

Ashland County Invasive Species Strategic Plan



Photo: WDNR



Photos: Jeff Gunderson / Minnesota Sea Grant



Prepared by:
Todd Norwood - Ashland County Land and Water Conservation Department
Email: todd.norwood@co.ashland.wi.us Phone: 715-682-7187



ASHLAND COUNTY
LAND & WATER
CONSERVATION
DEPARTMENT

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Ashland County Invasive Species Strategic Plan

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Strategic Plan Advisory Committee:

Miles Falck, Great Lakes Indian Fish and Wildlife Commission
Tom Fratt, Ashland County Land & Water Conservation Department
Sara Hudson, City of Ashland
Sarah Johnson, Northland College
Jim Oakley, Ashland County Land Conservation Committee
Pamela Roberts, Northwoods Cooperative Weed Management Area
Joe Rose, Ashland County Land Conservation Committee
Matt Schultz, Ashland County Forestry Department
Jessica Strand, Bad River Band of Lake Superior Chippewa
Pamela Toshner, Wisconsin Department of Natural Resources
Tom Wojciechowski, University of Wisconsin Extension

Ashland County Land Conservation Committee (2015):

George Mika - Chair
Ken Linquist - Vice Chair
Jim Oakley
Charles Ortman
Caryl Peck
Gerald Richardson
Joe Rose

Ashland County Land & Water Conservation Department
315 Sanborn Ave., Suite 100
Ashland, WI 54891
715-682-7187

List of Acronyms

AIS - Aquatic Invasive Species
APHIS - Animal and Plant Health Inspection Service (US Department of Agriculture)
ATV - All Terrain Vehicle
BMP - Best Management Practices
CBCW - Clean Boats Clean Waters
CLMN - Citizen Lake Monitoring Network
DATCP - Department of Agriculture, Trade, and Consumer Protection
EAB - Emerald Ash Borer
EDRR - Early Detection Rapid Response
ERW - Exceptional Resource Water
FS - Forest Service
FWS - Fish and Wildlife Service
GIS - Geographic Information Systems
GISN - Global Invasive Species Network
GLEDN - Great Lakes Early Detection Network
GLIFWC - Great Lakes Indian Fish and Wildlife Commission
IPM - Integrated Pest Management
IS - Invasive Species
LWCD - Land and Water Conservation Department
MISIN - Midwest Invasive Species Information Network
NCWMA - Northwoods Cooperative Weed Management Area
NGLVC - Northern Great Lakes Visitor Center
NPS - National Park Service
NRCS - Natural Resources Conservation Service
NR40 - Natural Resources 40 (Wisconsin Administrative Code Chapter)
ORW - Outstanding Resource Water
RED - Riverine Early Detection
SOC - Species of Concern
SWIMS - Surface Water Integrated Monitoring System
USDA - United States Department of Agriculture
USGS - United States Geological Survey
UWEX - University of Wisconsin Extension
WBIC - Water Body Identification Code
WDNR - Wisconsin Department of Natural Resources

Executive Summary

Invasive species often cause ecological, economic, and human health concerns. This plan seeks to address the invasive species concerns for Ashland County, Wisconsin and provide guidance to limiting their negative impacts.

This plan establishes four main invasive species goals and outlines associated objectives and activities.

Goals:

1. Education
2. Prevention
3. Monitoring
4. Control

Objectives:

1. Promote and support invasive species education across diverse audiences.
2. Prevent the introduction and spread of invasive species in Ashland County while keeping updated on new threats.
3. Support, maintain, and enhance invasive species monitoring efforts conducted by Ashland County and partners.
4. Promote and support county and partner control efforts of invasive species in Ashland County (and throughout the state).

The plan is deliberately broad in its strategy. Providing county-specific species lists or strategies within the plan is limiting when considering the potential for changing information on species establishment and abundance, methodology, state or federal policies, landowner cooperation, and partnerships. Also, instead of offering species-specific methods relating to the goals, the plan provides general suggestions and guidelines. This approach allows for addressing the goal, situation, or species-specific concerns with the most up-to-date integrated methodology, information, and partner assistance and input. For example, we could face the scenario of a new infestation of a particular species to a low quality, highly disturbed location. The species is a new record for the county and a rapid response control effort is warranted to avoid further spread. The species responds well to chemical treatment and chemical damage to non-target species is low due to degraded site conditions. It is also determined that a chemical control strategy has the greatest efficacy and is the most time and cost efficient approach. Conversely, if the species' initial establishment is located in a very high quality location or sensitive habitat, the management approach may change to a mechanical response such as hand pulling or mowing to limit collateral damage to non-target species.

