water Conservation Districts policy activities including the Annual Meeting, Area 3 Resolutions, and Legislative Days.
s. Serve on the Water Plan Advisory Committee.
t. Serve on the Laurentian Resource Conservation & Development (RC&D).
u. Serve on the MN Association of SWCDs - Forestry Committee.
v. Monitor County Planning Commission.
w. Participate in local watershed group meetings when appropriate.
x. Assist counties in distributing septic system and property owner's resource guides.
y. Explore opportunities for wetland restoration and creation in Cook and Lake County.

5.2.6.2 Conservation Cost-Share Program

The Erosion Control and Water Management Program, commonly known as the State Cost-Share Program, is designed to provide funds to Soil and Water Conservation Districts to share the cost of systems or practices for erosion control, sedimentation control, or water quality improvements designed to protect and improve soil and water resources. Through the State Cost-Share Program, land occupiers can request financial and technical assistance from their local District for the implementation of conservation practices. This program provides incentives for individuals and organizations to become better stewards of their water resources through projects or activities that will help improve the landscape and its resources.

In general, Cost-Share projects will address high priority erosion problems along lakeshores or stream banks, or address major erosion problems in other parts of the watershed that present a risk to water quality. Other projects needed to protect surface water, groundwater or soil quality will also be considered for funding.

Cost-Share priorities are as follows:

1. Conservation projects within Priority Areas.
2. Conservation projects that align with the goals and objectives of the Lake Superior North Watershed Management Plan, and leverage relationships with partnering organizations to provide multiple natural resource benefits.

5.3 CONCLUSION

The streams, forests, and lakes of northeastern Minnesota represent some of the highest quality natural resources in the lower 48 states by anyone's standards. Millions of people annually visit the North Shore of Lake Superior to hike, camp, fish, snowmobile, canoe, ski, mountain bike, or otherwise enjoy the region, and area residents are proud to call this place home. The character of northeastern Minnesota is largely defined by the environment that exists here. This Plan represents the efforts of the local government units of Lake and Cook Counties, staff from a variety of agencies and entities, and members of the public to acknowledge and act upon the importance of maintaining and enhancing the natural environment and water resources of this area. The individuals involved in the development of this Plan look forward to ensuring the integrity of this outstanding corner of the world is protected, improved, and maintained long into the future.

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Appendix A. Large Format Figures and Tables

Table 5a. Priority Concerns Evaluated Using Zonation Results

Priority Area selected based on Zonation		Priority Concern / Corresponding Zonation Feature(s)																						
		Stormwater Management					Impaired Waters			SSTS	Stream Connectivity	Priority Waters							Wetland Mgmt.	Unique/High Value Resources				
		Urban Nodes	Shore-land	Stream Riparian Areas	Soil Erosion Risk	Stream Power Index	Declining Water Quality	Vulnerable Streams	Impaired Waters	Subsurface Sewage Treatment Systems (SSTS)	Roadways	Bluff	Nutrients	Trout Catchment	Biological Significance	Sensitive Shoreline	Source Water Assessment (SWA)	Groundwater Contamination Susceptibility	National Wetland Inventory (NRI)	Ecological Connections	High Value Forest	Minnesota Biological Survey (MBS)	Rare Features
Tier 1																								
1	Two Harbors																							
2	Poplar River																							
3	Near Shore Lake Superior																							
4	City of Grand Marais																							
5	Flute Reed River																							
6	Knife River																							
7	Beaver River																							
Tier 2																								
1	Stewart River																							
2	Devils Track Lake																							
3	Baptism River WS																							
4	Mid Trail Lakesheds																							
5	Cascade River lower																							
6	McFarland Lakeshed																							
Tier 3																								
1	Brule River WS																							
2	Cross River WS																							
3	Cascade River upper and middle																							
4	Gooseberry HUC 10																							
5	Mid Trail Lakesheds West/East Bearskin																							
6	Greenwood Lake																							

Zonation Feature Descriptions

Urban Nodes	Areas that have higher densities and existing development with expansion possibilities as per local land use plans. Source: North Shore Management Board and local Land Use Plans.
Shoreland	Land within 1000 feet of inland lakes and Lake Superior shoreline.
Stream Riparian Areas	Stream riparian areas and potential flood zones (based on location, elevation and soil type). Source: MNDNR.
Soil Erosion Risk	Vulnerable or unstable shoreline areas in relation to extensive erosion. Source: Erosion Hazard of Minnesota's Lake Superior Shoreline. Source: MN Sea Grant & NRRI.
Stream Power Index	Index of the channelized flow erosive potential. Calculated from LiDAR data.
Declining Water Quality	Catchments (i.e., drainage basins) of lakes where long-term data suggest declining water quality. Source: MPCA.
Vulnerable Streams	Catchments of rivers that are susceptible to additional sediment and pollution loading as determined by biological monitoring (Indices of Biological Integrity). Source: MPCA.
Impaired Waters	Catchments upstream of impaired waters within the watershed. Identified as impaired by the Minnesota Pollution Control Agency (MPCA).
Subsurface Sewage Treatment Systems (SSTS)	Areas potentially impacted by Subsurface Sewage Treatment Systems (SSTS). SSTS, commonly known as septic systems, may not be adequately treating sewage. This sewage contains phosphorus and nitrogen, which may seep into lakes and rivers and cause excessive aquatic plant growth, leading to degraded water quality. Source: Cook (compliance reports) and Lake Counties (improved or unimproved status).
Roadways	Roads and right-of-ways in the watershed. Source: Lake and Cook Counties.
Bluff	Bluffs or steep slopes. Calculated from LiDAR data.
Nutrient	Catchments of lakes vulnerable to nutrient addition. The relative susceptibility of a lake to phosphorus pollution (based on lake morphology and catchment hydrology). Source: MNDNR.
Trout Catchment	Below barrier catchments of anadromous trout streams. Source: MNDNR.
Biological Significance	Biological significance. Catchments of high quality lakes. MNDNR list of high quality lakes based on dedicated biological sampling. Source: MNDNR.
Sensitive Shoreline	Sensitive shoreline. Lakeshore areas that provide unique or critical ecological habitat. Source: Cook County.
Source Water Assessment (SWA)	The surface and subsurface area surrounding a public water supply well that completely contains the scientifically calculated time-of-travel area. The primary purpose of the SWA is to give the public water supplier an idea of the potential size of the final Wellhead Protection Area (WHPA). Source: Minnesota Department of Health (MDH).
Groundwater Contamination Susceptibility	The relative susceptibility of an area to groundwater contamination (based on geologic stratigraphy, aquifer transmissivity, and recharge potential). Source: MPCA.
National Wetland Inventory (NWI)	Remaining wetlands as documented by the NWI.
Ecological Connections	Ecological corridors between generally large, intact, native or "semi-natural" terrestrial habitat patches. Source: MNDNR.
High Value Forest	MNDNR designated high conservation value forests due to plant and animals present and MNDNR designed old-growth forests. Source: MNDNR
Minnesota Biological Survey (MBS)	Areas with varying levels of native biodiversity that may contain high quality native plant communities, rare plants, rare animals, and/or animal aggregations. Identified by Minnesota Biological Survey. Source: MNDNR.
Rare Features	Locations of species currently tracked by the MNDNR, including Endangered, Threatened, and Special Concern plant and animal species as well as animal aggregation sites. Source: MNDNR.

Key:

Information used in a presence/absence fashion

0-24	Relative weight assigned to zonation layer/information - **green** (0-24) means geographical extent is smallest, there are fewer occurrences of the zonation feature or coding assigned to the zonation layer (e.g. MBS and groundwater contamination susceptibility) are low.
25-49	Relative weight assigned to zonation layer/information - **yellow** (25-49) means geographical extent is smaller, there are fewer occurrences of the zonation feature or coding assigned to the zonation layer (e.g. MBS and groundwater contamination susceptibility) is moderate.
50-74	Relative weight assigned to zonation layer/information - **orange** (50-74) means geographical extent is larger, there are more occurrences of the zonation feature or coding assigned to the zonation layer (e.g. MBS and groundwater contamination susceptibility) is higher.
75-100	Relative weight assigned to zonation layer/information - **red** (75-100) means geographical extent is largest, there are more occurrences of zonation feature or coding assigned to the zonation layer (e.g. MBS and groundwater contamination susceptibility) is highest.

Table 5b. Main Observations Evaluated Using Zonation Results

Stormwater Management	Most of the urban nodes located in Tier 1 Priority Areas
	Shoreland consistently triggered with higher Zonation Scores
	All of the Priority Areas contain stream riparian areas and the score assigned to these areas was low
	Erosion was triggered by the Zonation exercise for 6 of the 7 Tier 1 Priority Areas (and none of the Tier 2 and Tier 3 Priority Areas)
	Stream Power Index triggered for all 19 Priority Areas
Impaired Waters	All of the impaired waters located in the Tier 1 category
	Most of the Priority Areas under Tier 1 triggered for stream vulnerability and given higher zonation scores
	Fewer Priority Areas under Tier 2 triggered for stream vulnerability but 2 of the 3 ranked highest (red)
	Least amount of Priority Areas under Tier 3 triggered for stream vulnerability (2 of 6) but still noted
	Areas with long-term trends in declining water quality found in Tier 1 and Tier 2 Priority Areas only
SSTS	Presence of septic systems consistently triggered with lower Zonation Scores
Stream Conductivity	Presence of roadways (potential impacts to connectivity) consistently triggered with lower Zonation Scores
Priority Waters	All 19 Priority Areas triggered for bluffs or steep slopes with those receiving highest Zonation Score under Tier 1 Priority Areas
	All 19 Priority Areas triggered for nutrients and high Zonation Scores distributed equally amongst the 3 Tiers
	5 of the 7 Tier 1 Priority Areas contain trout stream catchments and the Zonation Score is high (red)
	3 of the 6 Tier 2 priority Areas contain trout stream catchments and none in Tier 3 category
	Priority Areas in all 3 Tiers contain lakes of biological significance and all 3 Tiers have areas ranked high (red)
	Sensitive Shoreline not triggered much (2 of 19) in any of the Priority Areas
	All 19 areas triggered for groundwater contamination susceptibility and ranking is higher in all 3 Tiers
Wetland Management	All 19 Priority Areas contain waterbodies identified in the National Wetlands Inventory
Unique/ High Value Resources	All triggers (ecological connectivity, high value forest, mbs, rare features) triggered uniformly throughout 3 Tiers
	Areas with rare features located in Tier 1 Priority Areas only

Table 8: LSN Watershed Secondary Implementation Plan

ID*	Activities	Priority Concern	Goal	Zonation Priority Area	Project Cost *(one time cost)*	On-going Activities *(annual costs)*	Project Lead	Project Partners	Activity Outcome Measurability
SM 1.3	Work with resorts and golf courses in priority spatial areas to develop and implement SWM plans with the goal of establishing one SWM plan at a resort or golf course every five years.	Storm Water Mgmt.	Promote compatibility between SWM goals & objectives of LSN 1W1P and existing landuse plans, ordinances, etc.	Beaver River/Silver Bay; City of Grand Marais; Near Shore LS, Two Harbors/Skunk Creek.		$5,000 every five years	SWCD/ County	SWCD, Business Owners	One stormwater plan for a resort and/or golf course.
SSTS 1.4	Achieve 50% SSTS compliance overall and specifically 75% in shoreland and/or riparian areas within priority spatial areas by 2025.	Subsurface Sewage Treatment System	Address water quality problems stemming from inadequate wastewater treatment by implementing and enforcing the local SSTS ordinance	Beaver River/Silver Bay; City of Grand Marais; Near Shore LS, Two Harbors/Skunk Creek.	Unknown		Counties	SWCD, BWSR, MPCA	Septic System compliance within shoreland and riparian areas; an increase from 70% non-compliance around shoreland areas to 75 compliance in the area.
SSTS 1.5	Provide education and outreach to help landowners understand how and why caffeine, volatile organo-chlorides, chlorides, etc. enter into surface and groundwater systems. Wells with indicators should either be properly abandoned or receive some type of advanced water treatment	Subsurface Sewage Treatment System	Address water quality problems stemming from inadequate wastewater treatment by implementing and enforcing the local SSTS ordinance	Watershed-wide	$5,000		Counties/ Landowners	SWCD, BWSR, MPCA, MDH	Annual education and outreach.
HLUP 1.1	Prevent soil erosion on vacant contaminated sites by promoting site restoration with native vegetation and trees on at least one acre every 5 years.	Historic Land Use Practices	Protect groundwater quality by following design guidelines for SWM on contaminated soils	Beaver River/Silver Bay; City of Grand Marais; Flute Reed River; Knife River; Near Shore LS, Two Harbors/Skunk Creek; Stewart River; Devil's Track Lake.	$12,000/acre		SWCD	NRCS	One every five years restored with native vegetation; four acres revegetated.
TH 1.3	Look for opportunities to initiate implementation of completed forest stewardship plans within priority subwatersheds	Timber Harvesting	Promote development of forest management plans for private and public lands to address water quality impacts	Watershed-wide	Unknown		SWCD	NRCS, TSA III	Try to re-engage 4 landowners with stewardship plans.
TH 3.2	Contact landowners who completed the logging step of the forestry management plan and review their progress towards the remaining activities in the plan	Timber Harvesting	Increase local technical capacity to help landowners implement existing forestry management plans	Watershed-wide	Unknown		SWCD, NRCS, BWSR		Connect with 10 landowners over the life of the Plan.
AM 1.2	Create Aggregate Extraction Management plan that evaluates available aggregate resources and considers potential effect on high quality ecological and groundwater resources, and includes a restoration plan requisite	Aggregate Materials	Protect groundwater, GDNRs and rare/high quality plant communities associated with aggregate-rich glacial features from extraction and dewatering processes	Watershed-wide	Unknown		County	SWCD, BWSR, Coastal	
EO 4.1	Build understanding of the connections between invasive species management and Lake Superior watershed basin health; work with and engage private landowners to educate, manage invasive species sites, develop local sources of native plants, and restore native vegetation and ecological function (Draft Strategy from Lake Superior Lakewide Action and Management Plan, 2013).	Education and Outreach	Increase public awareness about invasive species by identifying what individuals can do to prevent their introduction and spread.	Watershed-wide	L+C	L+C	L+C	L+C	L+C
IS 1.2	Develop a comprehensive and living database to track invasive species infestations spatially and temporally	Invasive Species	Reduce the impact of existing aquatic and terrestrial invasive species and prevent the introduction of new ones.	Watershed-wide		$2,000/yr	County/AIS Coordinator	SWCD, USGS, MNDNR, Sea Grant	Better regional understanding of the impacts of invasive species and what citizens can do to help with the effort; database of invasive species.
IS 1.3	Organize a consortium of land managers and stakeholders for education/outreach and early detection/rapid response	Invasive Species	Reduce the impact of existing aquatic and terrestrial invasive species and prevent the introduction of new ones.	Watershed-wide		$2,000/yr	County/AIS Coordinator	SWCD, MNDNR	More coordinated regional management and control of invasive species.
DC 6.1	Utilize Surface Water Assessment Grants (SWAGs) to fund monitoring efforts by counties, SWCDs, watershed districts, nonprofits, and educational institutions.	Data Collection	Expand capacity for sampling and data collection through citizen participation in a standardized monitoring program (LSS MPCA, 2014, MPCA 2015).	Watershed-wide	MPCA funding dependent/unknown		SWCD, MPCA		Monitor 10 additional sites within the county.

Table 9 LSN Watershed Secondary Implementation Plan

Item #	Implementation Action	Priority Concern	Goal	Project Lead
1	Implement prioritization tools to identify the largest contributing sources of sediment and pollutant loading and to target implementation projects	Stormwater Management **SM-Goal 2**	Reduce sedimentation & pollutant loading to surface water and groundwater resources through effective SWM and restoration practices	MPCA WRAPS funds
2	Convene a work group of local, county and state road authorities to develop a road salt management plan by 2020	Stormwater Management **SM-Goal 2**	Reduce sedimentation & pollutant loading to surface water and groundwater resources through effective SWM and restoration practices	MNDOT; MPCA road salt education program (Al Ronchak); Fortin Consulting
3	Provide guidance on the design, construction, operation and maintenance of Low Impact Development, Green Infrastructure and bioengineering techniques to road authorities	Stormwater Management **SM-Goal 3**	Promote SWM approach that emphasizes maintenance, restoration and/or rehabilitation of natural hydrologic functions	MPCA; U of M; MN SeaGrant
4	Work with partners to evaluate strategies identified in approved TMDL Reports and implement projects	Impaired Waters **IW-Goal 1**	Improve the quality of water affected by pollutants in order to restore these resources to healthy conditions, meet water quality and biological standards and remove them from impaired waters designation and from the 303d list	MPCA
5	Work with partners to develop strategies and/or individual TMDLs for resources impaired for mercury in fish tissue	Impaired Waters **IW-Goal 1**	Improve the quality of water affected by pollutants in order to restore these resources to healthy conditions, meet water quality and biological standards and remove them from impaired waters designation and from the 303d list	MPCA
6	Initiate a feasibility study to develop a management plan and program for wastewater systems in the Tofte Schroeder Sewer Sanitary District	Subsurface Sewage Treatment System **SSTS-Goal 1**	Address water quality problems stemming from inadequate wastewater treatment by implementing & enforcing the local SSTS ordinance	Cook County; TSSSD Board
7	Participate in clean up of old city dump in Two Harbors that fills unclassified waterway	Historic Land Use Practices **HLUP-Goal 2**	Protect groundwater quality by participating in the cleanup of contaminated sites	Two Harbors
8	Participate in clean up of old railroad cinder pit in the Knife River watershed	Historic Land Use Practices **HULP-Goal 2**	Protect groundwater quality by participating in the cleanup of contaminated sites	Lake County
9	Participate in clean up of old gas tank site in the Knife River watershed	Historic Land Use Practices **HULP-Goal 2**	Protect groundwater quality by participating in the cleanup of contaminated sites	Lake County
10	Develop a forest management guidance document	Timber Harvesting **TH-Goal 1**	Promote development of forest management plans for private and public lands to address water quality impacts	NRCS
11	Use the best information available to determine species composition for plantings that maintain a resilient watershed into the future	Timber Harvesting **TH-Goal 1**	Promote development of forest management plans for private and public lands to address water quality impacts	Agencies doing plantings
12	Identify 'Long–Lived Tree zones' per Minnesota Forest Resource Council (MFRC) recommendations and develop mature and diverse forests	Timber Harvesting **TH-Goal 1**	Promote development of forest management plans for private and public lands to address water quality impacts	NRCS
13	Review all existing forestry management plans as identified in the Coastal Project Access Database	Timber Harvesting **TH-Goal 1**	Promote development of forest management plans for private and public lands to address water quality impacts	County Forestry Depts. And/or NRCS/USFS Joint Chief's Forester
14	Conduct a land cover analysis to identify the percentage of young forest open lands within the watershed as well as coverage of conifers versus hardwood cover	Timber Harvesting **TH-Goal 2**	Manage density and composition of forest canopy to control runoff and extend snowmelt	DNR EcoWaters; MN DNR Coastal program
15	Utilize modeling tools to evaluate potential hydrologic changes resulting from forest harvest	Timber Harvesting **TH-Goal 2**	Manage density and composition of forest canopy to control runoff and extend snowmelt	MPCA;USFS; MN DNR; MN DNR Coastal Program; MFRC
16	Conduct analysis to determine the effective watershed scale to key in on potential impacts to small streams	Timber Harvesting **TH-Goal 2**	Manage density and composition of forest canopy to control runoff and extend snowmelt	MPCA;USFS; MN DNR; MN DNR Coastal Program; MFRC
17	Conduct analysis to further define open and young thresholds for individual watershed conditions by comparing any geomorphic response to modeled thresholds	Timber Harvesting **TH-Goal 2**	Manage density and composition of forest canopy to control runoff and extend snowmelt	MRFC
18	Determine sustainable composition of North Shore forest, in terms of appropriate canopy, midstory and ground cover vegetation	Timber Harvesting **TH-Goal 2**	Manage density and composition of forest canopy to control runoff and extend snowmelt	DNR(Forestry EWR), USFS, County Forestry, MFRC
19	Conduct an analysis to determine if adequate shade and ground cover is present in riparian corridors along rivers and streams	Timber Harvesting **TH-Goal 2**	Manage density and composition of forest canopy to control runoff and extend snowmelt	DNR general funds, Coastal grants
20	Identify areas downstream of industrial operations that are not meeting water quality standards and work with regulatory agencies to ensure that contaminated source water is captured and treated before discharging	Construction and Industrial Operations **Goal-1**	Encourage construction and industrial operations to use BMPs and to acknowledge their potential impacts to natural resources	MPCA
21	Work with regulatory authorities to evaluate MP7 Tailing Basin Operation and Reclamation Plans to ensure adequate storage capacity under larger rainfall events and to ensure reclamation activities meet the goals and objective of the LSN 1W1P	Construction and Industrial Operations **Goal-1**	Encourage construction and industrial operations to use BMPs and to acknowledge their potential impacts to natural resources	DNR; MPCA
22	Ensure Cumulative Impacts Assessments are conducted during regulatory review of proposed projects using methods established under the National Environmental Policy Act	Construction and Industrial Operations **Goal-1**	Encourage construction and industrial operations to use BMPs and to acknowledge their potential impacts to natural resources	DNR; MPCA
23	Ensure environmental review of existing and proposed mining, gas/oil pipelines and other industrial projects adequately identify natural and cultural resources in areas of potential effect and identify alternatives that help avoid those impacts	Construction and Industrial Operations **Goal-1**	Encourage construction and industrial operations to use BMPs and to acknowledge their potential impacts to natural resources	DNR; MPCA
24	Expand implementation of MPCA Channel Condition and Stability Index (CCSI) throughout the watershed, rather than limited to MPCA biological stations, to provide indication of changes stream channel geomorphology and stream habitat	Stream Connectivity **SC-Goal 1**	Develop and maintain road construction and maintenance policies that assure free-flowing riparian systems and stream–accessible floodplains that connect Lake Superior with the headwater lakes, streams and wetlands	MPCA

Item #	Implementation Action	Priority Concern	Goal	Project Lead
25	Slow/Arrest the introduction and spread of aquatic and terrestrial invasive species in the region including Emerald Ash Borer	Invasive Species **IS-Goal 1**	Reduce impact of existing aquatic & terrestrial invasive species and prevent introduction of new ones	MN DNR; County AIS programs
26	Conduct research to find a suitable tree species to fill the ecological niche of Ash Trees	Invasive Species **IS Goal-1**	Reduce impact of existing aquatic & terrestrial invasive species and prevent introduction of new ones	Unknown
27	Follow USDA and MN Dept. of Agriculture protocols and perform early detection monitoring for EAB in high risk areas throughout the regional unit such as travel corridors and camping areas	Invasive Species **IS-Goal 1**	Reduce impact of existing aquatic & terrestrial invasive species and prevent introduction of new ones	Unknown
28	Utilize current available data and research to identify and treat Gypsy Moth infestations in high risk areas (e.g. travel corridors) and monitor current infestations to inform future management decisions	Invasive Species **IS-Goal 1**	Reduce impact of existing aquatic & terrestrial invasive species and prevent introduction of new ones	USFS
29	Control high priority infestations of aquatic and terrestrial species, including Sea Lamprey	Invasive Species **IS-Goal 1**	Reduce impact of existing aquatic & terrestrial invasive species and prevent introduction of new ones	MN DNR; County AIS funds/ GLRI funding
30	Utilize updated climate change model predictions for the Lake Superior basin to assess impacts to infrastructure, terrestrial and aquatic ecosystems and keystone biota	Impacts of Climate Change **CC-Goal 1**	Continue to evaluate the impacts of climate change by partnering on regional efforts	MN DNR
31	Monitor climate change–related ecosystem impacts to native communities and species	Impacts of Climate Change **CC-Goal 1**	Continue to evaluate the impacts of climate change by partnering on regional efforts	MN DNR
32	Identify and conserve areas that are likely to be resilient to climate change and support a broad range of habitats and species	Impacts of Climate Change **CC-Goal 2**	Increase the resiliency of LSN Watershed by adapting to climate change	MN DNR
33	Maintain flows and water levels on managed streams, rivers and lakes that emulate natural conditions (i.e., magnitude, duration, timing, and pattern) (Draft Strategy from Lake Superior Lakewide Action and Management Plan, 2013) by installing Green Infrastructure (i.e. expand/restore floodplain areas, in-stream GI velocity-reduction techniques, etc.)	Impacts of Climate Change **CC-Goal 2**	Increase the resiliency of the Lake Superior North Watershed by adapting to climate change	Unknown
34	Identify pollutant sources and stressor(s) by evaluating the available information/data collected by MPCA for the WRAPS process	At Risk Waters (Unimpaired Resources) **ARW-Goal 1**	Protect the existing high quality waters from becoming impaired through targeted and prioritized best management practices (Cook County LWMP, 2014).	MN DNR; MPCA
35	Utilize the trend analysis being conducted as part of WRAPS process to define and identify At-Risk Waters.	At Risk Waters (Unimpaired Resources) **ARW-Goal 1**	Protect the existing high quality waters from becoming impaired through targeted and prioritized best management practices (Cook County LWMP, 2014).	MPCA
36	Establish targets for measuring water quality improvement over time and create a method for tracking the quality of At-Risk Waters.	At Risk Waters (Unimpaired Resources) **ARW-Goal 1**	Protect the existing high quality waters from becoming impaired through targeted and prioritized best management practices (Cook County LWMP, 2014).	MPCA
37	Identify and preserve sites that have high species diversity and/or critical habitat for fish or wildlife (Draft Strategy from Lake Superior Lakewide Action and Management Plan, 2013; MNDNR, 2015)	Fisheries **F-Goal 1**	Maintain high quality and diverse fishery (Draft Strategy from Lake Superior Lakewide Action and Management Plan, 2013).	MN DNR
38	Evaluate the implications single–species management decisions are having on the health of the resource.	Fisheries **F-Goal 1**	Maintain high quality and diverse fishery (Draft Strategy from Lake Superior Lakewide Action and Management Plan, 2013).	MN DNR
39	Restore or construct riparian buffers where necessary to provide adequate shade along existing cold and cool water streams, and/or to manage heavy runoff of non–point source pollution and sediments associated with potentially more frequent and intense precipitation events	Fisheries **F-Goal 1**	Maintain high quality and diverse fishery (Draft Strategy from Lake Superior Lakewide Action and Management Plan, 2013).	MN DNR
40	Identify minimum standards of water levels required for in–stream biological uses	Fisheries **F-Goal 1**	Maintain high quality and diverse fishery (Draft Strategy from Lake Superior Lakewide Action and Management Plan, 2013).	MN DNR; MPCA
41	Identify and take the actions necessary to rehabilitate Lake Sturgeon in the Pigeon River	Fisheries **F-Goal 2**	Restore/rehabilitate and protect self–sustaining Lake Sturgeon populations in each tributary they historically used to spawn	Unknown
42	Identify priority Brook Trout habitats using FishVis and ELOHA tools	Fisheries **F-Goal 3**	Restore/rehabilitate and protect self–sustaining Brook Trout populations in as many of the original, native habitats as is practical	MN DNR
43	Establish forested riparian areas for shade and long term wood recruitment	Fisheries **F-Goal 3**	Restore/rehabilitate and protect self–sustaining Brook Trout populations in as many of the original, native habitats as is practical (Draft Strategy from Lake Superior Lakewide Action and Management Plan, 2013)	MN DNR
44	Support ongoing efforts to study the effect of beaver on cold water fisheries, watershed hydrology and ecosystem function.	Fisheries **F-Goal 4**	Evaluate the impacts of beaver and their dams on cold water fisheries including watershed's ability to store significant rainfall and snowmelt events, flashiness of the system, bank susceptibility, impairments, etc.	DNR (Fisheries, EWR, Wildlife); USFS
45	Develop and implement a strategy to protect wild rice habitat in the watershed from industrial, development, and land management impacts.	Wild Rice Lakes **WRL-Goal 1**	Prevent net loss of wild rice in the Lake Superior North watershed and restore where appropriate	MN DNR; MPCA
46	Have a standardized method for monitoring wild rice in the region. Consider using methods developed by the Region 5 Manoomin project and the 1854 Treaty Authority and/or the Wild Rice Monitoring Handbook and Wild Rice Monitoring Field Guide, available through Minnesota Sea Grant.	Wild Rice Lakes **WRL-Goal 1**	Prevent net loss of wild rice in the Lake Superior North watershed and restore where appropriate	DNR; Tribal Gov'ts; 1854 Treaty

