Bayfield County Land and Water Resource Management Plan

Bayfield County Land Conservation Committee and
Land and Water Conservation Department

January 2020
For Implementation 2020 – 2029

Acknowledgements

This plan was prepared under the authority of Chapter 92, Wisconsin Statutes and under the direction of the Bayfield County Land Conservation Committee, the Bayfield County Board, and the Land and Water Conservation Department

Bayfield County Land Conservation Committee

Chair.....Fred Strand
Vice Chair.....Marty Milanowski
Member.....David A. Zepczyk
Member.....Thomas Snilsberg
Member.....Peter Tetzner
Farm Service Agency Representative.....Melissa Netz

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Cooperators and Partners

Wisconsin Department of Agriculture, Trade & Consumer Protection
Wisconsin Department of Natural Resources
USDA Natural Resources Conservation Service
USDA Farm Service Agency
Bayfield County Planning & Zoning Department
Bayfield County Land Information Department
Bayfield County Health Department
Lake Superior Collaborative Charter
University of Wisconsin Extension
US Fish and Wildlife Service
US Forest Service
Ducks Unlimited
Trout Unlimited
Bayfield County Lakes Forum
Eau Claire Lakes Association
Friends of the St. Croix Headwaters
Iron River Lakes Association
Landmark Conservancy

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Plan Approvals

Bayfield County Land Conservation Committee on November 8, 2019
Bayfield County Board on January 28, 2020
Wisconsin Land & Water Conservation Board on December 3, 2019

Initial Implementation Period

January 1, 2020 – December 31, 2025

DRAFT RESOLUTION

A RESOLUTION APPROVING THE BAYFIELD COUNTY LAND AND WATER RESOURCE MANAGEMENT PLAN

WHEREAS, Chapter 92.10 of the Wisconsin Statutes requires that all counties in the state of Wisconsin develop a Land and Water Resource Management Plan; and

WHEREAS, the Bayfield County Land Conservation Committee sent out surveys, hosted one informational session, contacted representatives of partnering NGOs, (hosted a meeting(s) open to the public), and held one public hearing to explain the plan process, solicit public opinion, and to solicit participation in the revision of the Land and Water Resource Management Plan; and

WHEREAS, the Bayfield County Land Conservation Committee formed a volunteer workgroup to draft a county-wide AIS Strategic Plan with the goals, objectives, and activities to address aquatic invasive species control, education, and prevention incorporated into this LWRMP; and

WHEREAS, the resulting LWRMP identifies land and water resource management goals, objectives, and activities for implementation by the Bayfield County Land Conservation Committee and the LWCD staff for the next ten years, including a work plan revision after 5 years; and

WHEREAS, at their November 2019 meeting, the Bayfield County Land Conservation Committee approved the Land and Water Resource Management Plan and forwarded the approved plan to the Bayfield County Board for their review and action; and

WHEREAS, the Bayfield County Land Conservation Committee staff will present the revised Land and Water Resource Management Plan to the Wisconsin Land and Water Conservation Board, at their meeting on December 3, 2019; and

WHEREAS, the Bayfield County Land and Water Resource Management Plan will be reviewed and approved by the Wisconsin Land and Water Conservation Board at their meeting on December 3, 2019:

NOW THEREFORE BE IT RESOLVED that the Bayfield County Board of Supervisors, does approve the Bayfield County Land and Water Resource Management Plan to be implemented for the period January 2020 through December 2029, with a work plan review and update in 2024.

Executive Summary

Bayfield County Land & Water Resource Management Plan

Introduction

The Bayfield County Land and Water Resource Management Plan (LWRMP) was developed to meet requirements in Chapter 92 of the Wisconsin Statutes. The intent of the plan is to guide local water quality protection activities and increase public participation in the management of Bayfield County's natural resources. The LWRMPs are intended to provide counties (through their Land Conservation Committees) the tools, flexibility, and funding necessary to address state and local water quality goals and priorities. The Bayfield County Land and Water Resource Management Plan contains realistic objectives and activities intended to meet the goals established by a diverse advisory committee consisting of volunteer citizens from throughout the county and natural resource agency representatives who work in Bayfield County. The resulting work plan will guide the Land Conservation Committee and their staff through 2030.

Plan Organization

The Bayfield County Land and Water Resource Management Plan is divided into three main volumes of information. Volume I provides a general overview of the county and an assessment of the county's resources. Volume II addresses the implementation of the agricultural performance standards for nonpoint pollution reduction and outlines implementation of plan goals, objectives, and activities. It includes a detailed work plan and discussion of ongoing monitoring efforts in the county. Volume III includes plan maps. Additional supporting information is found in the appendices.

Public Participation

Bayfield County provided several opportunities for citizens to provide input in preparation of the current LWRMP revision. The 2010-2020 LWRMP was used as a starting point for this revision.

Surveys and Questionnaires

The 2020-2030 LWRMP was developed with a series of public participation opportunities including informational meetings, a public hearing, and interactions with clients and partners. The LWRMP provided the framework and focus for the Bayfield County Land and Water Conservation Department (LWCD) conservation efforts over the past 10 years. The basic elements of the plan have proven to be effective in focusing available LWCD resources on identified local conservation concerns. There has been continued and growing public support for the activities and projects implemented by the LWCD under the LWRMP.

Three organizational meetings with partner agencies, citizens, and county departments were held in February of 2019, June of 2019, and again in August 2019 with the Land

Conservation Committee, to review the 2020-2029 LWRM Plan Goals, Objectives, and Activities. Many of the previous Goals and Objectives remain a top priority for the department, also adding some newer ideas for the future. Current priorities include:

- *Land use activities including agriculture, watershed planning and development*
- *Wetland protection and restoration*
- *Shoreland protection*
- *Conservation education*
- *Invasive species control*
- *Grassland Management*
- *Development of a forage council; increase in rotational grazing, beef herd management*
- *Emphasis on surface water resources*
- *Climate Resiliency Planning / Technical Standard Revisions*
- *Stream Crossing / Culvert Design Revisions*

Advisory Committee

Public participation in the LWRMP development in 2019 included the following steps:

- A list of potential advisors to the LWRMP revision effort was reached by the outreach of the department, and the LCC, or those with known interest through past interactions with the LWCD.

- An advisory committee that included representatives from partnering agencies, non-governmental agencies, municipalities, and citizen volunteers provided input in plan development. The committee represented diverse interest groups including agriculture, government, lake and river associations, environmental education, contractors, and forestry. The committee included DNR participation.

- Two advisory committee meetings were held to identify and prioritize issues, define goals and objectives, and develop a list of activities for plan implementation. These meetings were held May 17, 2019, and August 23, 2019.

- The advisory committee reviewed and commented on the draft plan. Committee comments were considered in development of the final plan.

- Press releases informed the public about plan development, and a public hearing was conducted to receive comments on the final plan on November 8, 2019.

Goals Objectives and Activities

The objectives and activities are organized under five main goals:

Goal I

Protect and enhance surface water, wetlands, and groundwater to maintain water quality, ecologic function, and recreation and aesthetic values.

Goal II

Reduce the spread of invasive species to aquatic and terrestrial habitats.

Goal III

Protect, restore, and enhance wildlife habitat in forests, lakes, and streams.

Goal IV

Goal IV. Increase natural resource education and LWCD outreach opportunities.

Goal V

Factor in climate resiliency for planning, design, engineering, and construction of future projects due to more intense weather events.

Plan Guiding Principles

- Uphold the protection of natural resources while considering the importance of the Bayfield County economy.
- Utilize staff time and financial resources efficiently.
- Facilitate partnerships and support efforts of other organizations where consistent with land and water resource priorities.
- Emphasize education to increase understanding of natural resource concerns and the methods to address these concerns and encourage beneficial changes in behavior.
- Restore and protect native habitats while meeting water quality objectives.
- Utilize information and recommendations in partner organization water quality and habitat management plans.

Plan Implementation

Volume II outlines roles, responsibilities, funding and staffing needs, program and project evaluation, and a detailed work plan that includes each goal, objective, and activity. Volume II also outlines the Bayfield County priority farm strategy and

agricultural and non-agricultural standards and prohibitions implementation. Priority areas will be targeted for voluntary participation and supporting educational efforts based on their potential to enhance the quality of the natural resources. Prioritization criteria for cost-share and technical assistance include geographic location, resource concern, partnership cooperation, and landowner interest among other criteria.

The NR 151 performance standards strategy is to encourage voluntary compliance through education and technical assistance. A comprehensive educational strategy has been developed which includes: media contact development, news releases, workshops, distribution of printed materials, website outreach, group presentations, and personal contacts.

Currently funding for the department is stable, however remains reliant on grant sources for full LWRMP implementation. Acquisition of staff funding from grants for all positions will remain a priority. The department has been successful in consistently obtaining grants annually for plan implementation primarily from State and Federal agencies.

Progress Tracking and Plan Evaluation

Plan evaluation is necessary to assess whether goals, objectives, and activities are being accomplished. The LCC lacks the resources to conduct scientifically supportable monitoring and research to verify the effectiveness of routine projects and events. The LCC will implement the LWRMP to applicable technical and educational standards determined by the NRCS, DNR, SOC, UWEX, and others to be effective, beneficial, and sustainable. Documentation of progress will be compiled where feasible to verify the effectiveness of new initiatives, practices, and projects in an appropriate metric.

The Land and Water Conservation Department staff will review progress toward plan completion on a yearly basis and provide periodic staff reports at LCC meetings. A written annual report will be provided to the public, the county, and DATCP.

Conclusion

Land and water resources are very important to Bayfield County. Water quality exceeds the EPA minimum standards in most areas of Bayfield County, allowing focus on resource protection rather than restoration activities. The county has taken the lead in resource protection by implementing rigorous protection standards. Structural setbacks on Lake Superior are based on site specific soils data that considers bank recession rates. The county received a wetland stewardship award for the protection of Sultz Swamp. In addition, one of only two purchase of development rights (PDR) projects in the state protects the viewscape and watershed around the City of Bayfield.

The LCC and the LWCD staff enjoy a high level of professional respect among clients, citizens, and partners. The LWRMP reflects citizen interest in local priorities,

encourages local leadership, and supports partner participation in protecting the natural resources of Bayfield County. This plan empowers the Land Conservation Committee to provide the local leadership and focus needed to coordinate a wide spectrum of conservation activities along with a diverse group of partners. The implementation of this plan will provide the basis for the future of land and water conservation in Bayfield County.

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Volume I. Plan Background

Introduction

Authority

Chapter 92 of the Wisconsin Statutes authorizes the creation and lists duties and responsibilities of Land Conservation Committees (LCC). Each county is required to have an LCC. The committees are responsible for administering soil and water conservation programs and for providing technical assistance and conservation education. The Wisconsin Department of Agriculture, Trade & Consumer Protection (DATCP) provides grant funding to aid counties in implementing their program through the Soil and Water Resource Management section.

The 1997-1999 biennial budget bill changed the way the State of Wisconsin allocated funds to counties for soil and water resource management. The intent of this change was to encourage and support local water quality planning through preparation of county land and water resource management plans. These plans are intended to provide counties, through their Land Conservation Committees, the tools, flexibility, and funding to be able to address both statewide goals and priorities identified at the local level.

Plan Requirements

A county land and water resource management plan must include, at a minimum, the following:

- Public participation
- Cropland soil erosion control plan or waiver from plan requirements approved by the Land and Water Conservation Board and DATCP
- Coordinated NR 151 implementation strategy
- A resource assessment including water quality, soil erosion conditions, and causes of nonpoint source water pollution
- Water quality and soil erosion goals, set in consultation with WDNR
- Standards for the Farmland Preservation Program
- A work plan describing objectives and activities for each goal
- A progress tracking and evaluation method
- A process for landowner notification if needed
- A public hearing
- Agricultural and non-agricultural performance standards, and practices that will help meet these standards

Public Participation

Bayfield County provided several opportunities for citizens to provide input in preparation for the current LWRMP revision. The 2010-2020 LWRMP was used as a starting point for this revision.

The 2020-2029 Bayfield County Land and Water Resource Management Plan was developed with a series of public participation opportunities including informational meetings, a public hearing, and interactions with clients and partners. The LWRMP provided the framework and focus for the Bayfield County Land and Water Conservation Department (LWCD) conservation efforts over the past ten years. The basic elements of the plan have proven to be effective in focusing available LWCD resources on identified local conservation concerns. There has been continued and growing public support for the activities and projects implemented by the LWCD under the LWRMP.

2 public input meetings were held, and many messages between partners were shared and discussed throughout the year, regarding where we all see Bayfield County's plan going for the next decade. As previously stated, many of the conservation issues and resource concerns of years past still remain a top priority for the LWCD as it plans for the next 10 years. Priority concerns included in the following list are:

- *Land use activities including agriculture, watershed planning and development*
- *Wetland protection and restoration*
- *Shoreland protection*
- *Conservation education*
- *Invasive species control*
- *Grassland Management*
- *Development of a forage council; increase in rotational grazing, beef herd management*
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- *Climate Resiliency Planning / Technical Standard Revision*
- *Stream Crossing / Culvert Design Revisions*

Advisory Committee

Public participation in the LWRMP development in 2019 included the following steps:

- A list of potential advisors to the LWRMP revision effort was compiled from those expressing interest in response to the public survey or those with known interest through past interactions with the LWCD.

- An advisory committee that included representatives from partnering agencies, non-governmental agencies, municipalities, and citizen volunteers provided input in plan development. The committee included diverse interest groups including agriculture producers, natural resource government agencies, lake associations,

environmental educators, and contractors. The committee included DNR participation.

- Three advisory committee meetings were held to identify and prioritize issues, define goals and objectives, and develop a list of activities for plan implementation. These meetings were held February 22, May17th, and August 23, 2019.

- The advisory committee reviewed and commented on the draft plan. Committee comments were considered in development of the final plan.

A public hearing was conducted to receive comments on the final plan on November 8th, 2019. The public hearing was noticed in the official Bayfield County newspaper two weeks before the hearing. No one from the public attended the hearing. The LCC approved the plan with minor editing changes to be made, and forwarded to the Bayfield County Board for approval on January 28th, 2020.

Other Management Plans

A review of other available natural resource management documents provided additional information about the public's interests and concerns for the county's natural resources. Those sources were also used to identify information gaps.

Local Cooperation

The Bayfield County LWCD has a long history of cooperating with and supporting the conservation activities of other organizations and agencies. The close relationship the LWCD has with various partners allows real-time exchange of information and project planning. The LWCD actively participates in conservation related forums whenever possible. LWRM planning information was considered through the following groups and documents:

Lakes Superior Collaborative Charter
My Lake Superior Northwoods
Bayfield County Comprehensive Plan
Bayfield County Lakes Forum
Lake Superior Basin Plan
Bayfield County Towns Association
Lake Superior Lake-Wide Area Management Plan
Superior Rivers Watershed Association
Bayfield County AIS Strategic Plan
Iron River Area Lakes Association
Upper St. Croix Basin Plan
Wisconsin Coastal Resilience Project

Priorities were solicited through the citizen and partner meetings and via review of the draft plan with the Land Conservation Committee.

County Resource Information

General Description

Bayfield County is the second largest county in Wisconsin in area and covers approximately 966,000 acres. It is the northernmost and second largest county in Wisconsin. The county is bordered by Douglas County to the west, Sawyer and Washburn Counties to the south, Ashland County to the east, and Lake Superior to the north.

Map 1 illustrates the elevation and topography of the county. Bayfield County's highest point is at Mount Tele mark which stands 1,700 feet above sea level. The elevation at Washburn is 654 feet, and at Lake Superior the elevation is 602 feet above sea level. Bayfield boasts 962 inland lakes covering 565 square miles and 22,629 acres.

Geology

A good portion of the northern two-thirds of Bayfield County is underlain by sedimentary rocks consisting of sandstone, shale, and conglomerate. Granite, gneiss, greenstone, and quartzite underlie the extreme southeastern part of the county, continuing a band from Iron and Ashland Counties. Lava flows consisting mostly of basalt are found in a band across much of the southern one-third of the county, and also in a narrow band north of Iron River. Bedrock outcrops are numerous in this band and are found in other areas of the county including many places along Lake Superior.

Bedrock is covered by glacial deposits throughout the county. These deposits range from 400 feet near Bayfield to less than 50 feet in an area south of Iron River. The latter area is covered with a layer of relatively impermeable ground moraine deposits. Old Glacial Lake Duluth deposits that consist mostly of red clayey till material can be found along much of the northern half of the county - mostly in the upper portions of watersheds draining to Lake Superior. The barrens area running through the center of the county from the southwest is composed of sandy soils. Material comprised of pitted outwash composed mostly of stratified sand and gravel, is generally found in the higher elevations. End moraine, formed of stratified sand and gravel and glacial till (a mixture of various glacial deposits), is also found in the Bayfield Ridge.

Soils

Soil survey information is invaluable in making land use decisions providing significant insight into landscape relationships. General characteristics and limitations of Bayfield County Soils are described on following pages.

The USDA Natural Resources Conservation Service (NRCS) completed a digital soil survey for Bayfield County in 2007. This information is available on-line at: http://soils.usda/gov/survey. Figure 4 is the soil association map of Bayfield County.

General Characteristics & Limitations of Bayfield County Soils

Bedrock-dominated Soils: These soils are relatively shallow to underlying bedrock. As a result, excavation required for roads, foundations, and utilities is limited. Shallow soil depths also limit filtering capabilities of drainage fields.

Clay Soils: These areas include very deep, nearly level to steep, soils that formed in clayey glacial till and/or clayey lacustrine deposits modified by wave action and in the underlying stratified loamy and/or sandy lacustrine deposits. The high clay content of these soils makes them susceptible to surface erosion, especially in areas where native vegetation has been removed. Because they have low soil strength when wet, a layer of cobble stone may be required under well graded, crushed rock to reduce rutting of driveways and to support heavy vehicles such as fire trucks and snow plows. Because clay soils shrink and swell dramatically with varying moisture levels, special construction of foundations is necessary to prevent damage to buildings. The high water-holding capacity of clays contributes to the use of level areas for agriculture, but clay soils also limit the availability of water to plant roots more than till soils do.

Sand Over Clay (Transitional) Soils: Very deep, moderately well to somewhat poorly drained soils that formed in sandy sediments, underlain by clayey deposits. Often referred to as the "transition area," these soils separate the clay plain from the higher elevation area that is dominated by sand. These soils have a sand cap over clay or stratified loamy material. Seeps often are prevalent in these areas, especially in spring, and the headwaters of many streams originate here.

Excavations in these soils are subject to cave-ins in spring. With seasonally high-water tables, these areas often require alternative sanitary systems such as mounds. Roads in these areas are subject to break-up and often contain unstable wet zones. Seep areas frequently do not freeze in winter creating driving hazards and instability. Some groundwater recharging of aquifers can also occur in these areas.

Sandy Soils: Sandy soils often are groundwater recharge areas. These areas are droughty because of low available water capacity and rapid permeability. The rapid permeability of these soils aid in ground water recharge but also provide a poor filter for contaminants. They are subject to rutting because of low soil strength. A gravel base often is necessary to provide adequate strength for roads and driveways. Sandy soils may also present a corrosion hazard for concrete structures.

Till Soils: Compared to sandy soils, till soils have a higher available water capacity and slower permeability along with higher nutrient holding capacity. They are better suited to growing trees and other plants. The moderate permeability of these soils aids in ground water recharge. Except in areas with steep slopes, these areas often are better suited for development because the silt and sand mixture provides soil strength for roads and foundations and filtering capability for drainage fields.

Steep Ravines and Floodplains: These are steep, well drained to excessively drained soils on ravines. Some areas are freshly undercut by streams and are slumped. Typically, these soils are stratified loamy, sandy, and clayey materials with water seeps exiting some strata. These areas are prone to slumping and instability, and disturbances often result in excessive sedimentation of waterways. Ravine bottoms include alluvial deposits that are subject to flooding.

Because these areas are subject to erosion problems, they are generally unsuited for development. Mass soil wasting and severe gully erosion can occur unless proper safeguards are in place. Upstream watershed changes (i.e., housing, roads, and other impervious surfaces) can cause stable channels in these areas to degrade. The best practice for these areas is a permanent forest cover type.

Wetland Soils: These areas are wet for part to most of the year and are typically capable of supporting wetland vegetation. Many areas do not freeze in the winter making winter logging difficult. They occur either where the groundwater table meets the surface of the land or in "perched" conditions where a confining layer in the soil retards downward flow through the soil.

Because these soils frequently are wet, they present severe limitations for construction of buildings and roads. Because of the close contact with the water table, any contamination in these areas can readily spread to groundwater supplies.

Habitat Type Classifications[1]

Habitat type classifications are named for indicator species commonly found in that habitat type. They are important for resource management because the classifications provide information about the vegetation, soils, climate, and wildlife. This information can be used for shoreland vegetation restoration, forest and wildlife habitat improvement plantings, and in making land use decisions. Habitat types found in Bayfield County include:

Superior Clay Plain

This zone borders Lake Superior and extends inland to a maximum of about 15 miles. It is a region of lake modified moraines (till) and lacustrine deposits dominated by calcareous, un-bedded red clay till and intermixed pink sands.

- ASnMi (Sugar Maple/Black Snakeroot-Partridgeberry) – Somewhat poorly to moderately well drained soils commonly with one or more foot of sand over clay.
- ArAbSn (Red Maple-Balsam Fir/Black Snakeroot) – Common in Bayfield County except for the peninsula. Somewhat poorly drained clay on lacustrine deposits and water worked till.

[1] Kotar, J., Kovach, J.A., Burger T.L. *A Guide to Forest Communities and Habitat Types of Northern Wisconsin(Second Edition).* Department of Forest Ecology and Management. University of Wisconsin-Madison. Madison,Wisconsin. 2002.

Bayfield Sand Plains

Extending across the region from southwest to northeast is a band of pitted outwash material
dominated by sands and gravels. The area is characterized by many lakes and bogs.

- ATM (Sugar Maple-Eastern Hemlock/Wild Lily-of-the-Valley) – Well to moderately well drained loamy soils on moraines and water worked till.
- PArVAa-Po (White Pine-Red Maple/Blueberry-Wild Sarsaparilla) – Sandy outwash soils, but also water worked sands on moraines and lake plains.
- PArV-U (White Pine-Red Maple/Blueberries) – Deep excessively drained outwash sands.

Southern Bayfield County (St. Croix River Basin)

East of the pitted outwash is a mixture of till, outwash, and loess deposits, and bedrock-controlled areas. Soils are generally stony loams with a rolling to hilly landscape with swamps common.

- ATD (Sugar Maple-Eastern Hemlock/Spinulose Shield Fern) – Scattered throughout. Primarily well drained loamy till and loess.
- AOCa (Sugar Maple/Sweet Cicely-Blue Cohosh) – Scattered throughout. Primarily well drained loamy till and loess.
- ACaI (Sugar Maple/Blue Cohosh-Jewelweed) – Scattered throughout the region and common in southern Bayfield County. Somewhat poorly drained loamy till and loess.
- ATAtOn (Sugar Maple-Eastern Hemlock/Lady Fern-Sensitive Fern) – Uncommon and scattered. Somewhat poorly drained loamy till, loess, and residuum.
- TMC (Eastern Hemlock/Wild Lily-of-the Valley-Goldthread) – Common throughout. Somewhat poorly drained soils on most landforms. Most common on sandy loams on moraines.
- ArAbVC (Red Maple-Balsam Fir/Blueberry-Goldthread) – Scattered throughout. Somewhat poorly drained sands. Occurs on most landforms, but most common on pitted outwash.
- AVVb (Sugar Maple/Blueberry-Maple-Leaved viburnum) – Well drained sandy loams and loamy sands on rolling moraines and pitted outwash.

Historical Vegetative Cover

Vegetative cover is a critical part of watershed management. In order to understand how watersheds function, it is important to look at the history of activities and their results on the watershed. For example, the over-harvest of large stands of pine and the loss of the duff (organic) layer of the soil causes increased runoff. Map 4 identifies original vegetation for Bayfield County

Major Watershed Basins[2]

Bayfield County is comprised of portions of 3 major watershed basins. Descriptions of each basin, along with relevant planning document information follow. Map 5 identifies watersheds within Bayfield County.

Lake Superior Basin[3]

Lake Superior is the deepest of the Great Lakes and, in surface area, is the largest fresh water lake in the world. The Lake Superior Basin contains 10% of the worlds surface freshwater. The Lake Superior drainage basin in Wisconsin covers about 1.96 million acres or about 3,069 square miles, most of which is forested. Land in Bayfield County makes up about 39 percent of Wisconsin portion of the Lake Superior basin. The original vegetation of the Lake Superior Basin included huge tracts of forest of white spruce, balsam fir, hemlock, sugar maple, yellow birch, and mixed pine. Forestlands were interspersed with wetland vegetation. Stands of 200-foot tall white pine held the soils together, shading streams in which fish spawned. The southern portions of the basin were (and are now) dotted with wetlands and lakes.

Most of the Wisconsin portion of the Lake Superior coastal area is composed of red clay deposits left behind by glaciers about 10,000 years ago. These geologically young deposits are highly erodible, especially in disturbed areas or on slopes. The red clay includes small particles of sand that remain behind in streambeds as the finer clay particles are carried out into the lake. Some sections of the southern portion of the basin are composed of rugged hill and kettle relief, formed by thick end moraine deposits and pitted outwash.

The Lake Superior shoreline, including its coastal wetlands, is a significant area of biological diversity. It is characterized by a cool climate, undulating and rolling plains, extensive wetlands and several unique natural features such as drowned river mouths and estuaries. The presence of clay soils and lowland boreal forest also contribute to its biological diversity. Extensive peatlands have formed at the mouths of many of the streams entering Lake Superior, usually behind sand spits. They provide habitat for many rare plant and animal species.

Seven main watersheds make up the Lake Superior Basin in Bayfield County:

- Bayfield Peninsula/Northwest
- Bayfield Peninsula/Southeast
- Bois Brule River
- Fish Creek
- Iron River
- Marengo River
- White River

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[2] Information about Wisconsin watersheds and basin plans is available at https://dnr.wi.gov/topic/Watersheds/.

[3] Lake Superior Partnership. *The Lake Superior Lakewide Action and Management Plan 2015-2019*. 2015.

Water quality in the Superior Basin is generally very good in Bayfield County. However, nonpoint source (NPS) pollution (such as streambank and shoreline erosion) is impacting many areas, causing turbidity and sedimentation of streambeds. Other examples of nonpoint pollution are pollution from stormwater drains, runoff from farm fields and feedlots, sedimentation from logging sites and construction-site erosion.

Basin wide Resource Management Issues:

- point source pollution (primarily municipal waste water treatment plant overflows)
- lake management
- nonpoint source pollution management
- surface water monitoring and assessment needs

Basin wide Recommendations:

- monitor water quality
- evaluate, protect and restore wetlands
- Slow the flow practices
- protect existing water quality in Class I lakes
- assist local authorities and landowners in coastal / bluff erosion remediation and prevention practices

Information & Education Recommendation:

- develop shoreline management education materials to prevent impacts to water resources; both inland and coastal

In March of 2013, the United States Environmental Protection Agency (EPA) approved The Marengo River Watershed Partnership Project Watershed Action Plan, for meeting the requirements of an EPA "9 Key Element" Plan[4]. This plan, developed by the Bad River Watershed Association, (Now the Superior Rivers Watershed Association) identified the priorities for protecting water quality in the Marengo watershed (which partially lies within Bayfield County). The technical team, for the partnership, identified the following as top challenges in protecting water quality within the Marengo watershed:

1) Unstable hydrologic system
2) Excess sediment
3) Terrestrial Habitat fragmentation and alteration

The action plan also included recommendations for addressing these challenges, as well as strategies for implementation and monitoring, over the next 10 years.

[4] Bad River Watershed Association. *The Marengo River Watershed Partnership Project Watershed Action Plan* 2013.

St. Croix Basin[5]

The St. Croix River originates at Upper St. Croix Lake near Solon Springs and flows approximately 160 miles to join the Mississippi River at Prescott, Wisconsin. The entire basin drains 7,760 square miles in both Minnesota and Wisconsin (40% and 60%, respectively)

Three watersheds make up the St. Croix Basin in Bayfield County.

- Upper St. Croix & Eau Claire Rivers
- Totogatic River
- Upper Namekagon River

Land in the St. Croix Basin is mostly forested, with small tracts of agricultural land interspersed. Water quality in the basin is generally good. However, as the demand for recreational opportunities and shoreland property increases, a decline in water quality, habitat, and natural scenic beauty can be expected. It should be noted that little to no baseline information has been collected from the Bayfield County portion of the St. Croix Basin.

Basin wide Issues:

- control agricultural nonpoint source water pollution
- reduce or eliminate the impacts of urban development on lake water quality
- identify sources of metals and other toxic substances
- protect endangered resources
- achieve compliance with all Wisconsin Pollutant Discharge Elimination System (WPDES) permits

Basin wide Recommendations

- identify water quality problems
- identify water quality needs
- identify management activities for protection
- coordinate DNR programs to manage surface & groundwater resources
- incorporate public concerns in water quality improvement/protection efforts

In 2012, The Minnesota Pollution Control Agency, in conjunction with the Wisconsin DNR & St. Croix Waster Resources Planning Team, introduced an implementation plan for Lake St. Croix's Nutrient Total Maximum Daily Load (TMDL). This Plan seeks to reduce the phosphorus load within Lake St. Croix (as well as the entire St. Croix River Basin), by reducing phosphorus loading in watersheds within the basin. The goals set forth in the implementation plan, for Bayfield County, are as follows:

[5] Minnesota Pollution Control Agency in cooperation with The Wisconsin Department of Natural Resources and The St. Croix Water Resources Planning Team. *Implementation Plan for the Lake St. Croix Nutrient Total Maximum Daily Load*. October 2012. Revised February 2013.

- Current Phosphorus Load (lbs./yr.): 16,902
- Phosphorus Reduction Goal (lbs./yr.): 1,615
- 20% by 2020 Goal (lbs./yr.): 15,707

Common approaches to these meeting these goals, that can be utilized within Bayfield County, include no-till planting, rotational grazing, field borders, buffer strips, streambank stabilization, native vegetation restoration, and community outreach. There are no farms in the watershed in our county, with the exception of undocumented hobby farms possibly, so we will work towards phosphorus reduction through the new surface water position; implementing BMPs with shoreline landowners, and stormwater management plans in the EauClaire Lakes Chain and other lakes in the Barnes area.