One aspect that does not change is the importance of partnerships in reaching the goals, objectives, and activities. The large size of the county, diverse landownership, broad audience,

and limited funding and staff, all necessitate a collaborative effort in addressing invasive species issues at a county-wide and regional level.

Vision

Our vision is to preserve the natural biodiversity and quality of Ashland County's aquatic and terrestrial ecosystems and to minimize the negative impacts of invasive species on the environment and economy. A collaborative effort among stakeholders will be used to prevent, contain, and control invasive species and safeguard the county's resources.

Mission

To develop a plan of action addressing the prevention, introduction, spread, and control of invasive species in Ashland County, Wisconsin.

Plan Consistency with Stakeholders

This plan is consistent with the goals and objectives of many of the plans developed by stakeholders within Ashland County including the Chequamegon-Nicolet National Forest Land and Resource Management Plan, the Great Lakes Indian Fish and Wildlife Commission Invasive Species Prevention and Control Plan, and the Northwoods Cooperative Weed Management Area (NCWMA) Management Plan, among others. Additionally, this plan is consistent with natural resources and invasive species concerns outlined by other Ashland County plans as outlined below.

Ashland County Comprehensive Plan: 2006 to 2025- Policy Document

Goal #5: Natural Resources: Preserve and protect the County's natural resource base from potential degradation and contamination.

Goal #5 Objectives:

1. Encourage the preservation and protection of environmental corridors for wildlife, water quality values, and habitat protection.
2. Increase collaboration with watershed associations.
3. Increase protection of the surface and groundwater resources.
4. Maintain the natural beauty of the County's roadways and scenic views.
5. Maintain and encourage the sustainable use and development of natural resources.

Ashland County Land & Water Resource Management Plan: 2010 - 2019

Goal #3: Protect and improve aquatic and terrestrial wildlife habitat in Ashland County.

Goal #3 Objectives:

- A: Restore or enhance habitat within and adjacent to lakes, rivers, and streams.
 - B: Restore, conserve, or enhance wetlands for wildlife habitat and watershed health.
 - C: Identify, classify, and protect sensitive areas.
 - D: Develop a comprehensive invasive species management and control program.*
- *The activities associated with Objective D provided by the Land & Water Resource Management Plan are also listed since the objective is specific to invasive species.

Goal #3 Activities:

- 1: Recognize areas with existing populations of invasive species and ensure that those areas and species are mapped within the invasive species GIS website maintained by the Great Lakes Indian Fish and Wildlife Commission.
- 2: Participate with other conservation partners to control existing populations of invasive species and to prevent the introduction of new invasive species to the region.
- 3: Support the efforts of the Northwoods Cooperative Weed Management Area in combating invasive terrestrial plants.
- 4: Promote the use of native plants when establishing vegetation.
- 5: Support local efforts to develop native seed and plant sources for the area.
- 6: Pursue funding to establish an invasive species control and education coordination position at the LWCD.

Goal #4: Provide information and education concerning natural resource conservation to private landowners, local governments, non-governmental organizations, and the general public through cooperation and coordination with other resource management entities.

Goal #4 Objectives:

- A: Promote cooperation among conservation partners.
- B: Work to attain a common vision and a conservation land use ethic among government representatives, land managers, and conservation partners in Ashland County and surrounding areas.
- C: Inform and educate people about land use regulations, land management plans, watershed assessment techniques, and best management practices necessary to protect and improve soil, water, and habitat resources.

Ashland County Forest Comprehensive Land Use Plan: 2006 - 2020

Mission Statement:

"...The mission of the County Forest is to manage, conserve and protect these resources on a sustainable basis for present and future generations. County Forest resources should be protected from natural catastrophes such as fire, insect and disease outbreaks, and from human threats such as encroachment, over-utilization, environmental degradation and excessive development. While managed for environmental needs including watershed protection, protection of rare plant and animal communities, and maintenance of plant and animal diversity, these same resources must also be managed and provide for sociological needs, including provisions for recreational opportunities and the production of raw materials for wood-using industries..."