Item #	Implementation Action	Priority Concern	Goal	Project Lead
47	Promote source water protection efforts that result in public water suppliers implementing a wellhead protection plan	Drinking Water **DW-Goal 1**	Promote Source Water Protection for Community and non-community Public Water Suppliers	MDH, County Health
48	Acknowledge and support public water supply wellhead protection areas and groundwater protection strategies within the watershed.	Drinking Water **DW-Goal 2**	Protect groundwater–based drinking water sources within the LSN watershed	MDH, County Health
49	Consider wellhead protection areas and groundwater protection when making land use decisions.	Drinking Water **DW-Goal 2**	Protect groundwater–based drinking water sources within the LSN watershed	MDH, County Planning and Zoning, DNR (Lands and Minerals, Forestry, EWR), USFS
50	Work with community and non–community public water suppliers in the development and implementation of wellhead protection activities.	Drinking Wate **DW-Goal 2**	Protect groundwater–based drinking water sources within the LSN watershed	MDH, County Health
51	Develop a water quality database to track contaminants of concern in the ground water (MDH, 2015).	Drinking Water **DW-Goal 2**	Protect groundwater–based drinking water sources within the LSN watershed	MDH; MPCA
52	When requested by a public water supplier, provide assistance in locating wells for ground water modeling efforts undertaken in wellhead protection.	Drinking Water **DW-Goal 2**	Protect groundwater–based drinking water sources within the LSN watershed	MDH & County Health
53	Develop a water quality data base to track contaminants of concern in the ground water. The MDH, 2015 may be able to offer technical assistance in this effort.	Drinking Water **DW-Goal 2**	Protect groundwater–based drinking water sources within the LSN watershed	MDH
54	Conduct environmental assessment for exploratory drilling	Groundwater **GW-Goal 1**	Protect groundwater quality by addressing sources of potential contamination	MPCA
55	Identify and properly manage potential contaminant sources	Groundwater **GW-Goal 1**	Protect groundwater quality by addressing sources of potential contamination	Unknown
56	Support efforts to determine the location and status of un–located wells	Groundwater **GW-Goal 1**	Protect groundwater quality by addressing sources of potential contamination	Unknown
57	Review groundwater appropriation permits for potential impacts to surface water, natural resources, and nearby wells	Groundwater **GW-Goal 2**	Protect groundwater supplies and maintain baseflow contributions to groundwater–dependent natural resources.	Unknown
58	Inventory and assess groundwater recharge areas to establish priority areas of groundwater protection.	Groundwater **GW-Goal 2**	Protect groundwater supplies and maintain baseflow contributions to groundwater–dependent natural resources.	MGS, DNR, DNR (EWR)
59	Utilize data collected within the LSN through the MDNR Observation Well Network to supplement and build upon the watershed-wide monitoring program (LSS MPCA, 2014).	Groundwater **GW-Goal 3**	Develop a watershed-wide well monitoring program, in collaboration with the Minnesota Department of Health and Minnesota Geological Survey	DNR & MDH
60	Utilize data collected within the LSN through MPCA's Ambient Groundwater Monitoring Program to supplement and build upon watershed-wide monitoring program (LSS MPCA, 2014).	Groundwater **GW-Goal 3**	Develop a watershed-wide well monitoring program, in collaboration with the Minnesota Department of Health and Minnesota Geological Survey	MDH, MGS, DNR
61	Identify existing wells or drill new wells to be added to the MDNR Observation Well Network	Groundwater **GW-Goal 4**	Secure funding and partners to develop a watershed-wide geological atlas	MDH, MGS, DNR, MPCA
62	Locate and map known wells in Cook County. The St. Louis and Lake County Geologic Atlases are already in process	Groundwater **GW-Goal 4**	Secure funding and partners to develop a watershed-wide geological atlas	MDH, County Health
63	Develop area-specific wetland regulation to address the unique wetland resources and functional replacement challenges within the LSN watershed.	Wetland Management **WM-Goal 2**	Protect, to the greatest extent practicable, the existing wetland resources and, for unavoidable impacts, increase the availability of wetland banking credits available within the watershed to support mitigation within the watershed	Counties
64	Identify species of conservation concern in the region, and their habitat	Unique/High Value Resources **UHVR -Goal 1**	Maintain *ecological connections* in the watershed that minimize barriers to biotic movement and thereby increase natural resource resiliency and adaptability	Unknown
65	Ensure critical upland and wetland habitats, browse areas and travel corridors for moose are identified in and consistent amongst forestry management plans and are identified in cumulative impacts assessments for industrial projects so impacts can be avoided and/or mitigated	Unique/High Value Resources **UHVR -Goal 1**	Maintain *ecological connections* in the watershed that minimize barriers to biotic movement and thereby increase natural resource resiliency and adaptability	DNR; USFS; Tribal Gov'ts; U of Minnesota
66	Address barriers to fish passage created by dams, hydroelectric generation, or misplaced or wrong sized culverts	Unique/High Value Resources **UHVR -Goal 1**	Maintain *ecological connections* in the watershed that minimize barriers to biotic movement and thereby increase natural resource resiliency and adaptability	MN DNR
67	Maintain flows and water levels on managed streams, rivers and lakes that emulate natural conditions	Unique/High Value Resources **UHVR -Goal 1**	Maintain *ecological connections* in the watershed that minimize barriers to biotic movement and thereby increase natural resource resiliency and adaptability	MN DNR
68	Identify and manage lands of concern (open lands, impervious areas, wetlands, forest land)	Unique/High Value Resources **UHVR -Goal 1**	Maintain *ecological connections* in the watershed that minimize barriers to biotic movement and thereby increase natural resource resiliency and adaptability	Unknown
69	Establish ecological buffer zones around natural features	Unique/High Value Resources **UHVR -Goal 1**	Maintain *ecological connections* in the watershed that minimize barriers to biotic movement and thereby increase natural resource resiliency and adaptability	Unknown
70	Implement existing species–specific rehabilitation plans in the region	Unique/High Value Resources **UHVR -Goal 1**	Maintain *ecological connections* in the watershed that minimize barriers to biotic movement and thereby increase natural resource resiliency and adaptability	Unknown
71	Develop an ecological analysis for watershed properties of School Trust Lands and assess the environmental impacts of development on this land	Unique/High Value Resources **UHVR -Goal 1**	Maintain *ecological connections* in the watershed that minimize barriers to biotic movement and thereby increase natural resource resiliency and adaptability	MNDNR

Item #	Implementation Action	Priority Concern	Goal	Project Lead
72	Maintain or enhance areas where large blocks of land with natural cover exist or could be expanded	Unique/High Value Resources **UHVR -Goal 2**	Protect *rare and endangered species* and their habitats to ensure long term viability of natural resource biodiversity	Unknown
73	Preserve sites that have high species diversity and/or critical habitat for fish or wildlife	Unique/High Value Resources **UHVR -Goal 2**	Protect *rare and endangered species* and their habitats to ensure long term viability of natural resource biodiversity; Preserve and maintain MBS sites of biodiversity significance to support ecosystem sustainability	MN DNR; USFS
74	Ensure environmental review of existing and proposed mining, gas/oil pipelines and other industrial projects adequately identify natural and cultural resources in areas of potential effect and identify alternatives that help avoid those impacts.	Unique/High Value Resources **UHVR -Goal 3**	Preserve and maintain *MBS sites of biodiversity significance* to support ecosystem sustainability	USFS; MN DNR
75	Identify, evaluate and manage threats to biodiversity from agricultural chemical and bio controls.	Unique/High Value Resources **UHVR -Goal 3**	Preserve and maintain *MBS sites of biodiversity significance* to support ecosystem sustainability	MDA; USFWS
76	Restore missing species, increasing patch sizes, improve within stand diversity using eco–based silviculture and account for amount of young forest per watershed in timber harvest plans	Unique/High Value Resources **UHVR -Goal 4**	Protect *high conservation value forests* from land use impacts and environmental stressors that degrade the quality of the resource	DNR; County Forestr;, USF; private foresters
77	Develop tools such as hydrologic corrected high resolution DEM (using LiDAR and stream crossings data	Data Collection **DC-Goal 1**	Develop regional sources of information and standardize data collection methods by working with land management and state agencies.	DNR
78	Develop updated (higher resolution) NHD stream layer and alignment with DNR 24k layer (SNF, 2015	Data Collection **DC-Goal 1**	Develop regional sources of information and standardize data collection methods by working with land management and state agencies.	DNR
79	Standardize forestry inventory data amongst agencies in the region and have a central database to store data so everyone has access	Data Collection **DC-Goal 1**	Develop regional sources of information and standardize data collection methods by working with land management and state agencies.	DNR; County Forestry; USFS; MFRC
80	Conduct fisheries survey before and after stream restoration projects to facilitate performance tracking.	Data Collection **DC-Goal 2**	Enhance baseline data collection efforts for surface water and groundwater resources	MN DNR; Lead of projects
81	1. Develop a groundwater monitoring plan that addresses the following: *a. Collects annual water quality samples of private wells (Cook County LWMP, 2014; Lake County LWMP, 2012).* *b. Tests private wells in sensitive areas, including the Superior national Forest and Boundary Waters (Lake County SWCD 2015 Annual Plan of Work).*	Data Collection **DC-Goal 2**	Enhance baseline data collection efforts for surface water and groundwater resources - lists them together maybe?	Unknown
82	Conduct a study which evaluates the impacts of recreation on surface waters as well as surface water appropriations	Data Collection **DC-Goal 2**	Enhance baseline data collection efforts for surface water and groundwater resources	DNR; MDH; MPCA
83	Develop a comprehensive and living database to track invasive species infestations spatially and temporally.	Data Collection **DC-Goal 2**	Improve sharing and coordination of collected data (LSS MPCA, 2014).	MN DNR
84	Organize a consortium of land managers and stakeholders for education/outreach and early detection/rapid response (SNF, 2015).	Data Collection **DC-Goal 3**	Improve sharing and coordination of collected data (LSS MPCA, 2014).	NRCS; North Shore Forest Collaborative
85	Map vernal pools (SNF, 2015).	Data Collection **DC-Goal 3**	Conduct natural resource inventories including high quality resources and invasive species.	USFS
86	1. Develop a surface water monitoring plan that addresses the following: *a. Focuses monitoring efforts where developmental pressures occur or are expected to occur (LSS MPCA, 2014).* *b. Includes unmonitored waters for a more comprehensive assessment of waters in the watershed (MNDNR, 2015).* *c. Includes heavy metals testing for ongoing collection of baseline data (MDH, Lake County Priority Concerns Scoping Document).* *d. Accounts for the collection of at least three years of non–point source pollution monitoring and analysis for the City of Grand Marais and Hovland (Cook County LWMP, 2014).* *e. Utilizes data that best represents current water quality conditions and therefore give more weight to pollutant categories such as toxics, lake eutrophication and fish contaminants (LSS MPCA, 2014).*	Data Collection **DC-Goal 5**	Enhance baseline data collection efforts for surface water and groundwater resources	Unknown
87	Engage landowners as partners in protecting important habitat (U.S. EPA, July 2013) by:	Education & Outreach **EO-Goal 2**	Promote stewardship by increasing people's awareness of their environment and sound best management practices.	Unknown
88	Create educational materials for private well owners pertaining to the 200' Inner Well Management Zone and the importance for minimizing infiltration of contaminants into the potable water supply (MDH, 2015).	Education& Outreach **EO-Goal 2**	Promote stewardship by increasing people's awareness of their environment and sound best management practices.	MDH
89	Target outreach to the timber industry, loggers, forest management agencies, and engage the public in forest management plan review.	Education & Outreach **EO-Goal 3**	Strengthen understanding of the connections between terrestrial land management and Lake Superior health.	NRCS; North Shore Forest Collaborative
90	Educate the public and elected officials about the importance of source water protection (MDH, 2015).	Education & Outreach **EO-Goal 3**	Strengthen understanding of the connections between terrestrial land management and Lake Superior health.	MDH
91	Target domestic groundwater appropriators through educational efforts to address related land use management (MDH, 2015).	Education & Outreach **EO-Goal 3**	Strengthen understanding of the connections between terrestrial land management and Lake Superior health.	Unknown

Appendix B. Land and Water Resources Inventory

PLAN APPENDIX B – LAND AND WATER RESOURCE INVENTORY (LWRI)

This Land and Water Resource Inventory (LWRI) is intended to catalog and briefly summarize the data available for each field. The name, location, and publisher or agency of any relevant datasets is included within each section of the LWRI. Datasets can be accessed through the URL links provided in the Datasets Referenced section or through inquiring at the agency websites or offices.

1.1 PLANNING EFFORTS IN PROGRESS

As it directly relates to watershed planning there are several efforts currently underway. Lake County is currently conducting a culvert inventory with an expectation to complete by the end of 2016. The Minnesota Pollution Control Agency (MPCA) is currently conducting watershed assessments for the Lake Superior North (LSN) and Lake Superior South (LSS) watersheds with an expected completion in 2017/2018. This process includes water quality assessment, stressor identification, modeling, TMDL reporting, and permitted discharge information, among many other attributes. This process culminates with TMDL reports and WRAPS reports. The MN Geological Survey will soon complete the Lake County geologic atlas. This geologic atlas process has not begun in Cook County. Lastly, the Minnesota Department of Natural Resources (MNDNR) is completing the National Wetland Inventory (NWI) for Lake and Cook counties with an expected completion in spring 2016.

1.2 LOCATION

The LSNW covers 1,313,880 acres in the Northern Lakes and Forest ecoregion. Soils and subsurface geology are dominated by bedrock, glacial till complexes and unconsolidated glacial lake deposits of sand, gravels, clay and silt. Bedrock is complex in its evolution and contributes to the spectacular mountains and ridges that slope toward Lake Superior. Numerous streams flow over the bedrock, forming waterfalls, cascades and rapids. Wetlands and lakes are found throughout the watershed. The LSN watershed is unique in that the drainage boundary is a portion of the much larger Lake Superior Basin and includes 15 major streams and their associated subwatersheds, which all drain into Lake Superior.

The LSNW encompasses Cook County, Lake County and a small portion of St. Louis County. Developed areas include the communities of Two Harbors, Beaver Bay, Silver Bay, Schroeder, Tofte, Lutsen, Grand Marais and Grand Portage. The main features of these communities are identified in Table 1B. Significant development is also located along Lake Superior's shoreline. Several state parks are located within the watershed, including Temperance, Cascade and Judge CR Magney. A large section of the southernmost Boundary Waters Canoe Area Wilderness is also located within the watershed.

Table 1B. Main Characteristics of the communities in the LSN Watershed

Communities	Population	Size (sq. mi)
Beaver Bay	176 (2013)	.73
Grand Marais	1,240 (2013)	2.9
Grand Portage	557 (2000)	74.2
Lutsen	190 (2010)	10.6
Schroeder	187 (2000)	149.9
Silver Bay	1,887 (2010)	7.9
Tofte	226 (2000)	154.6
Two Harbors	3,666 (2013)	3.3

The LSNW boundary was delineated by Board of Soil and Water Resources (BWSR) for the purposes of this assessment and includes a larger area than the Lake Superior North Watershed defined by the USGS-developed national system of categorization and hierarchy of watersheds. The boundary delineating this LSNW 1W1P planning area includes those subwatersheds draining to Lake Superior within Cook and Lake Counties as well as the portion of the Knife River subwatershed located in St. Louis County (see Figure 2-ES of the Plan). While a portion of St. Louis County is included in the watershed boundary, it was not involved in the development of the LSNW Management Plan. (1)

1.3 GENERAL GEOLOGY AND TOPOGRAPHIC DATA

Soils and subsurface geology within the Lake Superior North watershed are dominated by bedrock, glacial till complexes and unconsolidated glacial lake deposits of sand, gravels, clay and silt. The topography within the watershed is the most diverse in the state and contains the lowest and highest elevations in Minnesota, 600 feet and 2,301 feet respectively. Bedrock in this watershed is complex in its evolution and contributes to mountains and ridges that slope toward Lake Superior. Bedrock within the watershed is generally either exposed at the land surface or thinly overlain with glacial deposits.

The MN Geological survey is in the process of completing the county geologic atlas in Lake County and the geologic atlas process has not begun in Cook County. Shapefiles for other geologic features, such as hydrogeologic assessment, aggregate resources, karst, and peat are available through the Minnesota Geospatial Commons, also known as MNGeo(2). The MN Minerals Coordinating Committee(3) also contains data, including shapefiles for bedrock geology, surficial geology and aggregate resources, geophysics, and geochemistry.

Topographic data, including LiDAR and topographic maps, can be obtained from MNDNR, MNGeo(2), and MN Topo site for data access and delivery (http://arcgis.dnr.state.mn.us/maps/mntopo/). The National Oceanic and Atmospheric Administration (NOAA) Digital Coast(4) ftp site contains bathymetric and topographic data for Lake Superior.

1.4 SOIL DATA

Soils of the Lake Superior North watershed are confined by bedrock complexes and are typically characterized as unconsolidated glacial lake deposits of sand, gravels, clay and silt. Soil data is available but not fully complete from the databases for both Cook and Lake Counties at STATSGO[(5)] by United States Geological Survey (USGS) and SSURGO[(6)] by Natural Resources Conservation Service (NRCS). SSURGO does not include Federal land at this time. Once the soil survey data has been fully updated by these agencies, it will be added within this document.

1.5 PRECIPITATION

Precipitation and general climate data include current annual and monthly precipitation records as well as historic precipitation records from the Minnesota Climatology Working Group[(7)]. Climate data including long term trends can be obtained from NOAA National Climatic Data Center, including climate normal from 1981-2010 and historic data from 1971-2000 [(8)]. The MN Geospatial Commons[(2)] also contains data on climate and precipitation from local stations across MN. Additional data under state climatology work can also be found under Snow Rules (http://climate.umn.edu/snowrules/)

1.6 SURFACE WATER RESOURCES

There are 15 subwatersheds associated with the major North Shore streams which drain 1,313,880 acres of the North Shore into Lake Superior. Most of these seasonally flashy streams are short in length, steep and swift, cutting through bedrock, over rapids and down waterfalls. Other streams within the watershed such as the Poplar, Knife, Baptism, and Temperance rivers are notably longer, but exhibit similar pattern and profile as they travel over similar geological and topographic land surfaces. TMDLs have been completed for the Poplar River and the Knife River, both of which have turbidity impairments. Lake associations have been monitoring individual lakes and expanding management efforts to develop lake management plans for their lakes within the watershed. Three sentinel lakes, Tait, Greenwood and Trout, are located in the LSNW. Minnesota's final (2012) and proposed (2014) list of impaired waters (303d) are located on the MPCA's website at: http://www.pca.state.mn.us/lupg1125)

Several sources of surface waterbody data including Minnesota Department of Natural Resources (MNDNR) Public Waters Inventory (PWI)[(9)], statewide altered watercourses, shallow lake inventory, stream routes, lakes, and DNR hydrography can be obtained from the MN Geospatial Commons[(2)]. The MN Dam Inventory is also available at MN Geospatial Commons. The National Wetland Inventory (NWI) data can be obtained from the USFWS[(10)].

Surface water quality data was obtained from the MPCA Surface Water Monitoring Program EQuIS database[(11)] and contains data for all lake and stream monitoring stations (current and historic) and all parameters for the entire period of record through 2014 in the Lake Superior-North Major Watershed (04010101) and the Lake Superior-South Major Watershed (04010102). An inventory and summary of available data are shown for stream chloride, total phosphorus and total suspended solids in Table 2B, for stream *E. coli* in

Table 3B, and for lake eutrophication Table 4B. MPCA has completed a Watershed Monitoring and Assessment Report for Lake Superior-South (http://www.pca.state.mn.us/index.php/view-document.html?gid=21216) and is in the process of completing a Watershed Monitoring and Assessment report for Lake Superior-North (available in the future at: http://www.pca.state.mn.us/index.php/water/water-types-and-programs/watersheds/lake-superior-north.html).

Additional water quality related data, such as lists of impaired lakes and wetlands can also be obtained from MN Geospatial Commons[2]. Information about areas of known flooding problems as FEMA flood insurance are not available, because they have not been mapped. Minnesota Department of Health (MDH) has maps and data identifying the Source Water Protection Areas. Surface water appropriations permits information should be requested from MNDNR.

There are existing efforts to update the National Wetland Inventory (NWI) statewide and the LSN watershed is currently being updated with an expected completion of early 2016. Draft data has been completed for all of Cook County and most of Lake County. Although this data is in draft form, it is available at the MNDNR GIS website[12].

Table 2B. Stream Chloride, Total Phosphorus and Total Suspended Solids Data (MPCA EQuIS).

Reach Name	AUID	Use Class	Chloride (mg/L)				Total Phosphorus (ug/L)				Total Suspended Solids (mg/L)			
			2005-14 Average	N	Begin Year	End Year	2005-14 June-Sept Average	N	Begin Year	End Year	2005-14 Average	N	Begin Year	End Year
Assinika Creek	04010101-594	1B, 2A, 3B		1	1981	1981		1	1981	1981				
Baptism River	04010101-508	1B, 2A, 3B		52	1973	2013	17	213	1973	2015	6.3	261	1973	2015
Beaver River	04010102-501	1B, 2A, 3B	22.2	189	1973	2014	17	331	1973	2014	9.6	359	1973	2014
Beaver River, East Branch	04010102-536	1B, 2A, 3B	0.8	1	2013	2013					18.5	5	2013	2014
	04010102-531	1B, 2A, 3B	0.5	1	2013	2013					6.3	4	2013	2014
	04010102-535	1B, 2A, 3B						7	1997	1998	16.5	11	1997	2014
	04010102-530	1B, 2A, 3B									2.0	2	2013	2013
	04010102-534	1B, 2A, 3B									14.0	5	2013	2014
Beaver River, West Branch	04010102-576	1B, 2A, 3B					33	2	2014	2014	2.2	5	2013	2014
	04010102-577	1B, 2A, 3B					23	1	2014	2014	8.5	6	2013	2014
	04010102-578	1B, 2A, 3B					30	1	2014	2014				
Big Thirtynine Creek	04010102-B28	1B, 2A, 3B	1.4	1	2013	2013					4.9	4	2013	2014
	04010102-B26	1B, 2A, 3B									1.2	2	2013	2013
	04010102-B29	1B, 2A, 3B									5.4	5	2013	2014
	04010102-B30	1B, 2A, 3B									2.0	2	2013	2013
Blind Temperance Creek	04010101-513	1B, 2A, 3B						15	1997	1998		16	1997	1998
Brule River	04010101-502	1B, 2A, 3B		175	1973	2013	12	260	1973	2014	5.1	249	1973	2014
	04010101-D30	1B, 2Bd, 3C	1.0	9	2013	2013					3.4	9	2013	2013
Caribou Creek	04010101-614	1B, 2A, 3B						15	1997	2005		14	1997	1998
Caribou River	04010101-576	1B, 2A, 3B	1.5	23	2008	2013	12	29	2008	2013	27.6	30	2008	2013
Cascade River	04010101-590	1B, 2A, 3B	1.0	57	1973	2013	19	118	1973	2013	9.6	119	1973	2013
Cedar Creek	04010102-572	1B, 2A, 3B	1.3	1	2013	2013					9.2	5	2013	2014
Cross River	04010101-518	1B, 2A, 3B		31	1973	1975	14	50	1973	2014	4.9	52	1973	2014
Crow Creek	04010102-515	1B, 2A, 3B		7	1990	1991		7	1990	1991		7	1990	1991
Devil Track River	04010101-520	1B, 2A, 3B		21	1981	2013	17	45	1981	2014	7.9	51	2013	2014
Durfee Creek	04010101-523	1B, 2A, 3B		6	1982	1983		6	1982	1983				
East Split Rock River (East Branch Split Rock River)	04010102-A44	1B, 2A, 3B	1.2	21	2011	2012	19	33	1996	2012	1.7	21	2011	2012
Encampment River	04010102-554	1B, 2A, 3B	11.8	17	1990	2008	20	54	1990	2009	17.3	51	1990	2009
Flute Reed River	04010101-D32	1B, 2A, 3B	6.0	45	2008	2013	37	78	2008	2014	20.2	95	2008	2014
	04010101-D31	1B, 2A, 3B					39	30	2010	2014	17.0	44	2010	2014
Fortythree Creek (Mile Post Forty-Three Creek)	04010102-966	1B, 2A, 3B									4.2	2	2013	2013
Gooseberry River	04010102-502	1B, 2A, 3B	1.8	54	1973	2011	25	106	1973	2011	34.9	106	1973	2011
Greenwood River	04010101-528	1B, 2A, 3B		1	1981	1981		1	1981	1981				

Reach Name	AUID	Use Class	Chloride (mg/L)				Total Phosphorus (ug/L)				Total Suspended Solids (mg/L)			
			2005-14 Average	N	Begin Year	End Year	2005-14 June-Sept Average	N	Begin Year	End Year	2005-14 Average	N	Begin Year	End Year
Kimball Creek	04010101-532	1B, 2A, 3B		24	1981	2013	10	24	1981	2013	1.5	10	2013	2013
Knife River	04010102-504	1B, 2A, 3B	6.0	69	1973	2011	36	188	1973	2012	42.0	343	1973	2014
Knife River, West Branch	04010102-586	1B, 2A, 3B						11	1996	1997				
Little Knife River	04010102-824	1B, 2A, 3B						10	1997	1997				
Little Knife River (East Branch Little Knife River)	04010102-840	1B, 2A, 3B									9.8	55	2004	2006
Little Thirtynine Creek	04010102-B44	1B, 2A, 3B	0.5	1	2013	2013					2.2	4	2013	2014
	04010102-B46	1B, 2A, 3B									2.8	5	2013	2014
Manitou River	04010101-534	1B, 2A, 3B		41	1973	2013	14	41	1973	2013	2.2	41	1973	2013
McCarthy Creek	04010102-885	1B, 2A, 3B						12	1996	1997				
Murmur Creek	04010101-856	1B, 2A, 3B					25	1	2005	2005				
Onion River	04010101-535	1B, 2A, 3B	1.2	12	1981	2013	16	23	1981	2013	1.5	22	1997	2013
Palisade Creek	04010102-529	1B, 2A, 3B						13	1997	1998		13	1997	1998
Petes Creek	04010102-518	2B, 3C		9	1990	1991		9	1990	1991		9	1990	1991
Pigeon River	04010101-501	1B, 2Bd, 3A		40	1973	2013	14	47	1973	2014	50.3	49	1973	2013
Poplar River	04010101-613	1B, 2A, 3B	1.8	178	1973	2010	22	359	1973	2015	10.3	432	1973	2015
	04010101-612	1B, 2A, 3B	1.5	115	2001	2007	24	114	2001	2007	6.1	128	2001	2007
Silver Creek	04010102-513	1B, 2A, 3B		11	1990	1991		11	1990	1991		11	1990	1991
Skunk Creek	04010102-528	2B, 3C	39.4	32	1990	2012	30	32	1990	2012	20.7	74	1990	2014
	04010102-551	1B, 2A, 3B						26	1996	1998		14	1997	1998
South Brule River	04010101-541	2B, 3C	1.1	9	2013	2013					2.8	9	2013	2013
Split Rock River	04010102-519	1B, 2A, 3B	2.2	54	1973	2011	22	61	1973	2011	12.4	61	1973	2011
Stanley Creek	04010102-814	1B, 2A, 3B						17	1997	1998		17	1997	1998
Stewart River	04010102-503	1B, 2A, 3B		11	1990	1991		11	1990	1991		11	1990	1991
Swamp River	04010101-B66	1B, 2A, 3B		1	1981	1981		1	1981	1981				
Temperance River	04010101-C21	1B, 2Bd, 3C						14	1998	1999		14	1998	1999
Two Island River	04010101-547	1B, 2A, 3B						9	1998	1999		8	1998	1999
Unnamed creek (Beaver River Tributary)	04010102-621	1B, 2A, 3B									20.5	4	2013	2014
Unnamed creek (Fortythree Creek Tributary)	04010102-638	1B, 2A, 3B									2.4	2	2013	2013
Unnamed creek (Sugar Loaf Creek)	04010101-B62	1B, 2A, 3B	0.8	12	2008	2008	24	19	2008	2009	11.8	18	2008	2009
Unnamed creek (West Branch Beaver River Tributary)	04010102-631	1B, 2A, 3B	0.6	1	2013	2013					8.5	5	2013	2014
	04010102-580	1B, 2A, 3B									10.1	5	2013	2014
Unnamed creek (West Branch Little Knife River)	04010102-846	1B, 2A, 3B						25	1997	1998		27	1997	1998
	04010102-847	1B, 2A, 3B									4.1	56	2004	2006

Table 3B. Stream E. coli Data (MPCA EQuIS).