Upper Chippewa River Basin[6]

Only a small part of the county (in the extreme southeastern corner) drains into the Upper Chippewa River Basin. The entire basin within Bayfield County's borders is forested. Many wetland areas exist in this relatively high-quality area, as do headwaters to several Outstanding Resource Waters. Hydropower has significantly changed this watershed from its natural state.

Two watersheds of the Upper Chippewa Basins are located (in part) in Bayfield County:

- Lake Chippewa
- West Fork Chippewa River

Lake Chippewa

This watershed contains excellent water resources, primarily in the form of its many large lakes, especially Lake Chippewa (Chippewa Flowage) which dominates the watershed's southern half. Lake Chippewa is the product of a dam built on the Chippewa River in 1923 by Northern States Power to generate hydroelectric power and control floods. The flowage is the largest body of water in northern Wisconsin and supports an outstanding warm water sports fishery that includes walleye, muskellunge, largemouth bass, and blue gills.

Lake Chippewa drains an undeveloped area that is totally wooded or wetland, and 8 of the 12 named streams in the watershed - Pipestone, Camp One, Blueberry, Yankee Joe, Drake, Hay, and Moss Creeks, and the North Fork of the Chief River - empty directly into the lake. Despite the recreational value of the region, available water quality information on the streams in this watershed, including the section of the Chief River that runs through the Chief River State Wildlife Area, is out of date with most data more than 25 years old.

[6] Wisconsin Department of Natural Resources. *Upper Chippewa River Basin Water Quality Management Plan*. PUBL-WR-345-96-REV. 1996. Madison, WI.

West Fork Chippewa River
The West Fork of the Chippewa River originates in Bayfield County; the East Fork originates in central Iron County. Both rivers flow southwesterly through Ashland and Sawyer counties until they join at the Chippewa Flowage, a reservoir formed by the Winter Dam. The West Fork supports one reservoir upstream of the Chippewa Flowage - Moose Lake, a water storage impoundment with a thirteen-foot head dam. Both the East and West Forks were evaluated for in-stream habitat using the Wisconsin Warm Water Physical Habitat Rating System. The West Fork has a rating of "excellent", the East Fork rates between "good" and "excellent" (Kanehl and Lyons, 1990).

Surface Water

Bayfield County's total land area covers 944,800 acres. The county boasts an impressive 1,250 square miles of surface water in the form of lakes, rivers, streams, and wetlands. There are 966 lakes totaling 22,629 acres.

Rivers and Natural Streams

Bayfield County streams are generally small with 90 percent under 20 feet in width. The Namakagon River is the widest with an average width of 58 feet.

Pollutants can enter rivers and streams through two different avenues called point and nonpoint pollution. Runoff from various activities can carry pollutants from watersheds and deposit them in rivers and streams. This is known as nonpoint pollution. Examples of point sources of pollution include a discharge pipe from a manufacturing plant or wastewater treatment facility or an uncontrolled spill.

Stream assessments reveal that water quality in portions of the St. Croix Basin and the Lake Superior Basin is threatened by increasing fertility, increased suspended solids, mercury, polychlorinated biphenyls (pcbs), petroleum, and low biological oxygen demand. Suspected pollutant sources include runoff from construction sites, urban runoff, and forestry. These pollutant sources affect swimming, aquatic life, and drinking water. None of the watersheds in Bayfield County are ranked high for water quality threats to lakes, streams, or groundwater. Individual water body rankings (high, medium, or low) are found on DNR's Surface Water Viewer (https://dnrmaps.wi.gov/H5/?Viewer=SWDV).

Lakes

Seventy percent of Bayfield County's lakes and impoundments are less than 10 acres in size, although they account for only 8 percent of the lake acreage. The 41 lakes and impoundments exceeding 100 acres account for almost 58 percent of the lake acreage.

Like streams, lakes receive both point and nonpoint sources of pollution. Lakes are also deposition areas for pollutants from the atmosphere, such as mercury. Fish advisories due to mercury are in place on all lakes in Wisconsin.

Impaired Waters Listing

Water quality standards are set by states, territories, and tribes. These standards identify the designated uses (such as swimming, drinking water, fishing, etc.) for each waterbody. Federal, state, and local agencies and organizations regularly cooperate to obtain and update water quality data. Section 303(d) of the Clean Water Act requires each state to publish updated lists of streams and lakes that are not meeting water quality standards and designated uses because of excess pollutants. This list has become known as the *total maximum daily load (TMDL) or impaired waters list*. A TMDL is a calculation of the maximum amount of pollutant that a waterbody can receive and still meet water quality standards. A TMDL is calculated for each waterbody under Section 303 of the Clean Water Act. There are twenty-four lakes in Bayfield County on the impaired waters list. The Primary reasons for the impairment listing are Excessive Algal Growth, Elevated Water Temperatures, and Elevated Mercury in Fish. Lake Superior is the only Lake listed as impaired for Recreational Restrictions due to E. Coli. TMDLs are not generally conducted for mercury contaminated lakes because the source of mercury is airborne contamination – most of which is from sources outside the lake watersheds. Additionally, there are six impaired rivers within Bayfield County. South Fish Creek (and an unnamed tributary) is listed due to total phosphorus. Marengo River (and an unnamed tributary) is listed due to Fecal Coliform presence. Two Branches of Long Lake (White River Trib.) are listed due to elevated water temperatures. See Volume 3, Map 7 to view Impaired Waters and corresponding watersheds in Bayfield County. See Map 8 for land uses in Bayfield County.

Table 1. Bayfield County Impaired Waters

Lakes			
Name	Pollutant	Source*	Impairment Indicator
Bladder Lake	Mercury	AD	Contaminated Fish Tissue
Cisco Lake	Mercury	AD	Contaminated Fish Tissue
Diamond Lake	Mercury	AD	Contaminated Fish Tissue
Lake Tahkoda	Mercury	AD	Contaminated Fish Tissue
Long Lake	Mercury/ Unknown Pollutant	AD/PS/NPS	Contaminated Fish Tissue/Excess Algal growth
Lower Eau Claire Lake	Total Phosphorus	NPS	Impairment Unknown
Middle Eau Claire Lake	Total Phosphorus	NPS	Impairment Unknown
Perch Lake	Mercury	AD	Contaminated Fish Tissue
Siskiwit Lake	Mercury	AD	Contaminated Fish Tissue
South Fish Creek	Total Phosphorus	NPS	Impairment Unknown
Twin Lakes	Mercury	AD	Contaminated Fish Tissue

Rivers			
Name	Pollutant	Source*	Impairment Indicator
Long Lake Branch	Unknown Pollutant	PS/NPS	Elevated Water Temperature
Marengo River	Fecal Coliform	PS/NPS	Recreational Restrictions - Pathogens
South Fish Creek	Total Phosphorus	NPS	Impairment Unknown

Unnamed Trib. (Marengo River)	Fecal Coliform	PS/NPS	Recreational Restrictions - Pathogens
Unnamed Trib. (S. Fish Creek)	Total Phosphorus	NPS	Impairment Unknown

Impaired Waters List, WI DNR, May 2019
*AD =Atmospheric Deposition PS=Point Source NPS=Nonpoint Source

Outstanding and Exceptional Resource Waters

In contrast to the few impaired waters listings in Bayfield County, there are many water bodies on the Outstanding Resource Waters (ORW) and Exceptional Resource Waters (ERW) lists. This points to the need to protect the exceptional water quality in the county.

Outstanding and *Exceptional Resource Waters* are protected through the Department of Natural Resources rules NR 102.1 and NR 102.11 of the Wisconsin Administrative Code. The quality of these waters cannot be lowered due to DNR permitted activities, such as wastewater treatment plants.

- **Outstanding Resource Waters** (ORW) have the highest value as a resource, excellent water quality, and high-quality fisheries. They do not currently receive wastewater discharges, nor will point source discharges be allowed in the future, unless the discharge waters meet or exceed the quality of the receiving water. This classification includes national and state wild and scenic rivers and the highest quality Class I trout streams in the state.

- **Exceptional Resource Waters** (ERW) have excellent water quality and valued fisheries, but currently receive wastewater discharges or may receive future discharges necessary to correct environmental or public health problems.

Table 2. Bayfield County Outstanding Resource Waters

Bark Bay Slough
Bark River
Big Brook
Birch Run
Cranberry River
Cranberry River Trib. (T50N R7W S26)
DeChamps Creek
DeChamps Creek Trib. (S32 T48N R8W)
Diamond Lake
E Fork Cranberry River
E Fork Iron River
E Fork White River (Downstream from Delta Lake)
Eighteen Mile Creek
Eighteen Mile Creek Trib. (S8 T44N R6W)
Fish Creek (Main)
N Fork Fish Creek Trib. (S13 T47N R6W)
Flag River (South of Town Rd. S27 T50N R8W)
Four Mile Creek
Hill Creek
Lenawee Creek (Lower 1.0 mi to outlet)
Little Pine Creek
Little Sioux River
Long Lake Branch (Below Drummond L to White River)
Long Lake Branch Trib. (S16 T45N R6W)

Long Lake Branch Trib. (S17 T45N R6W)
Long Lake Branch Trib. (S22 T45N R7W)
Long Lake Branch Trib. (S27 T45N R7W)
Middle Creek
Middle Eau Claire Lake
N Branch Pikes Creek
N Fork Fish Creek
N Fork Whittlesey Creek (Below Rd crossing @ S20 T44N R5W)
Namekagon Lake
Namekagon River (Outlet of Lake Namekagon to Sawyer County line)
Onion River
Onion River Trib. (T50N R4W S31)
Owen Lake
Pike Chain of Lakes (Pike, Millicent, Buskey Bay, Hart, Twin Bear, Eagle, Flynn, and Hildur)
Pikes Creek
Pine Creek
Pine Creek Trib. (S10 T47N R6W)
S Fork White River
Schacte Creek
Sioux River
Sioux River Trib. (S32 T49N R5W)
Star Lake
Tader Creek
Thompson Creek
Totogatic River
Townsend Creek
Twenty Mile Creek
Upper Eau Claire Lake
White River (Downstream to Pike's Bridge)
Whittlesey Creek (Below N. Fork to Lake Superior)

Table 3. Bayfield County Exceptional Resource Waters

Bolen Creek
Dahl Creek
E. Fork Flag River
Hawkins Creek (S1 T44N R5W to Morgan Creek)
Little Brook
Marengo River Trib. (S17 T44N R5W)
Marengo River Trib. (S20 T44N R5W)
Marengo River Trib. (S21 T44N R5W)
Marengo River Trib. (S3 T44N R5W)
Marengo River Trib. (S9 T45N R5W)
Reefer Creek Headwaters (Downstream to S32 T49N R9W)
Sand Bay Trib. (S6 T51N R4W)
Saxine Creek
Siskiwit Bay Trib. (S34 T51N R6W)
Siskiwit River (Spring source S24 T50N R6W to Siskiwit Falls)
Slaughter House Creek
Squaw Bay Tributary (T51N R6W S23)
Squaw Creek
Whiskey Creek Trib. (S12 T44N R5W)
White River Below Pike's Bridge
White River Trib. (S26 NWNE T46N R7W)
White River Trib. (S26 SWNE T46N R7W)

Map 6 identifies surface waters, impaired waters, & ORW/ERW, within Bayfield County.

Wetlands

Wetlands are defined as areas where water is at, near, or above the land surface long enough to be capable of supporting aquatic or hydrophytic vegetation and that contain soils indicative of wet conditions. Wetlands can be seasonal or permanent and are commonly referred to as potholes, wet meadow, bogs, swamps, and marshes. The Wisconsin Wetland Inventory Maps (WWI) indicated that Bayfield County had 80,252 acres of wetland out of a total surface area of 944,902 acres (8.5% of the county).

Map 7 shows Bayfield County wetland distribution and WI DNR priority wetland and aquatic sites.

Although historically thought of as wastelands, it is now known that wetlands perform many important functions on the landscape. Wetlands filter pollutants before they enter surface and groundwater, provide critical habitat and increase diversity for fish and wildlife, reduce flooding by storing and slowly releasing water from rain and snowmelt, and reducing peak stormwater flows. The largest wetland in Bayfield County at 9,613 acres, the Bibon Swamp, is credited with saving the White River Dam in Ashland County during the 2016, and 2018 flood events.

Critical wetlands were identified in *Priority Wetland Sites of Wisconsin's Lake Superior Basin* developed by the DNR's Bureau of Endangered Resources in 1997. The Wisconsin portion of the Lake Superior basin contains rare coastal wetlands not found anywhere else in the basin. These areas are targeted for acquisition and special protection. The document identifies 30 priority wetland sites and 18 priority aquatic sites within the Lake Superior Basin. A list of sites in Bayfield County is included in Table 4. Additional priority areas for wetland protection include wetlands in the Whittlesey Creek watershed and coastal wetlands and estuaries such as the Fish Creek estuary.

All construction projects involving wetlands should be reviewed to ensure local, state, and federal wetland regulations are met prior to construction. The US Army Corps of Engineers, under Section 404 of the Clean Water Act, is responsible for permitting activities in wetlands in nonagricultural situations, such as urban development or road construction. The Wisconsin DNR has water quality certification over wetlands governed by the Corps of Engineers. Agricultural wetlands are regulated by the USDA Natural Resources Conservation Service (NRCS). The USDA Farm Service Agency (FSA) keeps records of all agricultural wetland determinations made by NRCS. The Wisconsin DNR has mapped an inventory of wetlands that are two to five acres and larger. Because these inventories were generally completed through aerial photo interpretation, rather than on-site inspection, some wetlands may not appear on the inventory. Non-inventoried wetlands are still subject to all rules and regulations relating to wetland management and protection.

Table 4. Priority Wetland and Aquatic Priority Sites in the Lake Superior Basin

Priority Wetland Sites	Priority Aquatic Sites
Bibon Swamp	White River
Port Wing	Fish Creek (3 branches)
Bark Bay	
Fish Creek Sloughs	
Lost Creek	
Sand Bay	
Red Cliff Reservation	
Sultz Swamp	
Bayview Beach-Sioux River Slough	

In addition to state and federal wetland regulation, the county has an existing Shoreland-Wetland Zoning Ordinance authorized by NR 115, Wisconsin Administrative Code, that regulates activities in wetlands that are within 1,000 feet of a lake and 300 feet (or the landward edge of the floodplain) of a river or stream. Cities and villages in the county have similar wetland rules authorized under NR 117, Wisconsin Administrative Code.

Shorelands

Shorelands include lands near lakes, rivers or streams, and certain wetlands. Bayfield County has 531 miles of stream frontage, of which about 382 miles (72%) are in public ownership. Lake frontage in the county totals 732 miles, with roughly 259 miles (35%) in public ownership. Bayfield County also contains diverse coastal wetlands and 86 miles of Lake Superior shoreline.

Shorelands are popular for residential development because of their scenic beauty and the access they provide to water. Shorelands also provide valuable habitat for both aquatic and terrestrial animals and plants, they act as buffers by filtering pollutants before they enter surface water, and control erosion by protecting soil from the impacts of wave action and stormwater runoff.

Many shoreland property owners have removed vegetation in favor of lawn turf in order to maximize the view from their dwelling. Efforts have been made by local, state, and federal agencies to return shorelands to native vegetation. Shoreland restoration is designed to return native species, restore filtering capabilities, reduce peak flows, provide erosion control, and restore natural scenic beauty to the lakes and rivers of Wisconsin.

Groundwater

Groundwater is the primary source of drinking water for most Bayfield County residents. As with 70% of the state, the sand and gravel aquifer is where the main source of groundwater is acquired. This aquifer includes primarily glacial deposits of unconsolidated sand and gravel material. It is not a continuous layer, but rather deposited in lenses or layers of sand and gravel interspersed with other fine grained or low permeability deposits. As a result, well yields vary and depend primarily on the permeability and thickness of the sand and gravel at a particular location. Groundwater is generally abundant in Bayfield County (WDNR 1997).

Bayfield County has five municipal water systems (Bayfield, Drummond, Iron River, Port Wing, and Washburn), and they all have wellhead protection programs. Bayfield has a wellhead protection ordinance.[7] WDNR Wellhead Protection Program Link here: https://dnr.wi.gov/topic/DrinkingWater/WellheadProtection/faq.html

[7] *Protecting Groundwater through Comprehensive Planning*. *Bayfield County*. On-line reference: http://wi.water.usgs.gov/gwcomp/find/bayfield/index.html.

The WDNR has compiled information regarding susceptibility to groundwater contamination in maps. The map for Bayfield County is included as Map 8. Susceptibility of groundwater to pollutants is defined here as the ease with which a contaminant can be transported from the land surface to the top of the groundwater called the water table. Many materials that overlie the groundwater offer good protection from contaminants that might be transported by infiltrating waters. The amount of protection offered by the overlying material varies, however. Thus, in some areas, the overlying soil and bedrock materials allow contaminants to reach the groundwater more easily than in other areas. Five physical resource characteristics were identified as important in determining how easily a contaminant can be carried through overlying materials to the groundwater. These characteristics are depth to bedrock, type of bedrock, soil characteristics, depth to water table, and characteristics of surface deposits.

Contamination of groundwater by human activity is a severe problem because contaminants generally travel un-noticed, are difficult to remove and may persist indefinitely. Water percolating through the soil can pick up pollutants and transport them to the groundwater. Contaminants may also enter the groundwater through unused wells that are not properly sealed. Groundwater contamination comes from a variety of sources, including leaking underground petroleum pipes and tanks; failing septic systems; use and storage of road salt; improper use, disposal, and storage of hazardous materials; and improper fertilizer, pesticide, herbicide and animal waste management. Identifying municipal and private well recharge zones and corresponding land use practices within each well recharge zone is an activity Bayfield County will work to complete during this plans 10-YR schedule to help reduce groundwater contamination risks.

Of private wells in Bayfield County for which test records exist, none have met or exceeded the drinking water limit for nitrate-nitrogen or arsenic. This data is available for viewing using the UW Stevens Point Center for Watershed Science and Education's Well Water quality viewer, available at: https://gissrv3.uwsp.edu/webapps/gwc/pri_wells/.

There are 19 open sites in Bayfield County with contaminated groundwater or soil. These sites are contaminated from leaking underground storage tanks (9 sites), contaminated industrial areas, and spills (10 sites). They can be identified using the WI DNR's Bureau of Remediation and Redevelopment Tracking System, located here: https://dnr.wi.gov/botw/SetUpBasicSearchForm.do.

Threatened and Endangered Resources

Rare, threatened, and endangered species are those whose populations are at risk. Federal agencies, in cooperation with the Wisconsin Natural Heritage Inventory, identify plant, animal, and natural communities that are threatened, rare, endangered, or special concern. Special concern species are those for which some problem of abundance or distribution is suspected but not yet proven. Bayfield County contains a

high number of rare, threatened, and endangered species and plant communities. Current Natural Heritage Inventory lists of species and communities can be found at: https://dnr.wi.gov/topic/NHI/data.asp.

Invasive Terrestrial and Aquatic Species

Like other Wisconsin counties, Bayfield County faces an onslaught of invasive species from other regions and countries. These non-native plants and animals displace native species, disrupt ecosystems, and can harm recreational activities such as fishing, boating, and swimming. They also can damage commercial and industrial interests. Invasive species are found both in the water (aquatic) and on the land (terrestrial). Recent statewide, county, and federal efforts and funding have focused on aquatic and terrestrial invasive species.

Because invasive species lack the predators and competitors they faced in their homelands, invasive species spread rapidly and aggressively. Controlling invasive species is difficult, and getting rid of them is often impossible. People play a major role in spreading invasive species but also can also prevent them from spreading.

Aquatic Invasive Species (AIS)

For lakeshore property owners, Eurasian water-milfoil (EWM) is the invasive aquatic plant that is most often the highest priority. Presently, and fortunately, 11 lakes, 8 of which are within the Pike/Delta chain of lakes, have populations of EWM in Bayfield County. Dense populations are also in the Washburn Marina and Washburn public boat launch along Lake Superior. Additional species are documented in other lakes across the county. Purple loosestrife is prevalent in the Bayfield Peninsula, and in patches in the southern part of the county. Other aquatic and riparian (shoreline) invasive plants, like Japanese knotweed, common reed, and curly-leaf pondweed are found in isolated patches, and can possibly be eradicated if treated and monitored closely. A list of documented aquatic invasive species is in Table 5, below.

Table 5. Documented Priority AIS in Bayfield County - 2016

AIS	Town	Lake/Area
Eurasian Water-milfoil	Barnes	Sand Bar, Tomahawk, and George Lakes
	Iron River	Buskey Bay, Eagle, Hart, Millicent, Twin Bear, Pike, Delta, and Flynn Lakes
	City of Washburn	Washburn Marina, Chequamegon Bay
	Namakagon	Lake Namakagon at Lakewoods Resort, also near Paines Island (hybrid milfoil)
Curly-leaf Pondweed	Iron River	Hart Lake, E. Fork White River, Iron River
	Barnes	Middle and Upper Eau Claire Lakes
Purple Loosestrife	Barksdale, Bayfield, Bayview, Russell	Bayfield Peninsula SE shoreline
	Barnes	Cranberry and Lower Eau Claire Lakes
	Cable	Cable Lake, Wiley Lake
	Keystone	ROW of County Highway F, Near Benoit bridge

	Iron River	Buskey Bay, Millicent & Pike Lakes
	Grand View	Bibon Swamp, Along Highway 63
	Namakagon	Twin Lakes, Lake Namakagon (Junek's Point, Lakewoods Resort)
Phragmites	Bayview	Sioux Beach and Port Superior
	Cities of Washburn, Bayfield, & Red Cliff	Isolated patches on Highways 13, near Waste H20 Treatment Plants in Washburn, Bayfield, and Red Cliff
Eurasian Ruffe	Bell, Clover, Port Wing, Russell	Numerous locations on the N and NE shoreline of Bayfield Peninsula, Lake Superior
	City of Washburn	Washburn Coal Dock (Lake Superior)
Rusty Crayfish	Barnes	Eau Claire Chain of Lakes (Upper, Middle, Lower)
	Delta /Iron River	Ruth & Pike Lakes, Pike Chain of Lakes
Yellow Iris	Iron River, Drummond, Cable, Grandview, Barnes, and Bayview	Iron River, Iron Lake, Lake Owen, Atkins, Bony, Mill Pond, Namakagon, Cable, and Deep Lakes, Birch Run and Friendly Valley Roads
Rainbow Smelt	Drummond, Grandview	Lake Superior, Cisco and Diamond Lakes
Queen of the Meadow	Clover, Port Wing	Cranberry River, Village of Port Wing

Land Use, Watersheds and Management

Volume 3, Map 9 illustrates Bayfield County land cover. Agriculture, forestry, recreation, and residential land uses are important to consider for soil and water resource management as is land ownership. Maps 5 and 7 in Volume 3 of the plan show watershed boundaries and impaired waters within Bayfield County.

Land Ownership

Bayfield County has a surface area covering approximately 1,502 square miles. Approximately 55 percent of the total land area is public land. These areas include county parks and forests; state parks, forest, and natural and wildlife areas; national forest and parks; and other public lands. Map 10 illustrates land ownership in Bayfield County. Public lands are summarized in Table 6 below.

Water resources influence land use patterns in the county. The Northwest Regional Planning Commission indicates that shoreland trends include the development of second and even third tiers of shoreland areas. They further suggest that if development continues in these areas, the balance of the county's developable shorelands will be consumed within the next 20 years. Planned development patterns are reflected in Map 11, the county's current zoning district map

Table 6. Bayfield County Publicly Owned Conservation & Recreation Land[8]

Land Type	Acres
County Parks & Forests	173,650
Total DNR	26,703

[8] WI Department of Administration Statewide Parcel GIS Analysis by NWRPC. 2018

Federal Government	334,179
Total Publicly Owned Land	**534,532**

Agriculture

Agricultural activity comprises nearly 9 percent of Bayfield County terrestrial lands. Most agricultural lands are located in the Fish Creek, White River, and Iron River watersheds. See Volume 3, Map 9 for agricultural land uses in Bayfield County. According to the 2002-2017 USDA Census of Agriculture[9], the number of farmers and farmland has decreased in the past decades, following the statewide trend. However, according to the last USDA Census (2017) Bayfield County saw a moderate increase in the number of farms (+21%) and lands in agriculture (+13%).

Table 7. Bayfield County Land in Agriculture

Census Year	Number of Farms	Average Farm Size (acres)	Land in Agriculture (acres)
2002	468	239	11,851,
2007	383	233	89,284
2012	352	204	71,824
2017	427	190	81,041

2017 USDA Census of Agriculture

Most farms in the county are dairy and beef operations. Other farming operations include organic "truck" farm operations and nurseries. These are important industries which provide valuable services such as raising native and organic produce for local consumption. Crops produced in the county include sunflowers, oats, trefoil (forage and seed), turf grass seed, corn, legumes, grass hay, fruits, vegetable crops (cabbage, pumpkins and various other crops), and nursery stock. Animal operations must now address an increasingly difficult part of farming – manure management. Manure is generally stockpiled or stored and spread on fields when conditions allow. Some producers still allow unlimited access to streams and, in some cases, may contribute to streambank erosion, sedimentation, nutrient loading, and shoreland degradation. Cropland soil erosion is not generally an issue due to long hay rotations and limited row crop production. Because of low erosion rates and few acres in cropland, soil erosion transect surveys are not completed in Bayfield County.

Most Bayfield County farmers recognize the environmental and economic benefits of proper use and management of nutrients and pesticides. Annual funding has been available from DATCP for nutrient management planning assistance and training, and most farms in the county are enrolled in nutrient management planning. Funding through state and federal agencies has been available to producers on a limited basis for many years. 20 farms in the county currently have nutrient management plans totaling 6,390.5 acres. Recognizing that farms not enrolled in nutrient management planning pose a greater threat to water quality; those not enrolled are a priority to enter into the program in the next 10-year period.

[9] USDA 2002-2017 Census of Agriculture

Forestry

Forests in Bayfield County provide many sustainable economic benefits. A properly managed forest can provide wildlife habitat, forest products, and recreational opportunities. Forests also play a critical role in maintaining healthy watershed hydrologic conditions and helping to slow down runoff and snowmelt. The Bayfield County community recognizes the importance of vast, undeveloped forest land to the area economy and the quality of life.

Bayfield County boasts 534,532 acres of publicly owned forest land, all managed for a variety of uses. County, state, and federal management includes the use of forest best management practices in both management and harvest. The current Bayfield County Forest Management Plan covers the years 2006 – 2020. It can be found at: https://www.bayfieldcounty.org/250/Forestry-Plan-2006-2020

More than a decade of monitoring best management practices for water quality by the DNR has dispelled the myth that logging practices are a significant threat to water quality and habitat in the state. The public forests are being well managed by professionals in a multi-use, sustainable manner. Private land managers have more opportunity to improve both silvicultural practices and operational procedures to enhance forest production and environmental sustainability.

Private forest land owners would benefit from additional forest management outreach opportunities. Many landowners do not feel comfortable meeting with agency staff about their lands. To bridge this communication gap, there are organizations like the American Forestry Foundation, My Lake Superior Northwoods, WoodsCamp, and Wisconsin Tree Farmer, that can assist interested landowners with management direction and ease anxiety about entering into contracts and management plans. The DNR has a private lands forester to assist landowners, as well as assistance from the Bayfield County Forestry Department.

Recreation

Recreation is an important land use in Bayfield County, because of the many opportunities available. Nearly 82 percent of land in the county is forested, most of which is in national, state, or county ownership, and private industrial forest. Visitors to the area are provided many recreational opportunities including trail riding, skiing, dog sledding, fishing, hunting, boating, swimming, hiking, canoeing, and chances to enjoy natural scenic beauty.

Abundant and clean water resources draw many visitors to the area. Bayfield County surface waters cover approximately 3 percent of the total land area (23,676 acres). Natural lakes and impounded water account for approximately 22,685 acres, with the balance in rivers and streams. Freshwater coastal resources include 86 miles of Lake Superior coastal shoreline.

Recreation can contribute to the degradation of these unique and generally high-quality resources. Use of motorized equipment near water can pollute lakes, streams, wetlands, and groundwater.[10] Eroded trails may negatively affect pristine resources. User conflicts may also arise with various recreational uses. Specific examples of impacts from recreational activities include:

- Soil erosion on recreational trails, campsites, and boat landings
- Soil erosion from improper planning, design, and installation of trails
- Fuel and lubricant spills
- Improper use of chemical pesticides, herbicides, or fertilizers
- Increased runoff from recreation based housing or urban development
- Failing septic systems for recreational based housing
- Disturbance or destruction of wetland or wildlife habitat

The use of best management practices for water quality can reduce negative impacts to Bayfield County waters.

Urban

The 2010 US Census placed the Bayfield County population at 15,014. The change from the 2000 US Census was negligible. That translates to 10.2 people per square mile of area in the county. With this low population density, Bayfield County cannot be considered an urban county by any measure. Areas with residential, commercial, and industrial development are considered urban in the discussion below.

Housing development in shoreland areas impacts water resources and habitat. In 2000 there were 11,640 housing units in the county, with 4,922 used primarily for seasonal and recreation use. In 2010 housing units had increased to 12,999, with 5,582 for seasonal use. Many seasonal homes are located on waterfront property. With seasonal housing at over 42 percent of the housing stock in the county, the impacts and potential impacts on lakes and rivers are great. Development around lakes, rivers, and wetlands can result in destruction of wetlands, floodplains, unique habitats, and trout streams. Shoreland development also can degrade water quality because of failing septic systems, addition of impervious surfaces, chemical applications (herbicides and fertilizers), and removal of shoreland vegetation.

Urban areas pose many threats to water quality. The addition of impervious surfaces, storm drains, and wetland fill all contribute to problems with the natural movement of water through a watershed. Pollutants from oil, petroleum, road salt, lawn fertilizers and herbicides, debris, and industrial waste are carried down storm drains and are generally untreated. Stormwater runoff causes increased water temperatures, flooding, decreased oxygen levels, streambank erosion, and increased sedimentation.