Chapter 830.2: Exotic Plant Species of Concern

"...Exotic or non-indigenous invasive plant species can cause significant ecological and economic damage to the Forest. ...Keeping them from dominating the understory is critical to the long-term health and economic viability of the forest..."

Introduction

Invasive species display a multitude of forms ranging from microbes to plants to animals. They often have a tremendous impact on the ecology and biodiversity of native ecosystems and cost billions to industry, agriculture, forestry, and tourism (Pimental et al., 2005). As defined in the Wisconsin State Statute Section 23.22 (1)(c), invasive species are "non-indigenous species whose introduction causes or is likely to cause economic or environmental harm or harm to human health". Indeed, invasive species have shown their adverse effects on Wisconsin's environment and to the state economy. Aquatic ecosystems are threatened by invasive species such as Eurasian water-milfoil, round goby, and sea lamprey which disrupt native species and habitat while consequently impacting the \$2.75 billion state fishing industry (Wisconsin Department of Natural Resources [WDNR], 2012a). Likewise, aquatic invasive species (AIS) such as zebra mussels often cause millions in damage to private industry and municipalities by clogging water intake pipes or other infrastructure. Forest pests such as the emerald ash borer (EAB) and beech bark disease have the potential to greatly alter forest ecology while impacting the state's \$28 billion forest products industry. Agricultural pests, weeds, and disease disrupt the \$59 billion state agriculture economy by increasing costs for farmers while crop yields often decrease (WDNR, 2012a). The state's tourism industry also suffers when natural areas, waterways, and trails, which often serve as quality wildlife habitat, are degraded by invasive species resulting in negatively impacted user experience. Regardless of whether the invasive species is aquatic or terrestrial, all have the potential to reduce property values (sometimes greatly) on land affected by the organism.

Numerous studies have made an attempt to describe and quantify the comprehensive effect of invasive species on the economy and environment. One review of economic impacts of AIS in the Great Lakes region suggests that the aggregated AIS-related cost estimates from numerous itemized studies add up to substantially more than \$100 million annually (Rosaen et al., 2012). Expenditures by the State of Wisconsin (which include federal funds) for AIS research, enforcement, education, outreach, and control was approximately \$7 million annually during 2011-2013 and does not include expenditures incurred by municipalities, businesses, or other entities subject to AIS issues (WDNR, 2012a, 2013a). Total spending for all aquatic and terrestrial invasive species by the State of Wisconsin during 2013 exceeded \$11 million.

Wisconsin Invasive Species Rule: NR 40

Wisconsin's Invasive Species Identification, Classification, and Control Rule (Wis. Adm. Code Chapter NR 40) establishes criteria to slow the spread of invasive species and to prevent additional invasions in Wisconsin. The rule includes a list of *Prohibited* and *Restricted* species within Wisconsin and establishes regulation on transportation, possession, transfer, and introduction. The following is a summary of invasive species classifications in NR 40:

Prohibited Invasive Species:

- Limited or no establishment in Wisconsin
- High potential to cause environmental, human, and economic harm
- Regional or statewide containment or eradication is feasible

Regulation: Illegal to transport, possess, transfer, or introduce without a WDNR permit.*

Control: Control is required and may be ordered or conducted by WDNR.

Restricted Invasive Species:

- Widely established in Wisconsin
- Evident environmental and/or economic impact
- Eradication unlikely

Regulation: Illegal to transport, transfer, or introduce without a WDNR permit. Possession is allowed except for fish and crayfish.*

Control: Encouraged but not required.

**Some exemptions exist (e.g. person in compliance with a DATCP-USDA APHIS compliance agreement applicable to a specific organism. See full rule for further explanation.)*

NR 40 also includes preventive measures that address pathways of spread for invasive species. Requirements within NR 40 addressing the prevention of AIS include drainage of water (including boat motors) and removal of all plant and animal material from boats, trailers, vehicles, and equipment immediately following removal from the water, bank, or shore, and prior to transportation away from the water body. Before entering Wisconsin from another state, vehicles, boats, and equipment that have been in contact with water, banks, or shores of another state must first drain water and remove plants and animals before transport within Wisconsin.