Reach Name	AUID	2005-2014 Monthly Geometric Average *E. coli* concentration (org/100mL)							Total Number of 2005-2014 Samples
		April	May	June	July	August	September	October	
Baptism River	04010101-508			25	18	17			14
Beaver River	04010102-501	5	4	34	25	4	47	130	53
Brule River	04010101-502	23	36	17	16	6	8	22	33
Brule River	04010101-D30			22	27	22			15
Caribou River	04010101-576	4	5	5	13	14	13	11	32
Cascade River	04010101-590	5	3	20	12	10	5	3	33
Cross River	04010101-518			2	9	5			15
Devil Track River	04010101-520			13	9	8			17
East Split Rock River (East Branch Split Rock River)	04010102-A44			19	85	21			15
Encampment River	04010102-554	3	1	44	41	4	11	7	18
Flute Reed River	04010101-D32			76	64	16			16
Gooseberry River	04010102-502	3	4	48	5	24	76	6	33
Kimball Creek	04010101-532			4	14	4			15
Knife River	04010102-504	17	5	39	93	55	60	379	34
Manitou River	04010101-534			16	13	5			14
Onion River	04010101-535			12	22	9			15
Pigeon River	04010101-501			31	45	27			15
Poplar River	04010101-612	12	44	36	60	19	9		20
Poplar River	04010101-613	6	30	31	32	19	12	247	75
Skunk Creek	04010102-528			489	585	134	52	39	43
South Brule River	04010101-541			23	34	22			15
Split Rock River	04010102-519	4	3	29	27	26	23	4	33
Unnamed creek (Sugar Loaf Creek)	04010101-B62	1	3	5	1		118	11	17
Unidentified	04010101-D49			4	33	24			14
Unidentified	04010101-D53			4	25	15			15
Unidentified	04010101-D57			27	9	7			14
Unidentified	04010101-D59			26	26	97			14
Unidentified	04010102-508			120	141	94			18
Unidentified	04010102-540	4	23	76	1	288	411	613	17
Unidentified	04010102-544	57	47	213	352	52	123	98	26
Unidentified	04010102-545	51	580	489	1299	2132	242	242	27
Unidentified	04010102-549	15	7	54	98	53	53	48	35
Unidentified	04010102-555			18	49	35			15
Unidentified	04010102-698			96	30	34			18
Unidentified	04010102-C36			195		645		2	6

Table 4B. Lake Water Quality Data (MPCA EQuIS).

AUID	Lake Name	2005-2014 Growing Season Average			Total Phosphorus Data			Chlorophyll-a Data			Secchi Disk Depth		
		TP (ug/L)	Chl-a (ug/L)	SD (m)	N	Begin Year	End Year	N	Begin Year	End Year	N	Begin Year	End Year
16-0515-00	Ada			0.76							1	2008	2008
16-0359-00	Agnes	31	9.9	0.60	8	2007	2010	8	2007	2010	5	2010	2010
16-0320-00	Allen			2.29							1	2007	2007
16-0622-00	Alton	5	2.8	4.27	7	2014	2014	7	2014	2014	15	1976	2014
16-0204-00	Aspen	17	7.8	2.82	10	2011	2012	10	2011	2012	12	1991	2012
16-0486-00	Baker			0.91							1	2007	2007
16-0182-00	Ball Club	11	3.4	3.74	12	1986	2014	12	1986	2014	82	1983	2014
16-0350-00	Banadad			2.10							1	2013	2013
16-0358-00	Barker	21	4.6	0.94	8	2013	2014	8	2013	2014	9	1991	2014
16-0228-00	Bearskin	7	1.8	6.42	34	1979	2009	24	1995	2009	537	1976	2014
16-0344-00	Bigsby			1.22	4	2004	2004	4	2004	2004	12	2004	2006
16-0098-00	Binagami	16	5.0	2.23	8	2013	2014	8	2013	2014	8	2013	2014
16-0247-00	Birch	8	2.3	5.50	12	2008	2009	12	2008	2009	54	2005	2014
16-0383-00	Bouder	24	5.9	1.21	8	2013	2014	8	2013	2014	10	1980	2014
16-0044-00	Boys	12	2.2	2.36	5	2013	2013	5	2013	2013	5	2013	2013
16-0348-00	Brule			3.69	1	1982	1982				12	1983	2013
16-0477-00	Burnt			2.29							2	2004	2007
16-0397-00	Cam			4.11							1	2005	2005
16-0141-00	Caribou			3.96							6	1989	2007
16-0240-00	Caribou	8	6.6	1.93	8	2014	2014	8	2014	2014	15	1989	2014
16-0360-00	Caribou	17	7.7	2.08	223	1979	2014	198	1987	2014	1193	1976	2014
16-0346-00	Cascade	13	4.2	2.47	9	2013	2014	9	2013	2014	8	2013	2014
16-0033-00	Chester	7	2.4	3.20	6	1983	2007	1	2007	2007	9	1980	2007
38-0750-00	Christianson	26	5.7	0.96	13	1983	2012	9	2011	2012	11	1981	2012
16-0373-00	Christine	17	4.0	1.61	9	2013	2014	9	2013	2014	9	2013	2014
16-0365-00	Clara	20	4.3	2.53	4	2011	2011	8	2011	2012	21	2005	2012
16-0139-00	Clearwater	4	1.5	9.13	24	2003	2014	25	2003	2014	582	1973	2014
16-0454-00	Crescent	20	6.3	2.48	4	2011	2011	8	2011	2012	9	2005	2012
16-0150-00	Daniels			5.16							45	1990	2013
16-0435-00	Davis			3.40							2	1988	2013

AUID	Lake Name	2005-2014 Growing Season Average			Total Phosphorus Data			Chlorophyll-a Data			Secchi Disk Depth		
		TP (ug/L)	Chl-a (ug/L)	SD (m)	N	Begin Year	End Year	N	Begin Year	End Year	N	Begin Year	End Year
16-0253-00	Deer Yard	17	4.9	2.32	56	1998	2014	56	1998	2014	218	1991	2014
38-0415-00	Delay	15	6.5	2.34	8	2013	2014	8	2013	2014	9	2012	2014
16-0143-00	Devil Track	13	4.2	3.14	21	2005	2010	21	2005	2010	457	2000	2014
16-0029-00	Devilfish	12	3.8	2.70	9	2013	2014	9	2013	2014	10	1980	2014
38-0256-00	Divide	8	7.8	2.95	1	2007	2007	2	2007	2012	11	1988	2012
16-0232-00	Duncan			5.53							6	1993	2011
16-0146-00	East Bearskin	10	3.4	3.54	8	2010	2011	8	2010	2011	25	2009	2013
16-0042-00	East Pike			4.21							6	1989	2011
16-0145-00	East Twin	20	8.3	2.39	8	2013	2014	8	2013	2014	8	2013	2014
16-0096-00	Elbow	19	6.0	1.23	9	2010	2011	9	2010	2011	7	2010	2011
16-0023-00	Esther	10	3.8	2.61	11	1983	2014	10	2013	2014	134	1980	2014
16-0147-00	Flour	12	2.4	5.56	10	2003	2010	11	2003	2010	28	2003	2013
16-0639-00	Four Mile	32	7.0	1.75	4	2011	2011	8	2011	2012	8	2011	2012
16-0319-00	Gaskin			4.05							11	1989	2012
16-0077-00	Greenwood	6	2.1	5.06	23	1986	2014	26	1986	2014	26	1983	2014
16-0380-00	Gust	20	4.1	1.34	8	2010	2011	8	2010	2011	13	1980	2014
16-0314-00	Henson			2.39							6	1989	2011
38-0753-00	Highland	22	4.2	1.49	9	2011	2012	9	2011	2012	7	2011	2012
38-0251-00	Hoist			2.71							6	2008	2008
16-0366-00	Holly			1.50							79	2005	2013
16-0406-00	Homer	15	5.3	2.13	8	2013	2014	8	2013	2014	89	1974	2014
16-0241-00	Horseshoe			2.09							14	1989	2012
16-0227-00	Hungry Jack	8	2.6	5.42	71	1998	2014	73	1998	2014	214	1989	2014
16-0035-00	John			2.74							1	2006	2006
38-0242-00	Johnson	23	2.2	3.33	5	1996	2005	5	1997	2005	175	1989	2013
16-0402-00	Juno			2.59							1	2007	2007
16-0476-00	Kelly			1.83							6	1997	2007
16-0706-00	Kelso			1.37							2	2007	2008
16-0188-00	Kemo	8	3.6	4.26	8	2013	2014	8	2013	2014	54	1998	2014
16-0045-00	Kimball	12	3.0	3.72	5	2013	2013	5	2013	2013	5	2013	2013
38-0406-00	Lax	17	7.5	3.26	8	2011	2012	8	2011	2012	282	1989	2012

AUID	Lake Name	2005-2014 Growing Season Average			Total Phosphorus Data			Chlorophyll-a Data			Secchi Disk Depth		
		TP (ug/L)	Chl-a (ug/L)	SD (m)	N	Begin Year	End Year	N	Begin Year	End Year	N	Begin Year	End Year
16-0198-00	Leo	10	2.5	4.55	14	2003	2012	14	2003	2012	57	2001	2012
16-0382-00	Lichen	18	5.6	1.08	8	2013	2014	8	2013	2014	8	2013	2014
16-0142-00	Little Caribou			1.88							8	1989	2007
16-0347-00	Little Cascade	14	5.3	1.41	8	2013	2014	8	2013	2014	8	2013	2014
16-0026-00	Little John			5.49							1	2006	2006
38-0051-00	Little Wilson	10	4.9	2.17	8	2013	2014	8	2013	2014	8	2013	2014
16-0199-00	Lizz			2.80							4	1989	2007
16-0022-00	Lost	11	7.5	1.77	4	2014	2014	4	2014	2014	3	2014	2014
16-0705-00	Lujenida			1.07							1	2007	2007
16-0027-00	McFarland			5.12							46	1989	2013
16-0307-00	Meeds			2.10							1	2011	2011
16-0391-00	Mid Cone			2.95							3	1990	2013
16-0046-00	Mink	14	3.6	3.10	5	2013	2013	5	2013	2013	9	2007	2013
16-0225-00	Misquah			2.59							1	2007	2007
16-0368-00	Mistletoe	15	3.9	1.10	8	2013	2014	8	2013	2014	8	2013	2014
16-0043-00	Moose			5.49							4	2005	2011
16-0093-00	Mountain			6.51							7	2005	2010
16-0389-00	Mulligan			3.35							2	1990	2005
16-0104-00	Musquash	7	2.0	3.46	8	2013	2014	8	2013	2014	9	2007	2014
38-0033-00	Ninemile	9	6.9	2.08	8	1996	2014	9	1996	2014	6	1980	2014
16-0036-00	North Fowl			2.29							2	2007	2009
16-0456-00	North Temperance			4.12							5	1987	2013
16-0089-00	Northern Light	14	0.9	1.29	4	2008	2008	4	2008	2008	4	2008	2008
16-0353-00	Omega			3.76							7	1990	2011
16-0298-00	One Island			1.40							1	2013	2013
16-0032-00	Otter			6.10							1	2012	2012
16-0478-00	Peterson			2.02							4	2004	2011
16-0252-00	Pike	9	2.1	5.65	20	1998	2010	16	1998	2010	271	1989	2012
16-0318-00	Pillsbery			3.00							1	2010	2010
16-0041-00	Pine			5.89							6	1989	2007
16-0194-00	Pine	6	3.0	3.58	4	2014	2014	4	2014	2014	4	2014	2014

AUID	Lake Name	2005-2014 Growing Season Average			Total Phosphorus Data			Chlorophyll-a Data			Secchi Disk Depth		
		TP (ug/L)	Chl-a (ug/L)	SD (m)	N	Begin Year	End Year	N	Begin Year	End Year	N	Begin Year	End Year
16-0108-00	Pine Mountain	9	2.2	2.48	8	2013	2014	8	2013	2014	8	2013	2014
16-0239-00	Poplar	10	3.7	3.11	36	2003	2014	36	2003	2014	173	1989	2014
16-0174-00	Ram			2.44							2	2004	2007
16-0643-00	Richey	29	8.0	1.40	8	2013	2014	8	2013	2014	10	2007	2014
16-0200-00	Road			1.60							7	2001	2005
16-0230-00	Rose			5.60							8	1993	2011
16-0137-00	Rove			4.65							4	2007	2009
16-0299-00	Rush			2.30							1	2013	2013
16-0496-00	Sawbill			2.67							16	1976	2010
16-0495-00	Smoke			1.58							6	1997	2010
16-0244-00	South			5.80							6	2004	2013
16-0457-00	South Temperance			3.45							4	1987	2013
16-0202-00	Squint			2.59	1	1983	1983				4	1980	2005
16-0405-00	Star	19	9.2	1.27	8	2013	2014	8	2013	2014	9	2007	2014
38-0744-00	Stewart	17	4.5	2.97	16	1979	2011	8	2011	2012	490	1979	2014
16-0663-00	Sunhigh			0.91							1	2008	2008
16-0268-00	Swan			3.20							1	2007	2007
16-0384-00	Tait	15	4.0	2.37	12	2003	2011	19	2003	2013	140	1993	2013
16-0654-00	Timber			1.70							1	2010	2010
16-0019-00	Tom	13	4.3	2.73	8	2010	2012	8	2010	2012	171	1976	2014
16-0345-00	Tomash			1.12							3	2005	2005
16-0645-00	Toohey	23	6.0	1.01	8	2013	2014	8	2013	2014	8	2013	2014
16-0049-00	Trout	7	1.4	5.47	33	1986	2014	41	1986	2014	70	1984	2014
16-0156-00	Two Island	11	2.5	2.58	4	2014	2014	4	2014	2014	11	2004	2014
16-0412-00	Upper Cone			2.40							7	1981	2013
16-0409-00	Vern			1.98							1	2007	2007
16-0224-00	Vista			2.90							2	2004	2006
16-0349-00	Wanihigan			3.35							2	1990	2005
16-0248-00	Ward	18	3.6	2.03	11	2007	2011	11	2007	2011	8	2010	2011
16-0138-00	Watap			4.85							6	1991	2010
16-0520-00	Weird			1.40							1	2013	2013

AUID	Lake Name	2005-2014 Growing Season Average			Total Phosphorus Data			Chlorophyll-a Data			Secchi Disk Depth		
		TP (ug/L)	Chl-a (ug/L)	SD (m)	N	Begin Year	End Year	N	Begin Year	End Year	N	Begin Year	End Year
16-0398-00	Wench			3.80	3	1981	1984				3	1981	2013
16-0086-00	West Pike			6.25							4	1989	2007
16-0186-00	West Twin	10	4.0	3.25	9	2011	2012	9	2011	2012	12	1990	2012
16-0410-00	Whack			1.37							1	2007	2007
16-0369-00	White Pine	18	5.4	1.75	8	2013	2014	8	2013	2014	20	2005	2014
38-0060-00	Whitefish	11	3.6	4.25	4	2011	2011	8	2011	2012	7	2011	2012
38-0047-00	Wilson	13	4.0	4.55	16	1986	2011	14	1986	2011	52	1984	2013
16-0354-00	Winchell			4.73							10	1989	2011
16-0664-00	Wonder			1.22							1	2008	2008

Groundwater Resource Data

Groundwater Resource Data includes groundwater/well water quality data that is available from the MPCA[13]. MNDNR developed a map showing statewide groundwater contamination susceptibility[14] based on aquifer materials, recharge potential, soil materials, and vadose zone materials. MNDNR also developed maps of the groundwater provinces of MN based on bedrock and glacial geology[15]. Groundwater level data is available from the MN Climatology Working Group[7]. MDH provides maps and data for wellhead protection areas and the county well index[16]. Efforts are underway to update the NWI statewide and the NE region of the state is currently being updated. At this time draft data has been completed for all of Cook County and most of Lake County, which includes the entire LSN watershed. However, this data is still in draft format and is available online with the correct password at DNR's online NWI update viewer[17].

Stormwater Systems, Drainage Systems and Control Structures

There are 9 communities with significant development within the watershed that all have stormwater infrastructure. None of these communities have yet mapped these stormwater management controls, which has been identified as a need within the implementation plan and should be included as a component to each respective stormwater master plan. There are no judicial ditch systems within the watershed.

Pollutant Sources and Permitted Wastewater Discharges

NPDES permitted discharges located in the project area were requested from the MPCA Data Desk (DataDesk.MPCA@state.mn.us) and will be incorporated into the LWRI once it is received. Until this information is received, it can be accessed through the MPCA website from "What's in my Neighborhood?" (http://pca-gis02.pca.state.mn.us/wimn2/index.html) and Petroleum Remediation Program (PRP) Maps Online (http://pca-gis02.pca.state.mn.us/prp/index.html), as well as other sources such as the Minnesota Geospatial Commons[18][19]. Data can be organized by discharger type, minor watershed, receiving water body type and name, among additional attributes. [20][2] Data for SSTS can be obtained through Lake and Cook Counties[21]. These datasets related to permitted facilities, permitted dischargers, and pollutant sources will be synthesized and summarized in the 2017/2018 LSS and LSN HUC 8 TMDL and WRAPS reports.

Fish and Wildlife Habitat

The Lake Superior North Watershed contains an immense diversity of plants and wildlife, including iconic northern wildlife species such as timber wolf, moose, black bear, lynx, deer, and loon. The watershed includes the Boundary Waters Canoe Area Wilderness (BWCAW) and is adjacent to Quetico Provincial Park, which is a several million acre wildlife migration corridor. Large portions of this watershed contain old-growth conifer forests and unique wildflower species. With 155 nesting bird species, the Superior National Forest has the greatest number of breeding birds of any national forest. Many of the 78 fish species within Lake Superior seasonally utilize the Lake Superior North Watershed for spawning and nursery habitat.

84 MNDNR Species in Greatest Conservation Need (SGCN) are known or predicted to occur within the watershed. These SGCN include 25 species that are federal or state endangered, threatened, or of special concern. The table on the MNDNR website[22], SGCN by Taxonomic

Group, displays by taxonomic group the number of SGCN that occur in the subsection, as well as the percentage of the total SGCN set represented by each taxon. For example, 10 mammal SGCN are known or predicted to occur in the watershed, approximately 46% of all mammal SGCN in the state.

Data for fish and wildlife habitat is available primarily from the MNDNR interactive maps[23]. Specifically, GIS data is available for Wildlife Management Areas, Wildlife Refuge Inventory, Designated Wildlife Lakes, Trout streams and lakes, and Moose Range. Data for rare and endangered species as well as Natural Heritage Inventory Data can be obtained from MNDNR.

Water-Based Recreation Areas and Land Ownership

For water based recreation areas, data is available through the MN Geospatial Commons[2] for state aquatic management areas, state administered lands, wildlife management areas, state parks, BWCA boundary, MN Water Trails, Wild and Scenic Rivers, and public water access sites. Land ownership and generalized land ownership data are available for both Cook and Lake Counties.

Land Use and Public Utility Services

Land use data can be obtained from the National Land Cover Database (NLCD) Land Cover data available at MN Geospatial Commons[2]. Roadways are also included in land cover and can be obtained from MNDOT. Two reports, North Shore Management Board Node Definition for Comprehensive Plans and Two Harbors Waterfront Planning Report, also include information related to land use. Specifically, these reports address and identify areas for development. Active water use permit information can be accessed online through the DNR Site-Specific Water Use Database (SWUDS)[24] database which can be categorized according to municipality, permitted water use type, among additional attributes. All permitted municipal waterworks within these records are Lake Superior withdrawal.

Unique Features and Scenic Areas

Data for unique features and scenic areas include SNAs, Natural Area Registry, Wild and Scenic Rivers, MBS Sites of Biodiversity Significance, all of which is available through the MN Geospatial Commons[2]. Natural Heritage Inventory data was requested as part of the zonation process.

Gap Analysis

In conducting the LWRI and through the MNDNR led Zonation Process, the following gaps in the data collection were noted. This has implications for components of potential impacts to Land and Water Resources that will not be considered in the current planning process:

- *No current wetland inventory data was available*
- *Gravel resources have not been extensively cataloged for the LSN watershed.*
- *The effect of timber harvesting on watershed hydrology, wildlife and water resources was not fully evaluated*
- *The effect of heavy industry on aquatic resources in the LSN watershed was not fully evaluated*
- *The location of existing invasive species or priority locations for future infestations was not fully evaluated*

The data gaps not identified in the LWRI are a result of the current planning efforts mentioned in Section 1.1 *Planning Efforts in Progress*. The MPCA WRAPS process, MN Geologic Atlas, and DNR wetland inventory will yield invaluable datasets to be included in the LWRI upon their completion.

Datasets Referenced

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12. Minnesota Department of Natural Resources (MDNR). Minnesota DNR GIS Website [Internet]. 2015. Available from: https://gisdata.mn.gov/
13. Minnesota Pollution Control Agency (MPCA). Groundwater Monitoring and Assessment [Internet]. [cited 2015 Aug 31]. Available from: http://www.pca.state.mn.us/index.php/water/water-types-and-programs/groundwater/groundwater-monitoring-and-assessment/index.html
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15. Minnesota Department of Natural Resources (MDNR). Groundwater Provinces [Internet]. [cited 2015 Aug 31]. Available from: http://dnr.state.mn.us/groundwater/provinces/index.html

16. Minnesota Department of Health (MDH). Source Water Protection Geospatial Information [Internet]. [cited 2015 Aug 30]. Available from: http://www.health.state.mn.us/divs/eh/water/swp/maps/index.htm

17. Minnesota Department of Natural Resources (MDNR). Draft NWI Update Viewer [Internet]. Available from: http://arcgis.dnr.state.mn.us/gis/nwi/

18. Minnesota Pollution Control Agency (MPCA). MPCA Discharger Data Desk Request for LSN [Internet]. Available from: ftp://files.pca.state.mn.us/pub/dmr/

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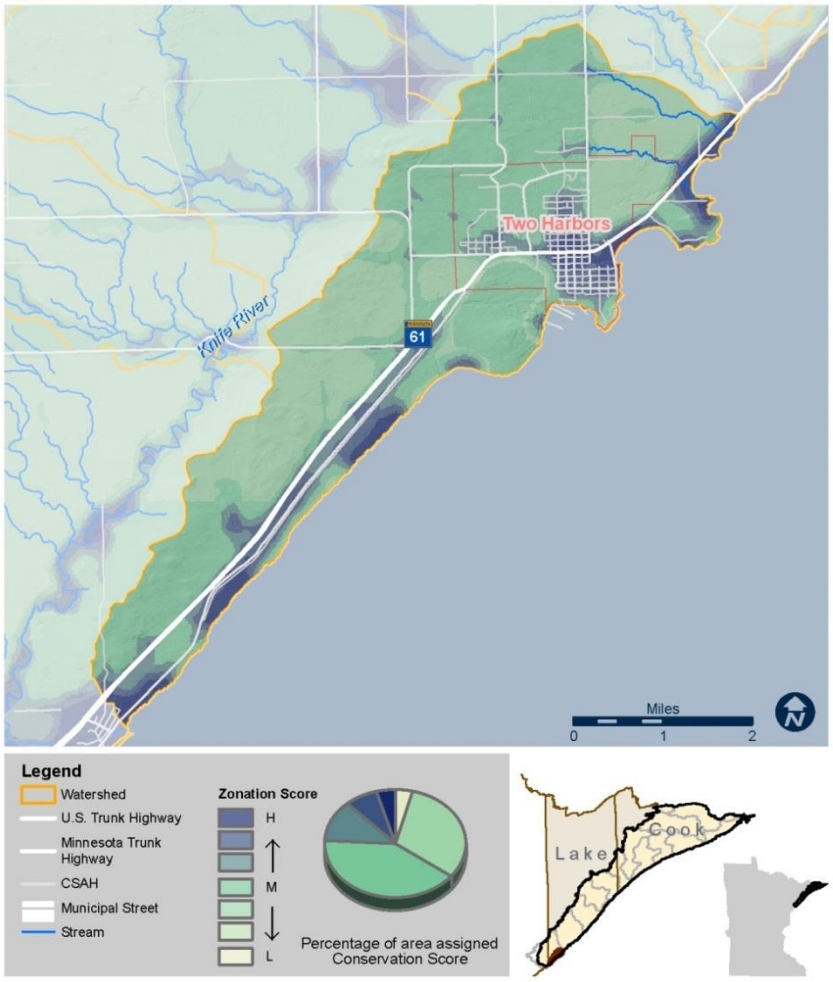
Appendix C.
Priority Area Fact Sheets

Two Harbors



Description of Priority Area:

Two Harbors is the Lake County seat. With a population of 3,745, it is largest urban node in the Lake Superior North watershed. The Two Harbors Priority Area is 10,457.5 acres in size and contains the following surface water feature: Skunk Creek.

Specific Concerns Contributing to Priority Area Designation:

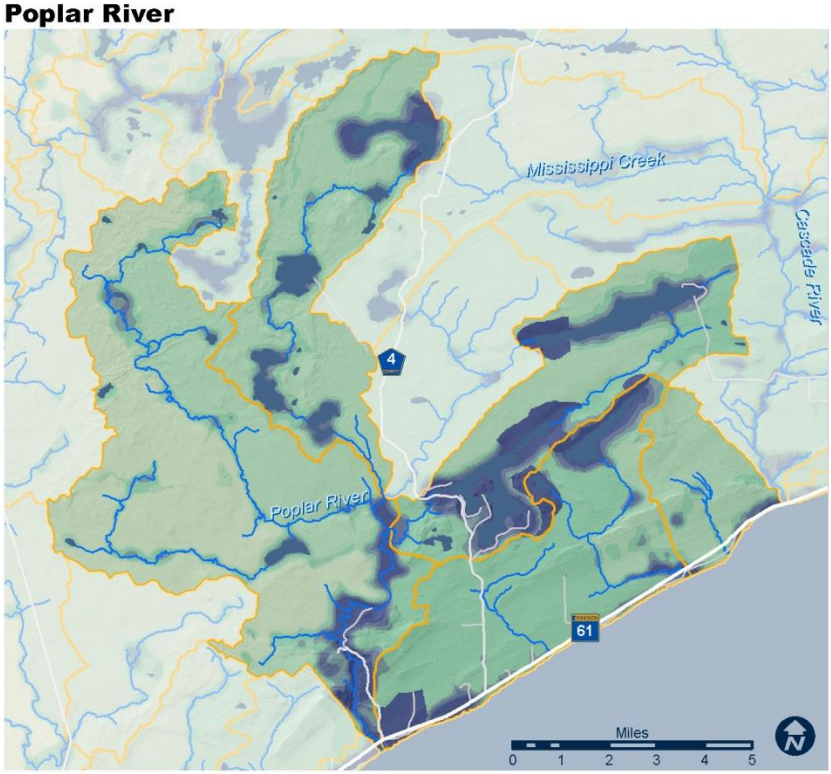
- Skunk Creek - Impaired for turbidity, *E. coli*, and biological assessments.
- Aging and failing septic systems in developed rural areas of Two Harbors present challenges for river, lake, and groundwater protection and management.
- The Two Harbors area has significant development in shoreland, riparian, and roadway areas, with the potential for increasing rates of development over the next 10 years.

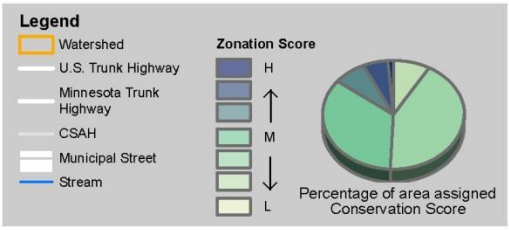
Category	Priority Concern	CS*	Input Provided	Source
Challenges	Stormwater Management	⌂	Golf Course	Advisory Group
			Platted for development	Advisory Group
			Erosion	Public Comment
			From Tower South, High Slope, TH to the West	Advisory Group
	Impaired Waters			
	SSTS		Failing septic systems into ditch (Larsmont Area)	Public Comment
			>30 SSTS Systems Planned	Advisory Group
	Historic Land Use Practices		Old city dump fills creek bed	Public Comment
	Timber Harvesting	*NA*		
	Aggregate Materials	*NA*		
	Construction & Industrial Operati+ons	*NA*		
	Stream Connectivity			
	Invasive Species	⌂		
	Climate Change	⌂		
Resource Protection	Priority Waters		Shoreline Buffer	Public Comment
	Wetland Management			
	Unique/High Value Resources			
Stewardship	Data Collection	⌂		
	Education and Outreach	⌂		

* Conservation Score - Ranking assigned to zonation inputs by priority concern (=low, = medium low, =medium high, = high).