The communities of Washburn, Bayfield, Red Cliff, Cornucopia, Herbster, Port Wing, Iron River, Grand View, Drummond, Cable, Delta, and Barnes are not large enough for DNR-required stormwater management plans. Some communities have opted to move

[10] Wisconsin DNR. *Wisconsin's Forestry Best Management Practices for Water Quality Field Manual.* Publication #FR093. 1995.

forward with stormwater system upgrades voluntarily. WDNR requires all construction sites that disturb one or more acres of land to obtain storm water permit coverage under the Wisconsin Pollution Discharge Elimination System (WPDES) Program. Stormwater management practices can reduce infrastructure expenses and reduce sediment and nutrient loading to waterways downstream.

Monitoring of E coli levels at municipal beaches over the past several years indicates E. coli spikes regularly following summer rain events. The heavy runoff flowing over areas with a high percentage of impervious surfaces carries waste, nutrients, and other contaminants leading to bacterial contamination. Table 8 identifies the number of measured elevated E. coli events, by municipal beach, in Bayfield County.

Table 8. Bayfield County Elevated E. coli Measurements by Beach 2010-2018

Beach	Number of Elevated Measurements
Bark Bay Beaches	1
Bono Creek Boat Launch	4
Broad Street Beach	2
Herbster Beach	11
Little Sand Bay Beach	2
Memorial Park Beach	1
Meyers Beach	2
Port Wing Beach East	10
Port Wing Beach West	9
Sioux River Beach North	2
Sioux River Beach South	4
Siskiwit Beach East	5
Siskiwit Beach West	4
Thompson West End Beach Park	17
Washburn Marina Beach	3
Washburn Walking Trail/ BAB Beach	2
Wikdal Memorial Boat Launch	1

Wisconsin Beach Health, 2019

Communities in Bayfield County are moving toward a green and sustainable philosophy. Many community leaders and teachers are advocates for the sustainability movement. The desire of a growing segment of the citizens to create an environmentally friendly community has provided the opportunity for the LWCD to initiate programs that can support this community movement.

County government is setting an example by implementing projects and practices that will slow and reduce the amount of runoff from county-owned property. Typical projects include rain barrels, rain gardens, retention ponds, and diversion structures. The county government buildings; Annex, Jail, Sheriff and highway departments have added solar panels to assist powering the facilities at 25-30%. 300 new panels, or 100 KW were added to the Annex building alone, and a large private consortium in the county has installed solar as well. Other public institutions are exploring these options as well, and a few private residents have also moved forward with plans to address urban runoff. The LWCD is providing information and education, technical assistance, and cost share assistance to support the movement.

Township & Transportation System

The county experiences road construction and maintenance challenges, especially in the Lake Superior Clay Plain, because of the presence of heavy clay soils and steep erosive slopes. The impervious clay soils and sloping landscape drain uplands quickly. The large volume of water and fast runoff rate can erode streams and damage culverts and bridges that provide stream crossings. We learned in recent years (2016, 2018 flood

events) that many crossings cannot handle water during intense rain periods and high-water years. Several million dollars of damage occurred during these periods, and the department will continue to assist the municipalities, DNR, county depts, FEMA, WEM, and others to help rebuild infrastructure to handle increased rain events.

Land Protection

Land protection tools such as purchase or donation of conservation easements or title to land are powerful methods to reduce or prevent land use impacts. A conservation easement is a voluntary legal agreement between a landowner and land trust or government agency that protects the conservation values of a piece of land by permanently limiting its present and future uses. The Landmark Conservancy is the areas local land trust. The LWCD provides a supporting role to land protection efforts in the Bayfield County by providing information and letters of support to their organization.

Soil and Water Regulations, Standards, and Best Management Practices

Federal Regulations

The Environmental Protection Agency (EPA) is responsible for "protecting human health and to safeguard the natural environment – air, water and land – upon which life depends." The EPA administers a number of major environmental laws including the Clean Air Act, Clean Water Act, Pollution Prevention Act, and National Environmental Policy Act. The EPA also defines minimum standards for categories for water body uses (such as swimming, drinking water, etc.) DNR and DATCP administer EPA programs for the state of Wisconsin. In turn, these state agencies turn over implementation of many of these programs to the county land conservation committees and their staff.

State Regulations and Standards

Chapter 30, Wisconsin Statutes – Navigable Water

DNR provides oversight for this important program. The LWCD staff provide assistance with restoration plans and technical assistance upon request.

NR 216, WI Admin. Code

The NPDES program is designed to require stormwater management plans and erosion control plans for sites larger than one acre as required under the EPA's Clean Water Act. The intent is to keep water leaving construction sites clean through filters, sediment basins, and diversions and to plan for long term stormwater management. DNR stormwater specialists work with local land conservation and zoning departments to implement this program.

Under subchapter III of NR 216, Wis. Adm. Code, a notice of intent must be filed with the DNR by any landowner who disturbs one or more acres of land. This disturbance can create a point source discharge of storm water from the construction site to waters of the state. Agriculture is exempt from this requirement for activities such as planting,

growing, cultivating and harvesting of crops for human or livestock consumption, and pasturing or yarding of livestock as well as sod farms and tree nurseries. Agriculture is not exempt from the requirement to submit a notice of intent for one or more acres of land disturbance for the construction of structures such as barns, manure storage facilities, or barnyard runoff control systems. (See s. NR 216.42(2), Wis. Adm. Code.) Furthermore, construction of an agricultural building or facility must follow an erosion and sediment control plan consistent with s. NR 216.46, Wis. Adm. Code and meeting the performance standards of s. NR 151.11, Wis. Adm. Code. An agricultural building or facility is not required to meet the post-construction performance standards of NR 151.12, Wis. Admin. Code.

NR 243

The NR 243 animal waste and feedlot program regulates waste storage structures and manure application at large farms known as CAFOs (Concentrated Animal Feeding Operations) under the U.S. EPA Clean Water Act's pollutant discharge permit program (known in Wisconsin as WPDES). A Wisconsin animal feeding operation with 1,000 animal units or more is a large Concentrated Animal Feeding Operation (CAFO).CAFO WPDES permits ensure farms use proper planning, nutrient management, and structure/system construction to protect Wisconsin waters. These permits apply only to water quality protection. They do not give the DNR authority to address air, odor, traffic, lighting, land use nor any of the social concerns people may have about large farms. The DNR may designate a smaller-scale animal feeding operation (fewer than 1,000 animal units) as a CAFO if it has pollutant discharges to navigable waters or contaminates a well. For more NR 243 information go to: https://dnr.wi.gov/topic/AgBusiness/CAFO/WPDESNR243.html

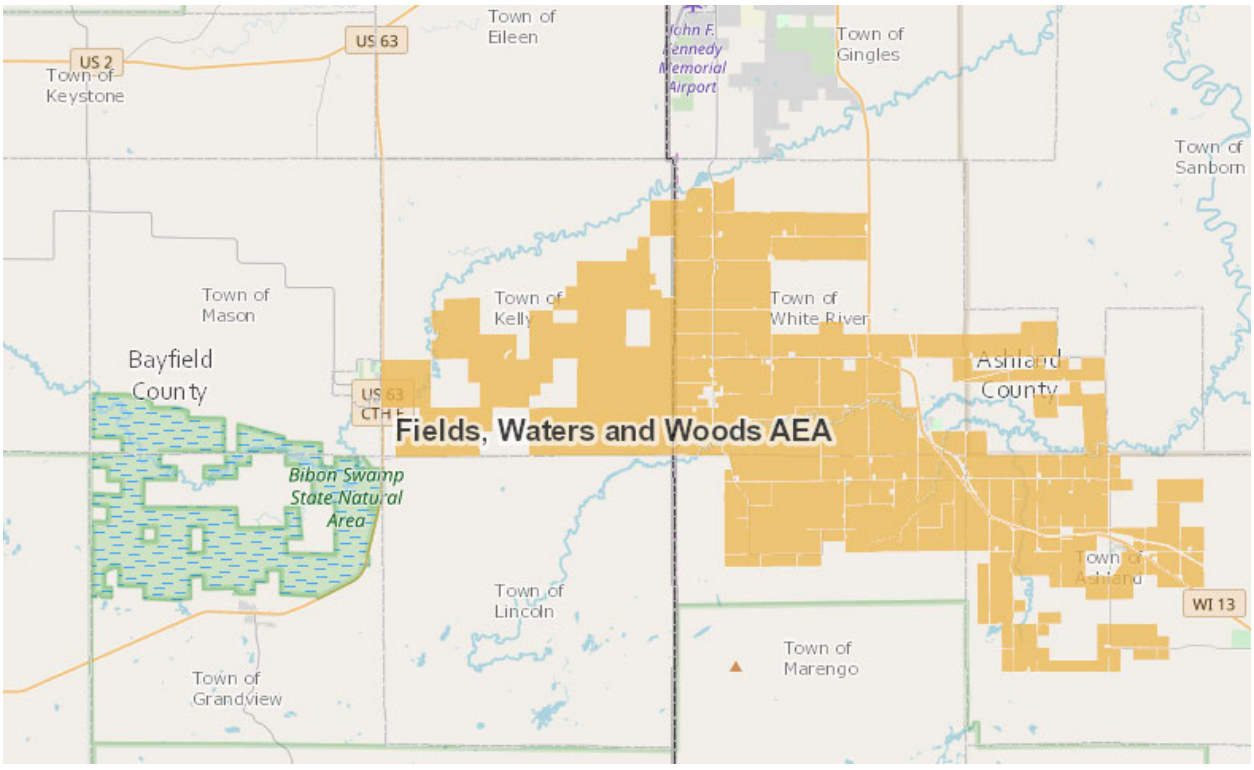
Farmland Preservation and Working Lands Initiative

The Working Lands Initiative (WLI) is an update to Wisconsin's 30-year-old Farmland Preservation Program. The WLI updates current tools for farmland preservation, introduces new incentives for farmers, and creates new tools for planning and conservation professionals. WLI can be summarized under three separate, but related, ideas: updated farmland preservation planning and zoning, agricultural enterprise areas, and agricultural conservation easements.

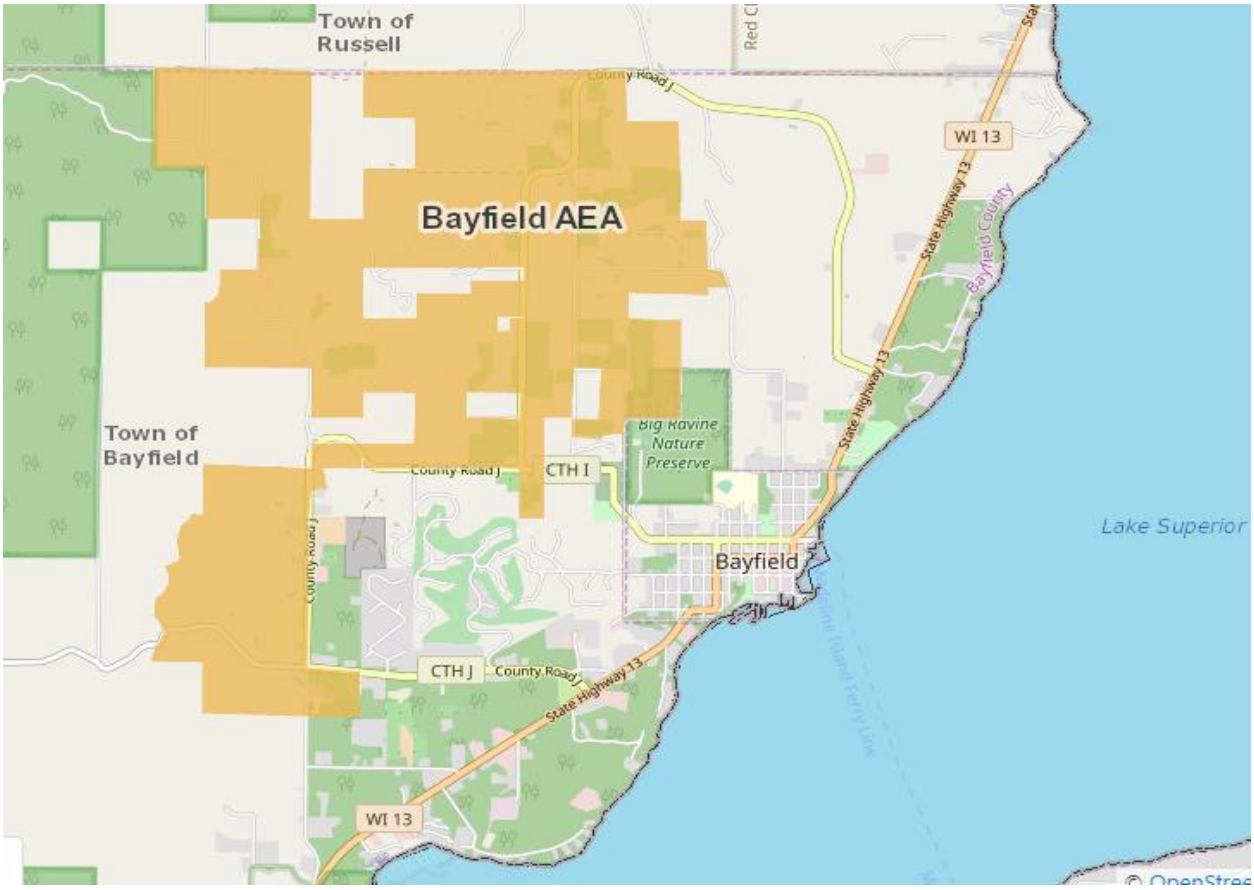
Under farmland preservation zoning, county and local governments may update or adopt local ordinances for protection of farmland. While it is not required that these ordinances be certified, certification is required in order for farmers to claim farmland tax credits. Farmers seeking tax credits must also have received at least $6,000 in gross farm revenue in the past year, or $18,000 in gross farm revenue in the past three years. Farmers in the program will also be required to comply with the state soil and water conservation standards and prohibitions established in NR 151. Bayfield County updated its farmland preservation plan in 2018. The county will then need to seek re-certification of its farmland zoning ordinance in order to maintain farmer eligibility for the tax credit program.

An agricultural enterprise area (AEA) is a contiguous land area, devoted primarily to agricultural uses, designated by DATCP in response to an application submitted by a local government. These areas are targeted for agricultural preservation and development. Only farmers in AEAs will be eligible to enter into new farmland preservation agreements with DATCP, which allows them to claim a tax credit. Any existing farmland preservation agreements will remain in effect until they expire. Currently there are 2 AEA's in Bayfield County, with no current plans to add additional AEA's at this time. The Bayfield AEA is located near the town of Bayfield in the Bayfield Peninsula watershed. The Field, Waters and Wood AEA is located near the town of Kelly in the Lower Bad River watershed and crosses over into Ashland County. See FPP maps below.

Bayfield County will be responsible for ensuring participants in WLI programs are compliant with current state soil and water conservation standards and prohibitions. The county will be required to check compliance every four years. One certificate of compliance has been issued in the last 3 years of FPP implementation.



Source: https://datcpgis.wi.gov/maps/?viewer=fpp - 2019



Source: https://datcpgis.wi.gov/maps/?viewer=fpp - 2019

NR 151 Performance Standards and Prohibitions

In 1998, the Animal Waste Advisory Committee (AWAC) developed four general animal waste prohibitions. The prohibitions were considered the basic animal waste guidelines needed to protect water quality. The Wisconsin Department of Natural Resources developed NR 151 beginning with the basic prohibitions developed by AWAC. This rule (NR 151) is part of eight WDNR rules that address runoff pollution, the major cause of polluted waters in Wisconsin and the United States. The most current version of NR 151 can be found here https://docs.legis.wisconsin.gov/code/admin_code/nr/100/151, and includes the following:

- **Subchapter I: General Provisions**
- **Subchapter II: Agricultural Performance Standards and Prohibitions**
- **Subchapter III: Non-Agricultural Performance Standards**
- **Subchapter IV: Transportation Facility Performance Standards**
- **Subchapter V: Technical Standards Development Process for Non-Agricultural Performance Standards**

These standards and prohibitions were promulgated into law on October 1, 2002, under NR 151, Wis. Admin. Code, and were amended in 2011 and again in 2018 with additional agricultural performance standards. This purpose of chapter NR 151 is to

establish runoff pollution performance standards for non-agricultural facilities and transportation facilities and performance standards and prohibitions for agricultural facilities and practices designed to achieve water quality standards as required by s. 281.16 (2) and (3), Stats. Under the NR 151 rule, each county may adopt any or all of the standards and prohibitions. The Non-Agricultural and Agricultural Performance Standards are included on following pages. The Bayfield County approach to NR 151 was initially developed in 2004, and revisited in 2010, 2014, and again in 2019 during the planning process. The LCC will remain to support NR 151 through a voluntary process with cost-share in conjunction with other agencies rather than adopt NR 151 as a county ordinance.

Non-Agricultural Performance Standards and Prohibitions
The LCC determined that the state requirements and enforcement on the Non-Agricultural Performance Standards are adequate in Bayfield County. There are activities included in this plan to assist other agencies in implementing the Non-Agricultural Performance Standards. The Bayfield County LWCD will continue to provide plan review and technical recommendations to partner agencies and departments as time allows.

Additional State Regulations
A companion rule of Wisconsin's Runoff Management Program, NR 154, entitled *Best Management Practices, Conditions, and Standards,* is an important tool for implementing NR 151. The Wisconsin Department of Agriculture, Trade & Consumer Protection (DATCP) administers ATCP 50 and assists the counties with implementation of this rule.

The following standards have been incorporated into the implementation section of Bayfield County's Land and Water Resource Management Plan. Statewide program rules, to be implemented through the LWRM plan include:

- NR 115 Wisconsin's Shoreland Protection Program
- NR 151 Runoff Management (Performance Standards and Prohibitions)
  - Subchapter I: General Provisions
  - Subchapter II: Agriculture Performance Standards and Prohibitions
  - Subchapter III: Non-Agricultural Performance Standards
  - Subchapter IV: Transportation Facility Performance Standards
  - Subchapter V: Technical Standards Development for Non-Agricultural Performance Standards
- NR 152 Model Ordinances for Construction Site Erosion Control and Stormwater Management
- NR 153 Targeted Runoff Management Grant Program
- NR 154 Best Management Practices and Cost-Share Conditions
- NR 155 Urban Nonpoint Source Water Pollution and Stormwater Management Grant Program
- NR 216 Storm Water Discharge Permits

- NR 243 Animal Feeding Operations
- ATCP 50 Soil and Water Resource Management Program

County Regulations and Plans

Bayfield County has relatively few regulations relating to soil and water resource management, however does have some new ordinances regarding large-scale agriculture and waste storage. The county currently relies on state and federal regulations as well as voluntary best management practices (BMPs) for the protection of soil and water resources. Bayfield County ordinances can be viewed on-line at https://www.bayfieldcounty.org/752/County-Ordinances or obtained from the Bayfield County Planning and Zoning Department. The Land and Water Conservation Department is directly involved in implementing the and Nonmetallic Mining Ordinance, and administering some of the new agricultural related ordinances. Local regulations and ordinances currently in place include the following:

County Regulations

Title 5 – Public Safety

Bayfield County adopted several new ordinances, primarily focused on large-scale agriculture and one dealing with captive cervids;

- 'Livestock Facility Licensing' (ATCP 51) in January of 2015.
- 'Application of Liquid Livestock Manure Using Spray Irrigation Systems' in February of 2015.
- 'Moratorium on Livestock Facilities Licensing' in February of 2015.
- 'Large-Scale Concentrated Animal Feeding Operations Ordinance' in February of 2016.
- 'Bayfield County Animal Manure Storage Ordinance' in August of 2017.
- 'Captive Cervids in Bayfield County Ordinance' in October 2019.

Copies are available at https://www.bayfieldcounty.org/752/County-Ordinances

Title 13 - Chapter 1 Zoning Code

The zoning code is adopted for the purpose of promoting and protecting the public health, safety, convenience and general welfare, to further the maintenance of safe and healthful conditions, to prevent and control water pollution, to protect spawning grounds, fish, and aquatic life, to control building sites, placement of structures and land uses, to prevent overcrowding of any natural resource such as a lake, to preserve shore cover and natural beauty, and to promote the better uses of scenic resources.

Title 13 - Chapter 2 Floodplain Zoning

The purpose of floodplain zoning is to provide a uniform basis for the preparation, implementation and administration of sound floodplain regulations for all floodplains within Bayfield County to: (a) protect life, health and property; (b) minimize expenditures of public monies for costly flood control projects; (c) minimize rescue and relief efforts, generally undertaken at the expense of the general public; (d) minimize business interruptions which usually result in the loss of local incomes; (e) minimize damage to public facilities on the floodplains such as water mains, sewer lines, streets

and bridges; (f) minimize the occurrence of future flood blight areas on floodplains; (g) discourage the victimization of unwary land and home buyers; and (h) prevent increases in regional flood heights that could increase flood damage and may result in conflicts or litigation between property owners.

Title 13 - Chapter 3 Shoreland -Wetland Zoning

Uncontrolled use of the shoreland-wetlands and pollution of the navigable waters of Bayfield County would adversely affect the public health, safety, convenience, and general welfare and impair the tax base. The Legislature of Wisconsin has mandated responsibility to the counties to: (a) further the maintenance of safe and healthful conditions; (b) prevent and control water pollution; (c) protect spawning grounds, fish and aquatic life; (d) control building sites, placement of structures and land uses; and (e) preserve shore cover and natural beauty.

Title 14 Land Divisions – Chapter 1 County Subdivision Control Code

This ordinance regulates and controls the division and subdivision of land within the unincorporated areas of Bayfield County. Jurisdiction includes all unincorporated lands within Bayfield County exclusive of those lands held in public trust by the federal government or those tribal owned lands located within the Red Cliff Indian Reservation.

Title 15 Sanitary and Private Sewage Code

This ordinance assures the proper siting, design, installation, inspection and management of private sewage systems and non-plumbing sanitation systems.

Title 16 Environment – Chapter 1 Nonmetallic Mining Reclamation Ordinance

The purpose of this ordinance is to establish a local program to ensure the effective reclamation of nonmetallic mining sites on which nonmetallic mining takes place in Bayfield County. The LWCD reviews reclamation plans and provides recommendations to the Zoning Department and Board of Adjustment for this ordinance.

County Plans

Bayfield County Farmland Preservation Plan

Bayfield County's Farmland Preservation Plan (FPP) includes goals and policies regarding land use and agricultural preservation. The FPP was completed and submitted to DATCP, for review, in late 2018.

Bayfield County Aquatic Invasive Species Strategic Plan

Bayfield County via its residents, and now the administration, has been pro-active with addressing Aquatic Invasive Species (AIS). The county received a WDNR AIS Control Grant to hire a project coordinator and develop a strategic plan. In March 2007, the County Board approved a standing Aquatic Invasive Species Committee, which not only would write the plan with input from numerous stakeholders, but oversee the plan once adopted. In April 2008, the County Board adopted the Bayfield County Aquatic Invasive Species Strategic Plan. The It is found at: https://www.bayfieldcounty.org/DocumentCenter/View/4755/2016-AIS-Committee-and-County-Board-Approved-BC-AIS-Strategic-Plan?bidId=. This working document brings

together many entities, all who share in the implementation of activities to keep AIS and their effects to a minimum in the county. This includes educational, prevention, monitoring, and management activities as well as activities to sustain the county-wide effort.

Northwoods Cooperative Weed Management Area Strategic Plan

The Northwoods Cooperative Weed Management Area (NCWMA) is a collective group of state and federal agencies, municipalities, tribes, nonprofits, community organizations, and individuals who have come together to combat invasive species in Douglas, Bayfield, Ashland, and Iron counties in northern Wisconsin. The high priority species for treatment and control are; garlic mustard, knotweed varieties, wild parsnip, giant hogweed, various invasive bushes such as buckthorn and honeysuckles, teasel, phragmites, and purple loosestrife. The strategic plan can be found here: http://www.northwoodscwma.org/

Bayfield County Comprehensive Plan Update 2010

In accordance with existing and future needs, the Bayfield County Comprehensive Plan will promote public health, safety, and general welfare of the community. As part of Act 9, a total of nine planning elements are addressed. These nine elements include:

1. Issues and Opportunities
2. Economic Development
3. Agricultural, Natural, and Cultural Resources
4. Transportation
5. Utilities and Community Facilities
6. Land Use
7. Housing
8. Intergovernmental Cooperation
9. Implementation

The plan is available at https://www.bayfieldcounty.org/DocumentCenter/View/129/Bayfield-County-Comp-Plan-Full-PDF. Some Bayfield County Towns have also developed Comprehensive Plans.

Marengo River Watershed (9 Key Element) Action Plan

Bayfield County will coordinate with neighboring counties and tribal efforts for plan implementation, partnering on projects when applicable.

Related Municipal Regulations

Bayfield County cities and villages include Barnes, Bayfield, Cable, Delta, Drummond, Grand View, Iron River, Kelly, Mason, Port Wing, and Washburn. Under Ss. 61.351 & 62.231, Wisconsin Statutes and NR 117, Wisconsin Administrative Code, cities and villages must regulate activities in wetlands located in the shoreland zone. Cities and villages are also required by s. 87.30 (1), Wisconsin Statutes to adopt reasonable and effective floodplain zoning ordinances in flood-prone areas.

Other Voluntary Conservation Initiatives

In addition to state and local regulations, Bayfield County relies upon voluntary standards such as ***Best Management Practices for Water Quality, Stormwater Management, and Construction Site Erosion Control***, and technical standards outlined by DATCP and USDA Natural Resources Conservation Service (NRCS). Many of these standards are referenced in ***Best Management Practice Guidelines for the Wisconsin portion of the Lake Superior Basin***. These voluntary standards are strongly encouraged for use in regulatory and non-regulatory situations. Conservation practices that may incorporate voluntary standards are listed in Appendix B.

LWCD Activities

Shorelands

Assistance is provided both for voluntary projects and for sites where mitigation is required for permitted activities. Installation of shoreland buffers, waterfront runoff reduction, erosion control practices, and overall shoreline restoration are all supported. The LWCD prepares and reviews mitigation plans for shoreland property owners, and has dedicated a half-time permanent position specifically for surface water protection projects.

Agriculture

The LWCD supports a full-time engineering technician who is responsible for planning, surveying, designing, and construction oversight on a variety of agricultural practices. Many of these projects are partnered with the NRCS office, both for funding and technical assistance. Both agencies currently work with most of the dairy and beef operations in the county, and continue to enroll producers in nutrient management planning annually with some assistance from the U.W. Extension to develop those plans using Snap-Plus. At the present, 6,390 acres (17%) are enrolled in nutrient management planning, out of 36,740 cropland acres in the county. They all fall into the 3 of the predominant agricultural watersheds in the county; Fish Creek, White River, and Iron River. Those not enrolled, primarily in the South Fish Creek Watershed are high priority for the next 10- year period. South Fish also has the highest concentration of agricultural lands in the county, which remains a high priority for NR 151 compliance. No Farmland Preservation certifications have been issued because none of the producers in the AEAs currently participate in the program. Several producers in the county are in compliance, and we annually address compliance issues, however no official NR 151 certifications have been issued.

Forestry

The LWCD provides basic forestry information regarding management options and resource contacts. The department also works closely with the Bayfield County Forestry Dept on erosion control practices, streambank and stream crossing projects, and some of their county parks projects. These include technical designs, construction / technical assistance, and permitting assistance. The LWCD typically coordinates with NRCS for forestry land management plans for forested landowners.

Invasive Species

Bayfield County is addressing invasive species through a containment and eradication strategy, with a substantial Information & Education campaign. Many of the invasive species, both aquatic and terrestrial, remain relatively localized, providing the opportunity to eradicate and contain the spread of these plants, rather than simply to control the damage. The county has 1.5 full-time staff dedicated to Invasive Species, which houses the full time terrestrial invasive position with the Northwoods Weed Cooperative Management Area. The county has supported a full-time AIS Coordinator for 12 years, and now has transitioned that position to half-time AIS, and half-time Surface Water Conservation Technician.

Education

Information and education for all LWCD programs is ongoing; and provided whenever the opportunity presents itself in the field directly with landowners, or in the classroom. All LWCD staff are involved in various aspects of resource education, and both enjoy and excel at it. The LWCD currently works with the Drummond, Washburn, and South Shore School Districts on field and classroom education days, and the annual poster and speaking contest.

Volume II. Plan Implementation

Volume II outlines the goals, objectives, and activities for the Bayfield County Land Conservation Committee and LWCD. An educational strategy is developed under a separate goal. While some activities are required by state statute, priorities were determined by advisory committee participants and the Land Conservation Committee. An important, required activity, NR 151 implementation, is included as a separate section below. The final component of Volume II is an implementation plan or work plan that prioritizes activities and lists the resources needed to implement each activity, along with annual benchmarks.

NR 151 Implementation in Bayfield County

Bayfield County regulates animal waste facilities through county-wide manure storage ordinance. In 2015 the county board also passed the Livestock Facility Siting Law, and others new regulations regarding large-scale agriculture. The Land Conservation Committee also passed a county-wide manure storage ordinance, but has not pursued local regulation beyond that for existing operations, because of the desire for the LWCD to remain an agency that provides primarily voluntary programs, the limited number of farms in the county, and with limited staff to implement a regulatory program. LCC members agreed that voluntary efforts, education, one-on-one meetings with farm operators, and collaboration with DNR would be the best route for NR 151 implementation.

If a complaint is received regarding compliance, voluntary measures will be pursued to correct the identified concern. If enforcement seems warranted, the case including documentation and existing landowner information will be referred to DNR through the NR 243 or NR 151 programs. Historically the Land & Water Conservation Departments have assumed the lead role of technical provider for these projects.

The detailed NR 151 implementation strategy is included on following pages.

Bayfield County will assume the lead role for the following components of the strategy:

- Individual on-site meetings with farm producers to evaluate compliance needs
- Secure additional funding and provide technical assistance
- Administer funding and technical assistance
- Compliance monitoring and follow up on-site visits
- Annual reporting

Priority Projects

Projects are prioritized by the estimated conservation benefits provided by the proposed project and the availability of cost share assistance and other partner resources. The LWCD strives for voluntary compliance by coordinating the interests and resources of landowners and partners to achieve economy of scale and efficiency in implementation. Pooling cost-share and technical resources allows the best projects to receive adequate funding for implementation.