For more information on NR40 including species lists and links to the full text rule see:

<http://dnr.wi.gov/topic/invasives/classification.html>

Invasive Species Concerns for Ashland County

Ashland County's total land area is 668,800 acres (US Census, 2014). Approximately 535,000 acres are forested (>80% of total land) of which approximately 50% are publicly owned in the form of national, state, and county and municipal forests. County and municipal forest acres in Ashland County account for approximately 43,000 acres and provide an important source of revenue to the county in terms of forest products and tourism/recreation. However, terrestrial invasive species are an increasing concern for Ashland County's forest ecology and economy, with numerous invasive species already existing on the county landscape and additional new threats on the horizon. Unfortunately, the spread of invasive species is often associated with human activity and land use or disturbance. Thus, the very aspects that allow economic viability such as forestry or agriculture may also provide avenues for invasion, necessitating the use of best management practices (BMP's) to reduce spread. Likewise, recreational activities that provide positive economic benefits such as trail riding, hiking, boating, fishing, and hunting also provide increased opportunity for the local spread of invasive species or the development of populations in new locations through seed and animal dispersal.

AIS and their impact on the ecology and economy of Ashland County are of equal concern. According to the US Census (2014) more than half of Ashland County's 1,466,880 acre area is surface water that includes portions of Lake Superior. An additional 168,388 acres are wetlands greater than 2 acres in size (25% of the total land surface area) (WDNR, 2012b) (Figure 1). Wetlands less than 2 acres in size are too small to map accurately using remote sensing methodology but rough estimates can be derived. According to the WDNR, there are 45,697 wetland points referencing wetlands under 2 acres. WDNR staff familiar with the data suggest that most wetland points are likely less than an acre, though it should be stressed that this is an estimate (T. Bernthal, personal communication, October 23, 2015). Thus, a rough estimate (using a half acre for all points) of wetlands less than 2 acres in size could add approximately 22,848 acres of wetland to the total. Considering the large amount of aquatic and wetland habitat throughout the county, invasive species have ample opportunity for introduction and establishment. Ashland County is situated on Lake Superior, an AIS source water containing 97 non-native species (Minnesota Sea Grant, 2014), yet, the county's inland waters remain relatively AIS-free. Water-based recreation is incredibly popular in the region with substantial numbers of local residents and tourists drawn to both Lake Superior and to the numerous inland waters. Because of this, outreach, education, and prevention is a vital strategy for limiting further spread and new introductions in Lake Superior and for ensuring continued healthy inland waters throughout the county and beyond.