⌂ = indicates this concern triggered by urban nodes

Poplar River





Description of Priority Area:

The Poplar River Watershed covers an area of approximately 114 square miles. Poplar River is approximately 25.5 miles in length, begins in the Boundary Waters Canoe Area and ends at Lake Superior. Average river gradient of the upper portion of the river is 1% with an increase of nearly 4% in the lower portion of the river. The lower portion of the river is developed with residential and commercial developments including a golf course and several resorts. Lakes within the Poplar River watershed include Tait Lake, Pike Lake, and Caribou Lake.

Specific Concerns Contributing to Priority Area Designation:

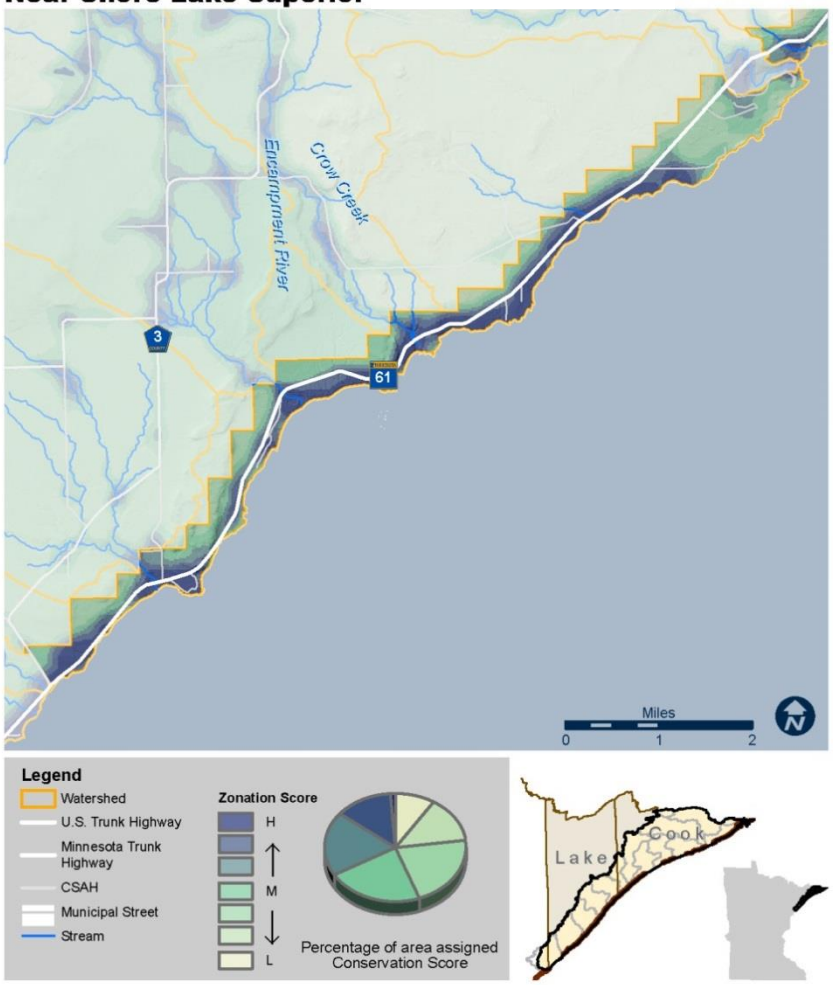
- Development along the river within the water pipe and ski hill related to increased erosion & sediment loading.
- Shallow sub-surface sewage treatment systems are a concern for nutrient loading into the river.

Category	Priority Concern	CS*	Input Provided	Source
Challenges	Stormwater Management	⌂	61 culverts divert water to streams; erosion	Public Comment (3x)
			Development; Water Pipe; Golf Course, Ski Hills	Advisory Group (3x)
	Impaired Waters			
	SSTS		(Issues with) Old SSTS; Wetlands; Shallow	Advisory Group (2x)
	Historic Land Use Practices			
	Timber Harvesting	NA		
	Aggregate Materials	NA	Gravel Pit	Public Comment
	Construction and Industrial Operations	NA		
	Stream Connectivity			
	Invasive Species	⌂		
	Climate Change	⌂		
Resource Protection	Priority Waters		Good well water; Well going bad	Public Comment (2x)
			Lutsen Crk; Stream of concern	Public Comment (2x)
			Spruce Creek, IBI Scores a Bit Low	Advisory Group
			Shoreline Buffer (Deer Yard/Poplar)	Public Comment (2x)
			Appropriations, hydrology, hab. loss (Deer Yard/ Poplar)	Public Comment (2x)
			Beaver dam; shallow (Tait); Sentinel Lake	Public Comment (3x)
	Wetland Management		Wetland Marsh (Tait)	Public Comment
	Unique/High Value Resources		Well Protected; Priority for Protect./ Cons.	A.G. (4x)/P.C.
			Bigsby/Caribou Creek; Spring	A.G. (2x)/P.C.
Stewardship	Data Collection	⌂		
	Education and Outreach	⌂		

* Conservation Score - Ranking assigned to zonation inputs by priority concern (=low, = medium low, =medium high, = high).

⌂ = indicates this concern triggered by urban nodes

Near Shore Lake Superior



Description of Priority Area:

The Near Shore Lake Superior area coincides with the North Shore Management Board's area of interest. Land within this priority spatial area has been extensively developed for both residential and commercial use and there continues to be strong potential for future development. This area is where migratory fish populations access north shore streams for spawning.

Specific Concerns Contributing to Priority Area Designation:

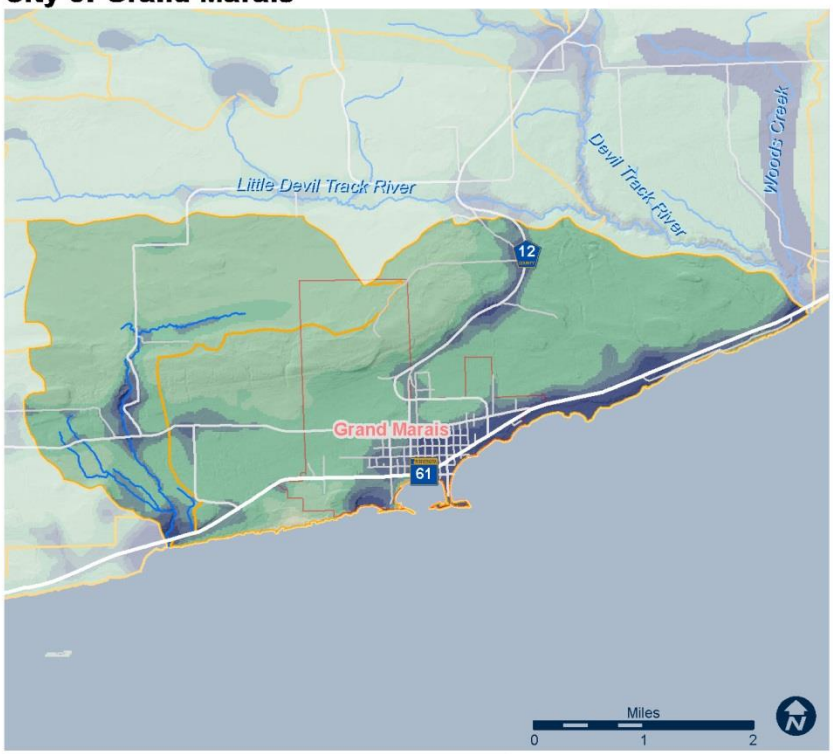
- Shoreline erosion and mass wasting events associated with bluffs and erosion hazard zones.
- Stream connectivity issues associated with road and private access crossings of rivers, streams, and unnamed drainages.
- Issues with septic system compliance & performance.
- Rare and threatened species and sites of biological significance (e.g. areas hosting sub-arctic plants in microclimates).

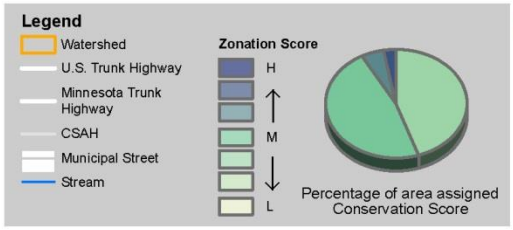
Category	Concern	CS*	Input Provided	Source
Challenges	Stormwater Management		Golf Course, Ski Hills; Resort	Advisory Group (2x)
			Culvert issues, Bank Fails on Chicago Bay Rd.	Public Comment (4x)
			Erosion problems (esp. Kimball Creek)	Public Comment (8x)
			High turbidity in Devil Track>Poplar River	Public Comment
			Road salt application & impacts to Knife river	Public Comment
	Impaired Waters		Monitor for fibers and toxins	Public Comment
	SSTS			
	Historic Land Use Practices		Reserve mining dump	Public Comment
	Timber Harvesting	NA		
	Aggregate Materials	NA		
	Construction and Industrial Operations	NA	Proposed tankhouse develop. on lakeshore	Public Comment
	Stream Connectivity			
	Invasive Species	NA		
	Climate Change	NA		
Resource Protection	Priority Waters		TH Source Water 2,000' Radius of Concern	Advisory Group
			Na in Wells; Salt Water	Public Comment (2x)
			Organics affect GM Drinking Water	Advisory Group
			Cold water estuary; Trout; Steelhead	Public Comment (3x)
			Otis Creek blows out; Stream of Concern	Public Comment (3x)
			Buffer; appropriations, hydrology, hab. loss	Public Comment (2x)
	Wetland Management		Mosaic Wetlands	Advisory Group
	Unique/High Value Resources		Restore Otis; Protect Cascade WD	Advisory Group/ Public Comment
Stewardship	Data Collection	NA	More info needed; FR monitor rose in winter	Public Comment (2x)
	Education and Outreach	NA		

* Conservation Score - Ranking assigned to zonation inputs by priority concern (=low, = medium low, =medium high, = high).

= indicates this concern triggered by urban nodes

City of Grand Marais





Description of Priority Area:

The City of Grand Marais is the Cook County seat. The population of the city is 1,351. The city is nearly at the level of Lake Superior an elevation of 617 feet. The watershed is comprised of mostly privately owned land. The major surface water features: Lake Superior, Devil Track River, and Fall River.

Specific Concerns Contributing to Priority Area Designation:

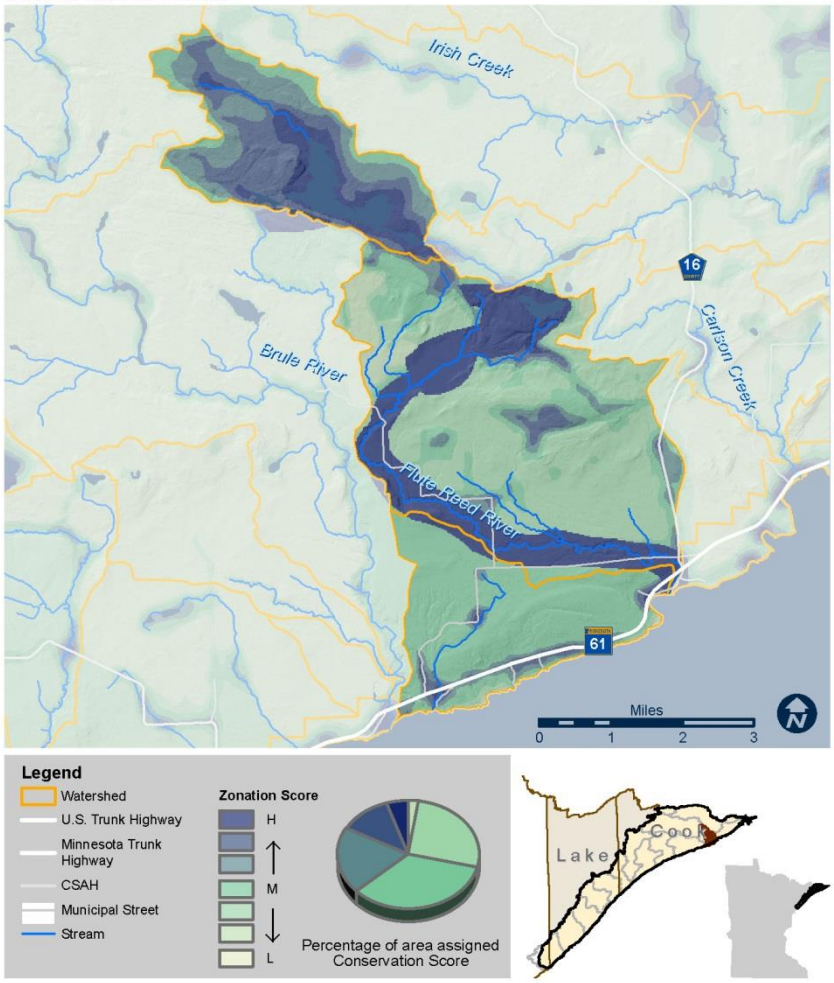
- Stormwater management within the watershed has an impact on surface water through runoff into Lake Superior.
- Surface water intake is a concern within the watershed as it relates to stormwater runoff pollution.

Category	Priority Concern	CS*	Input Provided	Source
Challenges	Stormwater Management	⌂	Road changed run off patterns, changing forest ecology/erosion; Poor culvert	Public Comment (3x)
			Kimball Creek - turbid plume to(?) heavy rain	Public Comment (2x)
			Surface Water Intake	Advisory Group
			Drainage between tire auto and car wash should be cleaned up	Public Comment
			Zipline, steep slope	Public Comment
	Impaired Waters	NA		
	SSTS			
	Historic Land Use Practices			
	Timber Harvesting	NA		
	Aggregate Materials	NA		
	Construction and Industrial Operations	NA	Too fragile for development	Public Comment (2x)
	Stream Connectivity			
	Invasive Species	⌂		
	Climate Change	⌂		
Resource Protection	Priority Waters		Shoreline Buffer; Stream of Concern	Public Comment (3x)
	Wetland Management		Wetland Fen	Public Comment (2x)
	Unique/High Value Resources			
Stewardship	Data Collection	⌂	More info needed	Public Comment
	Education and Outreach	⌂		

* Conservation Score - Ranking assigned to zonation inputs by priority concern (=low, = medium low, =medium high, = high).

⌂ = indicates this concern triggered by urban nodes

Flute Reed River



Description of Priority Area:

The Flute Reed River watershed is 16.4 square miles and 10,486 acres. The watershed is the most privately owned and developed watershed in the County. The river is 9 miles in length, spilling into Lake Superior. The forests within the watershed are mostly second and third growth. A watershed group is active as stewards within the watershed.

Specific Concerns Contributing to Priority Area Designation:

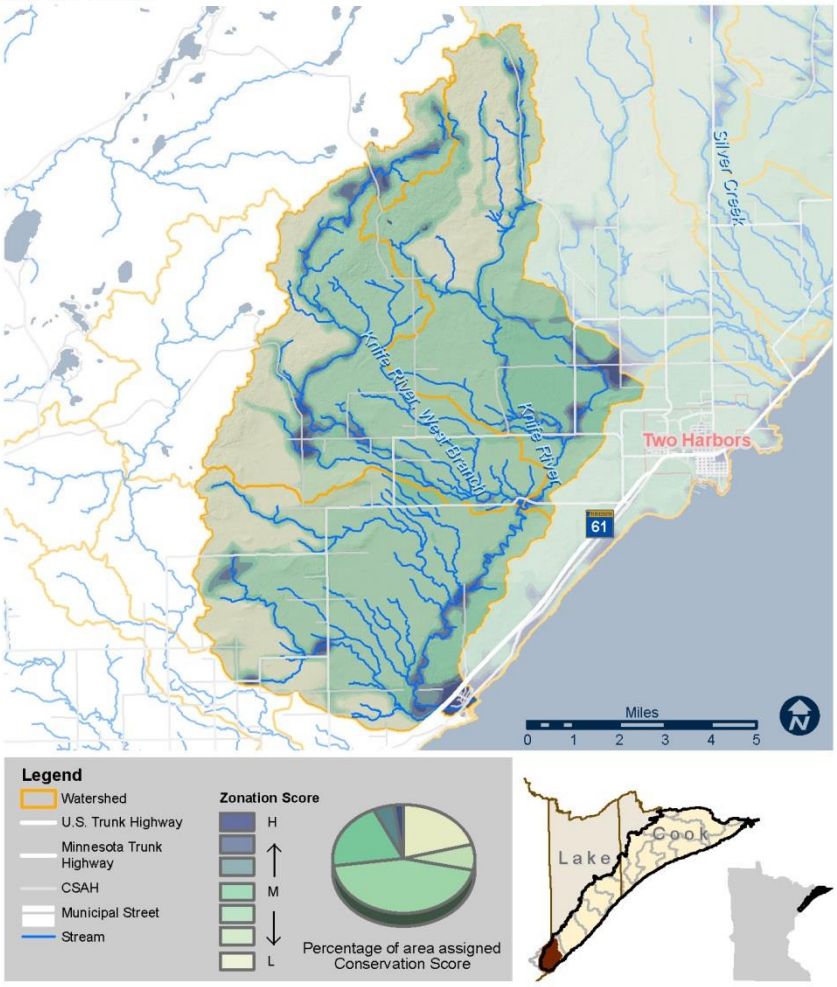
- Increased development pressure will impact changes on landuse.
- A TMDL for sedimentation is in the process of being developed for the Flute developed Reed River.

Category	Priority Concern	CS*	Input Provided	Source
Challenges	Stormwater Management	⌂	Bank failure/culvert on Chicago Bay Road	Public Comment (3x)
			Erosion along Flute Reed, Red Clay	Public Comment (3x)
			Flute Reed Impaired	Public Comment (2x)
	Impaired Waters			
	SSTS		Septics	Public Comment
	Historic Land Use Practices			
	Timber Harvesting	NA		
	Aggregate Materials	NA		
	Construction and Industrial Operations	NA	Development Stress / Create of enhance buffer	Public Comment
	Stream Connectivity			
	Invasive Species	⌂		
	Climate Change	⌂		
Resource Protection	Priority Waters		Otis Creek; Buffer; Plant trees (Hovland)	Public Comment (3x)
	Wetland Management			
	Unique/High Value Resources		Restoration of High Value River	Advisory Group
Stewardship	Data Collection	⌂	Flute Reed monitor rising this winter	
	Education and Outreach	⌂		

*Conservation Score - Ranking assigned to zonation inputs by priority concern (=low, = medium low, =medium high, = high).

⌂ = indicates this concern triggered by urban nodes

Knife River



Description of Priority Area:

The Knife River Watershed is approximately 86 square miles. The Knife River is a designated trout stream impaired for turbidity. The Knife River hosts nearly half of the total available cold water stream habitat for migratory steelhead and salmon species on the Minnesota side of the Lake Superior Basin, and has long been a focus of agency and non-profit efforts directed at maintaining an exemplary fishery.

Specific Concerns Contributing to Priority Area Designation:

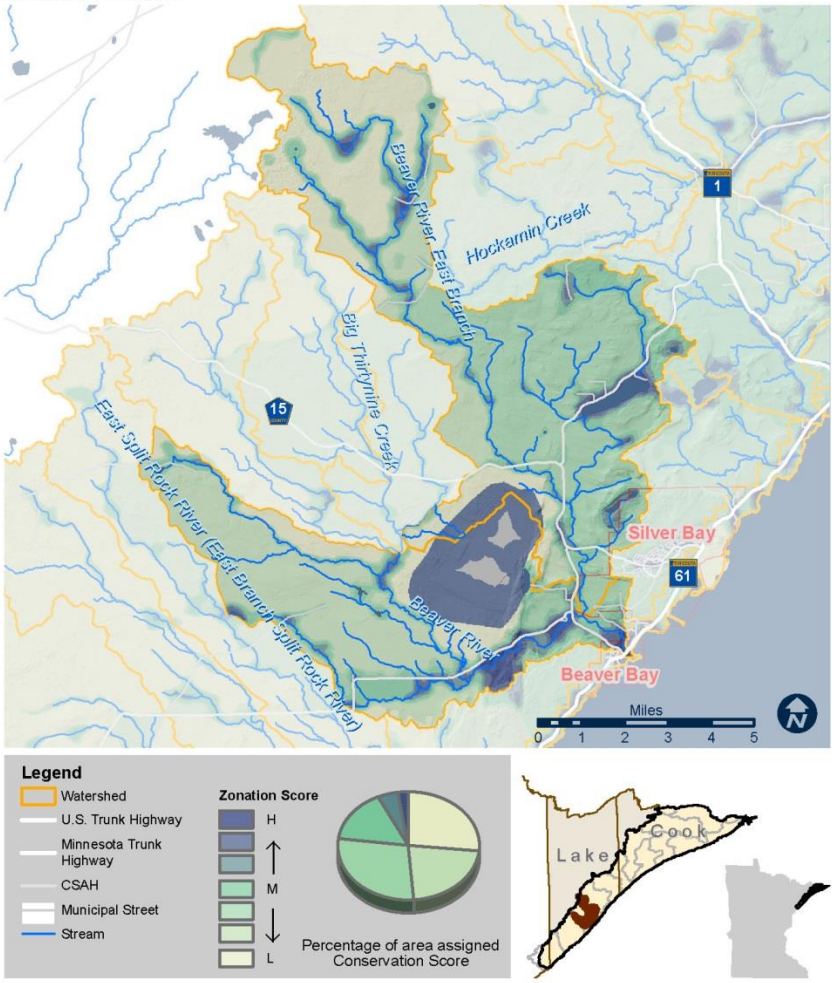
- Failing bluffs and banks on the river system.
- Forestry management activities related to riparian areas.
- Roads and associated stream crossings impact connectivity.
- high density of septic systems exists in the watershed,
- Area identified as susceptible to groundwater contamination.
- Hosts several areas of rare and threatened species.

Category	Priority Concern	CS*	Input Provided	Source
Challenges	Stormwater Management	⌂	Unstable, erosion	Public Comment (3x)
	Impaired Waters		Large Slump; Unstable, high bank erosion	Public Comment (3x)
	Historic Land Use Practices		Corn Field; Clover Valley School; TH Airport	Public Comment (2x)/Advisory Group
			Old gas tank site possible leakage	Public Comment
			Old cinder pit near parking area washes out	Public Comment
	Timber Harvesting	NA	LSSA Tree Planting	Public Comment
	Aggregate Materials	NA	Gravel Deposit (with discharged sediments)	Public Comment (4x)
	Construction and Industrial Operations	NA		
	Stream Connectivity			
	Invasive Species	⌂		
	Climate Change	⌂		
Resource Protection	Wetland Management		Destroying wetlands; Old Wetland Violation	Public Comment (3x)
			Critical wetland to be preserved	Public Comment
			Black Ash/Wetlands Bank	Advisory Group (3x)
	Unique/High Value Resources		Loss of Moose, waterfowl, [herptile] habitat	Public Comment
Stewardship	Education and Outreach	⌂		

*Conservation Score - Ranking assigned to zonation inputs by priority concern (=low, = medium low, =medium high, = high).

⌂ = indicates this concern triggered by urban nodes

Beaver River



Description of Priority Area:

The Beaver River Watershed covers an area of approximately 123 square miles. Beaver River is a designated trout stream impaired for turbidity and non-supporting of aquatic life. Both the river and groundwater resources within the watershed have been identified as vulnerable due to development and industrial pressures in the watershed. The watershed hosts areas of biological significance as well as rare and threatened species.

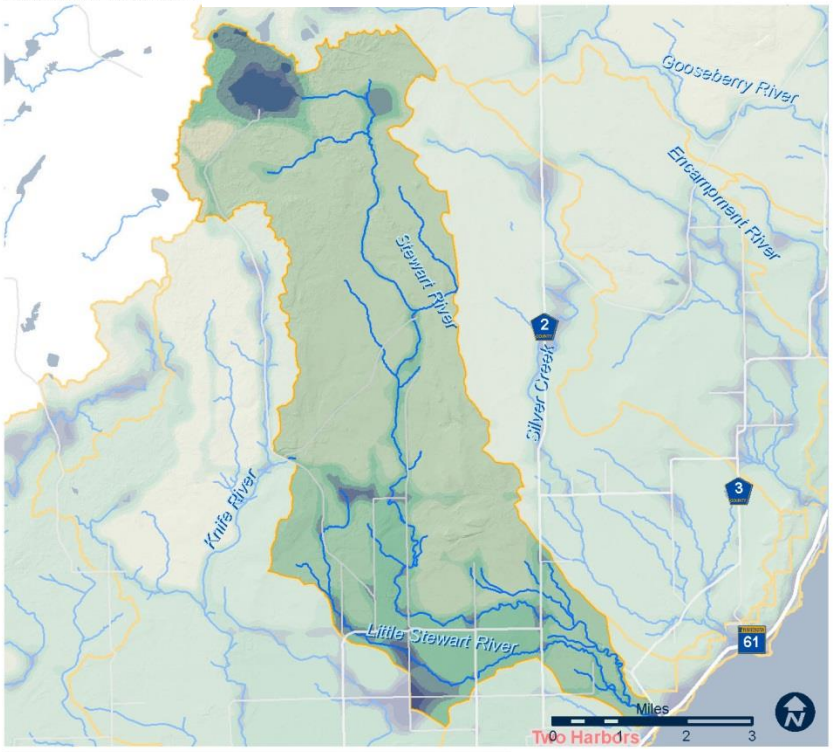
Specific Concerns Contributing to Priority Area Designation:

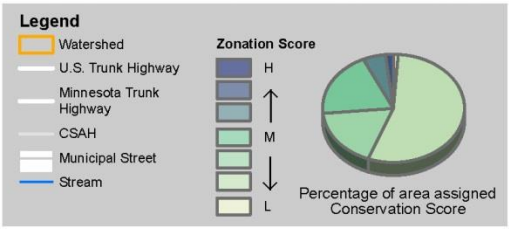
- Impaired for turbidity and non-supporting of aquatic life.
- Forestry management activities in riparian areas.
- Managing and enhancing roads and associated stream crossings to ensure connectivity within the watershed.
- Ensure protection and integrity of groundwater system within the watershed.

Category	Priority Concern	CS*	Input Provided	Source
Challenges	Stormwater Management	⌂	Development; Box culvert; Golf Course	Public Comment (4x)
			MP7 tailings basin, 7.5 million gal/day	Public Comment
			Beaver Bay Waste Water	Advisory Group
			Tailings Ponds and Outlet	Advisory Group
	Impaired Waters		Monitor for fibers and toxins	Public Comment (3x)
	SSTS			
	Historic Land Use Practices			
	Timber Harvesting	NA		
	Aggregate Materials	NA		
	Construction and Industrial Operations	NA		
	Stream Connectivity			
	Invasive Species	⌂		
	Climate Change	⌂		
Resource Protection	Priority Waters		Stream diversion; Shoreline buffer	Public Comment (2x)
			Native brook trout waters? 15 years ago	Public Comment
	Unique/High Value Resources			
	Wetland Management			
Stewardship	Data Collection	⌂		
	Education and Outreach	⌂		

* Conservation Score - Assigned to zonation inputs by priority concern (=low, = medium low, =medium high, = high).
⌂ = indicates this concern triggered by urban nodes

Stewart River





Description of Priority Area:

The Stewart River watershed is a designated trout stream which flows into Lake Superior near the source water intake for the City of Two Harbors. Significant effort has been made by agencies and non-profits to restore and protect the historically-productive fishery within the watershed. The rural land within the watershed has been developed resulting in a patchwork of forested, cleared, and developed land.