Priority considerations include landowner interest; watershed and sub-watershed location; soil and water conservation benefits; overall cost of the project; availability of cost share; and availability of supporting partners. The number of priority projects varies annually with the availability of funding and the ability of producers to fund and / or construct on farm practices.

Implementation Strategy for NR 151 Agricultural Nonpoint Performance Standards

Implementation Considerations

The Bayfield County Land and Water Conservation Department (LWCD) will work with the Department of Natural Resources (DNR) and the Natural Resources Conservation Service, (NRCS) and other agencies to implement the agricultural performance standards. Implementation of each component of the strategy outlined below will be dependent upon receiving adequate staffing, support, and cost share funds for completion.

Implementation of the agricultural performance strategy will be guided by the following concepts:

- Encourage voluntary participation in an ongoing cost sharing program for agricultural conservation practices
- Implement on-farm conservation practices; cattle watering systems, nutrient management planning, stream crossings, grazing plans, and streambank fencing, and barnyards / manure storage projects when funding is available
- Ongoing farmer-developed nutrient management plans utilizing Snap Plus.
- Coordinate DATCP funding for conservation practices to meet the agricultural performance standards with other cost share opportunities such as the Federal EQIP (Environmental Quality Incentives Program of the Natural Resources Conservation Service)
- It is not necessary for a particular farm/site to address all Agricultural Performance Standards in order to qualify for cost sharing.

1. Conduct information and education activities

The LWCD will distribute information and educational material prepared in-house, by the DNR. The information may be distributed via news media, newsletters, handouts, social media outlets, the county and departments web sites, email networks, and one-on-one contacts.

The educational materials will be designed to meet the following objectives:

- Educate landowners about Wisconsin's agricultural performance standards and prohibitions, applicable conservation practices, and cost share grant opportunities; and

- Promote implementation of conservation practices necessary to meet performance standards and prohibitions.

2. Systematically select and evaluate parcels for compliance with standards and prohibitions

A. Records and map inventory

Records and map inventory will be updated after landowners are identified for on-site visits. The heavier agricultural areas of the county; Fish Creek, White River, and Iron River watersheds, will be priority. Landowners will be selected for inventory review based on the criteria below for offering on-site visits, technical assistance, and cost sharing.

There may be opportunity to supplement limited file information through requests for information from landowners. Landowners may be willing to voluntarily release information in federal files or from consultant-prepared nutrient management plans, especially if the information supports their compliance with agricultural performance standards.

Selecting priority farms for on-site visits, technical assistance, and cost sharing

The number of farms selected for detailed on-site review will be dependent upon available time and resources.

Priority farms for on-site review will be identified in the following manner (in order of priority)

1) Voluntary requests for assistance
2) Respond to complaints
3) Support existing efforts (such as watershed plans, watersheds with impaired waters, or TMDLs)

Assistance will be available to dairy, beef, and crop producers.

The priorities established below will also be used to offer on-site visits, provide technical assistance, and distribute agricultural cost share funding.

Location/Resource Considerations

- Drains to an outstanding or exceptional resource water
- Within a water quality management area (surface water)
- Within a water quality management area (groundwater)
- Drains to a 303(d) listed water

Cost effectiveness and Practice Implementation

- Cost effectiveness of Best Management Practices (BMPs)
- Additional funding sources available or committed
- Project addresses more than one NR 151 standard

- Project includes nutrient management planning

Procedure for records and map inventory review

1. Update current list of on-site farm visits.
2. Based on available map and file information, update and further identify priority level of farm using criteria in list above. Update farm list in priority order.
3. From parcel records, evaluate which standards and prohibitions are likely to apply.
4. If possible, based on above evaluations, determine which landowners are currently already meeting standards and prohibitions as a result of:
   a. Installed or implemented BMPs under an existing state or federal cost share agreement; and/or
   b. Maintaining compliance with local or state animal manure regulations (e.g. NR 243, WPDES, etc.).

Note: It is expected that most landowners identified as priorities above will require on-site visits.

B. Onsite evaluations procedure

1. Visit farms in priority order as staff time is available.
2. Contact owners of selected parcels and schedule site evaluations.
3. Conduct onsite evaluations:
   a. Determine and document the extent of current compliance with each of the performance standards and prohibitions.
   b. Where non-compliant, determine costs and eligibility for cost sharing.
   Note: Cost share requirements are based upon whether or not the evaluated cropland or livestock facility is new or existing and whether or not corrective measures are eligible for cost sharing. See NR 151.09(4)(b-c) and 151.095(5)(b-c).
   c. An evaluation form will be developed as part of the implementation of the plan.

C. Maintaining voluntary cost share program

Bayfield County plans to maintain a successful voluntary cost share program with modifications to incorporate the agricultural performance standards. Significant water quality improvements are made through this voluntary versus regulatory participation.

Voluntary cost sharing guidance

Applicant farms will be screened using the agricultural performance standards on-site evaluation procedure and compliance status documentation.
Applicants will receive on-site evaluations as described previously.
Cost sharing offered will be prioritized using the criteria for priority sites.
Scheduling of cost share practices will be based upon:

- ✓ State and federal cost share $ available
- ✓ Farmer's desired timeframe and match availability
- ✓ Ability to meet agricultural performance standards at a relatively low cost.

Cost sharing may be provided to exceed the agricultural performance standards if water quality benefits are achieved and practices are relatively low-cost.

3. Document and report compliance status

A) NR 151 status report

Following completion of records review and on-site evaluation, prepare and issue NR 151 status report (developed by DNR and completed by the LWCD) to owners of the evaluated
parcels. This report will convey the following information at a minimum:

- Current status of compliance of individual parcels with each of the performance standards and prohibitions.
- Corrective measure options and rough cost estimates to comply with each of the performance standards and prohibitions for which a parcel is not in compliance.
- Status of eligibility for public cost sharing.[11]
- Grant funding sources and technical assistance available from federal, state, and local government, and third-party service providers.
- An explanation of conditions that apply if public cost share funds are used. *(If public funds are used, applicable technical standards must be met.)*
- A timeline for completing corrective measures, if necessary.
- Signature lines indicating landowner agreement or disagreement with report findings.
- Process and procedures to contest evaluation results to the county. The Land Conservation Committee will review cases of contested compliance evaluation results at a regularly scheduled LCC meeting.
- (Optional) A copy of performance standards and prohibitions and technical design standards.

Note: A cover letter describing the ramifications and assumptions related to the status report will be attached.

Note: Cost sharing will be encouraged for voluntary compliance, regardless of status on priority list. Cost-effective practices such as fencing, watering facilities, nutrient management planning, conservation planning, grazing plans, and well abandonment will be emphasized.

B) Maintain public records

Keep and maintain evaluation and compliance information as public record.
Note: The primary objective of this step is to ensure subsequent owners are made aware of (and have access to) NR 151 information pertinent to their property. The method for maintaining these records and for ensuring relevant information is conveyed to subsequent owners will be discussed with the Bayfield County Corporation Counsel.

[11] Livestock facilities constructed after October 1, 2002 are not eligible for DATCP cost sharing to reach compliance with the state agricultural performance standards.

4. Provide or arrange for the provision of technical assistance and cost sharing available for installation of BMPs

A) Voluntary component (Cooperative)

1. Receive request for cost-share and/or technical assistance from landowner.
   Note: Landowners will be prompted to voluntarily apply for cost-sharing based on information provided in a NR 151 Compliance Status Report.
2. Confirm cost-share grant eligibility and availability of cost-share & technical assistance.
3. Develop and issue cost-share contract (including BMPs to be installed or implemented, estimated costs, project schedule, and notification requirements under NR 151.09(5-6) and/or 151.095(6-7).
   Note: The DNR will assist in developing proper notification language.

B) Non-voluntary component (Non-Cooperative)

In the event a landowner chooses not to install corrective measures either with or without cost sharing and the LCC wishes to request DNR assistance to achieve compliance, the LCC will request that DNR issue landowner notification per NR 151.09(5-6) and/or 151.095(6-7). The LWCD will provide information including cost share money available and design assistance as requested by DNR. DNR will issue the notification if they choose to pursue it.

- If eligible costs are involved, this notification shall include an offer of cost sharing.
- If no eligible costs are involved, or if cost sharing is or was already made available, the notification will not include an offer of cost sharing.

The notification referenced above will be designed by the DNR and contain:

a) A description of the performance standard or prohibition being addressed;
b) The compliance status determination made in accordance with NR 151;
c) The determination of which best management practices or other corrective measures are needed and which, if any, are eligible for cost sharing;
d) The determination that cost sharing is or has been made available, including a written offer of cost sharing when appropriate;
e) An offer to provide or coordinate the provision of technical assistance;
f) A compliance period for meeting the performance standard or prohibition;
g) An explanation of the possible consequences if the owner or operator fails to comply with provisions of the notice; and
h) An explanation of state appeals procedures.

5. Administer funding and technical assistance (LWCD)

A) Execute cost-share agreement. If cost-sharing is involved, finalize and execute cost-share agreement including schedule for installing or implementing BMP(s).

B) Provide technical services and oversight.

- Provide conservation plan assistance
- Review conservation plans prepared by other parties
- Provide engineering design assistance
- Review engineering designs provided by other parties
- Provide construction oversight
- Evaluate and certify installation of conservation practices

C) Re-evaluate parcel. After corrective measures are applied, conduct evaluation to determine
if parcel is now in compliance with relevant performance(s) standard or prohibition(s).

- If site is compliant with additional performance standards, update "NR 151 Status Report" (see component 3.A.) and issue "Letter of NR 151 Compliance."
  Note: *A letter of NR 151compliance serves as official notification that the site has been determined to now be in compliance with applicable performance standards and prohibitions. This letter would also include a local appeals process if a landowner wishes to contest the findings. When and where counties are not operating under a local ordinance, the issuance of a letter of NR 151 compliance would likely be a joint effort with the DNR in order to give it the significance and standing that it merits.*

- If not compliant, seek non-regulatory remedies or initiate enforcement action.

  Note: *Follow-up measures at this stage will differ depending on the circumstances, including whether or not failure to comply is the fault of the landowner. If it is not the fault of the landowner, then non-regulatory remedies will likely be sufficient. If not (e.g., there is an intentional breach of contract) then enforcement action may be necessary under Component 6.*

6. Issue required notices and conduct enforcement activities

A. Notify DNR of enforcement action needed

If a landowner refuses to respond appropriately to a notice under 4.B., the LCC will notify DNR who will prepare and issue "Notice of NR 151 Violation" letter.

Note: Enforcement begins with this letter. It may be pursued in circumstances where:

1. *the landowner has failed to comply with a notice issued under component 4.B, AND*
2. *non-regulatory attempts to resolve the situation have failed.*

The county will not develop or create the forms or documents. The LWCD will provide information to the DNR who will complete and sign documents.

B. Schedule enforcement conference.
The DNR will set up any necessary enforcement conferences.

C. Participate in enforcement conference.
The LWCD will participate in an enforcement conference formally initiated by DNR.

D. Initiate enforcement action
Refer cases to DNR for enforcement. Priority list to request follow-up enforcement will be based upon the number and extent of performance standard violations and the priority criteria established in component 2A.

7. Monitoring compliance

- Conduct periodic evaluations to verify ongoing compliance. Landowners will be asked to complete a self-certification form annually and return it to the LWCD. The LWCD will also complete spot checks on 5-10 percent of sites on an annual basis.
- Respond to public complaints alleging noncompliance. LWCD will respond to complaints by investigating allegations with file review, telephone confirmation, and/or an on-site visit. If the review demonstrates significant violation(s) of the agricultural performance standards, staff will proceed with the strategy for compliance. This process will begin with documentation (Step 3), proceed to technical assistance (Step 4), administering funding (Step 5), then to enforcement actions (Step 6) if necessary.
- Noncompliance that threatens public health and safety will be immediately referred for enforcement action through appropriate county and state entities.
- Ensure new owners are made aware of (and have access to) NR 151 compliance information that may pertain to the property they have acquired. This may be accomplished through a query of the county tax parcel database.

8. Tracking and reporting program activities and progress

- Maintain and convey a record of annual site evaluations showing their location and compliance status.
- Maintain a record of estimated costs of corrective measures for each evaluated parcel.
- Maintain and convey a record showing parcels where public cost sharing has been applied to implement standards and prohibitions, the amount and source of those funds, and the landowner share.
- Maintain and convey a record and location of parcels referred to DNR for enforcement action.

- Maintain and convey a record of the annual cost of technical and administrative assistance needed to administer agricultural performance standards and prohibitions, as established in NR 151.

Note: The LWCD will provide the above information to the Department of Agriculture, Trade, and Consumer Protection to meet minimum program requirements. The LWCD will also incorporate new and / or changing NR 151 specifications and standards into the 2020-2029 LWRMP as they are modified in the future.

Goals, Objectives and Activities

This land and water management plan is developed to serve for a ten-year period from 2020 through 2029. The plan goals, objectives, activities will be reviewed after 5 years as currently required by the state. A general definition of each term is provided below. A detailed plan of work follows the list of activities.

Goals – General statements of the desired overall result to be accomplished

Objectives – More specific steps to reaching plan goals

Activities – Methods and actions to reach goals and objectives. All activities should have a tie to plan goals and objectives. *Or* there should be a clear, defensible explanation for why they are completed (for example, they are required by state statute). Additional activities consistent with plan objectives may be added during the plan implementation period.

Goals (2020 – 2029)[12]

Goal I

Protect and enhance surface water, wetlands, and groundwater to maintain water quality, ecologic function, and recreation and aesthetic values.

Goal II

Reduce the spread of invasive species to aquatic and terrestrial habitats.

Goal III

Protect, restore, and enhance wildlife habitat in forests, lakes, and streams.

Goal IV

Goal IV. Increase natural resource education and LWCD outreach opportunities.

Goal V

Factor in climate resiliency for planning, design, engineering, and construction of future projects due to more intense weather events.

The Land Conservation Committee and staff will implement the goals, objectives, and activities of the LWRMP using the following guiding principles:

Plan Guiding Principles

- Uphold the protection of natural resources while considering the importance of the Bayfield County economy.
- Utilize limited staff and financial resources efficiently.
- Facilitate partnerships and support efforts of other organizations where consistent with land and water resource priorities.
- Emphasize education to increase understanding of natural resource concerns and the methods to address these concerns and encourage beneficial changes in behavior.
- Restore and protect native habitats while meeting water quality objectives.
- Utilize information and recommendations in partner organization water quality and habitat management plans.

[12] The goals are listed in order of priority.

Objectives and Activities[13]

Goal I Protect and enhance surface waters, wetlands, and groundwater to maintain water quality, ecologic function, and recreational and aesthetic values.

Objectives and Activities

A. Assist waterfront landowners who voluntarily protect, restore, and enhance shorelands and watersheds.

1. **Provide technical and cost share assistance for shoreland restorations and waterfront runoff reduction projects.**
2. **Utilize new surface water conservation technician position to obtain DNR surface water grants for lake associations / shoreline restoration projects.**

B. Implement practices to reduce stormwater runoff volume and velocity.

1. Provide technical and cost share assistance to landowners to restore, enhance, and create water retention practices on their properties.
2. **Implement and fund slow the flow sediment reduction projects with neighboring counties with 9-key element plan watersheds.**
3. Increase nutrient management acres and implement cover crop practices with producers in the county.
4. **Provide technical assistance and work with partners to reduce streambank erosion and clay bank slumping**

C. Reduce environmental impacts from land-use activities in watershed areas.

1. **Provide technical assistance to landowners for implementing construction site erosion control, culvert upgrades, and other BMPs to reduce the impact of land disturbing activities.**
2. Provide assistance to the Bayfield County Tourism and Forestry Departments in addressing environmental concerns on 500 miles of recreation trails and 4 parks.

[13] Priority activities are listed in bold

D. Assist the Planning and Zoning Department and riparian landowners with shoreland mitigation and restoration requirements.

1. **Provide shoreland restoration, mitigation, and stormwater management plans to landowners through new surface water conservation tech position.**
2. Provide technical assistance for coastal erosion.
3. Review non-metallic mining reclamation plans.
4. Provide technical assistance for revisions to the county shoreland ordinance.

E. Develop a groundwater monitoring and protection program.

1. **Continue to cost share well abandonments.**
2. Support testing of drinking water wells in conjunction with the BC Health Department.
3. Identify areas of known contamination.
4. Support source water protection and well head protection ordinances for municipal wells.
5. Attempt to define well recharge areas and corresponding land use practices within those recharge areas.

F. Reduce and mitigate surface and groundwater impacts from agricultural land use activities in Fish Creek, White River, and Iron River Watersheds.

1. **Implement the NR 151 Strategy as outlined beginning on page 31.** *The Bayfield NR 151 strategy emphasizes voluntary technical assistance and cost sharing and relies upon the Department of Natural Resources for any needed enforcement support.*

2. **Provide technical and cost share assistance to producers choosing to implement conservation practices on their properties.** *Provide the best financial benefit to producers implementing nonpoint conservation practices by cooperating with agency partners. Use the nonpoint conservation practices available in ATCP 50. Continue promoting NM plans and reducing unlimited animal access to surface waters of the county.*

3. Continue to administer the Wildlife Damage and Abatement Program.

4. Continue to administer the new Farmland Preservation Plan.

Goal II Reduce the spread of invasive species to aquatic and terrestrial habitats.

Objectives and Activities[14]

A. Continue to successfully implement the Bayfield County AIS Strategic Plan.

1. **Carry out the activities identified in the AIS Strategic Plan.**
2. Utilize drone technology for mapping and quantifying AIS to develop treatment / control plans in affected areas.

B. Support an effective terrestrial invasive species control program.

1. **Continue to host and support the NCWMA and the organizations Strategic Plan**.
2. Database development and tracking of past, present and future treatment sites, grants and reporting.
3. Continue to support township efforts with info and education of invasive species in gravel pits and develop treatment plans.

Goal III Protect, restore, and enhance wildlife habitat in the forest, lakes, and streams.

Objectives and Activities

A. Implement wetland restoration and slow the flow sediment reduction projects.

1. **Identify, prioritize, and fund wetland habitat and restoration projects with partner organizations.**
2. **Locate slumping / failing streambanks and seek funding to repair those slumps to reduce sedimentation into Chequamegon Bay and Lake Superior.**

B. Improve fish passage on rivers and streams.

1. Provide technical and cost share assistance to landowners and municipalities to mitigate fish passage concerns regarding perched culverts, dams, roads, fords, and other man-made impediments to fish passage.
2. Assist US Fish and Wildlife in prioritizing fish passage barriers throughout county and seek out funding sources.
3. Incorporate BC Land Records Culvert Inventory into culvert replacement planning process.

[14] Priority activities are listed in bold.

C. Enhance grassland management to improve habitat and protect water quality on private lands.

1. **Provide technical and cost share assistance for practices necessary to implement BMPs for grazing and grassland management.**
2. Develop land management Information and Education materials for landowners regarding pollinator and grassland bird habitat.
3. Continue to support and partner with annual native tree and shrub sale (with Iron and Ashland County LWCDs).
4. Work with UWEX agricultural agent on developing a forage council for the Lake Superior forage producers.

Goal IV Increase natural resource education and LWCD outreach opportunities.

Objectives and Activities[15]

A. Utilize information technology to promote conservation practices and LWCD programs.

1. **Continually update and promote the Bayfield County, and LWCD web site.** Both sites are a *source of LWCD information and a resource for landowners regarding many past, present, and future conservation and natural resource issues in the county*
2. Enhance social media usage to continually update landowners and members of the public in general of current conservation issues.
3. Create Information and Education materials as needed to market LWCD programs and initiatives; ongoing
4. **Utilize BC Land Records drone for flights to measure bluff recession rates, AIS sites, NR-135 compliance and areal extent**.

B. Support and present natural resources education throughout the county.

1. **Provide regular, one-on-one, on-site education and technical assistance to landowners.**
2. Contribute regular LWCD updates and news releases highlighting timely conservation projects, practices, and issues to local media outlets and social media sources.
3. **Continue annual tour of conservation projects with county board, neighboring counties, partners and landowners of new projects and practices.**

[15] Priority activities are listed in bold.

4. Provide presentations on topics related to LWCD priorities, goals and objectives for project partners and NGO groups and organizations.

C. Continue to enhance strong partnerships with resource management agencies, nongovernmental organizations (NGOs), and landowners.

1. **Support the activities of partner initiatives both financially when available, also through technical assistance and project planning.**
2. Act as fiscal agent to house grant funds as needed for partner organizations.
3. New surface water technician position will increase work with lake associations in obtaining lake management planning, AIS, and lake protection grants.
4. Participate in greater Lake Superior Watershed partnership meetings and projects.

Topics of LWCD outreach and education focus

Restoration & creation of wetlands
Shoreland restoration
Surface water protection
Waterfront runoff reduction
Agricultural riparian buffers and BMPs
Drinking water/ well testing
Bluff stabilization and recession
Aquatic invasive species
Terrestrial invasive species
Fish and Wildlife Habitat
Groundwater protection
Septic system maintenance
LWCD programs and services

Local media contacts

The Daily Press (Ashland)
Iron County Miner (Hurley)
Masinaigan **(**GLIFWC)
Glidden Enterprise
Price County Review
WEGZ Eagle (Washburn)
Duluth News Tribune
The Country Today (Eau Claire)
WATW/WJJH Radio (Ashland)
WJMS-WIMI AM/FM (Ironwood)
Spooner Advocate
Ironwood Daily Globe
County Journal (Washburn)
The Daily Telegram (Superior)
Mellen Weekly Record
Sawyer County Record
WOJB-FM Radio (Hayward)
CESA #12 (Ashland)

Goal V Factor in climate resiliency for planning, design, engineering, and construction of future projects due to more intense weather events.

Objectives and Activities[16]

A. Establish full time surface water / lakeshore protection technician.

1. **Increase technical assistance and education activities with landowners regarding coastal erosion on the south shore of Lake Superior, and rising inland lake levels.**
2. Develop great lakes coastal engineering contact group to assist Lake Superior landowners with hard engineering practices, due to rising lake levels.

B. Work with Partner agencies; NRCS, DATCP and DNR to factor in more intense weather events when planning for projects.

1. **Incorporate additional storage and protection measures during planning, designing, and installing all conservation practices on the landscape.**
2. **Implement the Lake Superior Charter Action Plan with partner agencies (Appendix D)**
3. Develop a work group with DNR project permitting staff to account for climate resiliency during project planning.
4. Work with local WDNR staff to promote and distribute Coastal Resilience Self-Assessment with coastal landowners. (Appendix C)

C. Increase supervisor, staff, and Land Conservation Committee knowledge and skills to support plan activities.

1. As weather patterns continue to change, keep all staff abreast on changing rules, specifications, permitting activities.
2. **Promote staff training on conservation planning and engineering for changing climate patterns.**
3. Host training for board members on climate resiliency as it relates to project planning, funding, and workload.

[16] Priority activities are listed in bold.

Role of County in Plan Implementation

The Land Conservation Committee is responsible for oversight of the LWRMP. Land and Water Conservation Department staff is responsible for implementation of the plan, based on annual review and prioritization by the LCC. The work plan identifies activities, hours, and funding for the LWCD only. Because of the difficulty of predicting future priorities and more intense weather event occurrences, the work plan covers the first year of plan implementation only. The work plan will be updated annually to reflect new priority activities and address emerging issues.

Role of other Agencies and Institutions in Plan Implementation

A list of potential partners for implementation of the Land and Water Management Plan is included on the following page. Other county departments are encouraged to work together with the LWCD as the department implements plan activities. Other agencies and organizations are also encouraged to use the plan when performing resource management activities in Bayfield County. New partnerships will be actively sought by the LWCD and LCC.

The Department of Agriculture, Trade and Consumer Protection (DATCP) has oversight authority for the land and water resource management plans. DATCP also provides funding for implementation of the plan based on annual grant applications from counties.

The Department of Natural Resources, USDA-NRCS, and other agencies will play a critical role in plan implementation. Although few DNR staff are located in the area, the nature of many of the planned activities require collaborative relationships between DNR and county staff. Funding for projects identified in the plan may also be needed from existing or emerging programs.

Examples include the following activities:

- Implementation of the agricultural and non-agricultural performance standards
- Permitting for stabilization of lake and river frontage
- Permitting for municipal road crossings and other stabilization methods
- Lake/River Planning and Protection Grants
- Funding for new stabilization methods and geomorphic assessments proposed as part of an overall engineering / project planning for project installation.

The LWCD will support the activities and plans of partner agencies by providing technical assistance and the program services outlined in the LWRMP. For example, municipalities implementing their comprehensive land use plans may be able to take advantage of information and services offered by the LWCD. Several partner agencies and municipalities are frequently supported by LWCD technical assistance and cost sharing assistance for project installation.

List of LWMP Partners

Ashland County Land and Water Conservation Department
Ashland Bayfield County Sportsman
Bad River Band of Lake Superior Chippewa
Bayfield County Board of Commissioners
Bayfield County Forestry Department
Bayfield County Health Department
Bayfield County Highway Department
Bayfield County Lake and River Organizations
Bayfield County Lakes Forum
Bayfield County Municipalities
Bayfield County Tourism Department
Bayfield County University of Wisconsin Extension
Bayfield County Planning and Zoning Department
Ducks Unlimited
Fish America Foundation
Friends of the Eau Claire Lakes – Town of Barnes
Friends of the St. Croix Headwaters
Great Lakes Commission
Iron County Land and Water Conservation Department
Lake Superior Binational Program
Lake Superior Research Institute
Landmark Conservancy
Mary Griggs Burke Center for Freshwater Innovation – Northland College
National Fish and Wildlife Foundation
National Oceanic & Atmospheric Agency
National Park Service – Apostle Islands Lakeshore
Natural Resources Foundation of Wisconsin
Northland College
Northwoods Cooperative Weed Management Area
Red Cliff Band of Lake Superior Chippewa
Trout Unlimited
United States Army Corps of Engineers
United States Environmental Protection Agency
United States Fish & Wildlife Service
University of Wisconsin Extension
USDA Farm Service Agency
USDA Natural Resources Conservation Service
Wisconsin Coastal Management Program
Wisconsin Department of Agriculture, Trade, & Consumer Protection
Wisconsin Department of Natural Resources
Wisconsin Land & Water
Wisconsin Sea Grant
Wisconsin Wetlands Association

Funding Plan Implementation

Staff and project financial resources are stable at the present, however implementation of the activities outlined in new LWRMP will be contingent on maintaining those funds into the future. Activities that are identified as priorities will not be possible without funding that supplements Bayfield County and DATCP allocations. For example, the AIS and NCWMA program in Bayfield County are entirely dependent upon grant support from state and federal sources. Maintaining basic staff allocations is critical to continue the success in seeking additional funding sources to support existing and expanded programming in Bayfield County. Grant funding is often enhanced by cooperating with county partners.

Potential Funding Sources

Bayfield County General Fund
Department of Administration (DOA)
- Coastal Management Program (CMP)

Department of Agriculture, Trade & Consumer Protection (DATCP)
- Farmland Preservation Program
- Land & Water Resource Management Implementation (Bond)
- Nutrient Management Planning (NMP)
- Agricultural Enterprise Areas (AEAs)

Department of Natural Resources (DNR)
- Aquatic Invasive Species (currently supports AIS coordinator and projects)
- Basin Team Funding (Lake Superior, St. Croix)
- Lake Planning Grant Program
- Lake Protection Grant Program
- River Protection Grant Program
- Targeted Runoff Management Program
- Wildlife Sources – Segregated Funds (general license), Wisconsin Waterfowl Stamp, Trout Stamp

Ducks Unlimited (DU)
Environmental Protection Agency (EPA)
- Great Lakes Restoration Initiative

Fish America Foundation
Great Lakes Basin Program (GLBP)
National Fish and Wildlife Foundation (NFWF)
- Sustain our Great Lakes (SOGL)

Individual Contributions
Lake Associations
National Farmers Organization (NFO)
North American Wetland Conservation Act (NAWCA)
Private Foundations
River Organizations
Sports Clubs
Trout Unlimited
University of Wisconsin Extension

US Fish & Wildlife Service (FWS)
    Private Lands Funding for Wetland Restoration
    Fish Passage Program
US Geological Survey (USGS)
USDA Natural Resources Conservation Service (NRCS)
    Environmental Quality Incentive Program (EQIP)
    Wetland Reserve Program (WRP)
Wisconsin Environmental Education Board (WEEB)
Wisconsin Geologic & Natural History (WGNHS)
Wisconsin Tree Farm Commission
Wisconsin Waterfowl Association
Wisconsin Wetlands Association

Monitoring and Assessment

Monitoring and assessment are important to assess the progress toward meeting plan goals and objectives. Without data and information collection, departments cannot characterize the condition of the environment, assess and solve problems, or evaluate the effectiveness of management and regulatory actions. The Clean Water Act and state of Wisconsin law and associated rules mandate monitoring of surface waters. The collection and dissemination of information is also essential in educating and increasing public awareness of the environment and environmental issues.

Wisconsin Department of Natural Resources monitoring programs are implemented to achieve a comprehensive understanding of the state of Wisconsin's surface waters. Monitoring may be to assess baseline conditions, special project results, long-term trends, and total maximum daily loads.

Bayfield County has relatively little data collected for its surface and groundwater. Recommendations related to the availability of baseline data from which to recognize problems as they develop include the following:

1. DNR recommendations from the Water Quality Management Plans for Upper St. Croix and Lake Superior Basins should be followed. Additional resources should be invested in these efforts by the agency.

2. DNR and Bayfield County should continue to support lake and river groups in their efforts to pursue water quality management projects.