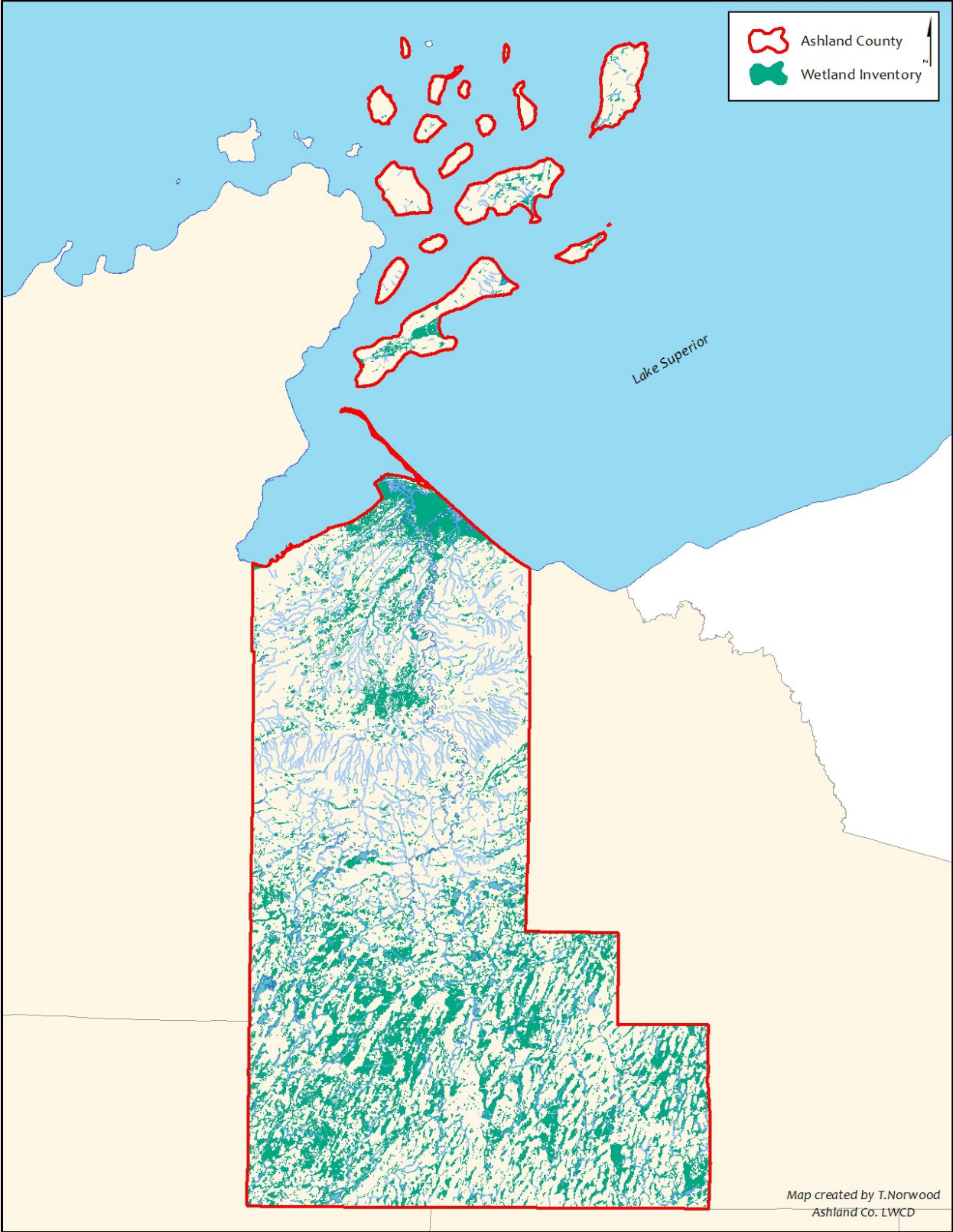


Figure 1: Wetlands of Ashland County, WI (Wisconsin Wetland Data)

Ashland County Physiography

General Description

Ashland County is located in northwestern Wisconsin and is 1,466,880 acres in area, of which 668,800 acres is land and 798,080 acres is water. All but four of the twenty-two Apostle Islands, a small archipelago in Lake Superior, are located in Ashland County. Devil's Island (Apostle Islands) is the most northern point of land in Wisconsin. Ashland County is bordered by Bayfield County to the west, Iron County to the east, Price and Sawyer County to the south, and Lake Superior to the north. The southern one-third of the county drains to the Upper Chippewa Basin and the remainder drains to the Lake Superior Basin (Figure 2).