Specific Concerns Contributing to Priority Area Designation:

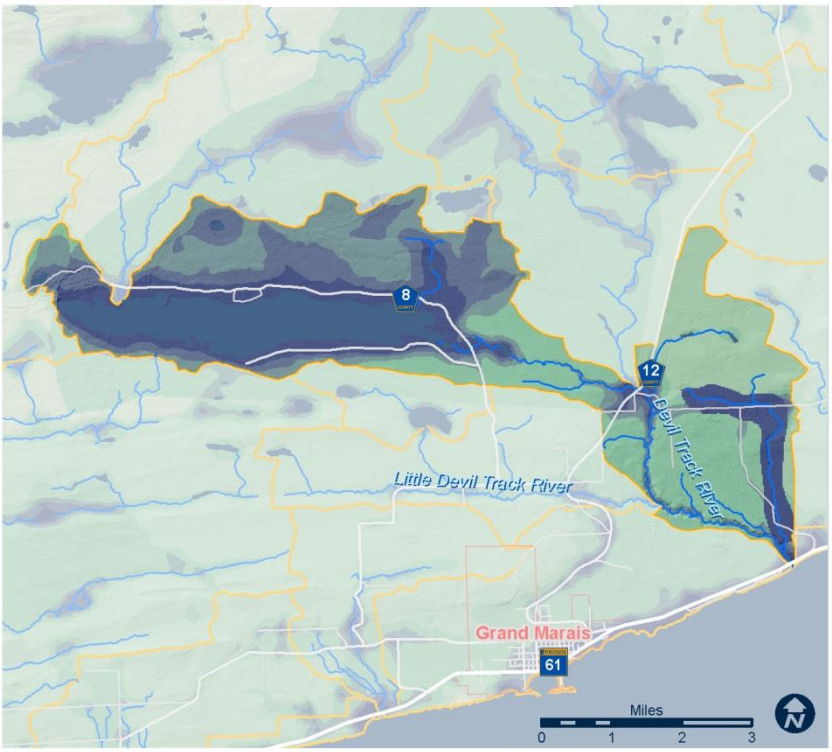
- Maintain and enhance the quality of water discharged from the system to ensure long-term protection of Two Harbors source water.
- Work with landowners to increase responsible land use practices and reforestation efforts.
- Ensure that sediment sources to the river do not lead to future water impairments.

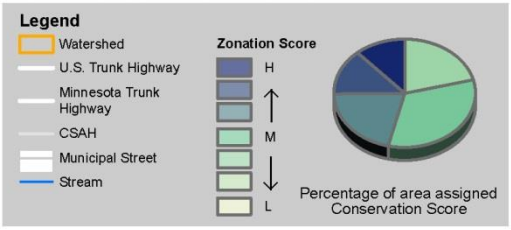
Category	Priority Concern	CS*	Input Provided	Source
Challenges	Stormwater Management	⌂		
	Impaired Waters			
	SSTS			
	Historic Land Use Practices			
	Timber Harvesting	NA		
	Aggregate Materials	NA		
	Construction and Industrial Operations	NA	Road crossings	Public Comment
	Stream Connectivity			
	Invasive Species	⌂		
	Climate Change	⌂		
Resource Protection	Priority Waters		Native trout	Public Comment
			Shoreline Buffer	Public Comment
	Wetland Management			
	Unique/High Value Resources		Wood / bark residue from "decades ago" sawmill on ice. Posts still remain	Public Comment
Stewardship	Data Collection	⌂		
	Education and Outreach	⌂		

* Conservation Score - Ranking assigned to zonation inputs by priority concern (=low, = medium low, =medium high, = high).

⌂ = indicates this concern triggered by urban nodes

Devils Track Lake





Description of Priority Area:

The majority of the lakeshed surrounding Devil Track Lake is privately owned. There is an old dam located at the outlet of the lake which discharges to Devil Track River. Woods Creek is also very developed and has been altered on individual properties through various land use practices. Devil Track River flows into Lake Superior and is 8.7 miles in length. Major water features include Devil Track Lake, Devil Track River, and Woods Creek.

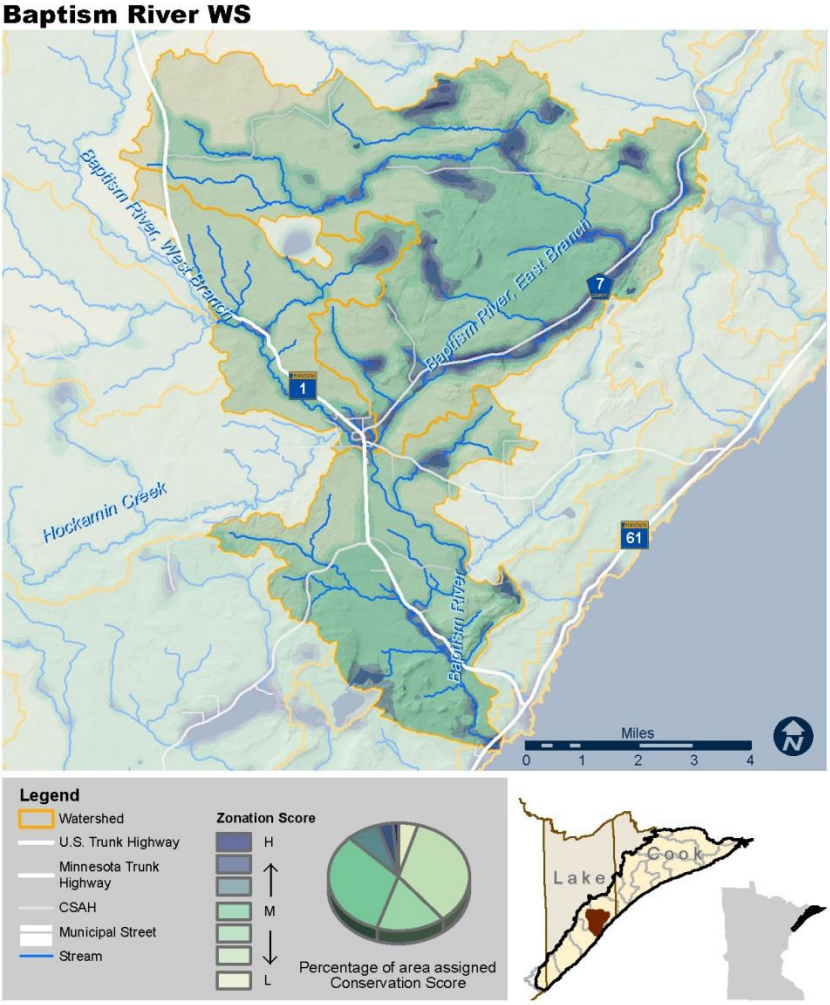
Specific Concerns Contributing to Priority Area Designation:

- Impacts related to land use changes from former logging activity (e.g. erosion, development, culverts, and agriculture).
- Gravel mining found in several locations throughout the watershed.

Category	Priority Concern	CS*	Input Provided	Source
Challenges	Stormwater Management	⌂	Ag Pressure; Irrigation	Advisory Group/Public Comment
			Eskers, Outwash; erosion; poor culvert	Advisory Group/Public Comment(3x)
			High turbidity in Devil Track > Poplar River	Public Comment
	Impaired Waters			
	SSTS			
	Historic Land Use Practices			
	Timber Harvesting	NA		
	Aggregate Materials	NA	Gravel Deposits	Advisory Group
	Construction and Industrial Operations	NA	AIS Development; Roads in Riparian Area	Public Comment/Advisory Group
	Stream Connectivity		Private dams	Public Comment
	Invasive Species	⌂	AIS	Public Comment
	Climate Change	⌂		
Resource Protection	Priority Waters		Shoreline Buffer; Stream of concern	Public Comment (2x)
			Restoration Potential	Advisory Group
	Wetland Management			
	Unique/High Value Resources		High Bio Value	Public Comment
Stewardship	Data Collection	⌂	More info needed; Unknown issues	Public Comment/Advisory Group
	Education and Outreach	⌂		

* Conservation Score - Assigned to zonation inputs by priority concern (=low, = medium low, =medium high, = high).
⌂ = indicates this concern triggered by urban nodes

Baptism River WS



Description of Priority Area:

Baptism River is a designated trout stream which flows into Lake Superior at Tettegouche State Park, north of Silver Bay. The river flows through the Finland area of Lake County where the community values the river as an important resource enjoyed by locals and visitors alike. The watershed exhibits high-quality attributes including intact forest lands and wetlands and relatively low development pressure.

Specific Concerns Contributing to Priority Area Designation:

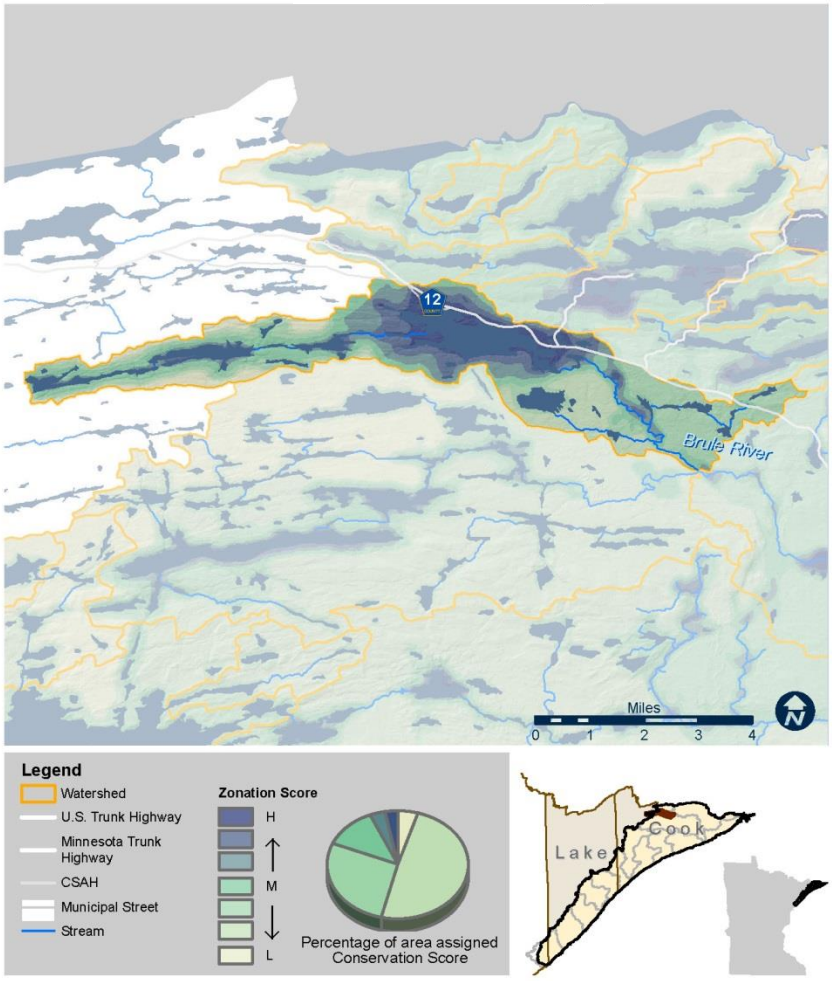
- Protection of the forested and wetland areas in this relatively pristine watershed.
- Rare, threatened, and high-value biological resources are found in this watershed.
- High-value forest resources are found in the watershed.

Category	Priority Concern	CS*	Input Provided	Source
Challenges	Stormwater Management	⌂	Steep Slopes	Advisory Group
			Ground Water Pollution / restricted groundwater withdrawal / (TCE site) Jeff Dickenson; Elevate to Orange/Red	Public Comment (2x)/Advisory Group
	Impaired Waters			
	SSTS			
	Historic Land Use Practices		USAF radar base	Public Comment (2x)
	Timber Harvesting	NA		
	Aggregate Materials	NA		
	Construction and Industrial Operations	NA		
	Stream Connectivity			
	Invasive Species	⌂		
	Climate Change	⌂		
Resource Protection	Priority Waters		Shoreline Buffer	Public Comment
	Wetland Management		Riparian + Wetland + Cedar IBI Scores	Advisory Group
	Unique/High Value Resources			
Stewardship	Data Collection	⌂		
	Education and Outreach	⌂		

* Conservation Score - Ranking assigned to zonation inputs by priority concern (=low, = medium low, =medium high, = high).

⌂ = indicates this concern triggered by urban nodes

Mid Trail Lakesheds



Description of Priority Area:

The majority of the watershed is federally or state owned, with a portion of this land in the Boundary Waters Canoe Area Wilderness (BWCAW). The north part of Poplar Lake, all of the property around Lace Lake, and 90 % of the property around Bow Lake is privately owned. There are several resorts and local businesses located on Poplar Lake as it is the entry point for the BWCA. Major water features include Poplar Lake, Swamp Lake, Skipper Lake, and Rush Lake.

Specific Concerns Contributing to Priority Area Designation:

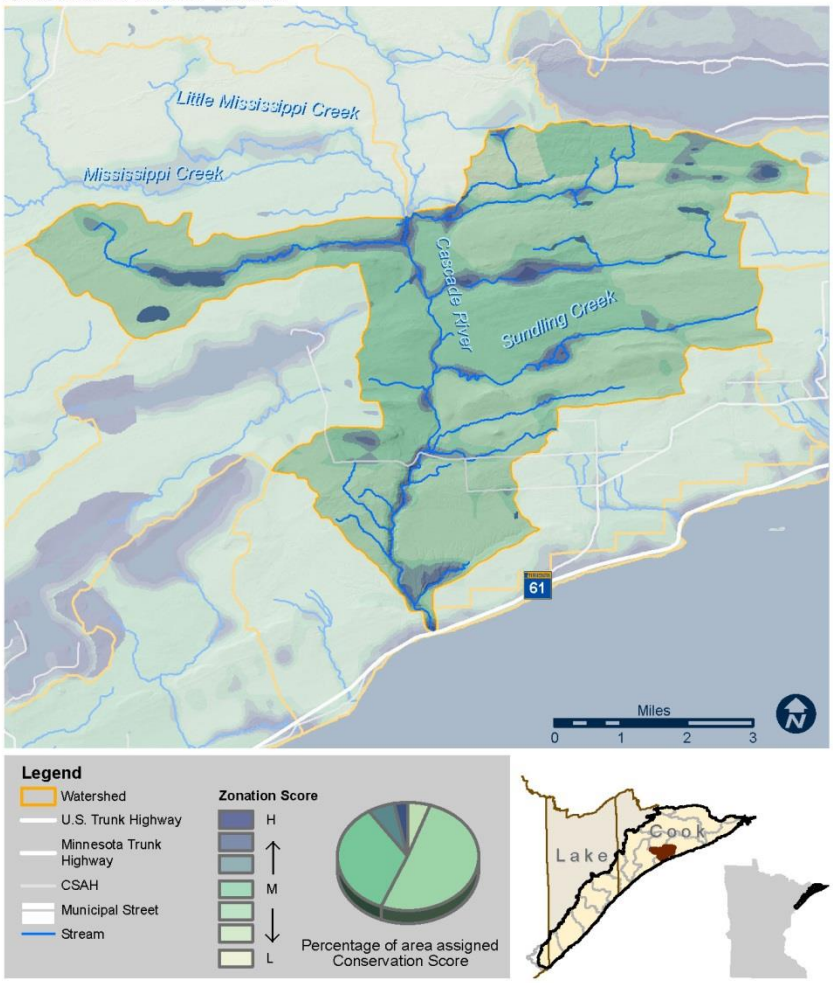
- Development and impact of failing septic systems and shoreland erosion.
- Highly valued resources are found within this watershed.

Category	Priority Concern	CS*	Input Provided - NONE	Source
Challenges	Stormwater Management	⌂		
	Impaired Waters	NA		
	SSTS			
	Historical Land Use Practices			
	Timber Harvesting	NA		
	Aggregate Materials	NA		
	Construction and Industrial Operations	NA		
	Stream Connectivity			
	Invasive Species	⌂		
	Climate Change	⌂		
Resource Protection	Priority Waters			
	Unique/High Value Resources			
	Wetland Management			
Stewardship	Data Collection	⌂		
	Education and Outreach	⌂		

* Conservation Score - Ranking assigned to zonation inputs by priority concern (=low, = medium low, =medium high, = high).

⌂ = indicates this concern triggered by urban nodes

Cascade River lower



Description of Priority Area:

The Cascade Watershed covers 66.7 square miles. Cascade State Park covers a portion of the Watershed. There are no major lake features within this watershed. The watershed has areas of focus for protection and restoration.

Specific Concerns Contributing to Priority Area Designation:

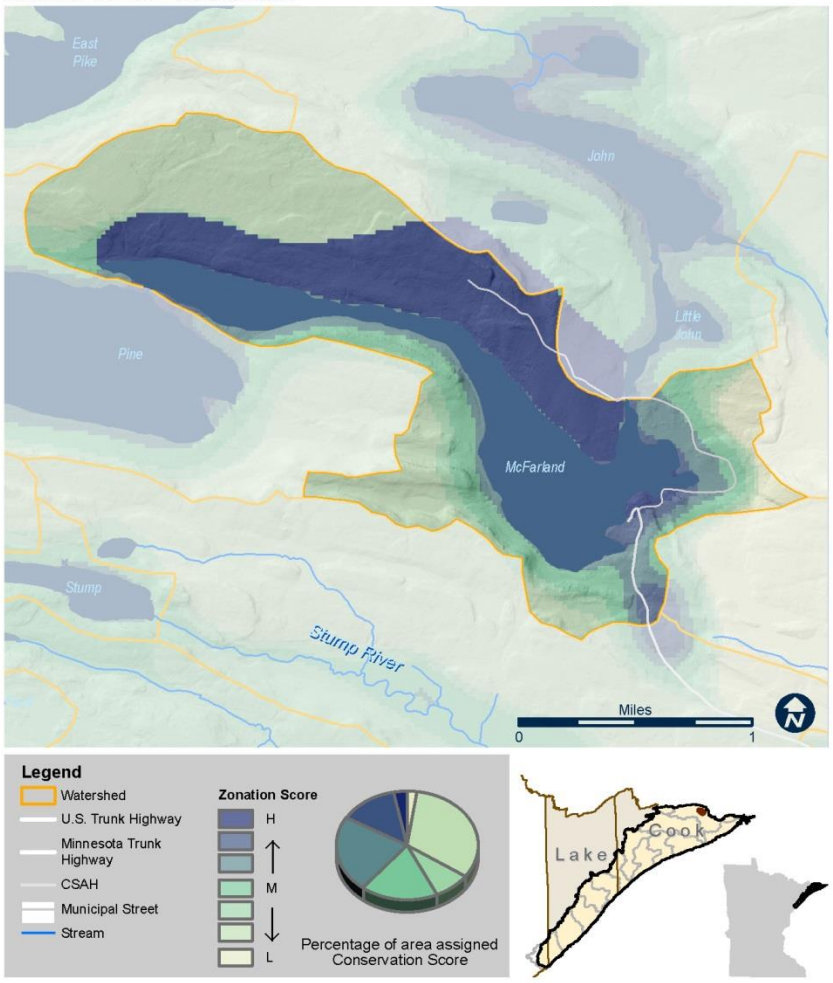
- Areas of unique/high value within the watershed include wells and springs are to be protected.
- Issues with old Septic systems in shallow soils are of concern within the area.

Category	Priority Concern	CS*	Input Provided	Source
Challenges	Stormwater Management	⌂	Eskers, Outwash; Failed Bluff	Public Comment (2x)
	Impaired Waters			
	SSTS			
	Historic Land Use Practices			
	Timber Harvesting	NA		
	Aggregate Materials	NA	Gravel Deposits	Public Comment
	Construction and Industrial Operations	NA		
	Stream Connectivity			
	Invasive Species	⌂		
	Climate Change	⌂		
Resource Protection	Priority Waters		Enhance for wild rice	Public Comment
			Shoreline Buffer	Public Comment
	Wetland Management			
	Unique/High Value Resources		Protect Cascade WD	Public Comment
			High Bio Value	Public Comment
Stewardship	Data Collection	⌂		
	Education and Outreach	⌂		

* Conservation Score - Ranking assigned to zonation inputs by priority concern (=low, = medium low, =medium high, = high).

⌂ = indicates this concern triggered by urban nodes

McFarland Lakeshed



Description of Priority Area:

McFarland Lake is a headwaters to the Boundary Waters Canoe Area Wilderness. The lake is 380 acres in size. The lakeshed is 65% publicly owned and the remaining property is privately owned.

Specific Concerns Contributing to Priority Area Designation:

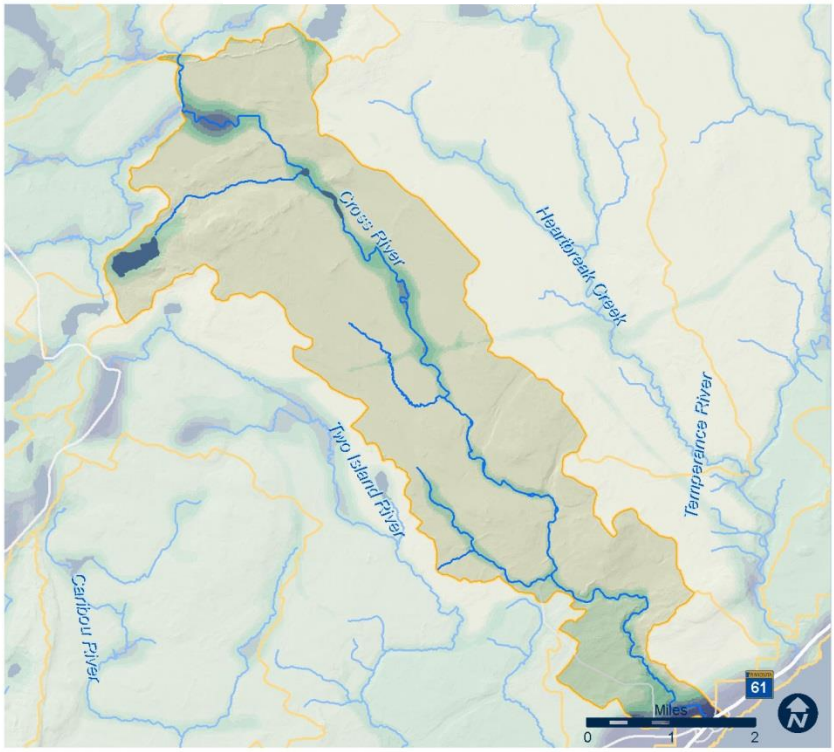
- Development on the lake affecting land use and the need for updated septic systems are of concern.
- Old lots with historic land use practices have been identified as a challenge to good water quality

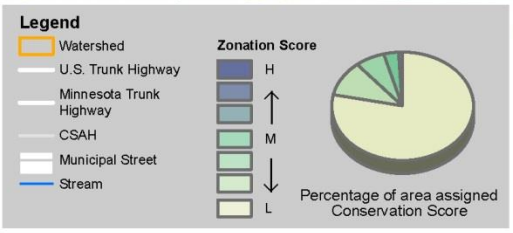
Category	Priority Concern	CS*	Input Provided	Source
Challenges	Stormwater Management	⌂		
	Impaired Waters	NA		
	SSTS		Failing septics / create or enhance buffer	Public Comment
			Land Use, Septic Repairs	Advisory Group
	Historic Land Use Practices		Elevate - Old Lots	Advisory Group
	Timber Harvesting	NA		
	Aggregate Materials	NA		
	Construction and Industrial Operations	NA		
	Stream Connectivity			
	Invasive Species	⌂		
	Climate Change	⌂		
Resource Protection	Priority Waters			
	Wetland Management			
	Unique/High Value Resources			
Stewardship	Data Collection	⌂		
	Education and Outreach	⌂		

* Conservation Score - Ranking assigned to zonation inputs by priority concern (=low, = medium low, =medium high, = high).

⌂ = indicates this concern triggered by urban nodes

Cross River WS





Description of Priority Area:

The Cross River is located in the West end of Cook County. It has one urban node, the township of Schroeder. The river is 20.4 miles long, flowing into Lake Superior with a cascade of waterfalls.

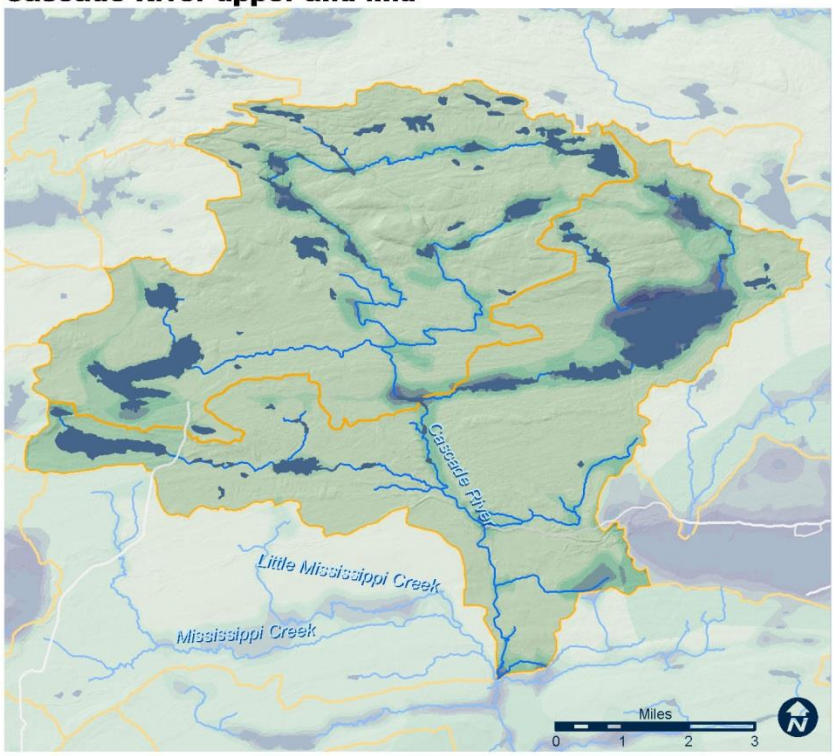
Specific Concerns Contributing to Priority Area Designation:

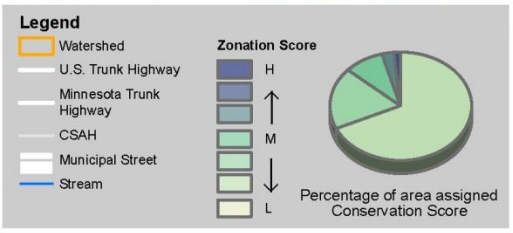
- Through the process of zonation the watershed has areas that need to be protected due to unique/high value resources.
- Stormwater management is necessary as it will have a direct impact through erosion and nutrient loading of water quality.

Category	Priority Concern	CS*	Input Provided	Source
Challenges	Stormwater Management	⌂		
	Impaired Waters	NA		
	SSTS	▬		
	Historical Land Use Practices	▬		
	Timber Harvesting	NA		
	Aggregate Materials	NA		
	Construction and Industrial Operations	NA		
	Stream Connectivity	▬		
	Invasive Species	⌂		
	Climate Change	⌂		
Resource Protection	Priority Waters	▬	Shoreline Buffer	Public Comment
	Wetland Management	▬		
	Unique/High Value Resources	▬		
Stewardship	Data Collection	⌂		
	Education and Outreach	⌂		

* Conservation Score - Ranking assigned to zonation inputs by priority concern (▬ =low, ▬ = medium low, ▬ =medium high, ▬ = high).
⌂ = indicates this concern triggered by urban nodes

Cascade River upper and mid





Description of Priority Area:

The area is located north of the Lower Cascade River watershed and is the headwaters for the Cascade River. Approximately 85% of the property in the watershed is public land with the remaining part owned privately. The main water features in the watershed include Cascade Lake; Little Cascade Lake; Two Island Lake; Dick Lake; McDonald Lake.

Specific Concerns Contributing to Priority Area Designation:

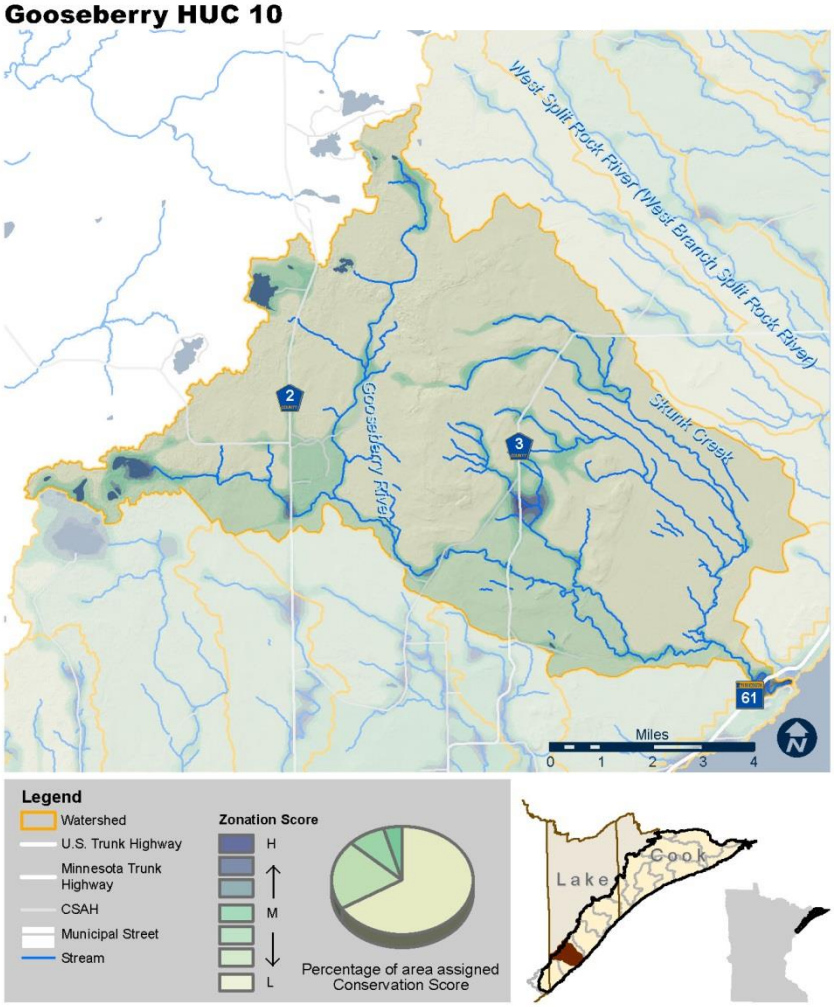
- As the headwaters of the lower cascade river, the area is viewed as having unique and with high value resources that need resource protection.
- Aggregate materials are found within the watershed.