3. DNR and Bayfield County LWCD should continue to encourage and support citizen lake monitoring.

Ongoing Monitoring

The following is a partial list of known monitoring programs in Bayfield County:

Table 9. Resource Monitoring in Bayfield County

Resource	Program	Agency/group
Fish	Mercury, Populations	GLIFWC[17]
Groundwater	Drinking Water Testing	UWEX, DNR, Zoning
Lakes	Citizen Lake Monitoring Network	Lake Volunteers, DNR
Lakes	Purple Loosestrife Monitoring	Lake Volunteers, DNR
Lakes	Zebra Mussel Monitoring	Lake Volunteers, DNR, UWS
Lakes	Clean Boats, Clean Waters	Lake Volunteers, UWEX
Lakes/Streams	Lake Planning & River Grants	DNR, Lake/River Groups
Lakes/Streams	Chemical Measurements	DNR
Lakes/Streams	Biological Assessments	DNR
Streams	Stream monitoring	UWEX
Lake Superior	Great Lakes Beach Testing	UWS, MN Sea Grant, Health Dept
Streams	Habitat Assessments	DNR
Wildlife	Loon Watch	Lake Volunteers, Sigurd Olson Inst.
Wildlife	Walleye Watch	Lake Volunteers

Citizen Monitoring

The following table shows existing DNR-supported ongoing citizen monitoring efforts in Bayfield County. Volunteer citizen monitoring is encouraged to evaluate progress toward water quality goals and identification of aquatic invasive species. These efforts build awareness and appreciation for the quality of Bayfield County's resources in the resident and non-resident public.

The DNR Citizen Lake Monitoring Network and other programs are encouraged and used as tools to raise environmental awareness while monitoring lake and habitat quality to establish baseline information. Several lake groups throughout the county take part in additional citizen monitoring projects. These projects include exotic species monitoring for Eurasian water milfoil, purple loosestrife, and zebra mussels. Citizen stream monitoring is supported by University of Wisconsin Extension. More information is available at http://watermonitoring.uwex.edu/index.html.

[17] Great Lakes Indian Fish and Wildlife Commission.

Table 10. Bayfield County Citizen WDNR Self Help Monitoring Program	
LAKE NAME	**YEAR STARTED**
Atkins Lake	1973
Bass Lake	2004
Bony Lake	2000
Breakfast Lake	2007
Cranberry Lake	2001
Delta Lake	2003
Diamond Lake	1973
Eagle Lake	1991
Ellison Lake	2000
Everett Lake	2003
Flynn Lake	1991
George Lake	2000
Hammil Lake	2000
Hart Lake	1991
Hay Lake	2003
Island Lake	1998
Namekagon Lake (Jackson)	1998
Lake Owen	1992
Lake Wilipyro	2001
Long Lake (T47N R08W S03)	1995
Lower Eau Claire Lake	1988
Middle Eau Claire Lake	1987
Millicent Lake	1991
Muskellunge Lake	2009
Namekagon Lake	1990
Phantom Lake	2000
Pickerel Lake	1977
Pigeon Lake	1998
Robinson Lake	2001
Samoset Lake	2001
Sand Bar Lake	2000
Shunenberg Lake	2001
Siskiwit Lake	2001
Spider Lake	2003
Tahkodah Lake	1991
Tomahawk Lake	2000
Trapper Lake	2007
Twin Bear Lake	1973
Upper Eau Claire Lake	1973

Results from these programs will be used as feasible to monitor progress toward improving surface water quality and to help determine if land and water conservation efforts are successful. They are available at: http://www.dnr.state.wi.us/lakes/CLMN/reportsanddata. These and other benchmarks will be reported in the annual plan accomplishment report.

LWCD Work Plan for Implementation in 2020

The LWCD staff that are available and needed to fully implement the activities outlined in the work plan are listed below.

LWCD Permanent Staff

County Conservationist	1.0 FTE	$65,000
Engineering Technician	1.0 FTE	$52,000
Office Manager	1.0 FTE	$43,000
2.5 FTEs Total Staffing Cost		$160,000

LWCD Current Limited Term Employees

AIS Coord / Surface H20 Tech	1.0 LTE	$44,000 Funded through February 2022
NCWMA Coordinator	1.0 LTE	$40,000 Funded through July 2020
1.6 FTEs Current LTE Cost		$84,000

Seasonal LTE Staff

CBCW Inspectors	4.0 FTE	$28,000 (3.5 months during summer)
CWD Outreach Technician	0.50	$8,000 (6-month fall position)

Total LWCD Staff currently used for LWRMP Implementation: 6.5 FTEs

Priority activities in the work plan are shown in bold. A list of partners for plan implementation is found on page 48. Partners will be selected as activities are planned and implemented

Table 11. ***Goal I. Protect and enhance surface waters, wetlands, and groundwater to maintain water quality, ecologic function, and recreational and aesthetic values.***

Objective	Activity[18]	Annual Costs	Evaluation Tools (Annual Benchmarks)
A. Assist waterfront landowners	**1. Provide technical and cost share assistance for shoreland restoration and waterfront runoff reduction.**	**Cost share $15,000**	**Shoreland restorations (3)** **Waterfront runoff reduction projects (6)**
	2. Use new surface water tech to secure grants for lake associations / projects and address sedimentation issues	**$32,000**	**New project grant funds**
B. Reduce stormwater runoff volume and velocity	1. Provide technical and cost share assistance for water retention practices on their property.	Cost share $10,000	Projects completed (2)
	2. Slow the Flow sediment reduction projects with neighboring counties	**$20,000**	**3 bank stabilization / crossings**
	3. Increase NMP acres and implement cover crops.	Cost share $20,000	500 Acres
	4. Tech assistance to reduce streambank erosion and bank slumping	**Cost share $15,000**	**Projects completed (2)** **On-sites with landowners (20)**
C. Reduce impacts in watersheds	**1. Provide technical assistance for construction site erosion control, culvert upgrades, BMPs**	**Support and supplies $5,000**	**Landowners assisted (15)**
	2. Address environmental concerns for county trails and parks.	Cost share $5,000	Problem areas mitigated (3)
D. Assist Planning and Zoning	**1. Provide shoreland restoration and mitigation plans – new position.**	**Fees collected $4,000**	**Plans completed (12)**
	2.Review NR 135 Plans	Fees collected $1,000	Plans reviewed (4)
	3. Provide technical assistance regarding coastal erosion.	Included in Staffing	Site visits completed (20)
	4. Provide technical assistance for revisions to the county shoreland ordinance.	Included in Staffing	On-site landowner visits with Zoning Dept. (10)

[18] Priority activities are shown in bold text.

Table 11. ***Goal I. Protect and enhance surface waters, wetlands, and groundwater to maintain water quality, ecologic function, and recreational and aesthetic values.***			
Objective	**Activity[18]**	**Annual Costs**	**Evaluation Tools (Annual Benchmarks)**
E. Monitor and protect ground-water	**1. Continue to cost-share well abandonments**	**$6,000 ($3k cost-share, $3k county funds)**	**6 well closures annually**
	2. Support testing of drinking water wells with BC health dept.	Included in Staffing	20 Wells tested annually
	3. Identify areas of known contamination		Identify sites through testing
E. Monitor and protect ground-water	**1. Continue to cost-share well abandonments**	**$6,000 ($3k cost-share, $3k county funds)**	**6 well closures annually**
	2. Support testing of drinking water wells with BC health dept.	Included in Staffing	20 Wells tested annually
	3. Identify areas of known contamination; and identify and assess well recharge areas		Identify sites through testing; work with WDNR and WI Rural Water Assoc Staff to ID well recharge areas https://www.wrwa.org/
	4. Support source water protection and well head protection ordinances	Included in Staffing	
F. Reduce impacts from agriculture.	**1. Implement NR 151 Strategy.** **a. provide on-site visits** **b. complete compliance reviews** **c. prioritize NM plans and reducing unlimited animal access to streams**	Included in Staffing	**Site visits completed (5/YR)** **Compliance reviews completed (5/YR)** **Issue NR 151 compliance determinations (1/YR)**
	2. Provide technical assistance and cost sharing.	**Cost share $75,000**	**Practices completed (12/YR)**
	3. Administer Wildlife Damage Program.	Contract staff & claims $70,000	Producers assisted, damage, and abatement paid
	4. Administer new Farmland Preservation Plan.	Included in Staffing	Producers assisted Compliance checks (1/YR)
Total FTEs needed to support Goal 1: 2 FTEs			

Table 12. ***Goal II. Reduce the spread of invasive species to aquatic and terrestrial habitats.***			
Objective	**Activity[19]**	**Annual Costs**	**Evaluation Tools (Annual Benchmarks)**
A. Implement AIS Strategic Plan	**1. Carry out activities in the plan.**	**$42,000**	**Goals of the AIS Strategic plan are met, several acres treated, several hundred reached thru I & E efforts**
	2.Utilize drone technology for AIS	$10,000	Several hundred acres ID-ed and mapped / treated
B. Support TIS Program	**1. Continue to support NCWMA Coordinator and Strategic Plan**	**$55,000**	**Goals of the plan are met, several acres treated, hundreds reached thru I & E efforts**
	2. Database development and tracking of sites / grant reporting		Demonstrate past success to obtain future grants ($50,000 annually)
	3. Support town efforts to prevent spread / assist with treatments	$8,000	Pits treated (10) Acres treated (50)
Total FTEs needed to support Goal 2: 2 FTEs			

[19] Priority activities are shown in bold text.

Table 13. *Goal III. Protect, restore, and enhance wildlife habitat in the forest, lakes, and streams.*			
Objective	**Activity**	**Annual Costs**	**Evaluation Tools (Annual Benchmarks)**
A. Wetland restoration and slow the flow projects	**1. Identify, prioritize, and fund wetland habitat projects.**	**$25,000**	**Acres restored and enhanced (15)**
	2. Locate slumping / failing banks and seek funding	**$100,000**	**Sites Restored (1)**
B. Improve fish passage	1. Provide technical and cost share assistance.	$50,000-$300,000	Barriers removed (5)
	2. Partner with USFWS on inventory and barrier prioritization.	$10,000	Sites Identified (5)
	3. Incorporate BC Land Records Culvert Inventory	Included in Staffing	Sites Identified (10)
C. Enhance grassland management	**1. Provide technical / cost-share assistance for grassland mgt**	**$10,000**	**Restoration Sites (3)**
	2. Develop land management I & E materials for landowners regarding pollinator and grassland bird habitat.	$5,000	Landowner Visits (10)
	3. Support surrounding counties annual tree and shrub sale.		Landowners reached (50)
	4.Work with the UWEX ag agent on developing a regional forage council	$2,500	Better price for forages based on cooperative marketing strategies
Total FTEs needed to support Goal 3: 1.5 FTEs			

Table 14. ***Goal IV. Increase natural resource education and LWCD outreach opportunities.***

Objective	Activity[20]	Annual Costs	Evaluation Tools (Annual Benchmarks)
A. Promote conservation practices and LWCD programs with information technology.	**1. Ongoing web updates, both county and dept websites are new**		**Web site updates (24)**
	2. Social media usage for current and hot topics	Included in staffing	Posts / Updates (52)
	3. Create I & E materials to market programs	$1,300	New materials distributed to landowners, producers, businesses
	4. Utilize Drone technology to measure bluffs, NR135, AIS	**$5,000**	**Hundreds of acres ID-ed and mapped**
B. Support and present natural resources education countywide.	**1. Provide one-on-one education and assistance to landowners.**	**Included in staffing**	**Technical assistance visits and contacts (50)**
	2. Contribute articles and news releases to press and social media	Included in staffing	Articles and news releases distributed (12)
	3. Continue annual tour of conservation projects with board / partner agencies, other counties	**$200**	**Generate more conservation projects and practices (2)**
	4. Provide presentations to LWCD priorities	Included in staffing	Outreach meetings (24)
C. Continue partnerships with other agencies	**1. Support partner initiatives, both financially and engineering**	**$5,000**	**Plans / Designs (5)**
	2. Act as fiscal agent for grants	Included in Staffing	Potential New Annual Projects
	3.New surface water position to assist lake associations	$32,000	New Surface Water Grants
	4.Participate in greater Lake Superior partnership	Included in Staffing	Potential New Projects and Partnerships
Total FTEs needed to support Goal 4: 1.0 FTEs			

[20] Priority activities are shown in bold text.

Table 15. ***Goal V. Factor in climate resiliency for planning, design, engineering, and construction of future projects due to more intense weather events.***

Objective	Activity[21]	Annual Costs	Evaluation Tools (Annual Benchmarks)
A. Establish full time surface water technician	**1. Increase tech assistance and education activities regarding lakes and costal / bluff erosion**	**$50,000**	**Expand surface water program**
	2. Develop great lakes coastal engineering contact group	Included in staff time	Better service to landowners on Lake Superior
B. Work with NRCS, DATCP, DNR to factor in more intense weather events during project planning	**1. Incorporate additional storage / protection in project planning and design, installation**	**Included in staffing**	**updated standards for engineering plans**
	2. Implement the Lake Superior Charter Action Plan	**Included in Staffing**	**Increase funding opportunities for LS Basin**
	3. Develop work group with other counties / DNR permitting staff	Included in staffing	More continuity between agencies
	4.Work with local WDNR staff to promote and distribute Coastal Resilience Self-Assessment with coastal landowners. (Appendix C)	Included in staffing	Better informed understanding bluff erosion for project planning
C. Increase supervisor, staff and LCC knowledge	1. As weather patterns change, keep all staff abreast on changing rules, specs, permitting activities	Included in staffing	Consistency with current rules and regs
	2. Promote staff training on conservation planning / engineering regarding changing climate patterns	**$1,000**	**Increased on the job knowledge and training**
	3.In conjunction with UWEX host training for board members on climate resiliency as it relates to project planning, funding, and workload	$1,000	Training sessions (2)
Total FTEs needed to support Goal 5: .5 FTE			

[21] Priority activities are shown in bold text.

Partner Web Sites

Landmark Conservancy
https://www.landmarkwi.org/

Bayfield County Lakes Forum:
http://www.bayfieldcountylakes.org

Department of Agriculture, Trade & Consumer Protection:
http://www.datcp.state.wi.us/index.asp

Farm Services Agency:
http://www.fsa.usda.gov/FSA/stateoffapp?mystate=wi&area=home&subject=landing&topic=landing

Natural Resources Conservation Services:
http://www.wi.nrcs.usda.gov/

The Nature Conservancy:
http://www.nature.org/

Trout Unlimited:
http://www.tu.org/site/c.kkLRJ7MSKtH/b.3022897/k.BF82/Home.htm

Ducks Unlimited:
http://www.ducks.org/

University of WI Extension:
http://www.uwex.edu/

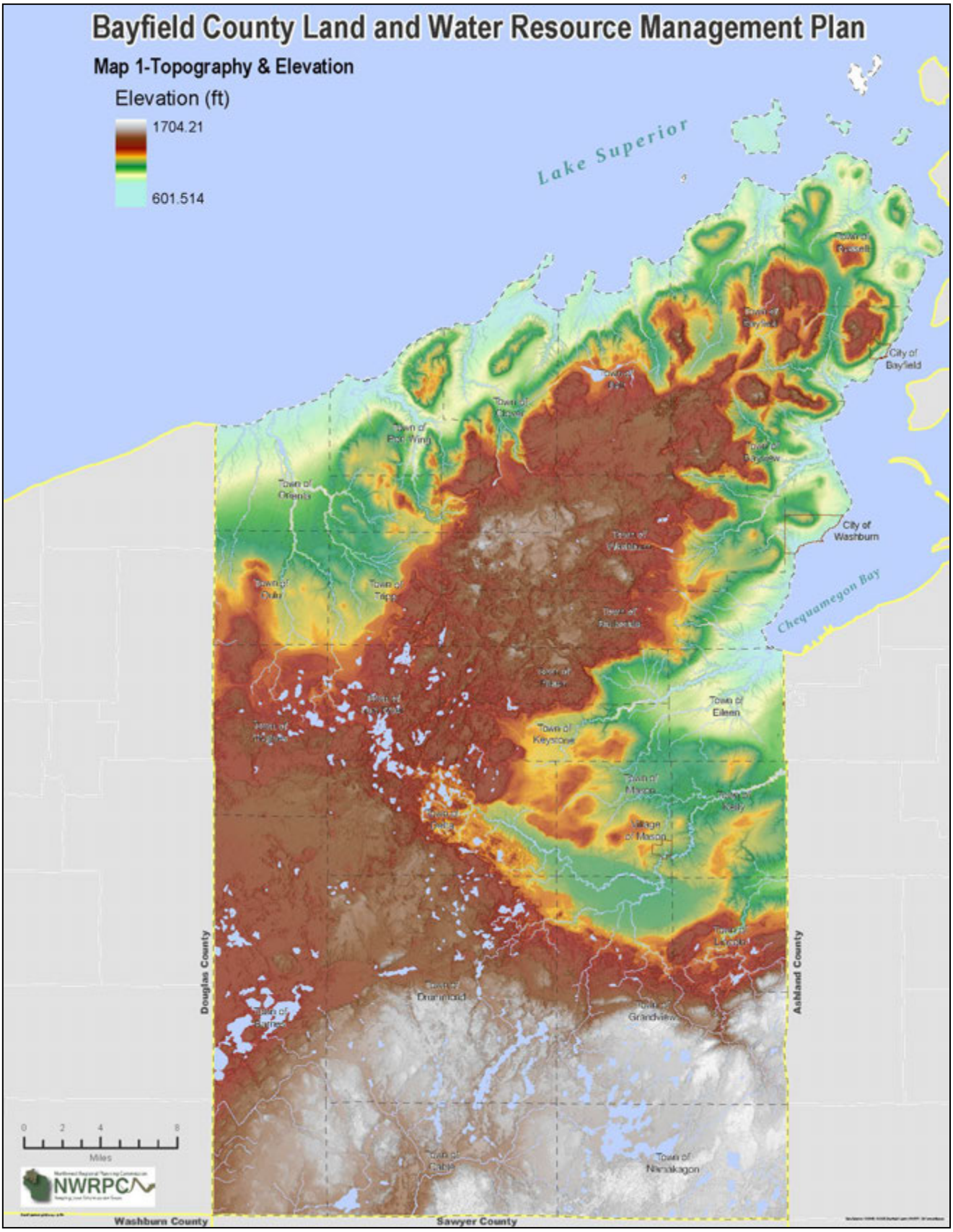
US Fish & Wildlife Service:
http://www.fws.gov/

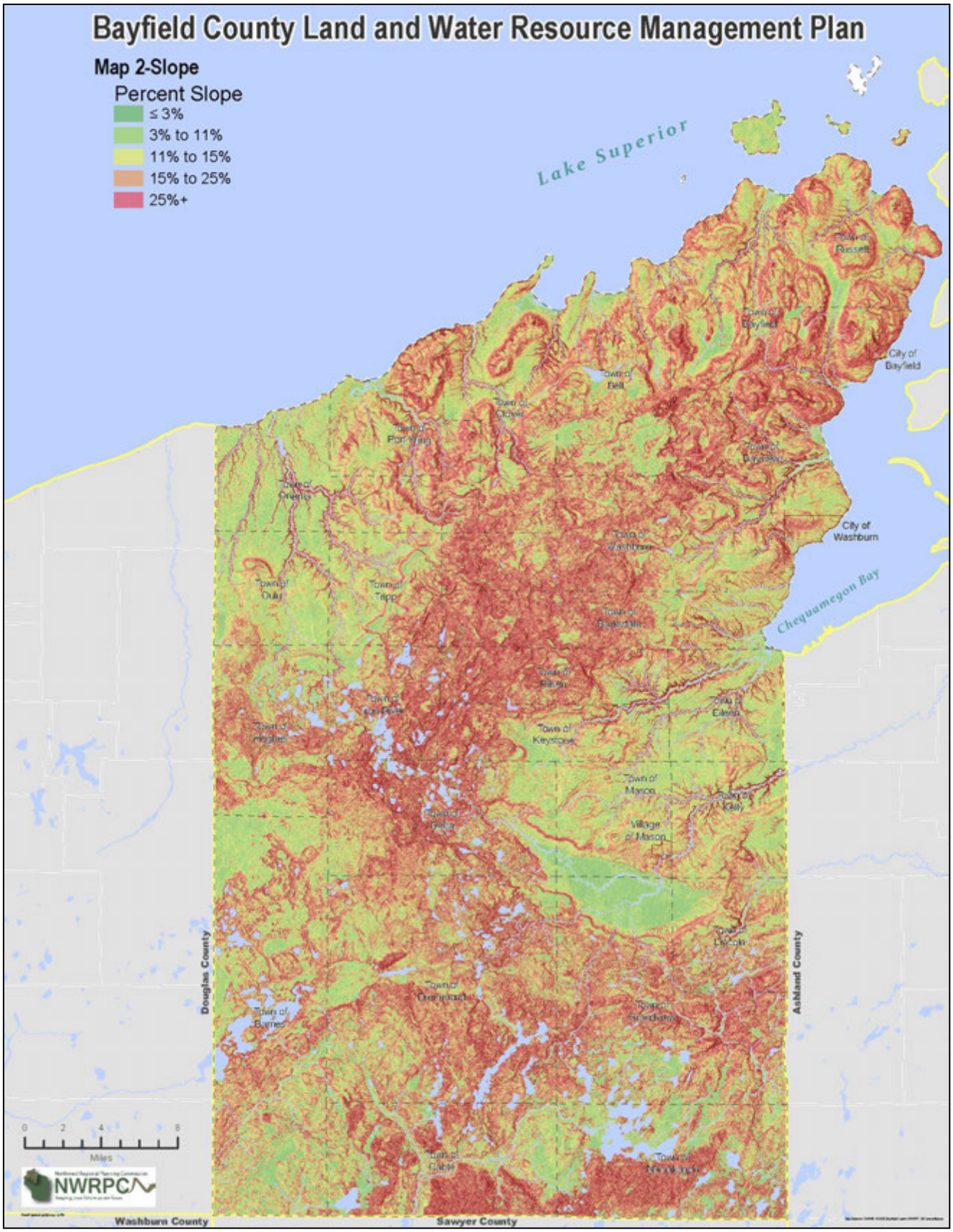
Wisconsin Department of Natural Resources:
http://www.dnr.state.wi.us/

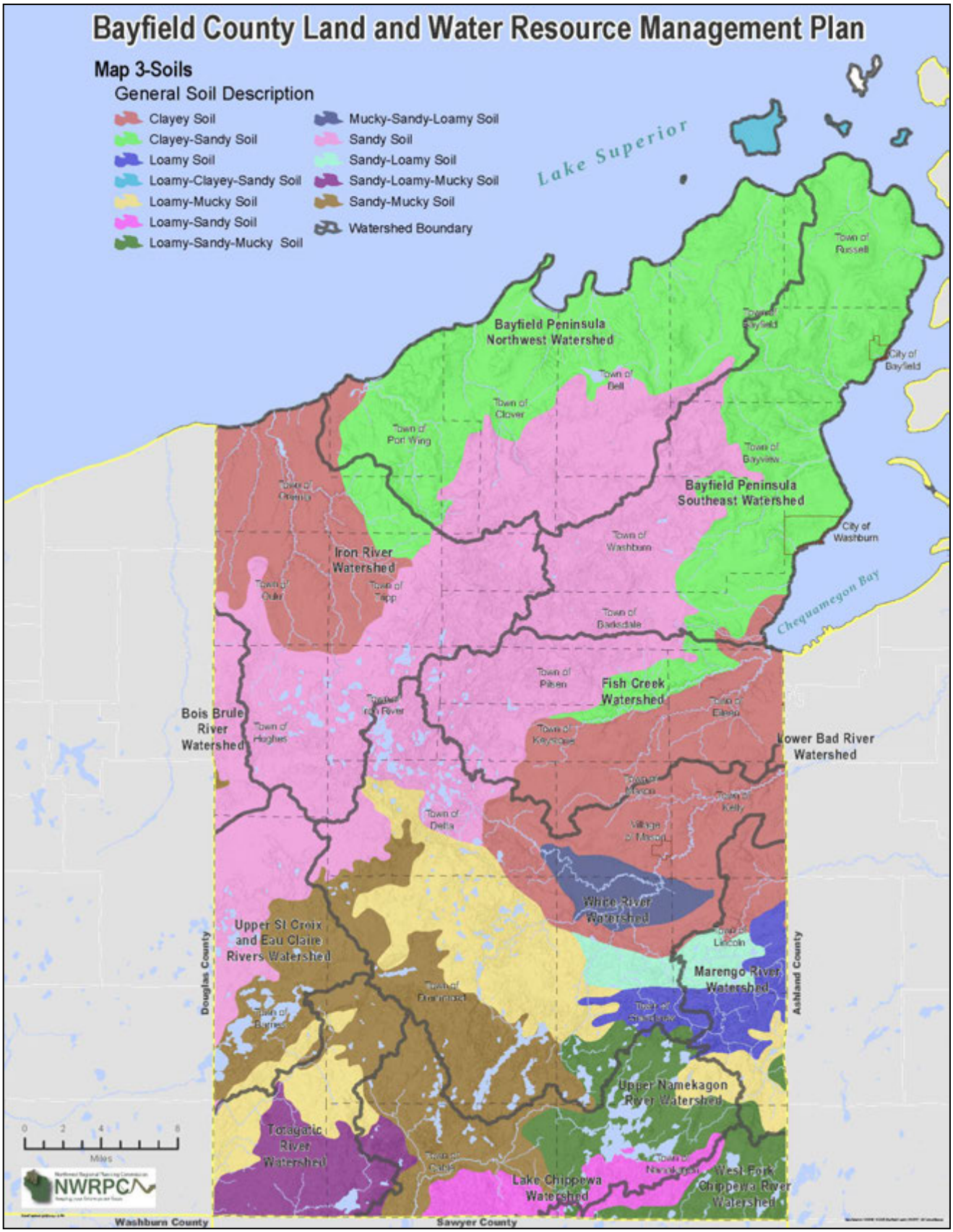
Associations /Affiliations

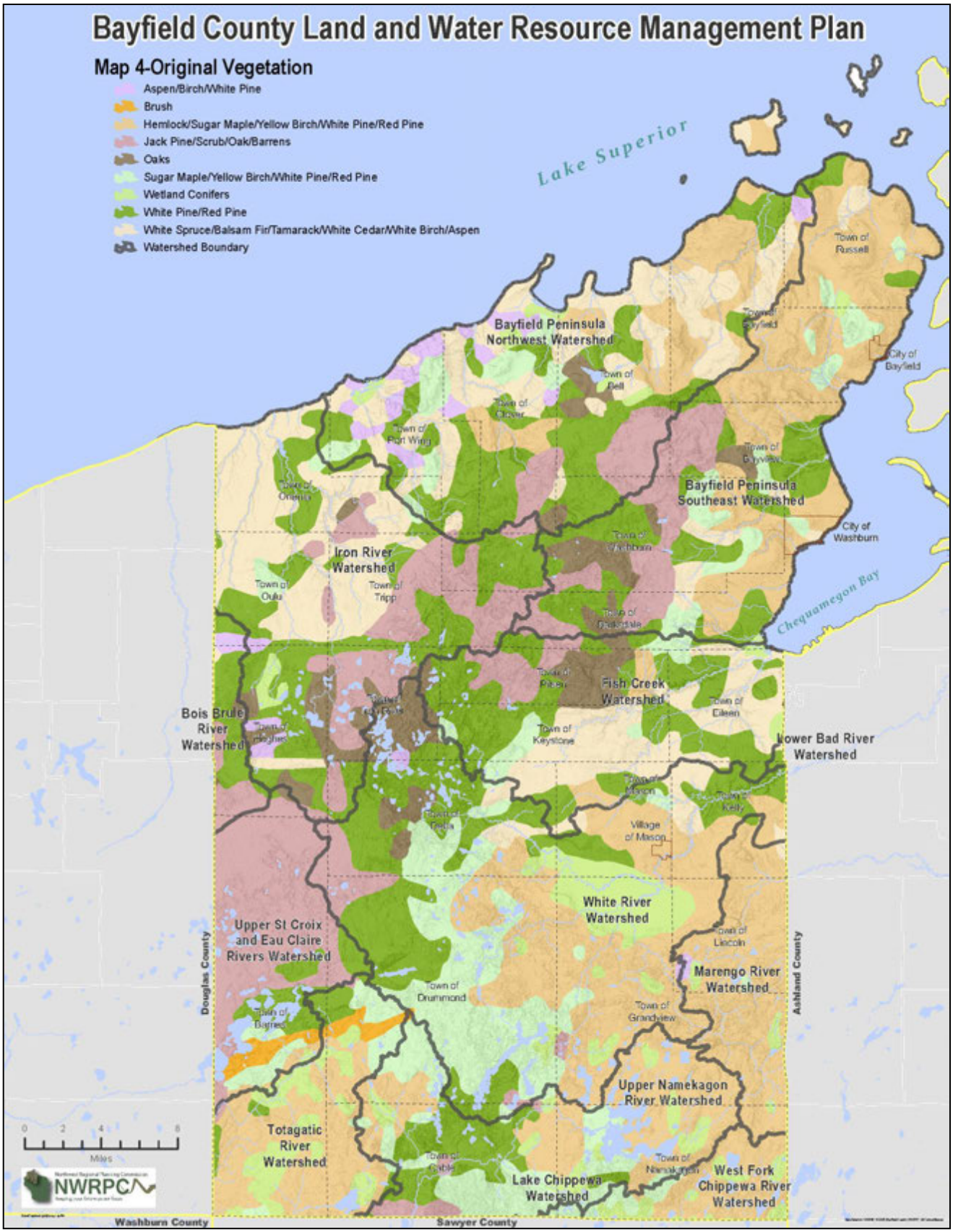
Wisconsin Land & Water
https://wisconsinlandwater.org/

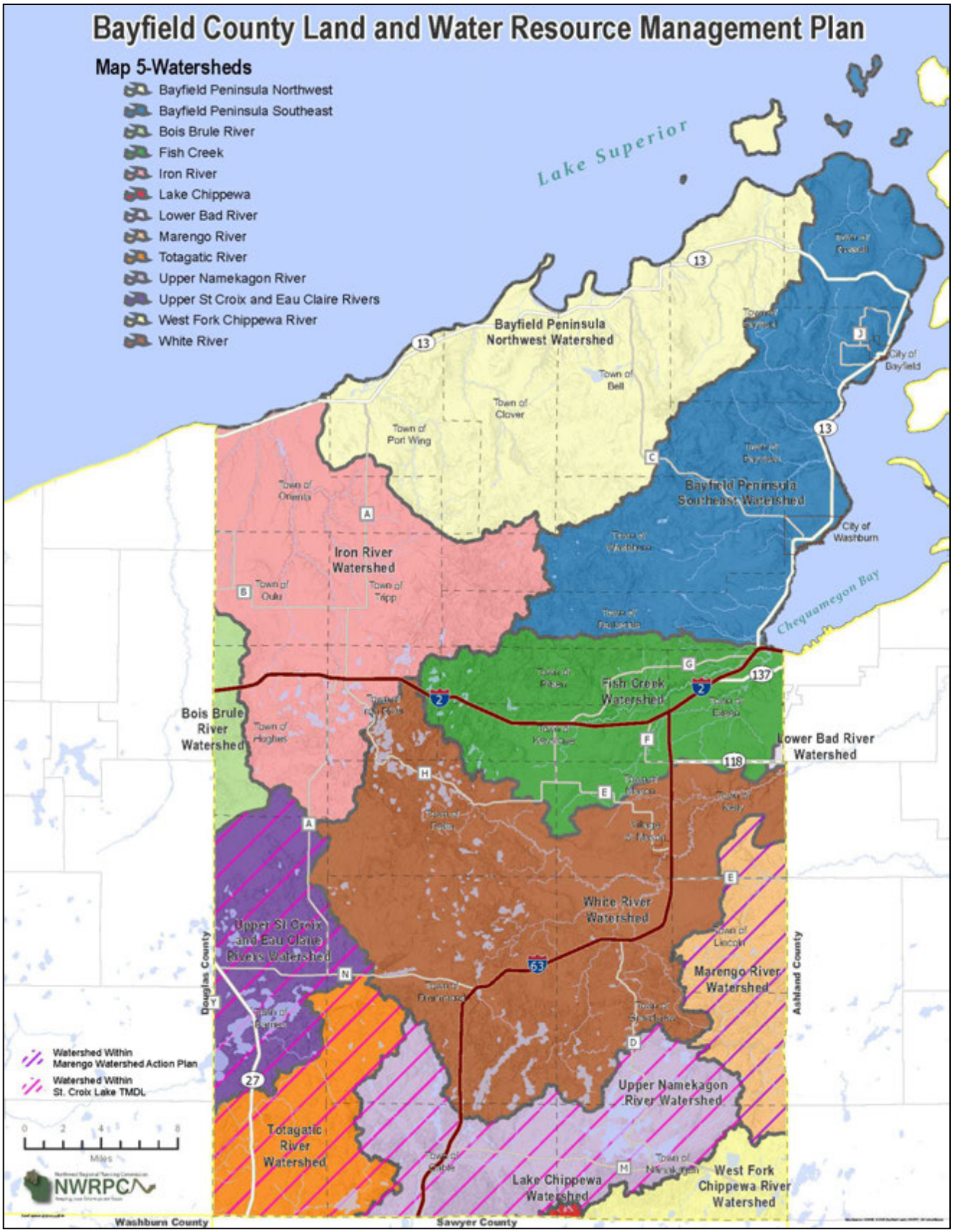
Volume III.- Maps

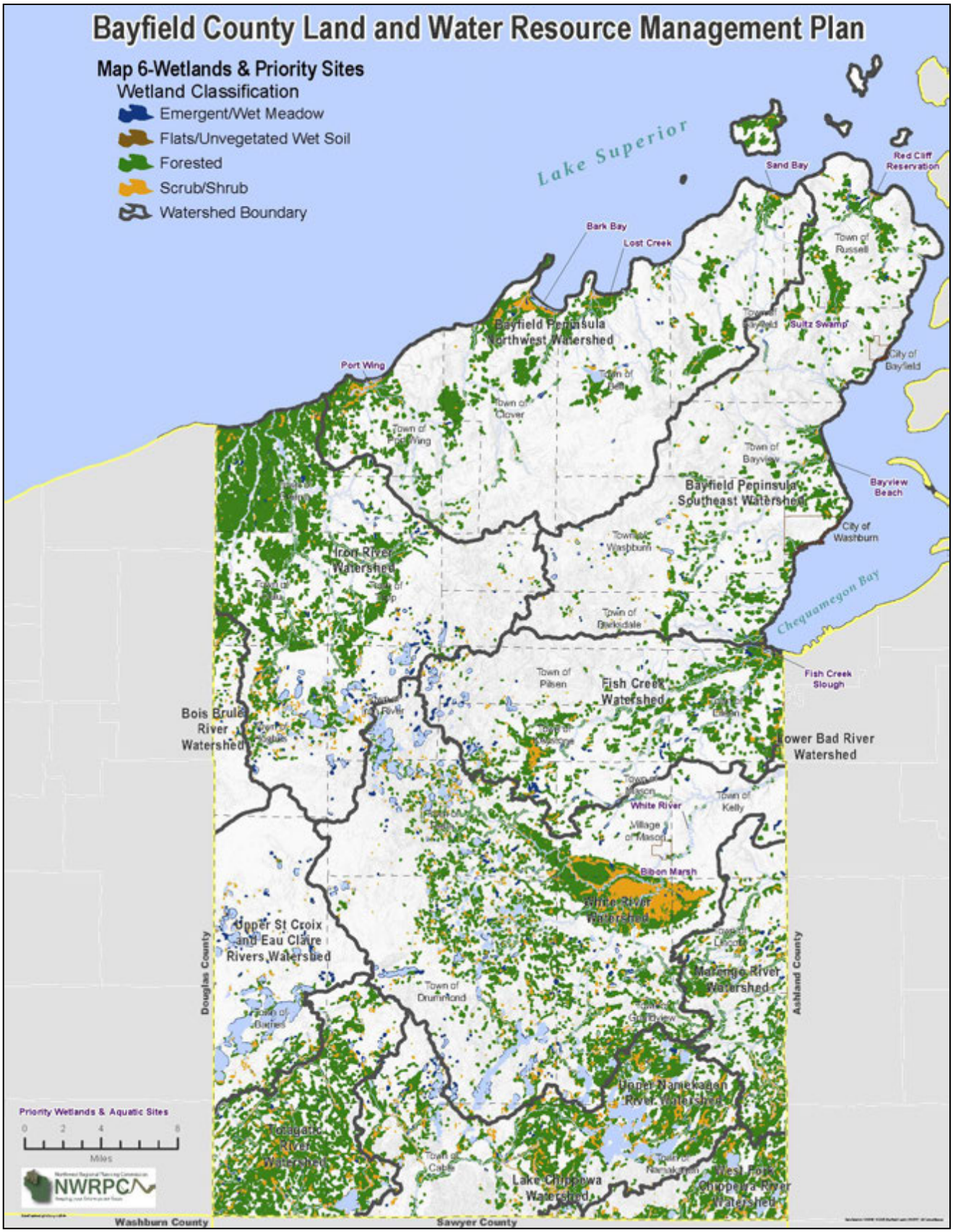


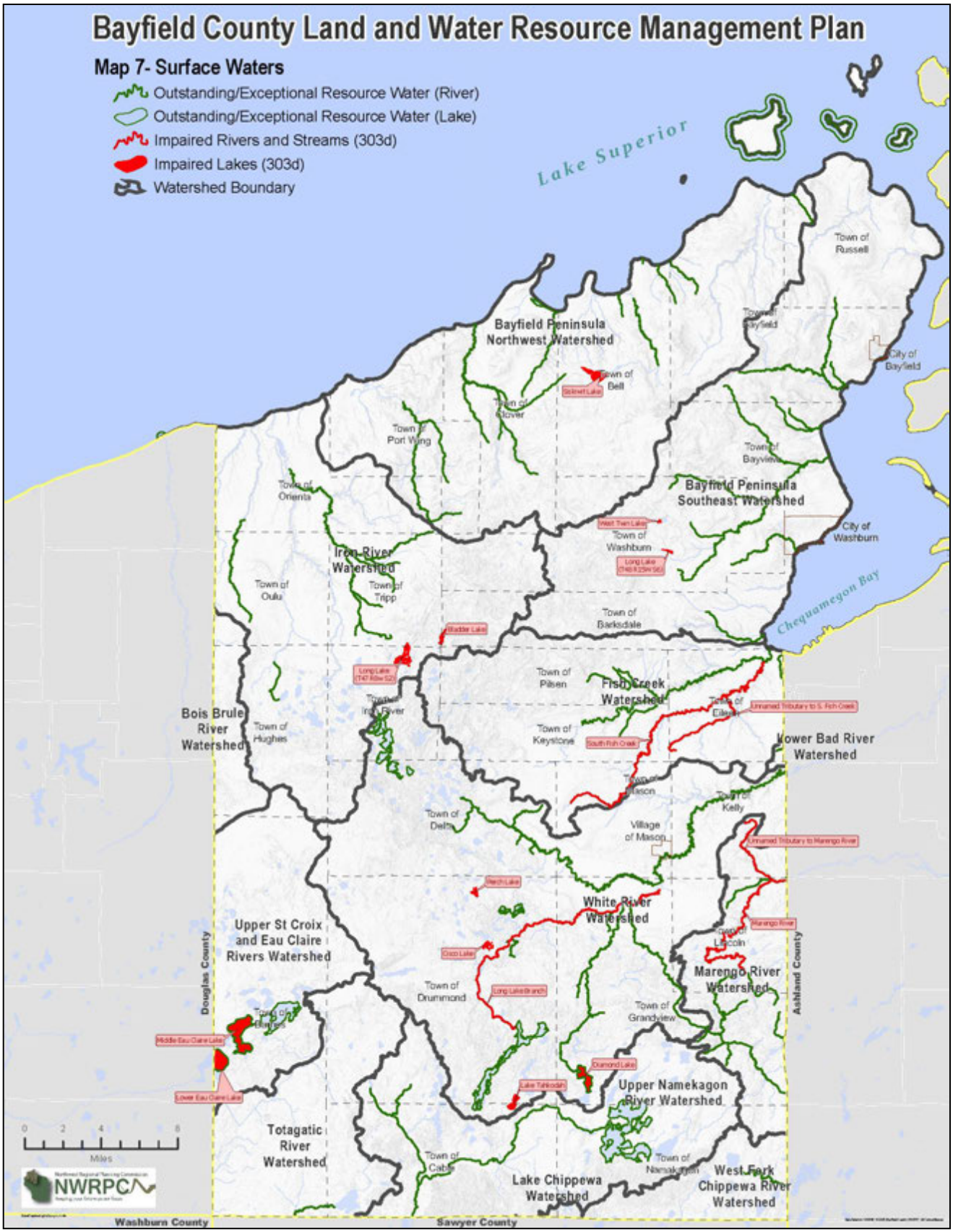

Bayfield County Land and Water Resource Management Plan
Map 2-Slope
Percent Slope
≤ 3%
3% to 11%
11% to 15%
15% to 25%
25%+
Lake Superior
Chequamegon Bay
City of Bayfield
City of Washburn
Town of Russell
Town of Bayfield
Town of Bell
Town of Clover
Town of Port Wing
Town of Orienta
Town of Washburn
Town of Delta
Town of Tripp
Town of Barksdale
Town of Rikers
Town of Eileen
Town of Keystone
Town of Mason
Village of Mason
Town of Lincoln
Town of Drummond
Town of Barnes
Town of Cable
Douglas County
Ashland County
Washburn County
Sawyer County
0 2 4 8
Miles
NWRPC

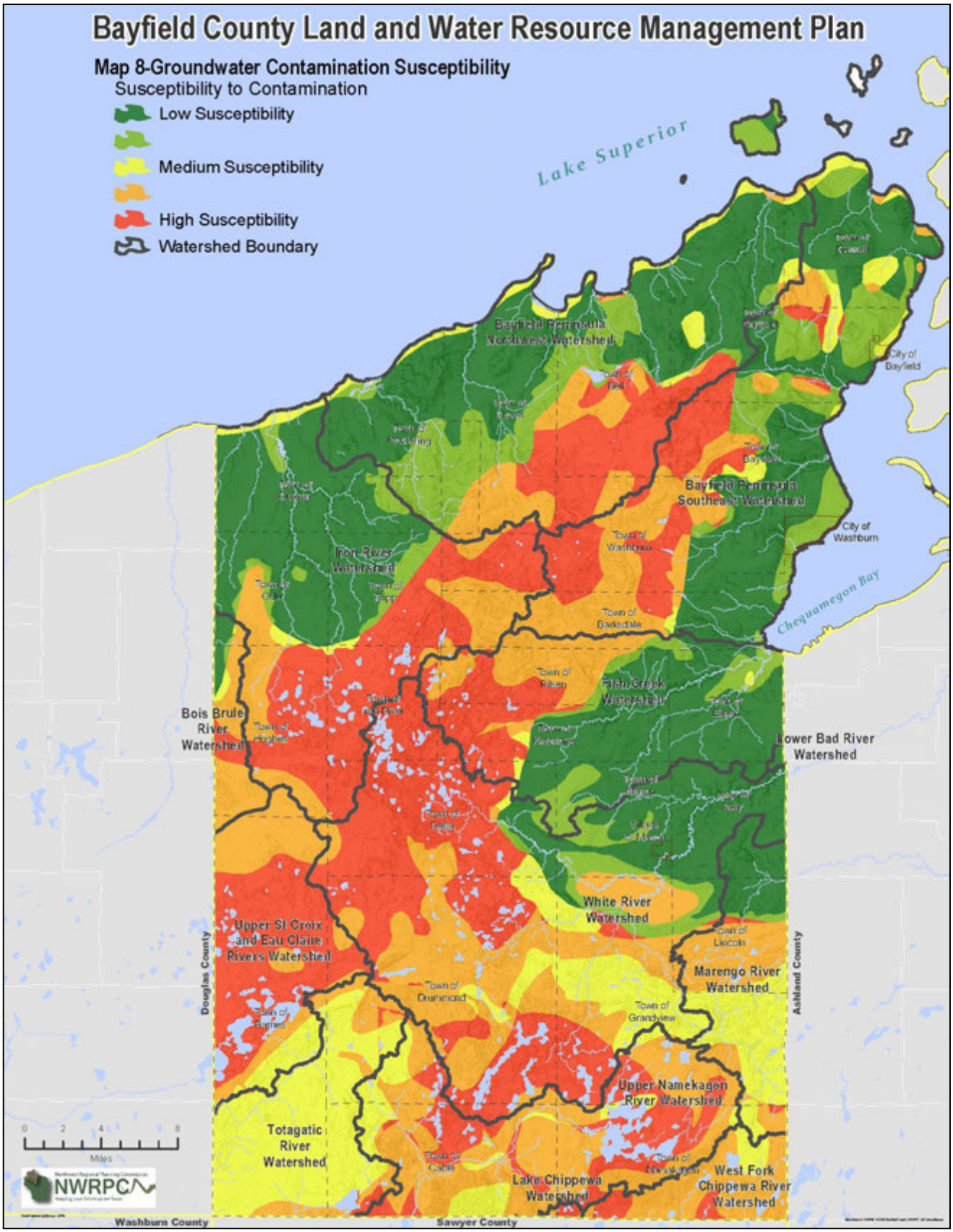

Bayfield County Land and Water Resource Management Plan
Map 3-Soils
General Soil Description
Clayey Soil
Clayey-Sandy Soil
Loamy Soil
Loamy-Clayey-Sandy Soil
Loamy-Mucky Soil
Loamy-Sandy Soil
Loamy-Sandy-Mucky Soil
Mucky-Sandy-Loamy Soil
Sandy Soil
Sandy-Loamy Soil
Sandy-Loamy-Mucky Soil
Sandy-Mucky Soil
Watershed Boundary
Lake Superior
Chequamegon Bay
Bayfield Peninsula Northwest Watershed
Bayfield Peninsula Southeast Watershed
Iron River Watershed
Fish Creek Watershed
Bois Brule River Watershed
Lower Bad River Watershed
White River Watershed
Upper St Croix and Eau Claire Rivers Watershed
Marengo River Watershed
Upper Namekagon River Watershed
Totagatic River Watershed
Lake Chippewa Watershed
West Fork Chippewa River Watershed
Town of Russell
City of Bayfield
Town of Bell
Town of Clover
Town of Port Wing
Town of Bayview
Town of Washburn
City of Washburn
Town of Barksdale
Town of Oulu
Town of Tripp
Town of Pilsen
Town of Hughes
Town of Delta
Town of Kelly
Village of Mason
Town of Lincoln
Town of Brandon
Town of Bass Lake
Town of Namakagon
Douglas County
Ashland County
Washburn County
Sawyer County
0 2 4 8
Miles
NWRPC


Bayfield County Land and Water Resource Management Plan
Map 4-Original Vegetation
Aspen/Birch/White Pine
Brush
Hemlock/Sugar Maple/Yellow Birch/White Pine/Red Pine
Jack Pine/Scrub/Oak/Barrens
Oaks
Sugar Maple/Yellow Birch/White Pine/Red Pine
Wetland Conifers
White Pine/Red Pine
White Spruce/Balsam Fir/Tamarack/White Cedar/White Birch/Aspen
Watershed Boundary
Lake Superior
Chequamegon Bay
Bayfield Peninsula Northwest Watershed
Bayfield Peninsula Southeast Watershed
Iron River Watershed
Fish Creek Watershed
Bois Brule River Watershed
Lower Bad River Watershed
White River Watershed
Upper St Croix and Eau Claire Rivers Watershed
Marengo River Watershed
Upper Namekagon River Watershed
Totagatic River Watershed
Lake Chippewa Watershed
West Fork Chippewa River Watershed
Town of Russell
City of Bayfield
Town of Bell
Town of Clover
Town of Port Wing
Town of Orienta
Town of Bayview
City of Washburn
Town of Oulu
Town of Tripp
Town of Barksdale
Town of Eileen
Town of Keystone
Village of Mason
Town of Lincoln
Town of Drummond
Town of Grandview
Town of Namakagon
Town of Cable
Douglas County
Ashland County
Washburn County
Sawyer County
Miles
NWRPC


Bayfield County Land and Water Resource Management Plan
Map 5-Watersheds
Bayfield Peninsula Northwest
Bayfield Peninsula Southeast
Bois Brule River
Fish Creek
Iron River
Lake Chippewa
Lower Bad River
Marengo River
Totagatic River
Upper Namekagon River
Upper St Croix and Eau Claire Rivers
West Fork Chippewa River
White River
Lake Superior
Chequamegon Bay
Bayfield Peninsula Northwest Watershed
Bayfield Peninsula Southeast Watershed
Iron River Watershed
Fish Creek Watershed
Bois Brule River Watershed
Lower Bad River Watershed
White River Watershed
Upper St Croix and Eau Claire Rivers Watershed
Marengo River Watershed
Upper Namekagon River Watershed
Totagatic River Watershed
Lake Chippewa Watershed
West Fork Chippewa River Watershed
City of Bayfield
City of Washburn
Town of Bell
Town of Clover
Town of Port Wing
Town of Orienta
Town of Oulu
Town of Tripp
Town of Hughes
Town of Lincoln
Town of Kelly
Town of Couderay
Town of Radisson
Douglas County
Ashland County
Washburn County
Sawyer County
Watershed Within Marengo Watershed Action Plan
Watershed Within St. Croix Lake TMDL
Miles
NWRPC


Bayfield County Land and Water Resource Management Plan
Map 6-Wetlands & Priority Sites
Wetland Classification
Emergent/Wet Meadow
Flats/Unvegetated Wet Soil
Forested
Scrub/Shrub
Watershed Boundary
Lake Superior
Sand Bay
Red Cliff Reservation
Bark Bay
Lost Creek
Town of Russell
Bayfield Peninsula Northwest Watershed
Sultz Swamp
City of Bayfield
Port Wing
Town of Clover
Town of Port Wing
Town of Bayview
Bayfield Peninsula Southeast Watershed
Bayview Beach
City of Washburn
Iron River Watershed
Town of Washburn
Town of Barksdale
Chequamegon Bay
Fish Creek Slough
Town of Pilsen
Fish Creek Watershed
Bois Brule River Watershed
Lower Bad River Watershed
Town of Iron River
White River
Town of Kelly
Village of Mason
Bibon Marsh
White River Watershed
Upper St Croix and Eau Claire Rivers Watershed
Douglas County
Town of Drummond
Marengo River Watershed
Ashland County
Upper Namekagon River Watershed
Priority Wetlands & Aquatic Sites
0 2 4 8
Miles
NWRPC
Totogatic River Watershed
Lake Chippewa Watershed
West Fork Chippewa River Watershed
Washburn County
Sawyer County


Bayfield County Land and Water Resource Management Plan
Map 7- Surface Waters
Outstanding/Exceptional Resource Water (River)
Outstanding/Exceptional Resource Water (Lake)
Impaired Rivers and Streams (303d)
Impaired Lakes (303d)
Watershed Boundary
Lake Superior
Chequamegon Bay
Bayfield Peninsula Northwest Watershed
Bayfield Peninsula Southeast Watershed
Iron River Watershed
Fish Creek Watershed
Bois Brule River Watershed
Lower Bad River Watershed
White River Watershed
Upper St Croix and Eau Claire Rivers Watershed
Marengo River Watershed
Upper Namekagon River Watershed
Totagatic River Watershed
Lake Chippewa Watershed
West Fork Chippewa River Watershed
Town of Russell
City of Bayfield
Town of Bell
Town of Clover
Town of Port Wing
Town of Bayview
Town of Orienta
City of Washburn
Town of Washburn
Town of Oulu
Town of Tripp
Town of Barksdale
Town of Pilsen
Town of Hughes
Town of Keystone
Town of Delta
Village of Mason
Town of Kelly
Town of Lincoln
Town of Drummond
Town of Grandview
Town of Cable
Town of Namakagon
Douglas County
Ashland County
Washburn County
Sawyer County
Miles
NWRPC


Bayfield County Land and Water Resource Management Plan
Map 8-Groundwater Contamination Susceptibility
Susceptibility to Contamination
Low Susceptibility
Medium Susceptibility
High Susceptibility
Watershed Boundary
Lake Superior
Chequamegon Bay
Bayfield Peninsula Northeast Watershed
Bayfield Peninsula Southeast Watershed
Iron River Watershed
Fish Creek Watershed
Bois Brule River Watershed
Lower Bad River Watershed
White River Watershed
Upper St Croix and Eau Claire Rivers Watershed
Marengo River Watershed
Upper Namekagon River Watershed
Totagatic River Watershed
Lake Chippewa Watershed
West Fork Chippewa River Watershed
City of Bayfield
City of Washburn
Town of Washburn
Town of Barksdale
Town of Drummond
Town of Grandview
Town of Lincoln
Town of Cable
Douglas County
Ashland County
Washburn County
Sawyer County
Miles
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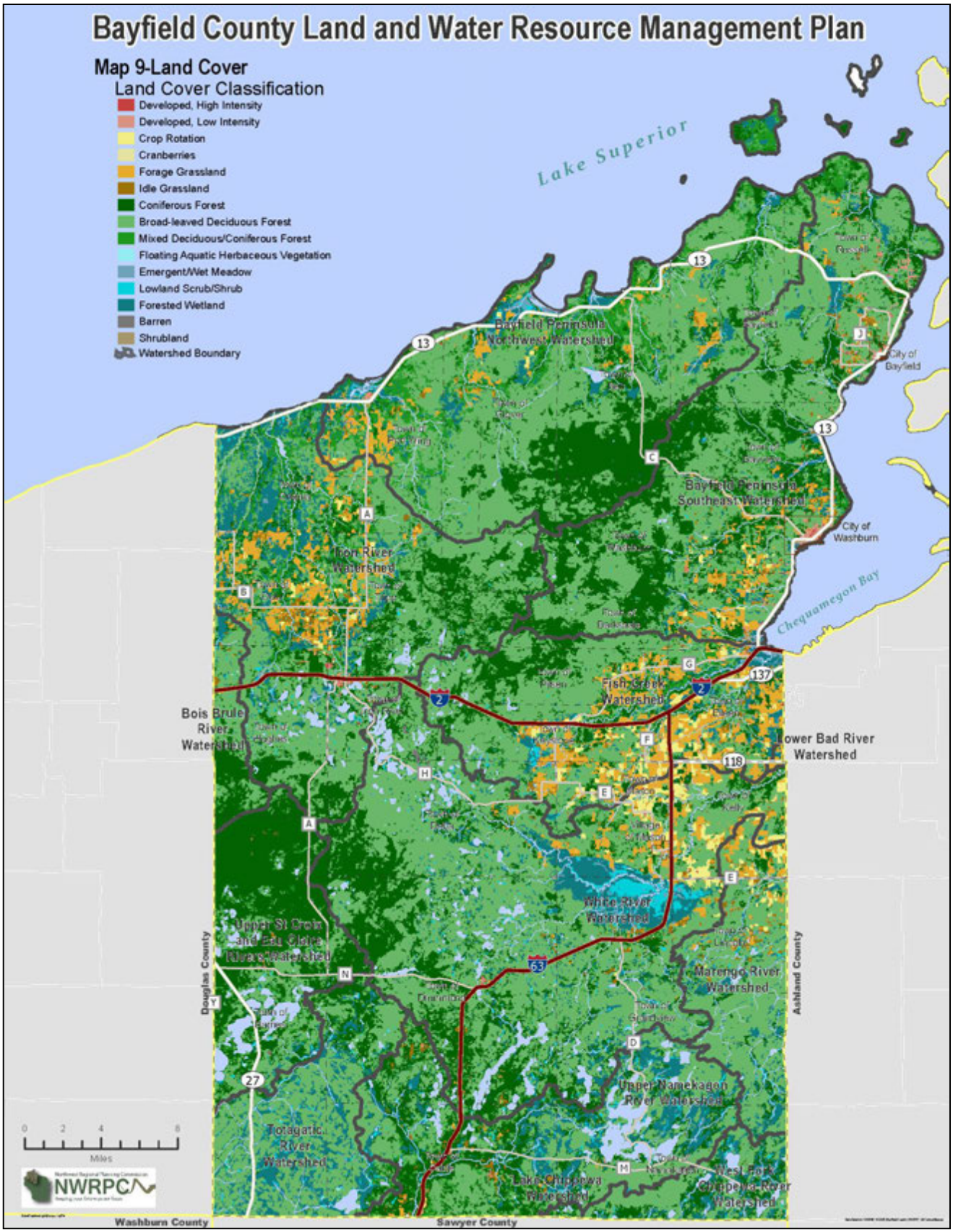
Bayfield County Land and Water Resource Management Plan
Map 9-Land Cover
Land Cover Classification
Developed, High Intensity
Developed, Low Intensity
Crop Rotation
Cranberries
Forage Grassland
Idle Grassland
Coniferous Forest
Broad-leaved Deciduous Forest
Mixed Deciduous/Coniferous Forest
Floating Aquatic Herbaceous Vegetation
Emergent/Wet Meadow
Lowland Scrub/Shrub
Forested Wetland
Barren
Shrubland
Watershed Boundary
Lake Superior
Chequamegon Bay
Bayfield Peninsula Northwest Watershed
Bayfield Peninsula Southeast Watershed
Iron River Watershed
Fish Creek Watershed
Bois Brule River Watershed
Lower Bad River Watershed
White River Watershed
Upper St Croix and Eau Claire Rivers Watershed
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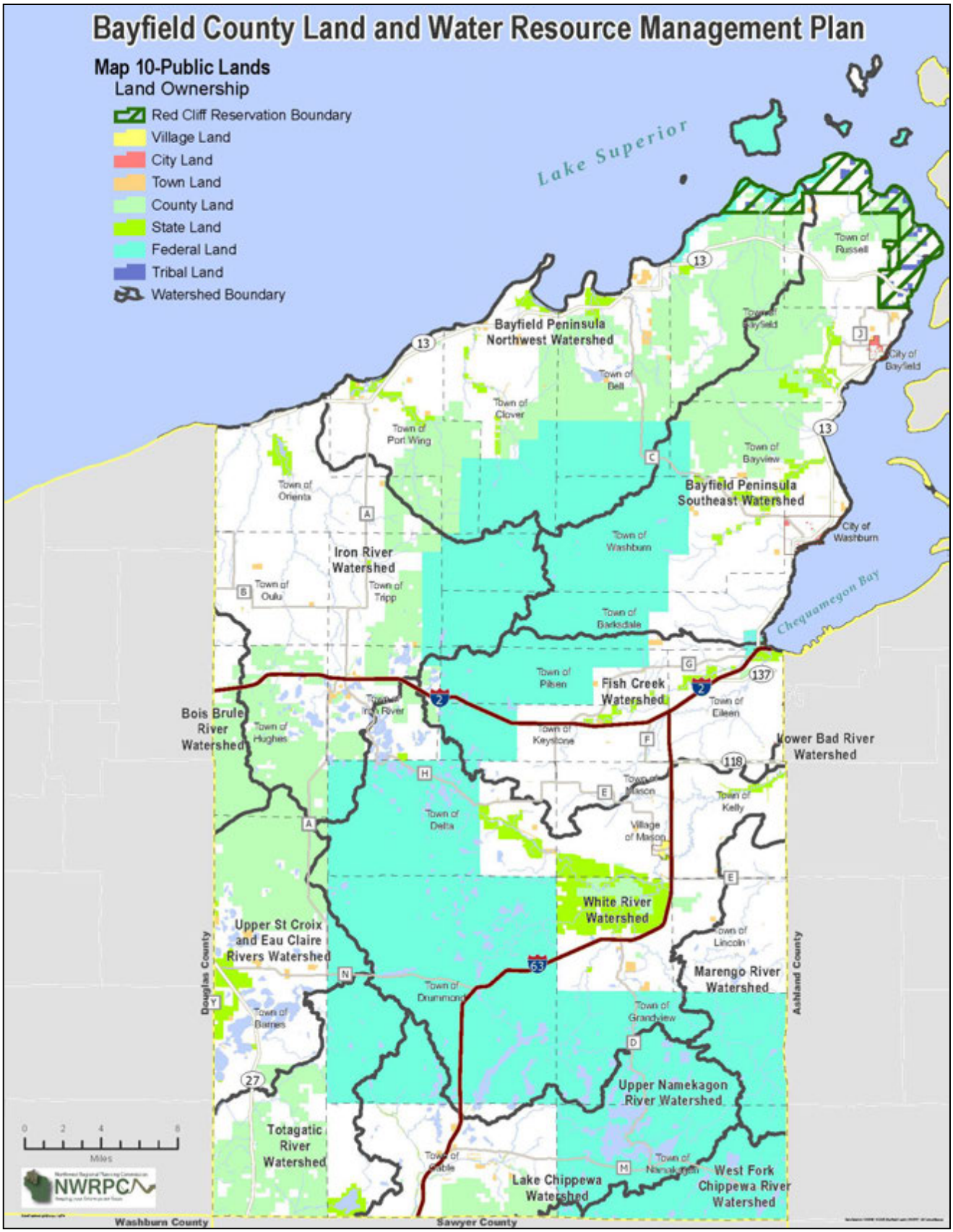
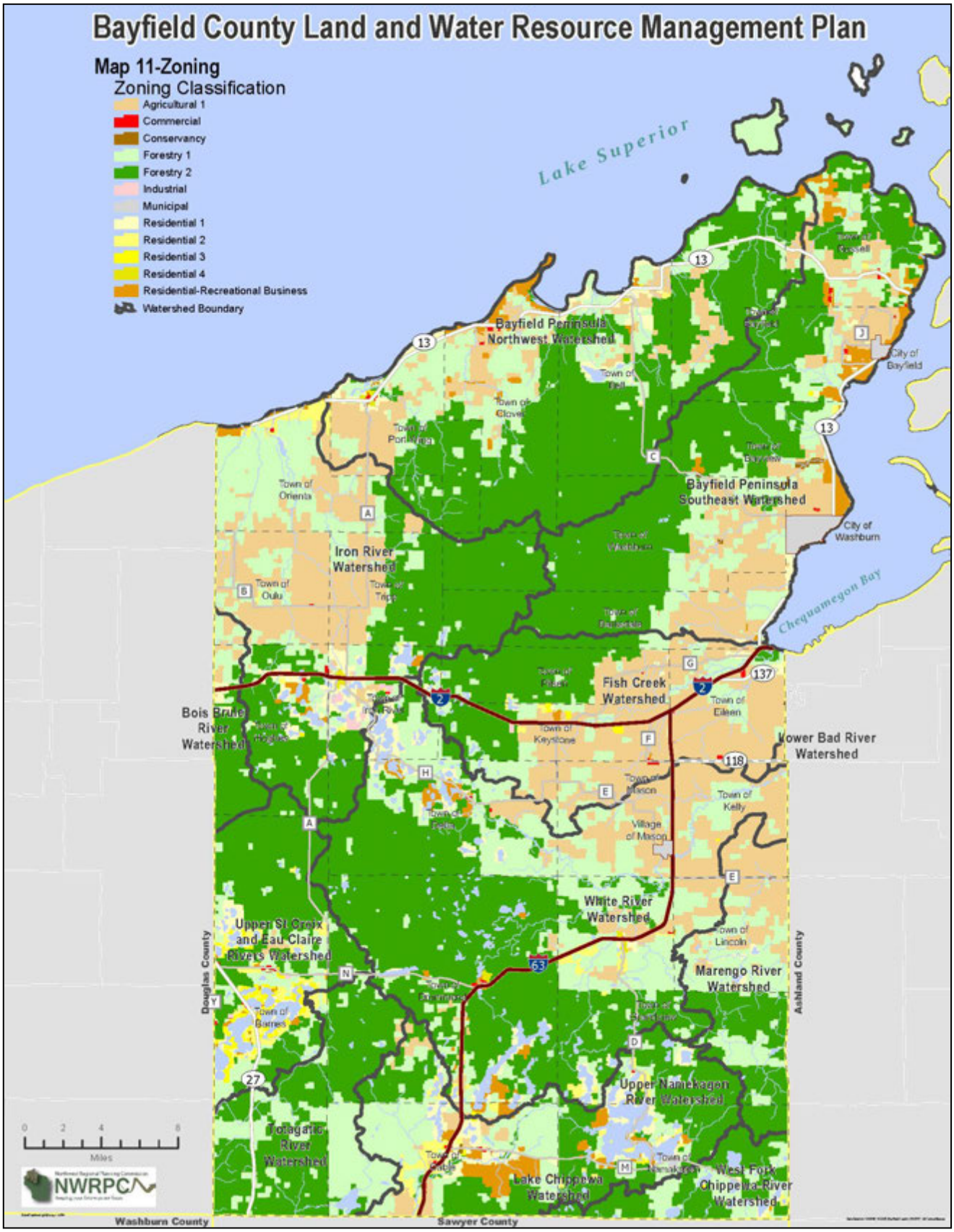
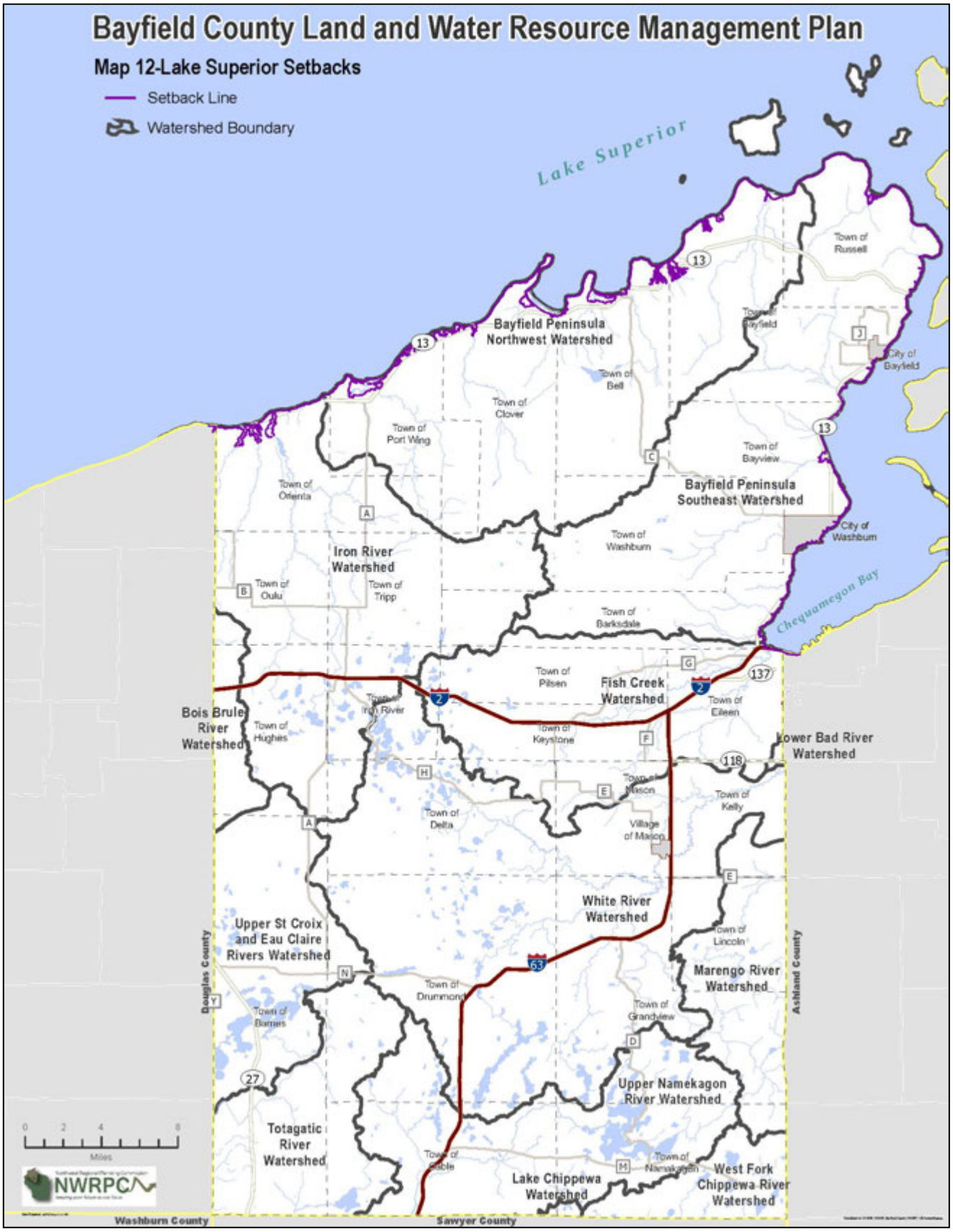
Upper Namekagon River Watershed
Totagatic River Watershed
Lake Chippewa Watershed
West Fork Chippewa River Watershed
City of Bayfield
City of Washburn
Douglas County
Ashland County
Washburn County
Sawyer County
Miles
NWRPC