Category	Priority Concern	CS*	Input Provided	Source
Challenges	Stormwater Management	⌂	Eskers, Outwash	Advisory Group
	Impaired Waters			
	SSTS			
	Historic Land Use Practices			
	Timber Harvesting	NA		
	Aggregate Materials	NA	Gravel Deposits	Advisory Group
	Construction and Industrial Operations	NA		
	Stream Connectivity			
	Invasive Species	⌂	Heavy use at the landing. Needs a pit toilet.	Public Comment
	Climate Change	⌂		
Resource Protection	Priority Waters			
	Wetland Management			
	Unique/High Value Resources		Protect Cascade WD	Public Comment (2x)
			Moose area; High Bio Value	Public Comment (2x)
Stewardship	Data Collection	⌂		
	Education and Outreach	⌂		

* Conservation Score - Ranking assigned to zonation inputs by priority concern (=low, = medium low, =medium high, = high).

⌂ = indicates this concern triggered by urban nodes

Gooseberry HUC 10



Description of Priority Area:

The Gooseberry HUC 10 watershed is the only HUC 10 watershed in Lake County with no existing impairments but identified as vulnerable, highlighting the need for protection in this area. It drains remote areas of the LSN watershed and includes a large area of intact forests and undisturbed wetlands. The Gooseberry River is a designated trout stream, and empties into Lake Superior at Gooseberry Falls State Park.

Specific Concerns Contributing to Priority Area Designation:

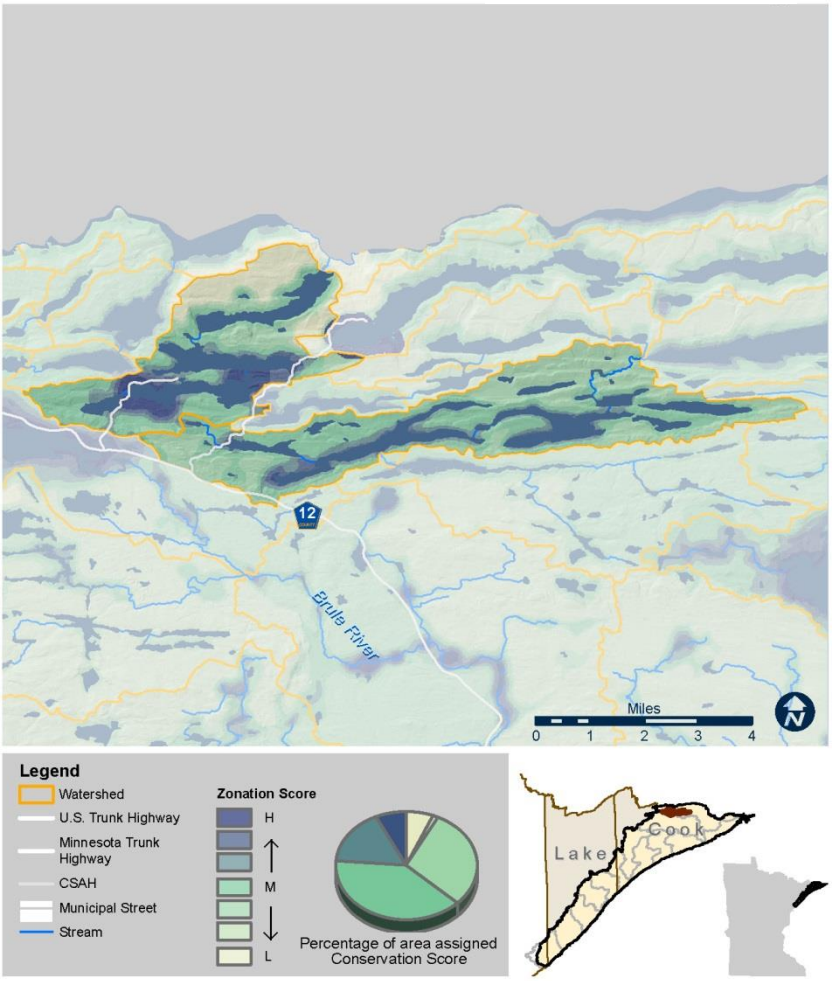
- Protecting forests and wetlands within the watershed.
- Educating constituents of the watershed about the unique value of this high-quality resource.

Category	Priority Concern	CS*	Input Provided	Source
Challenges	Stormwater Management	⌂	Eroding stream banks	Public Comment (2x)
	Impaired Waters			
	SSTS			
	Historic Land Use Practices			
	Timber Harvesting	NA	Riparian damage, clear cut to streams	Public Comment
	Aggregate Materials	NA		
	Construction and Industrial Operations	NA	Development	Public Comment
	Stream Connectivity			
	Invasive Species	⌂		
	Climate Change	⌂		
Resource Protection	Priority Waters		Native brook trout waters? 15 years ago	Public Comment
	Wetland Management			
	Unique/High Value Resources		Forest areas protected by MN land trust	Public Comment (2x)
			Encampment (Old Growth, IBI Issues)	Advisory Group
Stewardship	Data Collection	⌂		
	Education and Outreach	⌂		

* Conservation Score - Ranking assigned to zonation inputs by priority concern (=low, = medium low, =medium high, = high).

⌂ = indicates this concern triggered by urban nodes

Mid Trail Lakesheds W/E Bearskin



Description of Priority Area:

The area has several lakes that are entry points to the BWCA. The watershed is primarily federally owned. Areas of development include resorts and private landowners. There are six major waterbodies located in the watershed which includes Daniels Lake, Bearskin Lake, Hungry Jack Lake, Flour Lake, East Bearskin Lake and Alder Lake.

Specific Concerns Contributing to Priority Area Designation:

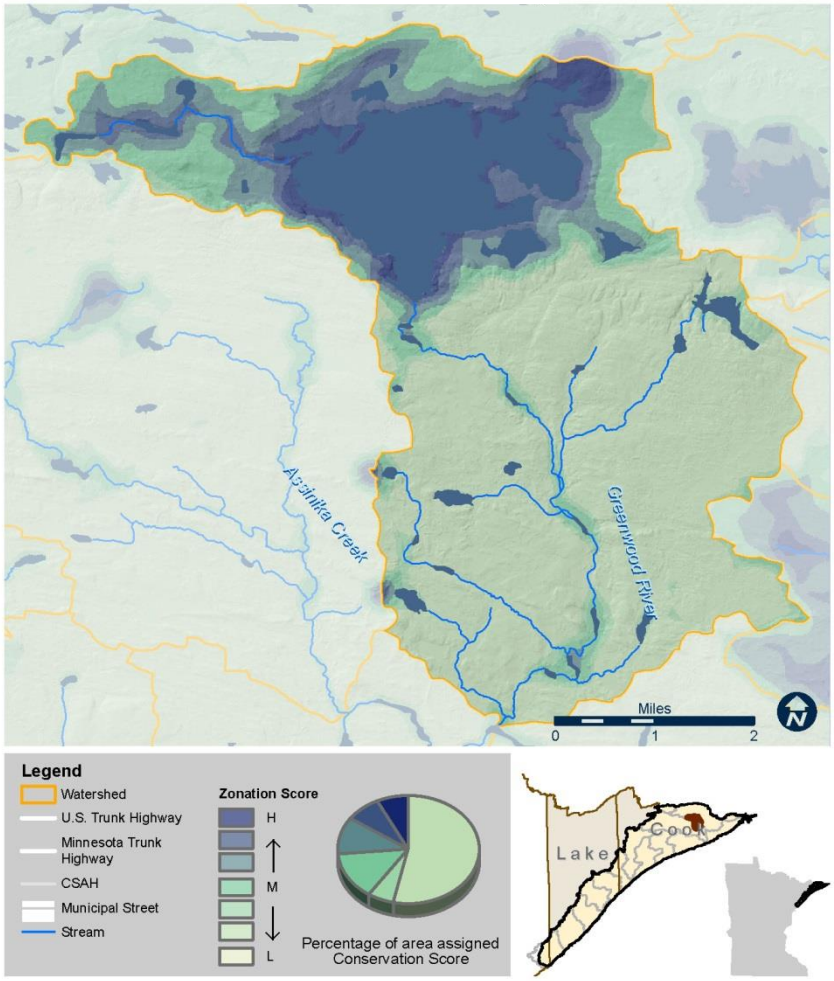
- The area has been identified as a high priority for water and unique/high value resources and should be protected.
- Additional data collection is needed in this area for a better understanding of the watershed.

Category	Priority Concern	CS*	Input Provided - NONE	Source
Challenges	Stormwater Management	⌂		
	Impaired Waters	NA		
	SSTS			
	Historical Land Use Practices			
	Timber Harvesting	NA		
	Aggregate Materials	NA		
	Construction and Industrial Operations	NA		
	Stream Connectivity			
	Invasive Species	⌂		
	Climate Change	⌂		
Resource Protection	Priority Waters			
	Unique/High Value Resources			
	Wetland Management			
Stewardship	Data Collection	⌂		
	Education and Outreach	⌂		

* Conservation Score - Ranking assigned to zonation inputs by priority concern (=low, = medium low, =medium high, = high).

⌂ = indicates this concern triggered by urban nodes

Greenwood Lake



Description of Priority Area:

Greenwood Lake is largest lake within the watershed at 1,953 acres. The lake has a history of development including an old fly-in lodge. The watershed is primarily surrounded by public land with development in concentrated, scattered areas around the lake.

Specific Concerns Contributing to Priority Area Designation:

- Resource protection includes protecting the lake.
- Providing education and outreach to property owners is a need within the area.

Category	Priority Concern	CS*	Input Provided - NONE	Source
Challenges	Stormwater Management	⌂		
	Impaired Waters	NA		
	SSTS			
	Historical Land Use Practices			
	Timber Harvesting	NA		
	Aggregate Materials	NA		
	Construction and Industrial Operations	NA		
	Stream Connectivity			
	Invasive Species	⌂		
	Climate Change	⌂		
Resource Protection	Priority Waters			
	Unique/High Value Resources			
	Wetland Management			
Stewardship	Data Collection	⌂		
	Education and Outreach	⌂		

* Conservation Score - Ranking assigned to zonation inputs by priority concern (=low, = medium low, =medium high, = high).

⌂ = indicates this concern triggered by urban nodes

Appendix D. Comments Received During Zonation Process

Priority Area		HUC 10 Name	HUC 12 Name	Concerns	Comments		
					Public Review	Technical Reports Points Data	Technical Reports Polygon Data
Tier 1	1 - Two Harbors	Knife River -Frontal Lake Superior	City of Two Harbors -Frontal Lake Superior	Land Development	Development	Platted for Development, Elevate to Yellow	Platted for Development
				Land Development	Failing septic systems into ditch (Larsmont Area)	>30 SSTS Systems Planned	Golf Course
				Priority Waters	Shoreline Buffer		
				SW Management	Erosion	From Tower South, High Slope, TH to the West	
				SW Management	Old city dump fills creek bed		
Tier 1	2 - Poplar River	Cascade River -Frontal Lake Superior	Deer Yard Lake -Frontal Lake Superior	Fisheries		Sprice Creek, IBI Scores a Bit Low	
				Land Development	Good well water	Old SSTS Wetlands, Shallow	Potential for Development
				Land Development	Well going bad		
				Priority Waters	Lutsen Crk		
				Priority Waters	Shoreline Buffer		
				Priority Waters	Stream of concern		
				Priority Waters	Water appropriations, hydrology, erosion (turbidity), habitat loss		
				SW Management	New culverts on 61 divert water from ditches into smaller streams. Large rain events will overwhelm them. (erosion)		
				Unique/High Value Resources	Spring	Push Towards Red	Priority for Protection
		Poplar River -Frontal Lake Superior	Poplar River	Land Development			Water Pipe, Escalate Hatched Area to Red
				Land Development			Push Toward Red - Golf Course, Ski Hills
				Priority Waters	Shoreline Buffer		
				Priority Waters	Water appropriations, hydrology, erosion (turbidity), habitat loss	Yes, Stay Red	
				SW Management	Failing culvert		
			Caribou Creek	Land Development	Gravel Pit	Issues With Old SSTS Systems	Potential for Development
				Land Development			New Development, Elevate to Red
				Land Development			A lot of Development Pressure Here
				SW Management	Culvert erosion		
				Unique/High Value Resources		Unique Bio Site	Priority for Protection
				Unique/High Value Resources			Bigsby, Unique Bio Site
			Tait River	Fisheries	Beaver dam		
				Fisheries	Shallow water		
				Land Development	Well Protected, Highlighted for Conservation	Well Protected, Highlighted for Conservation	
				Land Development	Development		
				Land Development	Should be noted: Lots of Pressure Happening Here		
				Priority Waters	Sentinel Lake		
				Wetland Management	Wetland marsh		
				Wetland Management	Wetland marsh		
Tier 1	3 - Near Shore Lake Superior	None	Frontal Lake Superior	Data Collection	More info needed		
				Fisheries	Cold water estuary. Unprotected		
				Fisheries	Steelhead		
				Fisheries	Trout		
				Impaired Waters	Monitor for fibers and toxins		
				Impaired Waters	Problems with runoff erosion		
				Impaired Waters	Stonegate Otis Creek - blows out		
				Land Development	Animal control problem (deer feeding) problem all along shore & East	Two Harbors Source Water 2,000' Radius of Concern	Lots of Development, Mosaic Wetlands, Red
				Land Development	Excess application of road salt by Lake County. All runs into the ditches and Knife River	Resort	Push Toward Red - Golf Course, Ski Hills
				Land Development	Na in Wells	Water Intake	
				Land Development	Proposed tankhouse development on lakeshore	Organics affect GM Drinking Water	
				Land Development	Salt Water		
				Priority Waters	Ottis Creek		Red - Restoration of High Value River
				Priority Waters	Shoreline Buffer		
				Priority Waters	Stream of concern		

Priority Area		HUC 10 Name	HUC 12 Name	Concerns	Comments		
					Public Review	Technical Reports Points Data	Technical Reports Polygon Data
Tier 1	3 - Near Shore Lake Superior	None	Frontal Lake Superior	Priority Waters	Water appropriations, hydrology, erosion (turbidity), habitat loss		
				SW Management	Bank erosion in several places on Kimball Creek		
				SW Management	Bank failure on Chicago Bay Road West and North		
				SW Management	Culvert issues and erosion		
				SW Management	Erosion problems		
				SW Management	High erosion area / high turbidity in Devil Track, more than Poplar River		
				SW Management	Kimball Creek - turbid plume to(?) heavy rain		
				SW Management	Old railroad cinder pit. Near parking area. Washes out in flood		
				SW Management	Old Reserve Mining dump		
				SW Management	poor culvert		
				SW Management	Stream bank erosion and culvert issues		
				Unique/High Value Resources	Cascade H2O Shed Should be protected		
				Unique/High Value Resources	Flute Reed Trout Stream / impaired for turbidity / monitor rising this winter		
Tier 1	4 - City of Grand Marais	Devil Track River -Frontal Lake Superior	City of Grand Marais -Frontal Lake Superior	Land Development	Road changed run off patterns, changing forest ecology		
				Land Development	Too fragile for development		
				Priority Waters	Shoreline Buffer		
				SW Management	Kimball Creek - turbid plume to(?) heavy rain		
				Wetland Management	Wetland Fen		
				Data Collection	More info needed		
				Land Development	Road changed run off patterns, changing forest ecology	Surface Water Intake	
				Land Development	Too fragile for development		
				Priority Waters	Shoreline Buffer		
				Priority Waters	Stream of Concern		
				SW Management	Drainage between tire auto and car wash should be cleaned up		
				SW Management	Erosion, zipline, new road, steep slope		
				SW Management	Kimball Creek - turbid plume to(?) heavy rain		
				SW Management	Poor culvert		
				Wetland Management	Wetland Fen		
				Not described	[hard to read handwriting] water coats(?) Hwy 61 (from artesian well?) culverts full of water and ice.		
Tier 1	5 - Flute Reed River	Pigeon River	Swamp River	Land Development	Septics / Development Stress / Create of enhance buffer		
		Grand Portage - Frontal Lake Superior	City of Hovland -Frontal Lake Superior	Impaired Waters	Flute Reed Impaired for turbidity		
				Land Development	Animal control problem (deer feeding) problem all along shore & East		
				Priority Waters	Maintain buffer & plant trees		Red - Restoration of High Value River
				Priority Waters	Ottis Creek		
				Priority Waters	Shoreline Buffer		
				SW Management	Bank failure on Chicago Bay Road West and North		
				SW Management	Erosion along F.R. See SWCD for map. Red Clay		
				SW Management	Erosion banks along F.R. see SWCD for map. - red clay		
				SW Management	Failing Culvert		
				Wetland Management	Flute Reed headwaters and wetlands	Wetland Bank, Elevate larger Area to Red	Elevate - Red - Protection
					Flute Reed Trout Stream / impaired for turbidity / monitor rising this winter		
				Fisheries	Trout		
				Impaired Waters	Flute Reed Impaired for turbidity		Red - Protection
				Land Development	Animal control problem (deer feeding) problem all along shore & East		
				Priority Waters	Maintain buffer & plant trees		
				Priority Waters	Shoreline Buffer		
				SW Management	Bank failure on Chicago Bay Road West and North		

Priority Area		HUC 10 Name	HUC 12 Name	Concerns	Comments		
					Public Review	Technical Reports Points Data	Technical Reports Polygon Data
Tier 1	6 - Knife River	Knife River -Frontal Lake Superior	Lower Knife River	Fisheries	Cold water for native and not....		
				Fisheries	Fish trap. provides information to DNR and public		
				Impaired Waters	Large Slump		
				Impaired Waters	Unstable, high bank erosion		
				Impaired Waters	Unstable, high bank erosion		
				Land Development	Corn Field		
				Land Development	Excess application of road salt by Lake County. All runs into the ditches and Knife River		
				Land Development	Gravel Deposit		
				Land Development	LSSA Tree Planting		
				Land Development	Old Clover Valley School		
				Land Development	Old gas tank site possible leakage / removed 7-10 years ago. Any final report?		
				SW Management	Down cut stream (couldn't read the rest)		
				SW Management	Erosion		
				SW Management	Old railroad cinder pit. Near parking area. Washes out in flood		
				Unique/High Value Resources	Loss of Moose, waterfowl, amphibian and reptile habitat		
				Wetland Management	Destroying wetlands		
				Wetland Management	Old Wetland Violation		
			West Branch Knife River	Land Development	Gravel pits, erosion		
				Wetland Management	Critical wetland to be preserved for storage and biodiversity		
				Wetland Management	Wetland destruction		
			Upper Knife River	Impaired Waters	Gravel erosion and sediment transport R/T Roads and possible gravel pits near the Knife River		
				Land Development	Gravel pits discharge large amounts of water and suspended sediments	TH Airport	
				SW Management	Clay banks		
				Wetland Management	Critical wetland to be preserved for storage and biodiversity	Black Ash / Wetlands	
Tier 1	7 - Beaver River	Beaver River-Frontal Lake Superior	East Branch Beaver River	Fisheries	Stream diversion		
				Impaired Waters	Monitor for fibers and toxins		
				Land Development	Development		
				Land Development	Golf Course		
				Land Development	MP 7 tailings basin / 7.5 million gallons per day / monitor for fibers		
				SW Management	Box culvert		
			Lower Beaver River	Fisheries	Native brook trout waters? 15 years ago		
				Impaired Waters	Monitor for fibers and toxins		
				Land Development	Golf Course	Beaver Bay Waste Water	
				Land Development	MP 7 tailings basin / 7.5 million gallons per day / monitor for fibers	Tailings Ponds and Outlet	Elevate to Orange/Red
				Priority Waters	Shoreline Buffer		
Tier 2	1 - Stewart River	Knife River-Frontal Lake Superior	Stewart River	Fisheries	Native trout		
				Land Development	Road crossings		
				Priority Waters	Shoreline Buffer		
				Unique/High Value Resources	Wood / bark residue from "decades ago" sawmill on ice. Posts still remain		
Tier 2	2 - Devil's Track Lake	Devil Track River-Frontal Lake Superior	Devil Track River	Data Collection	More info needed		
				Data Collection		Unknown Issues	
				Fisheries	Private dams		
				Invasive Species	AIS		
				Land Development	AIS. Development	Roads in Riparian Area	Elevate to Red
				Land Development		Ag Pressure	Gravel Deposits, High Bio Value, Eskers, Outwash
				Priority Waters	Shoreline Buffer	Restoration Potential	
				Priority Waters	Stream of concern		
				SW Management	Area of erosion		
				SW Management	High erosion area / high turbidity in Devil Track, more than Poplar River		
				SW Management	Irrigation		
					Poor culvert		

Priority Area		HUC 10 Name	HUC 12 Name	Concerns	Comments		
					Public Review	Technical Reports Points Data	Technical Reports Polygon Data
Tier 2	3 - Baptism River Watershed	Baptism River	East Branch Baptism River	Land Development	Ground Water Pollution / Old USAF radar base / restricted groundwater withdrawal / (TCE site) Jeff Dickenson	Steep Slopes	
				Wetland Management		Riparian + Wetland + Cedar IBI Scores	
			West Branch Baptism River	Land Development	Ground Water Pollution / Old USAF radar base / restricted groundwater withdrawal / (TCE site) Jeff Dickenson		Elevate to Orange/Red
			Baptism River	Priority Waters	Shoreline Buffer		
Tier 2	4 - Mid Trail Lakesheds	Mid-Trail Lakesheds		No Comments			
Tier 2	5 - Cascade Lower River	Cascade River-Frontal Lake Superior	Lower Cascade River	Land Development	Gravel Deposits, High Bio Value, Eskers, Outwash		
				Priority Waters	Enhance for wild rice		
				Priority Waters	Shoreline Buffer		
				SW Management	Failed Bluff		
				Unique/High Value Resources	Cascade H2O Shed Should be protected		
Tier 2	6 - McFarland Lakeshed	Pigeon River	McFarland Lake	Land Development	Failing septics / create or enhance buffer	Land Use, Septic Repairs	Elevate - Old Lots
Tier 3	1 - Indian Camp Creek	Indian Camp Creek		No Comments			
Tier 3	2 - Cross River Watershed	Cross River -Frontal Lake Superior	Cross River	Priority Waters	Shoreline Buffer		
Tier 3	3 - Cascade River Upper and Mid	Cascade River-Frontal Lake Superior	Middle Cascade River	Land Development			Gravel Deposits, High Bio Value, Eskers, Outwash
				Unique/High Value Resources	Cascade H2O Shed Should be protected		
			Upper Cascade River	Invasive Species	Heavy use at the landing. Needs a pit toilet		
				Unique/High Value Resources	Cascade H2O Shed Should be protected		
				Unique/High Value Resources	Moose area		
Tier 3	4 - Gooseberry HUC 10	Gooseberry River-Frontal Lake Superior	City of Castle Danger -Frontal Lake Superior	SW Management	Eroding stream banks		
				Unique/High Value Resources	Forest areas protected by MN land trust	Encampment (Old Growth, IBI Issues)	
			Encampment River	SW Management	Eroding stream banks		
				Unique/High Value Resources	Forest areas protected by MN land trust		
			Split Rock River	Fisheries	Native brook trout waters? 15 years ago		
				Land Development	Riparian damage, clear cut to streams / development		
Tier 3	5 - Mid Trail Lakesheds West/East Bearskin	Mid Trail Lakesheds West/East Bearskin		No Comments			
Tier 3	6 - Greenwood Lake	Greenwood Lake		No Comments			

Appendix E. Targeting and Prioritization of Geographic Areas

TARGETING AND PRIORITIZATION OF GEOGRAPHIC AREAS

A values-based model was used to prioritize areas for restoration and protection. This model was based on fundamental conservation principles, including biodiversity and connectivity. The MnDNR's five-component healthy watershed conceptual framework was used to facilitate an organized process to assess and review watershed problems and solutions. The five components for a healthy watershed are: biology, hydrology, water quality, geomorphology, and connectivity. This approach recognizes that attempts to solve clean water needs are not separate from other conservation needs; each conservation activity should provide multiple benefits. The values-based model used in this process helped achieve this multiple benefits goal by identifying areas that optimize benefits by incorporating data valued by the community. The prioritization goal was to obtain both clean water benefits as well as other conservation benefits. The model used a compilation of individual and aggregated criteria of valuable landscape features with the objective of providing data and maps that prioritize places on the landscape for conservation investments.

The value model was also used in a civic engagement process. As part of this process, participants provided feedback on the landscape features they valued and locations within the watershed facing a conservation challenge. As a final step, planning participants were given the opportunity to revise the model results. This synthesis step captured the knowledge and experiences of the people interested in and informed about the stresses, risks, and vulnerability of water resources within the watershed. This final priority map was then used to help identify general priority focus areas within the watershed for future conservation investments.

The value model output and final prioritization maps are presented in Figures 2 and 3. The value model identified several distinct high priority areas. Clusters of high priority areas include lands within and around the cities of Two Harbors and Grand Marais, the Poplar River watershed, the nearshore of Lake Superior, and several lake watersheds (e.g., Devils Track Lake).

PRIORITIZATION OVERVIEW

As threats to Minnesota's watersheds continue to mount, it is becoming increasingly important to identify and conserve high-priority areas. There are multiple opportunities for protection or restoration in any watershed. Identifying which practices to implement and where in the landscape to implement them can help more effectively target efforts and more efficiently utilize limited resources. A number of information technology tools are available for prioritizing and targeting land for restoration and protection efforts within a watershed.

A systematic approach aimed at optimizing environmental benefits while reducing interference between competing land uses is critical. Two of the most common approaches for conservation prioritization are system-based models and value-based models. One of the major strengths of system-based models is that they require resource planners to think deeply about a system by writing down mental models of how the system is believed to function. For many watersheds this has been done using the HSPF hydrologic system model, which simulates watershed hydrology and water quality at the catchment scale. However, system models that can accurately identify where in the watershed specific good management practices should be applied do not exist.

Similarly, the ability to simulate alternative land management actions and predict consequences at specific locations in the watershed is often not possible.

Values-based models use a compilation of individual criteria of valuable landscape features (heterogeneous content) and aggregated criteria (context and connections) with an objective function to prioritize places within the landscape for conservation. Although there are some shortcomings of using value models over system models (value models only allow exploration of tradeoffs and optimization, and they do not provide guidance on what practices should be implemented where), the use of value models is an efficient method for prioritizing places for protection or restoration.

Value models help achieve multiple benefits goals by identifying areas that optimize benefits by accounting for what the community values. The use of an additive benefits objective function in the value model allows for the retention of high quality occurrences of as many conservation features as possible while reducing interference between competing land uses (e.g., row crop areas). Value models also can be used in a public participation process, whereby participants can decide on what features are valued and the ranking of those valued features. Addressing conservation goals effectively necessitates a collaborative approach, and value-based models provide a structure for collaborative efforts. In addition, value models and the five-component conceptual model used to structure the content in the value models are simple concepts that are easy to explain and apply at the local government scale.

METHODS

The value models were developed using Zonation software (Moilanen et al. 2009). Zonation produces a nested hierarchy of conservation priorities. It begins with the full landscape and iteratively removes parcels (cells) that contribute least to conservation; therefore, the removal order is the reverse order of the priority ranking for conservation. Zonation assumes that the full watershed is available for conservation. In the models developed, the lakes were masked out prior to analysis. This focused the prioritization on the terrestrial parcels, in accordance with the conservation and restoration goals. Zonation's algorithms seek maximal retention of weighted normalized conservation features.