Bayfield County Land and Water Resource Management Plan
Map 10-Public Lands
Land Ownership
Red Cliff Reservation Boundary
Village Land
City Land
Town Land
County Land
State Land
Federal Land
Tribal Land
Watershed Boundary
Lake Superior
Chequamegon Bay
Bayfield Peninsula Northwest Watershed
Bayfield Peninsula Southeast Watershed
Iron River Watershed
Fish Creek Watershed
Bois Brule River Watershed
Lower Bad River Watershed
White River Watershed
Upper St Croix and Eau Claire Rivers Watershed
Marengo River Watershed
Upper Namekagon River Watershed
Totagatic River Watershed
Lake Chippewa Watershed
West Fork Chippewa River Watershed
Town of Russell
Town of Bell
Town of Clover
Town of Port Wing
Town of Bayview
Town of Orienta
Town of Washburn
City of Washburn
City of Bayfield
Town of Oulu
Town of Tripp
Town of Barksdale
Town of Pilsen
Town of Keystone
Town of Eileen
Town of Hughes
Town of Delta
Town of Mason
Village of Mason
Town of Kelly
Town of Lincoln
Town of Drummond
Town of Grandview
Town of Barnes
Town of Cable
Town of Namakagon
Douglas County
Ashland County
Washburn County
Sawyer County
Miles
NWRPC


Bayfield County Land and Water Resource Management Plan
Map 11-Zoning
Zoning Classification
Agricultural 1
Commercial
Conservancy
Forestry 1
Forestry 2
Industrial
Municipal
Residential 1
Residential 2
Residential 3
Residential 4
Residential-Recreational Business
Watershed Boundary
Lake Superior
Chequamegon Bay
Bayfield Peninsula Northwest Watershed
Bayfield Peninsula Southeast Watershed
Iron River Watershed
Fish Creek Watershed
Bois Brule River Watershed
Lower Bad River Watershed
White River Watershed
Upper St Croix and Eau Claire Rivers Watershed
Marengo River Watershed
Upper Namekagon River Watershed
Totagatic River Watershed
Lake Chippewa Watershed
West Fork Chippewa River Watershed
City of Bayfield
City of Washburn
Town of Oulu
Town of Orienta
Town of Mason
Town of Kelly
Village of Mason
Town of Lincoln
Town of Barnes
Town of Keystone
Town of Eileen
Douglas County
Ashland County
Washburn County
Sawyer County
Miles
NWRPC


Bayfield County Land and Water Resource Management Plan
Map 12-Lake Superior Setbacks
Setback Line
Watershed Boundary
Lake Superior
Chequamegon Bay
Bayfield Peninsula Northwest Watershed
Bayfield Peninsula Southeast Watershed
Iron River Watershed
Fish Creek Watershed
Bois Brule River Watershed
Lower Bad River Watershed
White River Watershed
Upper St Croix and Eau Claire Rivers Watershed
Marengo River Watershed
Upper Namekagon River Watershed
Totagatic River Watershed
Lake Chippewa Watershed
West Fork Chippewa River Watershed
Town of Russell
Town of Bayfield
City of Bayfield
Town of Bell
Town of Clover
Town of Port Wing
Town of Bayview
Town of Orienta
Town of Washburn
City of Washburn
Town of Oulu
Town of Tripp
Town of Barksdale
Town of Pilsen
Town of Iron River
Town of Hughes
Town of Keystone
Town of Eileen
Town of Mason
Town of Kelly
Village of Mason
Town of Delta
Town of Lincoln
Town of Drummond
Town of Grandview
Town of Barnes
Town of Cable
Town of Namekagon
Douglas County
Ashland County
Washburn County
Sawyer County
Miles
NWRPC

Appendix A. Conservation Practices

Use with Cost Share Applications			
Tech Guide Practice Code	**Practice**	**ATCP 50 #**	**Unit of Measurement**
560	Access Road *or* Cattle Crossing	50.65	FT
575	Animal Trails and Walkways	50.66	FT
350	Barnyard Runoff Control System	50.64	#
360	Closure of Waste Impoundment		#
332	Contour Buffer Strips		Acres
330	Contour Farming	50.67	Acres
340	Cover Crop/Green Manure	50.68	Acres
342	Critical Area Planting		Acres
362	Diversion	50.70	FT
382	Fencing/Exclusion	50.75	FT
386	Field Border		Acres
393	Filter Strips	50.72	Acres
395	Fish Stream Improvement		#
490	Forest Site Prep		Acres
410	Grade Stabilization Structure	50.73	#
412	Grassed Waterways	50.96	Acres
561	Heavy Use Area Protection	50.74	Acres
422	Hedgerow Planting		Acres
468	Lined Waterway or Outlet		Acres
360	Manure Storage Abandonment-Closure of Waste Impoundments	50.63	#
313	Manure Storage Facilities	50.62	#
635	Milk House Waste Control-Waste Treatment Strip	50.77	#
484	Mulching		Acres
590	Nutrient Management	50.78	Acres
500	Obstruction Removal		#
595	Pest Management-Field Crops	50.79	Acres
595	Pest Management-Specialty Crops		Acres
516	Pipeline		FT
528A	Prescribed Grazing-Cropland	50.80	Acres
528A	Prescribed Grazing-Pasture		Acres
329B	Residue Management Mulch-Till	50.82	Acres
329A	Residue Management No-Till & Strip-Till		Acres
393	Riparian Filter Strips (non-CREP)	50.83	Acres
558	Roof Runoff Management -Gutter	50.85	#
350	Sediment Basin-Barnyard		#
350	Sediment Basin (Non-Barnyard)		#
725	Sinkhole Treatment	50.87	#
574	Spring Development		#
313	Stacking Pad		#
580	Streambank Stabilization & Shoreline Protection	50.88	FT
585	Stripcropping	50.89	Acres
606	Subsurface Drain	50.90	#
600	Terraces	50.91	FT
612	Tree/Shrub Establishment	50.71	Acres
620	Underground Outlet	50.92	#
472	Use Exclusion		Acres
634	Waste Transfer system	50.93	#
635	Waste Water Treatment Strip	50.94	FT
638	Water and Sediment Control Structures	50.86	#
638	Water/Sediment Control Basin	50.95	#
614	Watering Facility Trough/Tank	50.76	#
642	Well Abandonment	50.97	#
657	Wetland Restoration	50.98	Acres
380	Windbreak/Shelterbelt Establishment		Acres

Appendix B. Coastal Resilience Self-Assessment

Coastal Resilience Self-Assessment

This self-assessment is intended to help staff and decision-makers of Wisconsin's coastal counties and municipalities weigh the effects of coastal hazards and begin to consider planning and mitigation actions which may increase the coastal resilience of their community. Coastal resilience is the ability to respond to, withstand and adapt to the impacts of coastal hazards. The Lake Michigan bluffs, beaches and waterfront infrastructure are vulnerable to coastal hazards issues resulting from waves, erosion, flooding, coastal storms, & fluctuating water levels (see Page 2 for hazard descriptions). Proactive planning and preparation for these hazards can enhance a community's coastal resilience.

Why should I complete this self-assessment?

The self-assessment provides a starting point to identify opportunities to increase a community's resilience to coastal hazards. The Wisconsin Coastal Resilience Project team will review your community's completed self-assessment to provide further guidance and assistance on the key issues indicated by your responses.

It is important to note that this self-assessment is not a complete vulnerability assessment nor is it intended to rank communities against each other in terms of needs or preparedness. Rather, this is an exercise to help communities consider actions that can build their resilience to coastal hazards.

Who should use this self-assessment?

This assessment tool is intended for use by county and municipal staff and decision-makers, especially those involved with planning, zoning, engineering, public works and emergency management. It is suggested that this self-assessment be completed with a team that is representative of these areas of expertise, as well as any other relevant individuals with local knowledge of coastal hazards.

What is in the self-assessment?

Part 1: Identifying Coastal Hazard Risks - This tool will help prioritize coastal hazards issues in a community based on rating (1) frequency of occurrence, (2) impact to the community and (3) level of preparedness.

Part 2: Resilient Practices Questionnaire - This series of yes/no questions will help identify common planning and mitigation actions that the community can implement to address coastal hazard issues.

Part 3: Summary – This summary asks your team to think about some top coastal resilience actions that your community could implement based on your responses to Parts 1 and 2.

Where can I go for more information on coastal resilience topics?

A separate *Appendix B* contains links to resources for each topic covered in the self-assessment.

How do I complete the self-assessment?

The assessment can be completed either (a) by hand with a printed version of the form or (b) electronically using the fill-in capabilities of this PDF form (requires Adobe Reader). Questions about the self-assessment or follow up discussions about the results may be directed to Adam Bechle at:

1975 Willow Drive, 2nd Floor
Madison, WI 53706

Phone: 608-263-5133
Email: bechle@aqua.wisc.edu

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Sea Grant University of Wisconsin

Wisconsin Coastal Management Program

NOAA

Coastal Hazard Issue Descriptions

The hazard processes that affect bluffs, beaches, and waterfront infrastructure are described briefly below. For more detailed information on these issues, an excellent review of hazard processes is available in the U.S. Army Corps of Engineers/Wisconsin Sea Grant publication Living on the Coast.

Shoreline Recession and Bluff Failure

Waves can erode the shoreline, causing it to recede landward and threaten property and infrastructure. Shoreline recession along bluff coasts is the result of wave erosion at the base of the bluff, which can destabilize the bluff slope and cause failure of the bluff. High lake water levels allow erosive waves to reach higher elevations on the shore, accelerating shoreline recession and bluff failure. Other factors that contribute to bluff failure include elevated groundwater (which reduces stability of the slope), stormwater runoff (which erodes the bluff surface soil) and freeze-thaw cycles (which weaken the soil strength).

Coastal Flooding

Coastal storms can cause inundation of low-lying areas of the coast due to the combined effects of waves and storm surge, which is the "piling up" of water along the coast over the course of several hours due to wind and atmospheric pressure gradients. High lake water levels will contribute to an increased extent of coastal flooding for a given wave and storm surge condition.

Shore Protection Damage and Failure

Large waves and storm surge can damage shore protection structures such as revetments, seawalls and groins, which typically have a lifespan from 20 to 50 years. If damage accumulates with a lack of maintenance, these structures can fail to protect the property behind them. High water levels allow waves to reach higher elevations, which can accelerate damage. Low water levels can lead erosion of the nearshore lake bed, known as downcutting, that can undermine and destabilize shore protection structures.

Beach Loss

High Lake Michigan water levels inundate portions of the beach while also allowing storm waves to erode higher elevations on the beach. Increased use of structural shore protection on the coast interrupts the transport of sand along the shore by waves and currents, which can cause a reduction in beach size.

Beach Impairment

Bacteria, viruses, chemicals and excess nutrients can lead to water quality issues that require beaches to be closed to protect public health and safety. A physical beach environment that retains standing water or has poor nearshore water circulation may exacerbate water quality issues.

Ports, Harbors and Marina Damage

Large waves associated with coastal storms can damage port, harbor and marina infrastructure, which typically has a lifespan on the order of 40 to 50 years. High water levels allow waves to reach higher elevations on marine infrastructure, which can accelerate damage to infrastructure. Low water levels can expose normally submerged timber and rock infrastructure to air, accelerating their deterioration.

Port, Harbor and Marina Navigation Impairment

Low water levels and sediment deposition can create situations where ships and boats have insufficient water depths to safely navigate and operate at ports, harbors and marinas. At low water levels, vessels may be damaged by hitting channel or slip bottoms so ships may need to carry less cargo and additional dredging may be required to allow for safe passage. Under both low and high water level extremes, operational and safety issues may arise if a large elevation difference exists between vessel and dockage.

Part 1: Identifying Coastal Hazard Risks

Participant Affiliation/Community: _____

This matrix will help identify what coastal hazards pose the most critical risks to your community. Risk is the potential for loss due to a hazard event, a combination of (1) the probability that a hazard event will occur, (2) the consequences that the hazard would have and (3) the actions that have been taken to mitigate those consequences. An example of a completed matrix is given in *Appendix A.*

Instructions:

For each coastal hazard issue described on Page 2, you will assign a score of ***Low***, ***Moderate***, or ***High*** for each of the following criteria.

PROBABILITY	The likelihood that an issue is expected to occur.
IMPACT	The extent to which a given coastal hazard issue can cause death or injury, property damage, or service interruption.
PREPAREDNESS	The level of effective planning or action that has taken place to reduce the overall impact of a hazard to your community

If you feel an issue does not apply to your community, cross out the issue and explain why. If you would like to learn more about an issue to inform your response, please provide a short explanation. If an important coastal hazard issue is not covered, use the blank rows to respond for that issue.

A RISK SCORE will be calculated for by the Wisconsin Coastal Resilience Team for each hazard based on the PROBABILITY, IMPACT and PREPAREDNESS responses (see *Appendix A* for example). The RISK SCORE becomes larger as the threat of a coastal hazard increases, allowing the relative importance of different hazards to be compared. *Note: Using the fill-in form requires Adobe Reader for proper saving*

COASTAL HAZARD ISSUE	PROBABILITY	IMPACT			PREPAREDNESS	RISK SCORE	I need to learn more about this issue (explain)
	Likelihood this issue will occur	***HUMAN*** *Possibility of death or injury*	***PROPERTY*** *Physical losses and damages*	***BUSINESS/ AGENCY*** *Interruption of services*	*Level of planning done for this issue*	*Relative threat *calculated by Coastal Resilience team*	
Shoreline Recession & Bluff Failure						0	
Coastal Flooding						0	
Shore Protection Damage						0	
Beach Loss						0	
Beach Impairment						0	
Port, Harbor, & Marina Damage						0	
Port, Harbor, & Marina Navigation Impairment						0	
						0	

Remember to save your progress

Part 2: Resilient Practices Questionnaire

The following series of yes/no questions will help identify opportunities to strengthen your community's approach to planning for and mitigating the impacts of coastal hazards.

Instructions: Answer each question by checking "Yes", "No", or "?" (meaning "not sure"). More detailed answers or explanations can be entered in the "Comments" section of each question. For instance, it may be useful to reference specific portions of a plan or strategy that addresses the question or to identify what information is needed to resolve a "?" response.

Understanding Coastal Hazard Impacts

Knowing the locations, populations and properties that are vulnerable to coastal hazards is the starting point to developing resilient strategies to reduce the risk and avoid losses.

Understanding Coastal Hazard Impacts	Yes	No	?	Comments
1) Has your community identified or documented the damage and/or cost of past coastal hazards?	○	○	○	
2) Do updated maps or spatial data exist that identify areas at risk to coastal hazards?	○	○	○	
3) Are there any estimates of the future financial losses that may result from coastal hazards, including loses to private property, public property, infrastructure and utilities?	○	○	○	
4) Is your community aware of pathways for contaminants to enter the lake due to coastal hazards, such as erosion of contaminated land?	○	○	○	

Hazard Mitigation Planning

An All-Hazard Mitigation Plan identifies critical hazard issues and mitigation actions that, if implemented and sustained, can reduce the long-term hazard risk posed to people and property.

Hazard Mitigation Planning	Yes	No	?	Comments
5) Does your community have a current FEMA-approved All-Hazard Mitigation Plan	○	○	○	
6) Does the Hazard Mitigation Plan document past coastal hazard mitigation efforts, along with their costs and effectiveness?	○	○	○	
7) Does the Hazard Mitigation Plan identify strategies to address all the coastal hazards of concern that you identified in *Part 1: Risk Perception Matrix*?	○	○	○	

Hazard Mitigation Planning (continued)	Yes	No	?	Comments
8) Have the strategies from the Hazard Mitigation Plan been implemented as described?	○	○	○	
9) Is your community aware of FEMA's Hazard Mitigation Grant Program (HMGP) and the Pre-Disaster Mitigation Grant Program (PDM) and the types of coastal projects that may be eligible for funding?	○	○	○	
10) Does the Hazard Mitigation Plan identify opportunities to integrate hazard mitigation with other planning mechanisms such as land use, capital investment, economic development or other community plans?	○	○	○	

Community Planning

Community planning efforts, such as comprehensive, land use, capital investment and economic development plans guide development and other investment actions by the community. Integrating strategies to mitigate the effects of coastal hazards into these plans can help reduce the exposure of development and other community assets to risk.

Community Planning	Yes	No	?	Comments
11) Does your community have a plan for land use that makes recommendations to reduce coastal hazard vulnerability?	○	○	○	
12) Do planning horizons incorporate potential long-term coastal hazards such as erosion and bluff failure?	○	○	○	
13) Is your community active in the National Flood Insurance Program's Community Rating System?	○	○	○	
14) Do plans for public infrastructure such as buildings, roads, water, sewer and other utilities include recommendations for relocation, abandonment, or protection of infrastructure at-risk to coastal hazards?	○	○	○	
15) Has the community considered relocation or voluntary acquisition of repetitive loss structures or those structures which are at high risk to coastal hazards?	○	○	○	

Local Ordinances

Community zoning ordinance provisions can reduce the risk that new coastal development is exposed to and limit adverse impacts to the coast.

	Local Ordinances	Yes	No	?	Comments
16)	Do existing ordinances require new development to be set back some distance from an erosion reference feature like the receding edge of a bluff or dune?	○	○	○	
17)	Do existing ordinances require new development in the coastal 100-year floodplain to take measures that reduce flood impacts such as elevating buildings a certain distance above the base flood elevation?	○	○	○	
18)	Do existing permitting processes review proposed practices that may significantly affect shoreline recession and bluff slope stability, including coastal vegetation removal, stormwater management and on-site waste disposal?	○	○	○	
19)	Are ordinances pertaining to coastal hazards consistent with those of surrounding jurisdictions in both policy and language?	○	○	○	

Public Education and Engagement

Coastal properties can frequently change hands, leaving new residents unaware of or unprepared for the risks posed by living on Lake Michigan. On the other hand, long-term residents and business owners may have local knowledge of past or current hazard impacts that can inform resilience strategies.

	Public Engagement	Yes	No	?	Comments
20)	Is outreach focused on coastal hazard issues routinely conducted for coastal residents?	○	○	○	
21)	Does the community have coastal hazard information such as maps and guidance on shoreline management practices available or accessible to residents upon request?	○	○	○	
22)	Has the public been involved with identifying historic coastal hazard impacts, areas that are at risk to coastal hazards or strategies to address coastal hazards?	○	○	○	

Shore Protection

Structural shore protection measures such as revetments, seawalls and groins are commonly used to protect property from flooding and erosion. To achieve the expected level of protection, these structures need to be monitored, maintained and replaced when necessary. Alternative hybrid-structural or non-structural practices may be considered due to cost, aesthetics, or adverse impacts to adjacent properties.

Shore Protection	Yes	No	?	Comments
23) Is the location of shore protection structures documented?	○	○	○	
24) Is the condition and expected effectiveness of shore protection structures documented?	○	○	○	
25) Is inspection and maintenance of shore protection structures performed routinely?	○	○	○	
26) Are you aware of instances where shore protection structures adversely impacted adjacent shorelines?	○	○	○	
27) Does your community consider hybrid-structural options (nature-based, living shoreline, or engineering with nature approaches) or non-structural options (slope stabilization, vegetation, beach nourishment, or asset relocation)?	○	○	○	

Managing Water on Coastal Lands

Water on the land can contribute to coastal hazard issues, as runoff over the bluff edge will erode the bluff surface, elevated groundwater levels reduce the stability of the bluff slopes and stormwater and effluent discharges can cause water quality issues at beaches.

Managing Water on Coastal Lands	Yes	No	?	Comments
28) Is stormwater runoff directed away from bluffs?	○	○	○	
29) Are infiltration practices like rain gardens constructed as far from bluffs as possible?	○	○	○	
30) Is snow plowed and managed to direct meltwater away from bluffs?	○	○	○	
31) Is wastewater effluent from on-site waste disposal systems located as far from the coast as possible?	○	○	○	
32) Does your community have a stormwater management plan with a section related to water management along the coast?	○	○	○	

Beaches

Beaches are drivers of tourism and serve important coastal access points for recreation. Beaches also act as a buffer against the impact of waves for bluffs and upland property. Understanding how natural coastal processes and hazards impact beaches is critical to maintaining these important community assets.

Beaches	Yes	No	?	Comments
33) Does your community have a beach water quality monitoring program?	○	○	○	
34) Do beach management plans exist that detail strategies for addressing water quality issues?	○	○	○	
35) Do beach management plans exist that detail strategies for addressing beach loss due to erosion or high lake level conditions?	○	○	○	
36) Are the natural sources of sand to the community's beaches known and are there strategies to avoid interruption of this sediment supply?	○	○	○	

Ports, Harbors and Marinas (*if applicable*)

Ports, harbors and marinas are centers of commerce and recreation. The ability for these facilities to withstand coastal hazards is important to the economic security of communities that rely on them.

Ports, Harbors and Marinas (if applicable)	Yes	No	?	Comments
37) Does your facility conduct a regular assessment of critical infrastructure to identify maintenance issues requiring corrective action?	○	○	○	
38) Does your facility have an assessment of costs to maintain, repair and replace its assets?	○	○	○	
39) Has your facility planed for extreme low water scenarios, including the infrastructure and maintenance needs necessary to maintain function under these conditions?	○	○	○	
40) Has your facility planed for extreme high water scenarios, including the infrastructure and maintenance needs necessary to maintain function under these conditions?	○	○	○	

Part 3: Summary

Use your responses in *Part 1* and *Part 2* to think about possible actions that could be implemented to enhance your community's resilience to coastal hazards.

Instructions: List a few of the questions that generated the most interest within your team and briefly describe some actions that could be initiated in your community to address this question and increase coastal resilience. More information about resilient actions for each topic in the self-assessment can be found in the resources listed in the *Appendix B: Coastal Resilience Resources*.

Question #

Possible Actions

Question #

Possible Actions

Question #

Possible Actions

Question #

Possible Actions

List and briefly describe any other actions not covered in the questionnaire that you may want to implement in the near future to increase your community's resilience to coastal hazards.

Save

Appendix

for *Coastal Resilience Self-Assessment*

Appendix A: Example for *Part 1: Identifying Coastal Hazard Risks*

Appendix B: Coastal Resilience Resources

Appendix C: How was this *Coastal Resilience Self-Assessment* developed?

Appendix A: Example for *Part 1: Identifying Coastal Hazard Risks*

The *Identifying Coastal Hazard Risks* matrix tool is adapted from a Hazard Vulnerability Analysis tool originally developed by Kaiser Permanente. SEWRPC has used a form of this matrix to prioritize critical hazards in All-Hazards Mitigation Planning.