Weights are used to influence which features are valued more. Within the five-component healthy watershed framework, for example, water quality conservation features could be weighted higher than biological features. The feature-specific weights used in the value models reflect social valuation, and they are set using the analytic hierarchy process (AHP; Saaty and Peniwati 2007). A survey comprised of pairwise comparisons is used to solicit the preferences of individuals. Features used in the comparison are based loosely on the DNR's five-component healthy watershed approach, with the addition of alternative land uses or economic features representing a social component. Each individual taking the survey uses his or her judgment about the relative importance of all elements at each level of the hierarchy. The relative importance values include "equal," "prefer," and "strongly prefer." The use of abbreviated pairwise importance values helps reduce the cognitive burdens associated with a large number of pairwise comparisons. Individual responses are aggregated with a geometric mean, and the pairwise comparison matrix is constructed to compute the feature-specific weights consistent with the AHP.

There are three commonly definable objective functions possible in Zonation: core area, target-based planning, and additive benefit functions. The core area objective function aims to retain high-quality occurrences of each feature. This function is most appropriate when there is a definite set of conservation features and all of them are to be conserved. The target-based planning objective function is a prescriptive approach where requirements are specified *a priori* for each feature. This function produces a minimum set coverage solution, and is most appropriate when a defined proportion of the watershed is assigned for conservation.

The additive benefit function variant of Zonation was used, which aggregates values by summation across features:

$$V(P) = \Sigma w_j N_j(P)^z$$

where the value of a parcel *V(P)* is equal to the summation of weighted *w* normalized conservation features of the parcel $N_j(P)$, to the power of *z* (set to 0.25 for all features).

The conservation features for use in the analysis are on the same grid with a resolution of 30 by 30m. We use high-resolution data to maximize conservation planning realism and for greater practicality in local government conservation planning and implementation.

Additionally, Zonation allows ranking to be influenced by neighboring parcels, so that highly valued areas can be aggregated. This minimizes fragmentation of conservation within the landscape. The distribution-smoothing algorithm in Zonation, which uses an aggregation kernel α parameter was used in the process. Using this algorithm assumes that fragmentation (low connectivity) generally should be avoided for all conservation features. Initial analyses indicate that an aggregation kernel α of 0.01, which corresponds to a connectivity distance of 200m, may be appropriate for conservation efforts targeted at the watershed scale. It was found that very small connectivity distances made no difference in parcel prioritization, since the connectivity effect did not extend very far into neighboring parcels, and very large connectivity distances aggregated parcels across unrealistically large areas. It was also found that across a modest range of connectivity distances the results were minor. The connectivity distance can be conservation feature-specific, for a biological example, if a species dispersal capability or fragmentation vulnerability was known, then a species-specific parameter could be explicitly used.

The final step in identifying areas for potential protection and restoration includes a mapping exercise. Participants use their knowledge and experiences within the watershed to revise the Zonation output maps to create a final map that may be used to provide guidance on which areas within the watershed may be priorities for potential future conservation investments. This synthesis step captures the wisdom of the group of people interested and knowledgeable about the stresses, risks, and vulnerability of water resources within the watershed.

Description of Prioritization Approach and Methods By Paul J. Radomski and Kristin Carlson, MnDNR.

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RESULTS

The pairwise questionnaire survey results identified the *Protect/Restore Shorelands and Riparian Zones* component of the value model inputs as the highest weight, followed by *Reduce Erosion and Runoff* (Figure 1 and Table 2).

A priority map was created using the results from the Zonation value model. The map ranked lands as to their importance for land management activities that would provide greater protection of ecosystem functions, especially water quality, and to their importance for application of various land best management practices (Figure 2). The values model identified several distinct areas with high priority lands. Clusters of high priority areas include lands within and around the cities of Two Harbors and Grand Marais, the Poplar River watershed, the nearshore of Lake Superior, and several lake watersheds (e.g., Devils Track Lake).

The final prioritization map created from Zonation and synthesis analysis is presented in Figure 3. From this map, the Advisory and Policy Committee identified and ranked several general priority focus areas (Table 3).

APPENDIX E: TABLES

Table 1E. Variable descriptions for content used in land prioritization value models.

Objective	Description
Protect or Improve **Waters of Concern**	Waters of special concern include vulnerable groundwater or drinking water supplies, catchments of lakes and rivers with organic and inorganic pollution loads, catchments of lakes and rivers with declining water quality, catchments of lakes vulnerable to pollution, and areas in need of protection or restoration for the purpose of protecting or improving water quality.
Reduce **Erosion & Runoff**	Erosion and runoff can be become more prevalent and severe due to human alteration of the land. When wetlands are removed, water runs off the land faster. Also, more water runs off land with impervious surfaces and in areas that have lost vegetation. Improper land disturbance and culvert sizing may also increase erosion from the land.
Protect or Improve **Fish & Wildlife Habitat**	Habitat provides food, shelter, and breeding territory for animals. The size, shape, connectivity, and distance between habitat parcels are all important to sustaining populations of plants and animals.
Protect or Restore **Shoreland and Riparian Zones**	Management of shoreland and riparian zones are important for maintaining economic and environmental values. If those zones are naturally vegetated, they can serve as a buffer between land and water and filter out pollutants. Shorelands were defined as all lands located within 1000 feet of an inland lake and Lake Superior. Riparian zones include areas adjacent to streams and their potential flood zones (based on location, elevation and soil type).
Protect or Focus on **Lands of Concern**	This objective includes the protection of valuable timber land and focus on roadways and North Shore Management nodes for important economic reasons. Timber Land: valuable timber areas and forest lands. Maximize values in forest areas by protecting natural areas for timber production, recreation, and multiple benefits and the identification of project areas for best management practices, including forest stewardship. Roadways: roads and road right-of-ways. Focus on these areas for potential use of best management practices related to sediment control and culvert design and installation. Important Commercial Rural Areas or Town/Community Centers (aka North Shore Management nodes): areas that have higher densities and existing development with expansion possibilities as per local Land Use Plans. Focus on these identified areas for potential use of best management practices with the purpose of wise development or redevelopment.

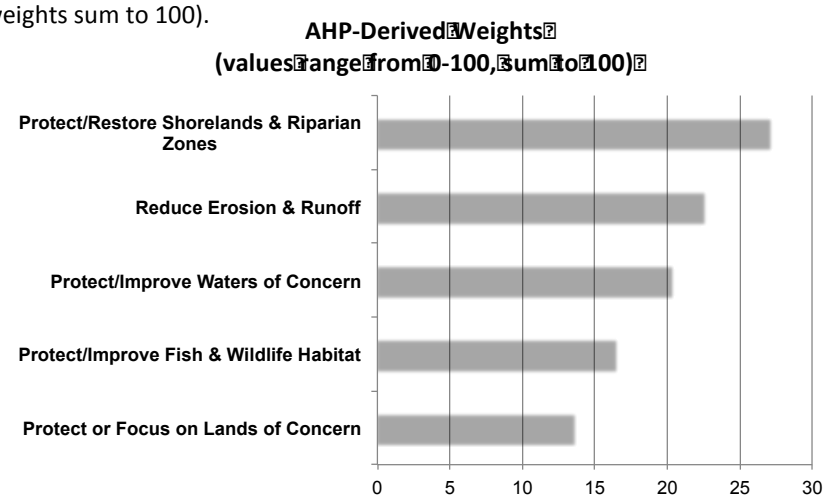
Objective	Description
Protect or Improve Waters of Concern	
Focus on Drinking source water assessment areas (SWA)	Source water assessment area (SWA) is the surface and subsurface area surrounding a public water supply well that completely contains the scientifically calculated time-of-travel area. The primary purpose of the SWA is to give the public water supplier an idea of the potential size of the final Wellhead Protection Area (WHPA). Source: Minnesota Department of Health (MDH).
Focus on Impaired waters	Catchments (i.e., drainage basins) upstream of impaired waters within the watershed. Identified as impaired by the Minnesota Pollution Control Agency (MPCA).
Focus on Catchments of lakes with declining water quality	Lakes where long-term data suggest declining water quality. Source: MPCA.
Focus on Groundwater contamination susceptibility	The relative susceptibility of an area to groundwater contamination (based on geologic stratigraphy, aquifer transmissivity, and recharge potential). Source: MPCA.
Focus on Catchments of lakes vulnerable to nutrient addition	The relative susceptibility of a lake to phosphorus pollution (based on lake morphology and catchment hydrology). Source: Minnesota Department of Natural Resources (DNR).
Focus on Catchments of rivers vulnerable to pollution	Rivers that are susceptible to additional sediment and pollution loading as determined by biological monitoring (Indices of Biological Integrity). Source: MPCA.
Focus on Areas potentially impacted by Subsurface Sewage Treatment Systems (SSTS)	SSTS, commonly known as septic systems, may not be adequately treating sewage. This sewage contains phosphorus and nitrogen, which may seep into lakes and rivers and cause excessive aquatic plant growth, leading to degraded water quality. Source: Cook (compliance reports) and Lake Counties (improved or unimproved status).
Reduce Erosion and Runoff	
Focus on Areas with high erosive potential	Stream Power index: This is an index of the channelized flow erosive potential. Calculated from LiDAR data.
Focus on Areas close to water	Lands close to a stream and lake are more valuable in the protection of water quality than those farther away. The data are the inverse distance from water.
Protect Existing wetlands	Remaining wetlands as documented by the National Wetland Inventory (NWI).
Protect or Restore Lake Superior Shoreline with High Erosion	Vulnerable or unstable shoreline areas in relation to extensive erosion. Source: Erosion Hazard of Minnesota's Lake Superior Shoreline. Source: MN Sea Grant & NRRI.
Protect or Restore Bluffs	Bluffs or steep slopes. Calculated from LiDAR data.

Objective	Description
Protect or Improve Fish & Wildlife Habitat	
Protect Rare features	Locations of species currently tracked by the MDNR, including Endangered, Threatened, and Special Concern plant and animal species as well as animal aggregation sites. Source: DNR.
Protect Sites of biodiversity significance	Areas with varying levels of native biodiversity that may contain high quality native plant communities, rare plants, rare animals, and/or animal aggregations. Identified by Minnesota Biological Survey. Source: DNR.
Protect or Improve Lakes of biological significance	Catchments of high quality lakes. MDNR list of high quality lakes based on dedicated biological sampling. Source: DNR.
Protect High value forests	MDNR designated high conservation value forests due to plant and animals present and MDNR designed old-growth forests. Source: DNR.
Protect or Restore Trout stream catchments	Below barrier catchments of anadromous trout streams. Source: DNR.
Protect or Restore Ecological connections	Ecological corridors between generally large, intact, native or "semi-natural" terrestrial habitat patches. Source: DNR.
Protect or Restore Sensitive lakeshore	Lakeshore areas that provide unique or critical ecological habitat. Source: Cook County.
Protect or Restore Shoreland and Riparian Zones	
Protect or Restore Shoreland	Land within 1000 feet of inland lakes and Lake Superior shoreline.
Protect or Restore Stream riparian areas	Stream riparian areas and potential flood zones (based on location, elevation and soil type). Source: DNR.
Protect or Focus on Lands of Concern	
Focus on Roadways	Roads and right-of-ways in the watershed. Source: Lake and Cook Counties.
Focus on Important Commercial Rural Areas or Town/Community Centers	Areas that have higher densities and existing development with expansion possibilities as per local land use plans. Source: North Shore Management Board and local Land Use Plans.

Table 2E. Broad-scale and fine-scale weights used in the value models from a questionnaire using the analytic hierarchy process (AHP; weights sum to 100).

Broad-Scale Prioritization	AHP Derived Weight	Weight Used in Zonation Model
Protect/Improve Waters of Concern	20.3	
Reduce Erosion & Runoff	22.5	
Protect/Improve Fish & Wildlife Habitat	16.5	
Protect/Restore Shorelands & Riparian Zones	27.1	
Protect or Focus on Lands of Concern	13.6	
Fine-scale Prioritization		
Drink Water	11.1	2.3
Impaired Waters	12.3	2.5
Catchments with declining water quality	17.3	3.5
Groundwater Contamination Susceptibility	9.9	2.0
Lakes vulnerable to TP addition	16.3	3.3
Catchments of Rivers vulnerable to pollution	17.7	3.6
SSTS areas	15.5	3.1
Areas with high erosive potential	17.3	4.8
Areas close to water	17.1	4.8
Existing wetlands	18.8	5.1
Lake Superior shoreline	16.1	4.5
Bluffs	10.6	3.3
Rare features	9.6	1.6
Sites of Biodiversity significance	14.8	2.4
Lakes of Biological Significance	15.9	2.6
High value forests	10.8	1.8
Trout stream catchments	16.6	2.7
Ecological connections	16.0	2.6
Sensitive shorelands	16.3	2.7
Riparian areas	62.4	16.9
Shorelands	37.6	10.2
Roadways	37.4	7.4
Commercial rural areas	28.2	6.2
	TOTAL:	**100.0**

Figure 1E. The broad-scale weights used in the value models from a questionnaire using the analytic hierarchy process (AHP; weights sum to 100).



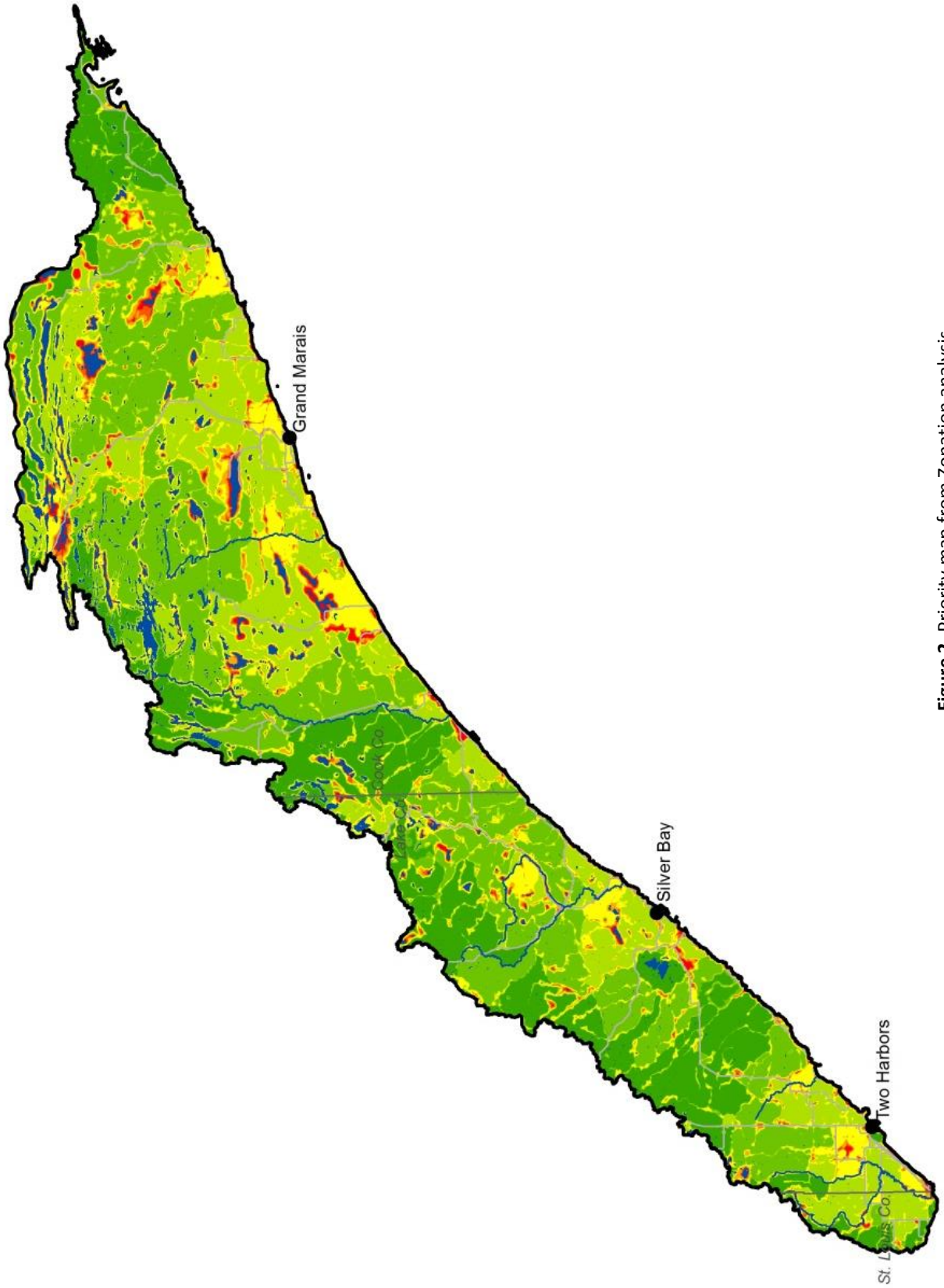


Figure 2. Priority map from Zonation analysis.

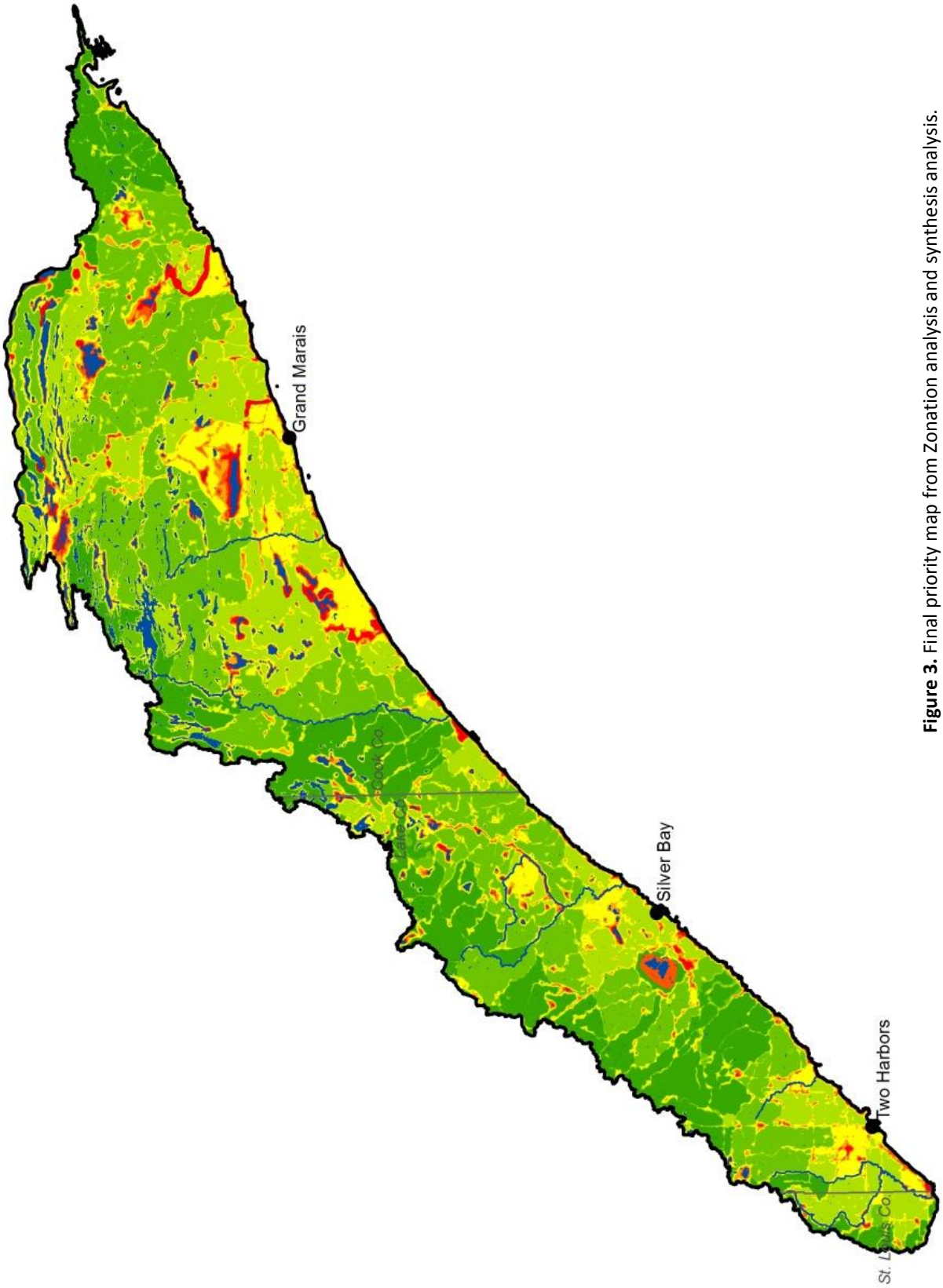


Figure 3. Final priority map from Zonation analysis and synthesis analysis.

Table 3E. General priority areas identified by the planning process and median Zonation score. For comparison purposes the median Zonation score for non-priority areas was 0.439 (Zonation scores range from 0 to 1).

Order	Area	Zonation Score
Tier 1		
1	Two Harbors	0.755
2	Poplar River	0.734
3	Near Shore of Lake Superior	0.864
4	City of Grand Marais	0.829
5	Flute Reed River	0.828
6	Knife River	0.631
7	Beaver River	0.614
Tier 2		
1	Stewart River	0.296
2	Devils Track Lake	0.891
3	Baptism River	0.688
4	Poplar & Hungry Jack Lakesheds	0.831
5	Lower Cascade River	0.716
6	McFarland Lakeshed	0.835
Tier 3		
1	Indian Camp Creek	0.733
2	Brule River	0.478
3	Cross River	0.174
4	Upper and Mid Cascade River	0.349
5	Gooseberry HUC 10	0.146
5	West & East Bearskin Lakesheds	0.831
7	Greenwood Lakeshed	0.468

Table 4E. Description of individual zonation layers.

Zonation Input	Source	Comments
biol_sig – lakes of biological significance	DNR	*MNDNR Level 08 catchments of lakes of biological significance (data provided by MN DNR)*
bluff_steep – bluffs (or steep slopes)	Calculated from LiDAR	http://files.dnr.state.mn.us/waters/watermgmt_section/critical_area/sheet_2-comparison_bluffs_and_steep_slopes.pdf
decl_wq – catchments of lakes with declining water quality	MPCA	*MNDNR Level 08 catchments of lakes with decreasing water quality (based on long-term Secchi trends – data provided by MPCA)*
ecol conn – ecological connections	DNR	*DNR. (Statewide ecological connections)*
erosion – Lake Superior shoreline with high erosion	MN Sea Grant & NRRI.	*60 meter buffer of shoreline areas with high erosion potential (see Dropbox for original data)*
groundwat – groundwater contamination susceptibility	MPCA	http://www.dnr.state.mn.us/waters/groundwater_section/mapping/gwcontam_susceptibility.html
hv_forest – high-value forests (HCVF + old growth)	DNR	*DNR. (HCVF + old-growth)*
id_water – areas close to water (inverse distance to water)	DNR	*Data calculated were inverse distance from lakes and streams.*
impaired – catchments upstream of impaired waters	MPCA	*MNDNR Level 08 catchments upstream of aquatic life or aquatic recreation-impaired lakes or streams (data available from MPCA)*
mbs – sites of biodiversity significance (Minnesota Biological Survey)	DNR	*DNR data*
nodes – important commercial rural areas/town-community centers (North Shore Mgmt Board)	North Shore Management Board and local Land Use Plans.	*Nodes were digitized from North Shore Management Board Node Definition for Comprehensive Plans (309-01-06-final_node_development_document.pdf) - see Dropbox for document*
nutrient – catchments of lakes vulnerable to nutrient addition	DNR	*DNR Level 08 catchments upstream of high-risk lakes susceptible to phosphorus pollution. Phosphorus pollution sensitivity scores provided by MNDNR, lake risk scores provided by Cook and Lake Counties.*
nwi – existing wetlands	NWI	*(slightly modified based on recommendations of watershed experts)*
rare_feat – rare features	DNR	*nonpublic dataset - have to request data from DNR*
riparian – stream riparian areas	DNR	*DNR.*
roadways – roadways	Lake and Cook Counties	*30m buffer of DOT roads (all classes) (2008?)*
sens_shore – sensitive lakeshore	Cook County	*Unable to find final output from data within Dropbox – digitized based on Cook County Final report (pdf)*
septic – areas potentially impacted by SSTS	Cook (compliance reports) and Lake Counties (improved or unimproved status).	*Tax parcels with septic codes (data provided by Cook and Lake Counties)*
shoreland – shoreland (land within 1000 feet of shoreline)	Calculation	*Land within 1000 feet of inland lakes and Lake Superior shoreline. Dataset created based on above description*
spi – areas with high erosive potential (stream power index)	Calculated from LiDAR	*Calculated from LiDAR data.*
swa – drinking source water assessment areas	MDH	http://www.health.state.mn.us/divs/eh/water/swp/maps/index.htm
trout_catch – trout stream catchments	DNR	*see Dropbox*
vul_stream – catchments of rivers vulnerable to pollution	MPCA	*DNR Level 08 catchments of stream reaches with low-scoring streams (based on fish, macroinvertebrate, and stream habitat IBI scores) – data provided by MPCA*

Appendix F. Memorandum Of Agreement

LAKE SUPERIOR NORTH WATERSHED
MEMORANDUM OF AGREEMENT

This Lake Superior North Watershed Memorandum of Agreement (Agreement) is made and entered into between:

> The **County of Lake**, by and through the County Board of Commissioners, The **County of Cook** by and through the County Board of Commissioners, the **Lake County Soil and Water Conservation District**, by and through the Soil and Water Conservation District Board of Supervisors, and the **Cook County Soil and Water Conservation District**, by and through the Soil and Water Conservation District Board of Supervisors, collectively referred to as "the Parties", and each individual referred to as a "Party".

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

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

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

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

WHEREAS, MS 103B.101 Subd. 14, the Board of Water and Soil Resources "may adopt resolutions, policies, or orders that allow a comprehensive plan, local water management plan, or watershed management plan, developed or amended, approved and adopted, according to Chapters 103B, 103C, or 103D to serve as substitutes for one another or be replaced with a comprehensive watershed management plan," also known as the One Watershed, One Plan. The Parties have formed this Agreement for the specific goal of developing the Board of Water and Soil Resources - One Watershed, One Plan for the Lake Superior North Watershed.

NOW, THEREFORE, the Parties hereto agree as follows:

1. **Purpose:** The Parties to this Agreement recognize the importance of partnerships to plan and implement protection and restoration efforts for the Lake Superior North Watershed (see *Attachment A for a map of*

the planning area). Parties signing this Agreement will be collectively referred to as Lake Superior North Watershed Planning Policy Committee (the Policy Committee or Committee).

2. **Term:** The term of this Agreement shall begin on October 15, 2014 and continue until terminated by a resolution of the Policy Committee, by law, or according to the provisions of this Agreement.

3. **Adding Additional Parties:** A Party desiring to become a member of this Agreement shall indicate its intent by adoption of a board resolution prior to October 15, 2014. The Party agrees to abide by the terms and conditions of the Agreement; including but not limited to the bylaws, policies and procedures adopted by the Policy Committee.

4. **General Provisions**:

   a. **Compliance with Laws/Standards:** The Parties agree to abide by all Federal, State or local laws; statutes, ordinances, rules and regulations now in effect or hereafter adopted pertaining to this Agreement or to the facilities, programs and staff for which the Agreement is responsible.

   b. **Indemnification:** Each Party to this Agreement shall be liable for the acts of its officers, employees or agents and the results thereof to the extent authorized or limited by law and shall not be responsible for the acts of the other Party, its officers, employees or agents. The provisions of the Municipal Tort Claims Act, Minnesota Statute Chapter 466 and other applicable laws govern liability of the Parties. To the full extent permitted by law, actions by the Parties, their respective officers, employees and agents, pursuant to this Agreement are intended to be and shall be construed as a "cooperative activity" and it is the intent of the Parties that they shall be deemed a "single governmental unit" for the purpose of liability, as set forth in Minnesota Statutes Section 471.59, Subd. 1a(a), provided further that for purposes of that statute it is the intent of each Party that this Agreement does not create any liability or exposure of one Party for the acts or omissions of the other Party.

   c. **Records Retention and MGDPA:** The Parties agree that records created pursuant to the terms of this Agreement will be retained in a manner that meets their respective entity's records retention schedules that have been reviewed and approved by the State in accordance with Minn. Stat. §138.17. The parties further agree that records prepared or maintained in furtherance of the agreement shall be subject to the Minnesota Government Data Practices Act.

   d. **Timeliness:** The Parties agree to perform obligations under this Agreement in a timely manner and keep each other informed about any delays that may occur. If individuals participating in this Agreement on behalf of their respective entities are unable to attend a scheduled meeting of the Policy Committee, it is their responsibility to identify a replacement authorized to act on behalf of their respective entity as a voting member of the Policy Committee at the attended meeting.