Below is an example of a completed *Identifying Coastal Hazard Risks* matrix with each issue rated for PROBABILITY, IMPACT and PREPAREDNESS.

COASTAL HAZARD ISSUE	PROBABILITY	IMPACT			PREPAREDNESS	RISK SCORE	I need to learn more about this issue (explain)
	Likelihood this issue will occur	***HUMAN*** *Possibility of death or injury*	***PROPERTY*** *Physical losses and damages*	***BUSINESS/ AGENCY*** *Interruption of services*	*Level of planning done for this issue*	*Relative threat *calculated by Coastal Resilience team*	
Shoreline Recession & Bluff Failure	High	Low	High	Low	Moderate	**58%**	
Coastal Flooding	Low	Moderate	Moderate	Low	Low	**22%**	PROBABILITY may change with new FEMA flood maps
Shore Protection Damage	Moderate	Low	Moderate	Low	Low	**39%**	Unsure of businesses with shore protection
Beach Loss	High	Low	Moderate	Moderate	Low	**67%**	
Beach Impairment	Low	Moderate	Low	Moderate	Moderate	**19%**	
Port, Harbor, & Marina Damage	Moderate	Low	Moderate	High	Low	**50%**	
Port, Harbor, & Marina Navigation Impairment	Moderate	Low	Low	High	High	**33%**	Were boats damaged during last low water period?

Calculating RISK SCORE (note: this will be done for you by the Wisconsin Coastal Resilience Team or automatically by the fill-in PDF form)

First, a numeric value is assigned to the PROBABILITY, IMPACT and PREPAREDNESS responses as follows: Low = 1, Moderate = 2, High = 3

Then a RISK SCORE is then calculated for each hazard using the following formula:

$$\text{RISK (in \%)} = \frac{\text{PROBABILITY}}{3} \times \frac{\text{HUMAN + PROPERTY + BUSINESS + (4-PREPAREDNESS)}}{12}$$

Results

In this example, the top 3 hazards based on RISK SCORE are: (1) Beach Loss – 67%, (2) Shoreline Recession & Bluff Failure - 58%, (3) Port, Harbor & Marina Damage – 50%. These results suggest that priority should be given to building resilience to these most critical coastal hazards.

2

Appendix B: Resilience Resources

Listed below are resources that may be useful for learning about or addressing questions for each of the categories in the *Resilience Practices Questionnaire*. Note that some resources appear more than once if they are applicable to multiple categories.

General Coastal Resilience Resources

Great Lake Coastal Resilience Planning Guide – A website with guidance on Great Lakes coastal hazard resilience featuring case studies, tools, maps, data and publications.

Living on the Coast – Booklet describing natural coastal processes and strategies to manage risk to coastal properties.

Coastal Processes Manual – Manual describing the methods to estimate risk to Great Lakes coastal properties from coastal hazards

Wisconsin Coastal Atlas - A web platform that provides access to maps, data, and tools to support decision-making about Wisconsin's Great Lakes coast.

Understanding Coastal Hazard Impacts

Wisconsin Shoreline Inventory and Oblique Viewer – A web mapping tool to view shoreline condition assessments (1976 and 2007) and oblique aerial photos (1976, 2007, 2012, 2016 and 2017) for most of Wisconsin's Great Lakes coast.

Lake Michigan Shoreline Recession and Bluff Stability in Southeastern Wisconsin: 1995 - A report on the 1995 status of bluff recession and bluff stability on selected bluff slopes in Kenosha, Racine, Milwaukee and Ozaukee counties shoreline.

Coastal Processes Manual – Manual describing the methods to estimate risk to Great Lakes coastal properties from coastal hazards

Modern Studies of Coastal Erosion in Wisconsin – A review of the efforts to understand and document the shoreline erosion processes and changes in coastal Wisconsin.

Lake Level Viewer – A web mapping tool to examine the potential impacts of lake level changes on shoreline position and water depth in the Great Lakes.

Great Lakes Water Level Dashboard – A dashboard interface to access and visualize over 150 years of Great Lakes water level data, as well as seasonal forecasts of future lake levels.

Hazard Mitigation Planning

A Guide to Hazard Mitigation Planning for Wisconsin's Coastal Communities - A guide which describes how to identify, profile and mitigate coastal hazards for inclusion in an All-Hazards Mitigation Plan.

Plan Integration for Resilience – Scorecard Guidebook - A guide which describes how to evaluate how multiple community plans (i.e. hazard mitigation, land use, economic development, etc.) may affect a community's vulnerability to hazards and how to identify priorities for better integrating strategies across plans to reduce overall community vulnerability to hazards.

Community Planning

Managing Coastal Hazard Risks on Wisconsin's Dynamic Great Lakes Shoreline - A report which describes coastal hazard processes, reviews past efforts to address coastal hazards in Wisconsin and provides a set of strategies for managing the risks to coastal development, including an erosion hazard model ordinance.

Plan Integration for Resilience – Scorecard Guidebook - A guide which describes how to evaluate how multiple community plans (i.e. hazard mitigation, land use, economic development, etc.) may affect a community's vulnerability to hazards and how to identify priorities for better integrating strategies across plans to reduce overall community vulnerability to hazards.

A Guide for Planning for Coastal Communities in Wisconsin – A guide which describes how to address coastal issues in a variety of community planning considerations.

Local Ordinances

Managing Coastal Hazard Risks on Wisconsin's Dynamic Great Lakes Shoreline - A report which describes coastal hazard processes, reviews past efforts to address coastal hazards in Wisconsin and provides strategies for managing the risks to coastal development, including an erosion hazard model ordinance.

Coastal Ordinance Provisions in Wisconsin Communities - A report which reviews county, city, village and town ordinances in Wisconsin which contain provisions that have been adopted to reduce the risks to coastal development as of 2016.

Protecting Coastal Investments: Examples of Regulations for Wisconsin's Coastal Communities - A guide which describes the causes of coastal erosion and suggests ordinance language that can be used by communities to address locally identified needs.

Public Education and Engagement

Adapting to a Changing Coast: Options & Resources for Lake Michigan Property Owners – A booklet describing actions that Lake Michigan property owners can take to address coastal erosion

Stabilizing Coastal Slopes on the Great Lakes – Fact sheet describing shoreline erosion and slope instability and steps than can be taken to address these issues

Working with Engineers and Contractors on Shore Protection Projects – Fact sheet describing the process of finding and working with qualified coastal professional

Great Lakes Shore Protections Structures – Fact sheet describing shore protection structures and their effects, both positive and negative, on the shoreline

Natural and Structural Measures for Shoreline Stabilization – Brochure about the range of green and gray shore protection infrastructure

Wisconsin Shoreline Inventory and Oblique Viewer – A web mapping tool to view shoreline condition assessments (1976 and 2007) and oblique aerial photos (1976, 2007, 2012, 2016 and 2017) for most of Wisconsin's Great Lakes coast.

Shore Protection

Great Lakes Shore Protections Structures – Fact sheet describing shore protection structures and their effects, both positive and negative, on the shoreline

Ohio Coastal Design Manual – Online manual demonstrating how common Great Lakes coastal structures are designed

Systematic Approaches to Geomorphic Engineering (SAGE) – Website for a Community of Practice focused on advancing natural coastal infrastructure practices

Natural and Structural Measures for Shoreline Stabilization – Brochure about the range of green and gray shore protection infrastructure

Living Shorelines Academy – Web resource for natural "living" shoreline practices

Engineering with Nature – Web resource detailing United States Army Corps of Engineers approaches to align natural and engineering processes to achieve economic, environmental, and social benefits

Engineering with Nature: Alternative Techniques to Riprap Bank Stabilization – A Federal Emergency Management Agency booklet that illustrates case studies of engineering techniques that incorporate natural functionality into streambank protection

Managing Water on the Land

Stabilizing Coastal Slopes on the Great Lakes – Fact sheet describing bluff stabilization, including surface water and groundwater management actions that can be taken to stabilize slopes (page 5).

Managing Coastal Hazard Risks on Wisconsin's Dynamic Great Lakes Shoreline - A report which describes strategies for managing the risks to coastal development, including recommendations for managing surface water and ground water to stabilize slopes (page 36).

Surface Water and Groundwater on Coastal Bluffs – A guide for property owners on Puget Sound in Washington that describes options for managing surface water and groundwater on bluffs. Many of these practices may be applicable for Great Lakes coastal bluffs.

Beaches

Virtual Beach – A free software program for developing and operating beach water quality models that can aid both short term decisions on testing and closures as well as long term remediation activities

Beach Nourishment Database – A database with information on beach nourishment projects nationwide, including the Great Lakes

Lake Level Viewer – A web mapping tool to examine the potential impacts of lake level changes on shoreline position and water depth in the Great Lakes.

Port, Harbor and Marinas

Great Lakes Port and Harbor Infrastructure and Dredging Cost Evaluation Matrix – A matrix model to estimate the cost of building and maintaining structures at large ports in the Great Lakes

Failing Coastal Wood Infrastructure on the Great Lakes – A fact sheet on timber structure failure mechanisms and potential solutions

Best Practice Inspection Guidelines for Great Lakes Port, Harbor and Marina Structures – A fact sheet with inspection guidelines to prevent structure deterioration

Adaptation Strategies for Great Lakes Ports, Harbors and Marinas – A fact sheet on potential future Great Lakes water levels and their possible impacts

Wisconsin Clean Marina Best Management Practices – A guidebook that describes regulations and practices that address marine facilities and nonpoint sources of pollution

Reinforcing our Waterfronts – A brochure which summarizes risks to marinas and harbors as well as best practices to prepare for these risks.

Appendix C: How was this Coastal Resilience Self-Assessment developed?

This *Coastal Resilience Self-Assessment* is modeled after a number of existing self-assessment tools that are aimed at identifying opportunities to develop resilience to natural hazards. Though coastal resilience indicators, metrics and rating systems exist, most of these tools focus on the issues faced by ocean coasts. While some of those resilience issues are applicable to the Great Lakes, no tool exists that is focused on the coastal hazard issues faced in the Great Lakes. We have adopted the approaches of other successful self-assessment tools, which are listed below, and incorporated many resilience recommendations for Great Lakes coastal issues into the *Coastal Resilience Self-Assessment*.

Coastal Community Resilience Indicators and Rating Systems
National Oceanic and Atmospheric Administration (NOAA)
https://coast.noaa.gov/digitalcoast/training/resilience-indicators.html

Maryland's CoastSmart Communities Scorecard
Chesapeake and Coastal Service
http://dnr.maryland.gov/ccs/coastsmart/Pages/cs_Scorecard.aspx

Getting to Resilience: A Community Planning Evaluation Tool
New Jersey Coastal Management Program
http://www.prepareyourcommunitynj.org/

The Coastal Community Resilience Index
Mississippi-Alabama Sea Grant Consortium
http://masgc.org/assets/uploads/publications/662/coastal_community_resilience_index.pdf

The Ports Resilience Index
Mississippi-Alabama Sea Grant Consortium
http://masgc.org/assets/images/Ports_resilience_index.pdf

The Fisheries Resilience Index
Mississippi-Alabama Sea Grant Consortium
http://masgc.org/assets/uploads/publications/1141/fisheries_resilience_index.pdf

The Tourism Resilience Index
Mississippi-Alabama Sea Grant Consortium
http://masgc.org/assets/uploads/publications/1142/tourism_resilience_index.pdf

Climate Adaptation Checklist
University of Wisconsin Sea Grant Institute
https://publications.aqua.wisc.edu/product/great-lakes-coastal-community-climate-adaptation-checklist/

Climate Ready Infrastructure and Strategic Sites Protocol (CRISSP) Risk Matrix
Great Lakes and St. Lawrence Cities Initiative
https://glslcities.org/initiatives/municipal-climate-adaptation/crissp/

A Self-Assessment to Address Climate Change Readiness in Your Community: Great Lakes
Minnesota Sea Grant
https://glslcities.org/library/a-self-assessment-to-address-climate-change-readiness-in-your-community/

Appendix C. Lake Superior Collaborative Charter

Lake Superior Collaborative Charter June 2019

1. Background and Purpose

In 2018 a collaborative formed to coordinate protection and restoration efforts in Wisconsin's portion of the Lake Superior Basin. The collaborative, known as the Lake Superior Collaborative, is composed of governmental agencies, academic institutions, and non-governmental organizations who live and work in or near the Lake Superior Basin of Wisconsin. Governmental agencies include federal, state, Tribal, and local governments.

The Lake Superior Collaborative has evolved from historical partnership efforts conducted by the Lake Superior Basin Partner Team (1998-2012), the Chequamegon Bay Area Partnership (2009-2017), and the Lake Superior Landscape Restoration Partnership (2014-2017). The current Lake Superior Collaborative operates under the principles set forth in the 2018 Collaborative Charter.

This charter outlines the foundation for the Collaborative and creates principles of cooperation and coordination between the member organizations. The charter more fully describes the collaboratives working structure, including its goals, roles and responsibilities of cooperation and coordination of its members, a decision-making process, and a fundraising process.

The Collaborative will develop an Action Plan (2019-2022)to identify priorities and actions, which will guide the collaborative's work into the future. Collaborative Project Teams then can identify their specific projects or initiatives of interest based on the Action Plan. Selecting specific projects or initiatives to focus on within a fiscal year will provide direction to the Project Teams to achieve overall success.

2. Shared Vision

To facilitate collaboration among governmental agencies, academic institutions, and non-governmental organizations to protect and restore natural resources, clean water and climate resiliency in Wisconsin's Lake Superior Basin.

3. Goals

- Align local priorities with regional priorities, including the Lake Superior Lake-wide Area Management Plan
- Implement on-the-ground collaborative projects on public and private lands that reduce nonpoint source pollution, improve land use, preserve fish and wildlife habitat, and increase climate change resiliency

- Facilitate networking and information exchange among partners
- Coordinate public outreach efforts to increase awareness and engagement in watershed stewardship
- Assess the value added benefits of the Collaborative's efforts to promote protection and restoration of the Lake Superior Basin in Wisconsin
- Pursue funding opportunities to increase the investment in protection and restoration of the Lake Superior Basin in Wisconsin

4. Organizational Structure

Leadership Team	Steering Team	Coordinator	Membership	Project Teams
US Forest Service *UW-Extension* *Wisconsin DNR*	*Natural Resources Conservation Service*	*UW-Extension*	Federal agencies State agencies Tribal agencies Local government agencies Nonprofit organizations Academic institutions	Any combination of members who work together to work on an initiative or implement a project that meets the objective(s) of the collaborative
	American Forest Foundation			
	Clean Wisconsin			
	City of Ashland			
	Superior Rivers Watershed Association			
	US Fish and Wildlife Service			
	Wisconsin Department of Natural Resources			
	US Forest Service			
	Ashland County Land and Water Conservation Dept			
	Wisconsin Wetlands Association			
	Bad River of Lake Superior Chippewa			

5. Roles and Responsibilities

Leadership Team:

- Attend an annual meeting to receive updates from the Collaborative
- Communicate with staff and work within their respective agencies to promote investment in the priority actions of the Collaborative

Steering Team:

- Develop a multi-year Action Plan for the Collaborative as identified through the needs and/or priorities of the partners
- Attend regular meetings to share information, and identify opportunities for collaborative members
- Act as liaisons to other staff and leadership in their respective organizations; to promote the collaborative, and share documented results and accomplishments
- Seek and identify funding sources to carry out goals of the Collaborative, including capacity support for the coordinator
- Provide direction, support and guidance to the coordinator; assist the coordinator in planning meetings, workshop presentations, and special events as needed
- Advocate for continued collaboration among all groups and promote the Collaborative at local, regional, and national meetings

Coordinator:

- Organize regular meetings of the Steering Team, inviting leadership annually
- Organize annual meetings, workshops, and/or special events of the larger collaborative
- Follow up with Steering Team and Project Team members between meetings to ensure action items are completed timely
- Identify funding sources to carry out goals of the collaborative
- Facilitate discussions of collaborative members to help identify, prioritize and implement projects in the Collaborative's Action Plan. Facilitate updates to the Action Plan every 3-5 years.
- Provide regular news and updates including events and funding opportunities to collaborative members via email, e-newsletters, etc.
- Present/share collaborative information at local, regional, and national meetings
- Evaluate effectiveness and opportunities to improve the functioning of the Collaborative.

Members:

- Participate in regular meetings, workshops and/or special events as provided

- Receive regular news and updates
- Contribute input and ideas to the Action Plan
- Bring expertise to the table to implement projects or initiatives in the Action Plan
- Implement activities in the Action Plan
- Participate in Project Teams as needed
- Identify opportunities to partner on funding, come together to discuss and act on opportunities
- Share lessons learned and results of initiatives or projects with the larger Collaborative

Standing Project Teams:

- Implement ongoing initiatives or projects that meet the goals of the Collaborative
    - Examples:
        - Outreach and Public Relations Team
        - Fundraising Team
    - Share project progress and lessons learned with the larger collaborative

Ad-Hoc Project Teams:

- Self-organized and selected to implement specific initiatives or projects that meet the goals of the Collaborative
- Share project progress and lessons learned with the larger collaborative
- Ad-hoc project teams maintain membership for the purpose of a specific project.

Organizations that participate on the Steering Team agree to sign a Memorandum of Understanding (MOU) as a statement of their commitment and participation in the Collaborative. The MOU is a non binding document, but outlines a member organizations contribution and investment into the Collaborative. Examples of investment can include funding, resources, staff time, or a combination. If funding is part of the investment, then additional agreements according to the participating organizations rules and regulations may also apply.

6. Decision-making Process

Each member organization retains authority to make decisions as appropriate as an independent agency or entity. However, the Steering Team will make decisions regarding the goals and priorities of the Collaborative, such as:

- The Action Plan, approved by consensus of the Steering Team, reflects the prioritization of strategies, actions and funding to meet collaborative goals and objectives, regardless of whether the actions will be taken or the funding sought by individual Collaborative members, groups of Collaborative members, or the Collaborative as a whole. Input on the development of the initial Action Plan and

subsequent updates, will be sought from the members and approved by Steering Team consensus. Implementation of the Action Plan, as approved, is done at the Project Team level.

- The Steering Team will be made up of representatives from government agencies, academic institutions and non-governmental organizations participating in the Collaborative. Not more than two representatives per participating organization will sit on the Steering Team. Good faith effort will be made to ensure adequate representation on the Steering Team according to different types of organizations, geography of the Basin, and relevant skills/knowledge of individual members.
- Project Team membership and leadership is voluntary, and is open to all members of the Collaborative.
- The Lake Superior Collaborative has determined that all decisions made by the Steering Team or any Project Team will be made by a consensus of members present. Therefore, all members agree to work toward consensus and not simply block a decision they disagree with. In striving for consensus, members will listen actively and suggest options s/he believes can meet all perspectives. If a consensus is not reached after allowing a reasonable time for discussion, members will follow this process to move toward consensus:
    - Determine whether all available facts or information have been shared, and if not, get the information and review it together.
    - Clarify the areas of agreement and disagreement.
    - Those who do not consent have the responsibility to suggest alternatives that meet the needs of all parties and incorporate the differing perspectives.
    - Collaborative members should remain at the table during deliberations to hear the full discussions in order to make informed judgments when decision-making occurs.
    - Absence will be equivalent to not dissenting.
    - If consensus cannot be attained after following this process, the group will vote by supermajority (80% of members present) whether to (a) decide the issue by a super-majority vote, or (b) table the decision with suggestions on ways to make future progress toward consensus.

7. Implementation of Partnership Goals

Each collaborative organization is encouraged to provide support that meets the goals set forth in the charter and subsequent Action Plan. Contributions can be staff time and expertise, equipment, and/or funding. The Collaborative may also submit a funding request for projects as an entity. The Collaborative will provide regular opportunities for

members to share interests in collaborative fundraising, to ensure strategic and coordinated submission of funding requests, and to assist in identifying potential funding matches.

The Partnership will develop a 3 year Action Plan that identifies priority projects and initiatives that best meet Partnership goals. The Action Plan will be developed with the leadership of the Steering Team, and will compile input from all interested partners. The Action Plan will include identification of which partners will engage in items in the work plan. Some may incorporate staff time via work planning. Some may actively pursue grant funding to support partnership coordination and on the ground work. Some may utilize the Collaborative's strategic priority setting as criteria in the distribution of their funding programs. Each agency can contribute in the way that is consistent with their organization's capacity, authorities and mission. The voluntary participation in collaborative projects reflects the interests of those that work on that project. Participation as a member of the Partnership does not imply full organization support of any and all Partnership activities that different organizations may undertake.

Appendix D. Glossary of Terms

ANIMAL WASTE MANAGEMENT
Practices designed to minimize the impacts of animal manure on surface and groundwater resources. These practices include barnyard runoff management, nutrient management, and manure storage facilities

AQUIFER
A water-bearing stratum of permeable rock, sand, or gravel.

AREAWIDE WATER QUALITY MANAGEMENT PLAN (208 PLAN)
A plan to document water quality conditions in a drainage basin and make recommendations to protect and improve basin water quality. Each basin in Wisconsin must have a plan prepared for it, according to section 208 of the Clean Water Act.

BASIN PLAN
See "Areawide Water Quality Management Plan."

BEST MANAGEMENT PRACTICES (BMPs)
The most effective, practical measures to control nonpoint sources of pollutants that run off from land surfaces.

BUFFER STRIPS
Strips of grass, shrubs, trees, and other vegetation between disturbed areas and a stream, lake, or wetland.

CONSERVATION DESIGN DEVELOPMENT
Grouping homes on part of a property to maintain a large amount of open space on the remaining land.

CONSERVATION EASEMENT
A legal document that limits the use of land for purposes such as farming, open space, or wildlife habitat. A landowner may sell or donate an easement to a government agency or a private land trust.

COST-EFFECTIVE
A level of treatment or management with the greatest incremental benefit for the money spent.

ECOSYSTEM
A biological community interacting with its nonliving surroundings.

ENVIRONMENTAL PROTECTION AGENCY (USEPA)
The federal agency responsible for enforcing federal environmental regulations. The Environmental Protection Agency delegates some of its responsibilities for water, air, and solid waste pollution control to state agencies.

EROSION
Wearing away of the land surface by wind or water.

EUTROPHIC
Refers to a nutrient-rich lake. Large amounts of algae and weeds characterize a eutrophic lake (see also "Oligotrophic" and "Mesotrophic").

EUTROPHICATION
The process of nutrient enrichment of a lake leading to increased overall production of aquatic organisms. Eutrophication can be accelerated by human activity such as agriculture and improper waste disposal.

FECAL COLIFORM
A group of bacteria used to indicate the presence of other bacteria that cause disease. The number of coliform is particularly important when water is used for drinking and swimming.

FISHABLE AND SWIMMABLE
Refers to the water quality goal set for the nation's surface waters by Congress in the Clean Water Act. All waters were to meet this goal by 1984.

GROUNDWATER
Water that fills internal passageways of underground, porous geologic formations (aquifers) and flows in response to gravity and pressure. Often used as the source of water for communities and industries.

HABITAT
The place or type of site where a plant or animal naturally lives and grows.

HERBICIDE
A type of pesticide that is specifically designed to kill plants and can also be toxic to other organisms.

MACROPHYTE
A rooted aquatic plant.

MESOTROPHIC
Refers to a moderately fertile nutrient level of a lake between the oligotrophic and eutrophic levels. (See also "Eutrophic" and "Oligotrohpic.")

MILLIGRAMS PER LITER (mg/1)
A measure of the concentration of a substance in water. For most pollution measurements this is the equivalent of "parts per million."

MITIGATION
The effort to lessen the damages from a particular project through modifying a project, providing alternatives, compensating for losses, or replacing lost values.

NONPOINT SOURCE POLLUTION (NSP)
Pollution whose sources cannot be traced to a single point such as a municipal or industrial wastewater treatment plant discharge pipe. Nonpoint sources include eroding farmland and construction sites, urban streets, and barnyards. Pollutants from these sources reach water bodies in runoff, which can best be controlled by proper land management.

NUTRIENT MANAGEMENT PLAN
A guidance document that provides fertilizer and manure spreading recommendations for crop fields based upon soil test results and crop needs. Plans are sometimes referred to as NRCS 590 plans for the Natural Resources Conservation Service Standard that guides their preparation.

OLIGOTROPHIC
Refers to an unproductive and nutrient-poor lake. Such lakes typically have very clear water. (See also "Eutrophic" and "Mesotrophic.")

ORDINARY HIGH WATER MARK
The point on the bank or shore up to which the water leaves a distinct mark on the shore or bank from its presence, wave action, or flow. The mark may be indicated by erosion, destruction of or change in vegetation, or another easily recognizable characteristic.

PESTICIDE
Any chemical agent used to control specific organisms. Pesticides include insecticides, herbicides, fungicides, etc.

PHOSPHORUS
A nutrient that, when reaching lakes in excess amounts, can lead to overfertile conditions and algae blooms.

POINT SOURCES
Sources of pollution that have discrete discharges, usually from a pipe or outfall.

POLLUTION
The presence of materials or energy whose nature, location, or quantity produces undesired environmental effects.

PRIME AGRICULTURAL LAND
Farmland that has gentle slopes and well-drained soils and requires a minimum of conservation practices. It is the easiest land to farm. Class I and II soils, as defined by the Natural Resources Conservation Service are considered prime agricultural soils.

PRIORITY WATERSHED
A drainage area selected to receive state money to help pay the cost of controlling nonpoint source pollution.

PRIVATELY OWNED WASTEWATER TREATMENT SYSTEMS (POWTS)
means a sewage treatment and disposal system serving a single structure with a septic tank and soil absorption field located on the same parcel as the structure. This term also means an alternative sewage system approved by the department including a substitute for the septic tank or soil absorption field, a holding tank, a system serving more than one structure or a system located on a different parcel than the structure. A private sewage system may be owned by the property owner or by a special purpose district.

PRODUCTIVITY
A measure of the amount of living matter supported by an environment over a specific period of time. Often described in terms of algae production for a lake.

PUBLIC PARTICIPATION
The active involvement of interested and affected citizens in governmental decision-making.

PURCHASE OF DEVELOPMENT RIGHTS
The voluntary sale of the rights to develop a piece of property. The sale price is determined by an appraisal. The land may be restricted to farming or open space.

REDUCED TILLAGE
Planting row crops while only slightly disturbing the soil. With reduced tillage, a protective layer of plant residue stays on the surface and erosion rates decrease.

RIPARIAN
Belonging or relating to the bank of a lake, river, or stream.

RIPRAP
Broken rock, cobbles, or boulders placed on the bank of a stream to protect it against erosion.

RUNOFF
Water from rain, snowmelt, or irrigation that flows over the ground surface and returns to streams and lakes. Runoff can collect pollutants from air or land and carry them to receiving waters.

SEDIMENT
Soil particles suspended in and carried by water as a result of erosion.

SEPTIC SYSTEM
Sewage treatment and disposal for homes not connected to sewer lines. Usually the system includes a tank and drain field. Solids settle to the bottom of the tank. Liquid percolates through the drain field. A type of privately owned wastewater treatment system (POWTS).

SHORELAND
The area within 1000 feet of a lake and 300 feet of a stream.

SLOW THE FLOW PRACTICES
Best management practices designed to reduce the quality and velocity of runoff. These practices are commonly applied to areas of heavy clay soils where infiltration rates are low.

STORM SEWERS
A system of sewers that collect and transport rain and snow runoff. In areas that have separated sewers, such stormwater is not mixed with sanitary sewage.

SUSPENDED SOLIDS (SS)
Small particles of solid pollutants suspended in water.

TOLERABLE SOIL LOSS
The tolerable soil loss rate, commonly referred to as "T," is the maximum average annual rate of soil erosion for each soil type that will permit a high level of crop productivity to be sustained economically and indefinitely (ATCP 50.01(16)).

TOTAL MAXIMUM DAILY LOADS
The maximum amount of a pollutant that can be discharged into a stream without causing a violation of water quality standards.

TRANSFER OF DEVELOPMENT RIGHTS
Property rights that may not be used on the land from which they come. TDRs may be sold to be used on a designated site in a receiving (growth) area. When TDRs are sold, the land they came from is then restricted to farming.

TROPHIC STATUS
The level of growth or productivity of a lake as measured by phosphorus content, algae abundance, and depth of light penetration.

TURBIDITY
Lack of water clarity. Turbidity is usually closely related to the amount of suspended solids in water.

UNIFORM DWELLING CODE
A statewide building code enforced in municipalities with more than 2500 residents specifying requirements for electrical, heating, ventilation, fire, structural, plumbing, construction site erosion, and other construction related practices.

UNIVERSITY OF WISCONSIN-EXTENSION (UWEX):
A special outreach and education branch of the state university system.

VARIANCE
Government permission for a delay or exception in the application of a given law, ordinance, or regulation. Also, see water quality standard variance.

WASTE
Unwanted materials left over from manufacturing processes; refuse from places of human or animal habitation.

WATER QUALITY CRITERIA
A measure of the physical, chemical, or biological characteristics of a water body necessary to protect and maintain different water uses (fish and aquatic life, swimming, etc.).

WATER QUALITY STANDARDS
The legal basis and determination of the use of a water body and the water quality criteria; physical, chemical, or biological characteristics of a water body that must be met to make it suitable for the specified use.

WATER QUALITY STANDARD VARIANCE
When natural conditions of a water body preclude meeting all conditions necessary to maintain full fish and aquatic life and swimming, a variance may be granted.

WATERSHED:
The land area that drains into a lake or stream.

WETLANDS:
Areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support a variety of vegetative or aquatic life. Wetland vegetation requires saturated or seasonally saturated soil conditions for growth and reproduction. Wetlands generally include swamps, marshes, bogs, and similar areas.

WISCONSIN ADMINISTRATIVE CODE:
The set of rules written and used by state agencies to implement state statutes. Administrative codes are subject to public hearing and have the force of law.

WISCONSIN NONPOINT SOURCE WATER POLLUTION ABATEMENT GRANT PROGRAM:
A state cost-share program established by the state legislature in 1978 to help pay the costs of controlling nonpoint source pollution. Also known as the nonpoint source element of the Wisconsin Fund or the Priority Watershed Program.