5. **Administration:**

   a. **Development of the Plan.** The Parties agree to designate one representative, who must be an elected or appointed member of the governing board of the Party, to a Policy Committee for development of the watershed-based plan. The Committee will meet monthly or as needed to decide on the content of the plan. Each representative shall have one vote. The Policy Committee will establish bylaws by October 30, 2014. The Parties agree to designate one or more technical representatives to an advisory committee for development of the watershed-based plan. The Committee will meet monthly or as needed to make recommendations on the content of the plan.

   b. **Advisory Committee** – The Parties agree that an Advisory Committee will be formed and comprised of state agency representatives from the Minnesota Pollution Control Agency, Board of Water and Soil Resources, Minnesota Department of Natural Resources, Minnesota Department of Health, Minnesota Department of Agriculture and other entities that the Policy Committee invites to participate. The purpose of the Advisory Committee is to make recommendations on the plan and plan implementation to the Policy Committee, including identification of priorities. Representatives from additional entities may be invited to participate in Advisory Committee meetings when the topic pertains to the interests of those entities.

   c. **Submittal of the Plan.** The Policy Committee will recommend the plan to the Parties of this Agreement. The Policy Committee will be responsible for initiating a formal review process for the watershed-based plan conforming to Minnesota Statutes Chapters 103B and 103D including public hearings. Upon completion of local review and comment, and approval of the plan for submittal by each Party, the Policy Committee will submit the watershed-based plan jointly to the Board of Water and Soil Resources for review and approval.

   d. **Adoption of the Plan.** The Parties agree to adopt and begin implementation of the plan within 120 days of state approval and provide notice of plan adoption pursuant to Minnesota Statutes Chapters 103B and 103D.

6. **Fiscal Agent: Cook County Soil and Water Conservation District** will act as the fiscal agent for the purposes of this Agreement and agrees to:

   a. Accept all fiscal responsibilities associated with the implementation of the BWSR grant agreement for developing a watershed-based plan.

   b. Perform financial transactions as part of contract implementation.

   c. Annually provide a full and complete audit report.

   d. Provide the Policy Committee and its members with such records as are necessary to describe the financial condition of the BWSR grant agreement.

e. Responsible for fiscal records retention consistent with the agents records retention schedule until termination of the Agreement (at that time, records will be turned over to the grant Day-to-Day contact.)

7. **Duties of Lake and Cook Counties and Lake and Cook County SWCDs :** The Lake and Cook County Boards of Commissioners and the Lake and Cook County SWCD Boards of Supervisors agree to provide the following services to the partnership:

   a. Actively attend and participate in all scheduled meetings of the Policy Committee or in case of a legitimate conflict, designate a replacement commissioner to attend.

   b. Actively engage in the decision-making process for watershed-based planning with the understanding that goals, objectives, and action items of the water plan must be prioritized, targeted, and measureable.

   c. Initiate and/or assist with providing opportunities for County constituents to be appraised of updated progress of the watershed-based planning process.

   d. Regularly update their respective Boards on the progress of the comprehensive watershed –based planning process.

   e. Utilize the technical resources of their respective entities to assist and inform their decisions in the water planning process.

8. **Duties of SWCD for Lake and Cook County**: The SWCDS for Lake and Cook County agree to provide the following services to the partnership:

   a. Identify potential contracted service providers for process facilitation, plan writing, GIS, mapping, data analysis, monitoring activities or any other technical services needed throughout the process.

   b. Ensure that goals, objectives, and action items of the plan produced are prioritized, targeted, and measurable.

   c. Assist with data compilation, meeting facilitation, and plan writing.

   d. Upon review and approval by the Policy Committee, Lake and Cook County SWCD staff will establish and manage contracted services for above mentioned activities.

   e. Coordinate Policy Committee meetings, including establishing date, location, time, and any necessary accommodations such as refreshments.

   f. Coordinate and facilitate Advisory Committee meetings including establishing date, location, time, space, IT needs, and any necessary accommodations such as refreshments.

g. Coordinate public meetings as required by Minnesota Statutes 103B and 103D as part of the formal review process for the watershed-based plan, including establishing date, location, time, IT needs, presenters, and any necessary accommodations such as refreshments.

h. Administrate the grant with the Board of Water and Soil Resources for the purposes of developing a watershed-based plan, including reporting, process oversight, consistent planning and update meetings with BWSR staff, and overall coordination of the process.

9. **Authorized Representatives:** The following persons will be the primary contacts for all matters concerning this Agreement:

Cook County
Mr. Garry Gamble or successor
County Commissioner
Cook County Board of Commissioners
Administrator's Office Room 1800
411 W. 2nd Street
Grand Marais, MN 55604
Telephone: (218) 387-3602

Cook County SWCD
Mr. Don Goodell or successor
District Supervisor
Cook County SWCD
411 W. 2nd Street
Grand Marais, MN 55604
Telephone: (218) 387-3647

Lake County
Mr. Rich Sve or successor
County Commissioner
Lake County Board of Commissioners
Lake County Courthouse
601 Third Avenue
Two Harbors, MN 55616
Telephone: (218) 834-8320

Lake County SWCD
Mr. Todd Ronning or successor
District Supervisor
Lake County SWCD
616 3rd Avenue
Two Harbors, MN 55616
Telephone: (218) 834-8370

The remainder of this page left intentionally blank. Signature page follows.

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

PARTNER: Cook County

APPROVED:

BY: Janice Hall 9-29-2014
Board Chair Date

Printed Name: Janice Hall

BY: Donald F. Goodell 10/2/14
SWCD District Supervisor Date

Printed Name: DONALD F. GOODELL

APPROVED AS TO FORM

BY: Molly Dicke 9/25/14
County Attorney Date

PARTNER: **Lake County**

APPROVED:

BY: [signature] 10-7-14
Board Chair Date

Printed Name: Rich Sve

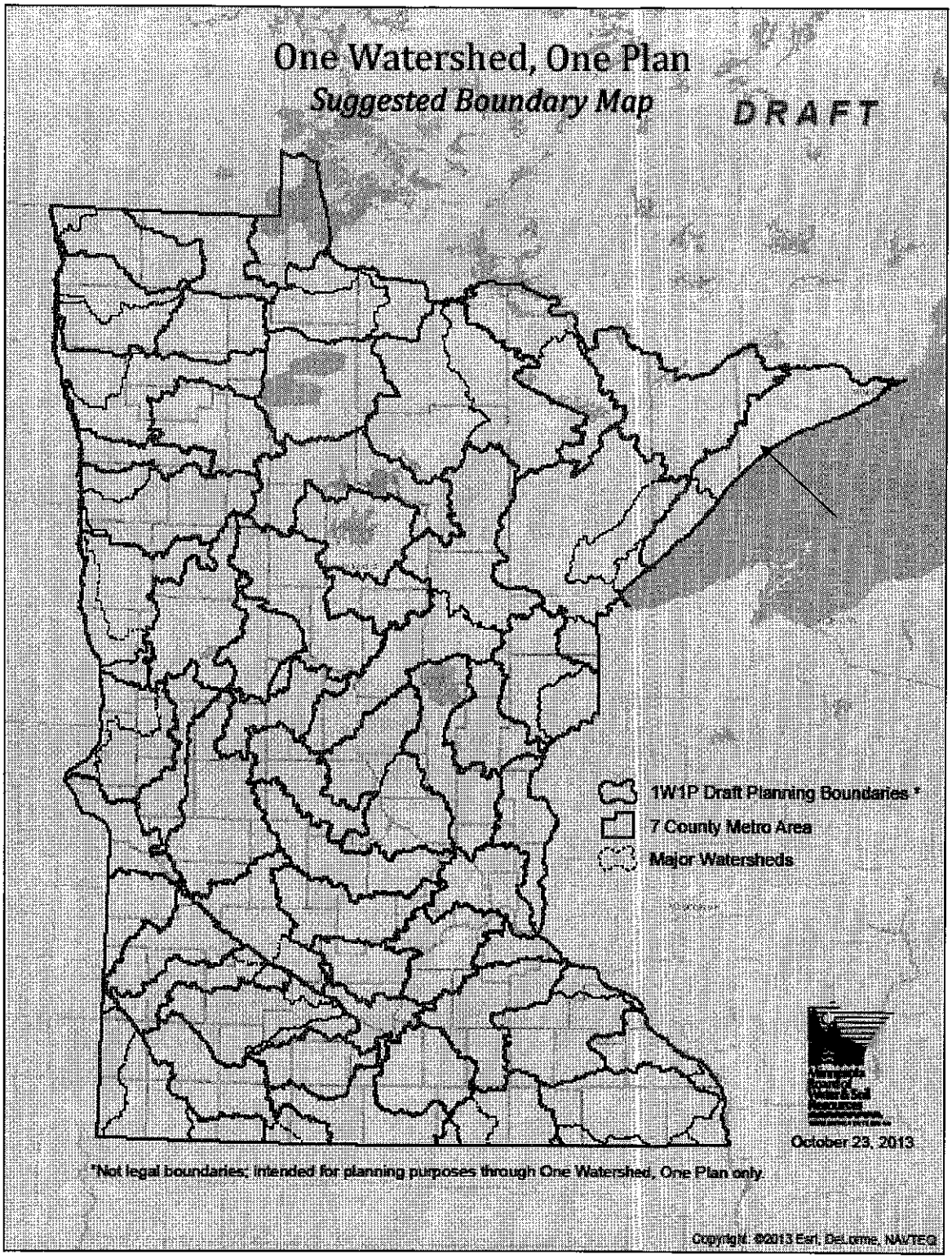
BY: [signature] 10-9-14
SWCD District Supervisor Date

Printed Name: Phillip Gouterment

APPROVED AS TO FORM

BY: Lauren M Aure 10-2-2014
County Attorney Date

Attachment A



MEMORANDUM OF AGREEMENT FOR IMPLEMEMTATION OF THE LSNW ONE WATERSHED ONE PLAN

This MEMORANDUM OF AGREEMENT FOR IMPLEMENATION OF THE LSNW ONE WATERSHED ONE PLAN (the "Agreement") is made and entered into between the County of Lake, by and through the County Board of Commissioners, The County of Cook by and through the County Board of Commissioners, the Lake County Soil and Water Conservation District, by and through the Soil and Water Conservation Board of Supervisors, and the Cook County Soil and Water Conservation District, by and through the Soil and Water Conservation District Board of Supervisors, collectively referred to as "the Parties", and each individual referred to as "Party".

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

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

WHEREAS, the Parties all have authority over lands comprising the Lake Superior North Watershed (or "LSNW"), the boundaries of which are established by the Minnesota Board of Water and Soil Resources; and

WHEREAS, the Parties to this Agreement have a common interest and statutory authority to prepare, adopt, amend as appropriate and/or needed, and assure implementation of a comprehensive watershed management plan for the Lake Superior North Watershed to conserve soil and water resources through: the implementation of practices, programs, and regulatory controls that effectively control or prevent erosion, sedimentation, siltation and related pollution in order to preserve natural resources; ensure continued soil productivity; protect water quality; reduce damage caused by floods; preserve wildlife; protect the tax base; and protect public lands and waters; and

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

WHEREAS, pursuant to Minn. Stat. Section 103B.101 Subd. 14, the Board of Water and Soil Resources (BWSR) "may adopt resolutions, policies, or orders that allow a comprehensive plan, local water management plan, or watershed management plan, developed or amended, approved or adopted, according to chapter 103B, 103C, or 103D to serve as substitutes for one another or be replaced with a comprehensive watershed management plan," a policy also known as "One Watershed, One Plan"; and

WHEREAS, the Parties collaborated to submit a nomination to pilot a comprehensive watershed management plan under the "One Watershed, One Plan" initiative in the. In October 2014, the LSNW was selected as one of five major watersheds across the state to pilot this program. The watershed planning area known as LSNW includes lands in Lake County, lands in Cook County and less than 10% of the LSNW physical area within St. Louis County. This physical area drains into Lake Superior. The planning area is shown in Attachment A to this Agreement. The pilot program continues to involve a

broad range of stakeholders, including governments, state agencies, and community members and organizations as partners in the planning process; and

WHEREAS, the Parties previously entered into a Memorandum of Agreement (the LAKE SUPERIOR NORTH WATERSHED MEMORANDUM OF AGREEMENT, executed in 2014) (the "2014 MOA"), for the purpose of planning the "One Watershed, One Plan" comprehensive watershed management plan for the LSNW (also known as the "LSNW Plan"). The resulting plan addresses threats to and protection of our water and soil resources and the land use practices that provide the greatest environmental benefits to the watersheds; and

WHEREAS, the Vision Statement of the Lake Superior North Watershed Plan is the following: "The LSNW Plan contributes to a globally significant freshwater body. People world-wide value the area and recognize the numerous challenges facing its unique and sensitive resources. The goal of the Plan is to maximize the ecosystem services provided by a healthy Lake Superior watershed, and to maintain or increase the resiliency of the LSNW for continued social, environmental and economic well-being. The LSNW Management Plan takes a targeted, prioritized, measurable and sustainable approach to resource protection. By integrating collaborative governance, leveraged partnerships, and active stewardship by local residents, businesses, and visitors, the ecological health and economic vitality of the LSNW will be maintained for generations to come;" and

WHEREAS, with the development of the initial LSNW Plan completed, the Parties now enter into this Agreement so as to continue the cooperative and collaborative work of the Counties and SWCD's with BWSR and the members of the Advisory Committee for continued planning and implementation of LSNW Plan: and

WHEREAS, it is understood by all Parties to this Agreement that the LSNW Plan does not replace or supplant local land use, planning or zoning authority, but, instead, provides a framework to provide increased opportunities for cooperation and consistency on a watershed basis: and

WHEREAS, it is understood by all Parties to this Agreement that the LSNW Plan is intended to provide a framework for consistency and cooperation on a watershed basis and to allow local governments to cooperatively work together to implement projects with the highest return on investment for improving water and soil quality/quantity issues on a watershed basis:

NOW,THEREFORE, the Parties hereto agree as follows:

1. **Purpose.** The Parties to this Agreement recognize the importance of partnerships to plan and implement protection and restoration efforts for the LSNW (see Attachment A for a map of the planning area) and this MOA formalize the nature and details of this collaborative effort. Parties signing this Agreement will be collectively referred to as LSNW Planning Policy Committee (the Policy Committee or Committee).

2. **Term.** This Agreement is effective upon signature of all Parties and will remain in effect until terminated according to the provisions of this Agreement, unless earlier terminated by law.

3. **Procedure for Parties to Leave Membership of the Agreement.** A Party desiring to leave the membership of this Agreement shall indicate its intent in writing to the Policy Committee in the form of an official board resolution. Notice must be made 180 days in advance of leaving the 1W1P

LSNW. A Party that leaves the membership of the Agreement remains obligated to comply with the terms of any grants the LSNW Plan has at the time of the Party's notice to leave membership until the grant period and reporting period has ended.

4. **General Provisions.**
   a. **Compliance with Laws/Standards:** The Parties agree to abide by all Federal, State or local laws; statutes, ordinances, rules and regulations now in effect or hereafter adopted pertaining to this Agreement and to the facilities, programs and staff for which the Agreement is responsible.

   b. **Indemnification:** Each Party to this Agreement shall be liable for the acts of its officers, employees or agents and the results thereof to the extent authorized or limited by law and shall not be responsible for the acts of the other Party, its officers, employees or agents. The provisions of the Municipal Tort Claims Act, Minnesota Statute Chapter 466 and other applicable laws govern liability of the Parties. Actions by the Parties, their respective officers, employees and agents, pursuant to this Agreement are intended to be and shall be construed as a "collaborative activity".

   c. **Employee Status:** The Parties agree that the respective employees and agent of each Party shall remain the employees or agents of each individual respective Party.

   d. **Records Retention and MGDPA:** The Parties agree that records created pursuant to the terms of this Agreement will be retained in a manner that meets their respective entity's records retention schedules that have been reviewed and approved by the State in accordance with Minn. Stat. 138.17. The Parties further agree that records prepared or maintained in furtherance of the agreement shall be subject to the Minnesota Government Data Practices Act.

   e. **Timeliness:** The Parties agree to perform obligations under this Agreement in a timely manner and keep each other informed about any delays that may occur.

   f. **Termination:** The Parties anticipate that this Agreement will remain in full force and effect until terminated in writing by all Parties, unless otherwise terminated in accordance with law or other provisions of this Agreement.

5. **Administration.** To carry out the coordinated planning, development, and implementation of the 1W1P LSNW, the Parties agree to continue the structure established under the Memorandum of Agreement, which includes the Policy Committee and Advisory Committee.

   a. **Policy Committee:** The Parties agree that the Policy Committee established under the 2014 MOA for the purpose of developing the LSNW Plan shall continue to operate cooperatively and collaboratively for the purpose of continued planning of, review of, advising on, and coordinating the implementation of the LSNW Plan. Each Party may designate its own representative and alternate representative to the Policy Committee, although each designated representative must be an elected or appointed member of that Party's governing board. The Policy Committee will adhere to the by-laws established for the LSNW Plan.

b. **Advisory Committee:** The Parties agree that the Advisory Committee established through the planning process, comprised of state agency representatives, federal agency representatives, tribal representatives, and other entities will continue to advise on the plan as requested by the Parties or Policy Committee. The purpose of the Advisory Committee is to make recommendations on the plan and plan implementation to the Policy Committee. Representatives from additional entities may be invited to participate in Advisory Committee meetings when the topic pertains to the interests of those entities.

c. **Implementation of the Plan:** The Parties agree to adopt and begin implementation of the plan within 120 days of state approval and provide notice of plan adoption pursuant to Minnesota Statutes Chapter 103B and 103D.

6. **Fiscal Agent.** Upon application for funding or project determination, the Policy Committee shall by majority vote designate a fiscal agent for each funding source and/or project. Voting for purposes of designating a fiscal agent may occur at an in-person meeting or by email/written proxy vote To accommodate administrative overhead costs inherent to any grant, the Fiscal Agent shall be entitled to receive 5-10% of the total grant amount. The Policy Committee shall establish the percentage allowed the Fiscal Agent after reviewing the complexity and anticipated administrative workload of the specific grant being applied for. Each Party agrees that, while acting as Fiscal Agent it shall:

   a. Accept all fiscal responsibilities associated with the grant agreement for the specific funding source or project and fulfill these responsibilities through the life of the funding or project.

   b. Perform financial transactions as required by grant agreements for project implementation.

   c. Be responsible for fiscal records retention consistent with the Party's records retention schedule.

7. **Finances.**

   a. **Budget and work plan:** The Policy Committee will develop an annual work plan budget, dependent on budget reserves and/or anticipated continued Grants and Project funding at the annual meeting. The work plan and budget may be modified as needed to meet actual grant or funding source requirements.

   b. **Financial Obligation:** Grant funding will be obtained to accomplish tasks within the LSNW Plan. In addition to grant funding received, Parties may provide additional direct funding as approved by each Party's governing Board. In addition to or in lieu of financial support, the Parties may also contribute services, personnel, equipment, or other property as available and approved by each Party's governing Board to fulfill plan requirements. Each Party is not expected to make any individual contribution unless it is approved by all the Parties.

8. **Structure.** To carry out the implementation of the LSNW Plan, the Parties agree to continue the structure established under the 2014 MOA, which includes Cook County Soil and Water Conservation District, Lake County Soil and Water Conservation District, Cook County, and Lake County.

   a. **Duties of Lake and Cook Counties and Lake and Cook County SWCDs:** The Lake and Cook County Boards of Commissioners and the Lake and Cook County SWCD Boards of Supervisors agree to provide the following services to the partnership:

i. Actively attend and participate in all scheduled meetings of the Policy Committee or in case of a legitimate conflict, designate a replacement commissioner or supervisor to attend.

ii. Actively engage in the decision-making process for watershed-based project implementation with the understanding of the goals, objectives, and action items of the LSNW Plan.

iii. Initiate and/or assist with providing opportunities for County constituents to be appraised of LSNW Plan implementation progress.

iv. Semi-annually update their respective Boards on the progress of the implementation of the LSNW Plan.

v. Utilize the technical resources of their respective entities to assist and inform their decisions in the implementation process.

vi. Ensure that their staff are working towards the achievement of the goals, objectives, and action item implementation tasks per the LSNW Plan and Targeted Implementation Schedule (Table 7 of the LSNW Plan).

b. Duties of Counties Lake and Cook: The Counties of Lake and Cook County agree to provide the following services to the partnership:

i. Ensure that goals, objectives, and actions items of the plan are being achieved.

ii. Work with departments in identifying lead staff and implementation of projects within the Plan.

iii. Assist with plan implementation and documentation, annual meetings, and other plan related activities as requested from the Parties.

iv. Assist with securing funding and administering funding responsibilities as mechanisms to accomplish tasks within the Plan.

c. Duties of SWCDs for Lake and Cook Counties: The SWCDs for Lake and Cook County agree to provide the following services to the partnership:

i. Ensure that goals, objectives, and actions items of the plan are being achieved.

ii. Assist with plan implementation and documentation, annual meetings, and other plan related activities as requested by the Parties.

iii. Act as a liaison for the County to LSNW Plan activities as necessary for implementation.

iv. Assist with securing funding and administering funding responsibilities as mechanisms to accomplish tasks within the Plan.

9. **Authorized Representative.** The following persons will be the primary contacts for all matters concerning this Agreement:

COOK COUNTY
Mr. Myron Bursheim or Successor
Cook County Board of Commissioners
411 W. Second Street
Grand Marais, MN 55604
Telephone: (218) 387-3602

LAKE COUNTY
Mr. Rich Sve or Successor
Lake County Board of Commissioners
601 Third Avenue
Two Harbors, MN 55616
Telephone:

COOK COUNTY SWCD DISTRICT
Mr. Don Goodell or Successor
Cook County SWCD Board
411 W. Second Street
Grand Marais, MN 55604
Telephone: (218) 387-3647

LAKE COUNTY SWCD DISTRICT
Mr. Todd Ronning or Successor
Lake County SWCD Board
601 Third Avenue
Two Harbors, MN 55616
Telephone: (218) 834-8370

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

COOK COUNTY
BY: _____ 5/25/2017
Board Chair Date

Printed Name: Jan Sivertson

COOK COUNTY SWCD
BY: DONALD F. GOODELL 5/4/17
SWCD District Supervisor Date

Printed Name: Donald F. Goodell

APPROVED AS TO FORM
BY: _____ 5/25/17
County Attorney Date

LAKE COUNTY
BY: _____ May 23, 2017
Board Chair Attest: Laurel D Buchanan Clerk of the Board Date

Printed Name: Rich Sve

LAKE COUNTY SWCD
BY: _____ 5/12/17
SWCD District Supervisor Date

Printed Name: Todd Ronning

APPROVED AS TO FORM
BY: _____ May 23, 2017
County Attorney Date

Appendix G. Original Priority Concerns

PRIORITY CONCERNS

Priority concerns from the 2017 LSNW 1W1P were rephrased based on input from the Planning Work Group and Advisory Committee. Recommended adjustments are summarized in Table 1. Adjustments were made to better align with current implementation efforts and bring in new data and information in the WRAPS.

Table 1. Summary of Priority Concerns for LSNW 1W1P

Priority Concern	Description of Concern
Stormwater Management	Unmanaged or poorly managed land development can have adverse impacts on groundwater recharge and stormwater runoff quality and quantity.
Impaired and Nearly Impaired Waters	There are lakes and streams within the watershed that are considered impaired because they do not meet the requirements for their designated uses (e.g., swimmable, drinkable, fishable, consumable). Nearly impaired waterbodies are not on the impaired waters list but have declining water quality that may put them on the list in the near future.
Subsurface Sewage Treatment Systems	Trends in lakes in northern Minnesota have shown an increase in nutrient loading that correlates with development and septic system densities. These non–compliant or failing septic systems pose a threat to public health and natural resources.
Forest Management	The decline of forest health due to insect and disease, climate change, age-class, and past management practices alter peak flows affecting the stability of streams and rivers. Addressing forest management on private property, particularly on lands <20 acres, has very little support for reforestation and re–vegetation practices.
Aggregate Materials	The extraction of aggregate materials, a high value resource, has the potential to negatively impact ecological resources and increase susceptibility to groundwater pollution.
Stream Connectivity	Improperly designed or installed road crossings tend to dam streams and prevent fish passage, which often disturbs the natural flow regime and migration of aquatic life necessary to support fisheries throughout the Watershed.
Invasive Species	Invasive species alter native ecosystems by reducing biodiversity and degrading wildlife habitat and can negatively impact commercial, recreational, and cultural activities and harm human health.
Groundwater and Drinking Water	Increasing development pressure and existing land use practices have the potential to adversely impact groundwater quantity and quality resulting in reduced groundwater recharge and impacts to receiving water and drinking water supplies. There are four Community Public Water Suppliers in the LSNW with a number of Non-Community Public Water Suppliers, private wells and lakes (including Lake Superior) which provide surface drinking water supplies.
Wetland Management	Wetlands provide valuable ecosystem functions and services that can be lost through impacts from development, catastrophic weather events and invasive species. The majority of the wetlands in Lake and Cook County are relatively pristine and intact, yet susceptible to degradation from development and high volumes of stormwater.
Unique/High Value Resources	The LSNW contains some of the most unique and rare natural resources in the State of Minnesota that are also susceptible to degradation from environmental stressors. Unique and high value resources include but are not limited to forests, coastal wetlands, exceptional quality waterbodies, wild rice lakes, fisheries, and bluffs.
Altered Hydrology and Resiliency	Altered hydrology can result in flashy streams, low baseflow, and streambank degradation. Addressing altered hydrology will build watershed resilience to flooding and changing climate conditions.

ORIGINAL PRIORITY CONCERNS

Some priority concerns in the LSN 1W1P were included at the time the pilot plan was written. Since then, some of these priority concerns are no longer relevant, either because they are outside the authority of local government staff, are addressed by other issues, or are better summarized as action items. Table 2 below summarizes the priority concerns present in the 2017 LSNW 1W1P that are now summarized in the Plan Appendix. This recommendation is based on input from the Planning Work Group and Advisory Committee.

Table 2. Summary of priority concerns in 2017 LSNW 1W1P moved to Appendix in 2024 amendment.

Concern	Summary	
Historic Land Use	Initial description:	Historic land use and waste management practices have resulted in a number of contaminated sites in the Lake Superior North Watershed.
	Moved because:	Local partners implementing the LSNWMP do not have authority to clean up contaminated sites.
Construction & Industrial Operations	Initial description:	Construction and industrial operations can have long-term impacts on the environment.
	Removed because:	Local partners implementing the LSNWMP do not have authority on construction and industrial operations.
Impacts of Climate Change	Initial description:	Changes in climate and the frequency of severe storm events and droughts will have economic, ecological, and human health impacts in the LSNW.
	Moved because:	Rather than its own concern, the impacts of climate change was removed as a single issue and will be a lens through which to see issues due to its overlap across many resources.
At Risk Waters (Unimpaired Resources)	Initial description:	There are waters in the LSNW that are currently meeting their designated uses and water quality standards but are at risk for becoming impaired and not meeting state standards.
	Moved because:	Local partners will be addressing this issue in the “Impaired Waters” priority concern.
Fisheries	Initial description:	The watershed supports many fish populations that are highly sensitive to habitat degradation. Among the most sensitive are trout in streams (brook and rainbow trout) and lake trout. Maintaining high water quality is also essential to the health of equally sensitive Lake Superior fish populations.
	Moved because:	Local partners implementing the LSNWMP do not address this, state agencies do. Issue will also be addressed in the “Stream Connectivity” priority concern.
Wild Rice Lakes	Initial description:	Wild rice, an important food supply for humans and resource for wildlife, is being threatened by anthropogenic sources of disturbance and pollution.
	Moved because:	Local partners will be addressing this issue in the “Unique/ High Value Resources” priority concern.
Drinking Water	Initial description:	There are four Community Public Water Suppliers in the LSNW with a number of Non-Community Public Water Suppliers, private wells and lakes (including Lake Superior) that require protection from stormwater impacts.
	Moved because:	Issue was folded into the “Groundwater” priority concern
Data Collection	Initial description:	Data gaps in the LSNW limit the ability to make informed decisions about resource management issues.
	Moved because:	Data gaps will be filled by actions within priority concerns where applicable.
Education and Outreach	Initial description:	A coordinated campaign is needed to develop a unified vision for land management within the watershed that establishes goals and actions that are supported and promoted by local governance and the public.
	Moved because:	Education and outreach will be done addressing priority concerns where applicable.