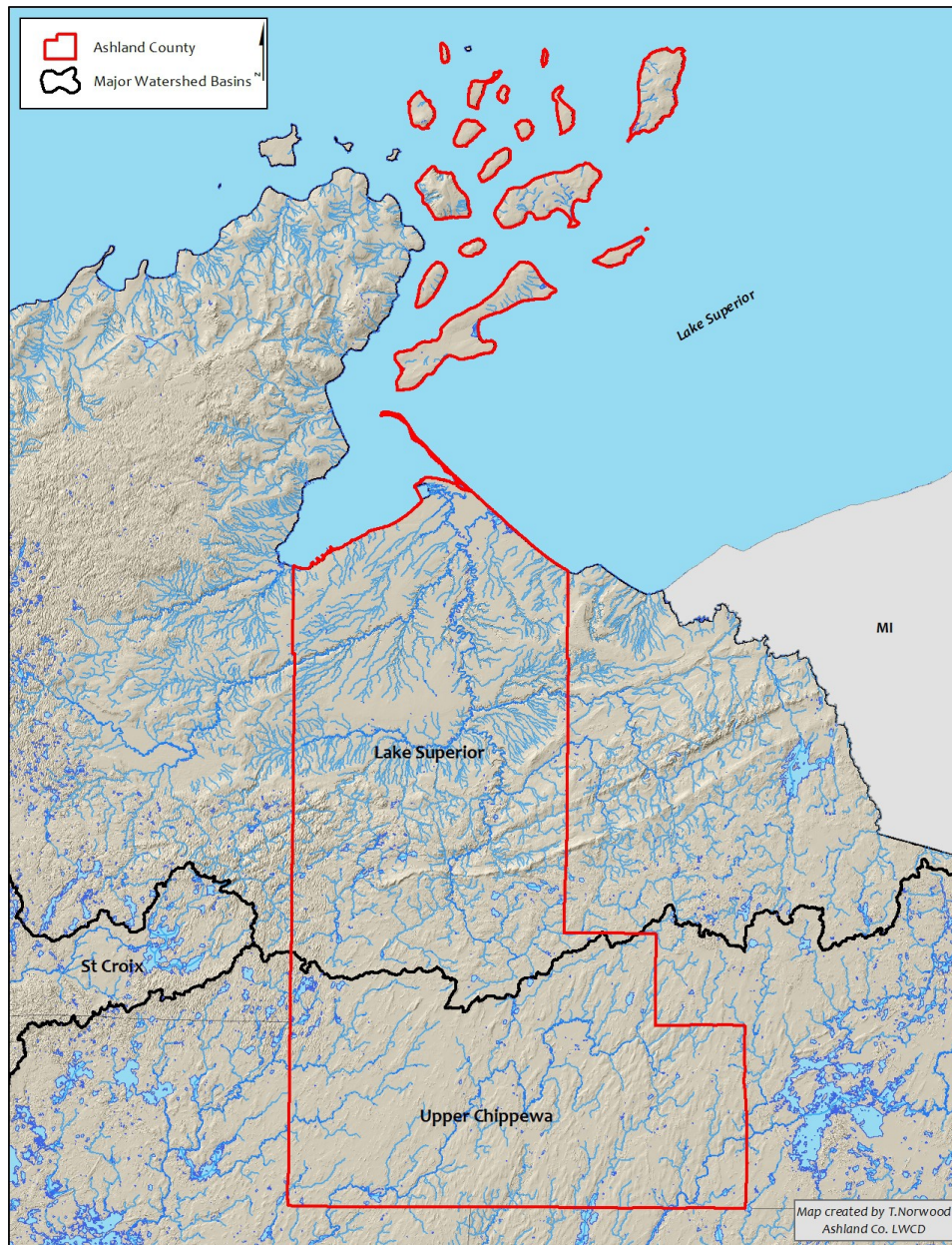


Figure 2: Major drainage basins in Ashland County, WI

Physical Description

The physical characteristics of Ashland County are largely a result of the most recent advance of the Laurentide Ice Sheet during a period known as the Wisconsin Glaciation, but also due to geologic processes dating back to the precambrian period some 3,500 million years ago. Approximately 26,000 years ago during a period of maximum ice extent for the Wisconsin Glaciation period, multiple lobes of the Laurentide Ice Sheet extended into what is now Wisconsin. This advance of ice contributed much to shaping the current landscape of Ashland County following ice retreat some 10,000 years ago (Dott & Attig, 2004).

Ashland County is divided into two major drainage basins at the St. Lawrence Seaway Continental Divide (Figure 2). The northern half of the county drains mainly through the Bad River and its tributaries to Lake Superior. From there, the water continues through the other Great Lakes, the St. Lawrence Seaway, the Gulf of St. Lawrence and ultimately, the Atlantic Ocean. The southern portion of the county is drained by the Chippewa River and its tributaries to the Mississippi River and eventually the Gulf of Mexico (Ashland County, 2010).

The northern portions of Ashland County are situated in the Superior Coastal Plain Ecological Landscape (Figure 3), one of sixteen ecoregions or landscapes throughout the state which exhibit distinct ecology and management opportunities (WDNR, 2014). The Superior Coastal Plain on the mainland portion of Ashland County exists as the Lake Superior Lowlands, also known as the "red clay plain". This area is the ancient lake plain of Glacial Lake Duluth and has extensive areas of clayey till and lake sediment deposits. The clay plain is mostly flat but slopes gently toward Lake Superior with occasional steep, deeply incised rivers (Dott & Attig, 2004). The clay of this region often has a reddish hue and is particularly noticeable in streams and Lake Superior during runoff events. Many areas of the Lake Superior shoreline in the Superior Coastal Plain exhibit ecologically important coastal estuaries such as the Kakagon-Bad River Sloughs, a Ramsar wetland of international importance located within the Bad River Band of Lake Superior Chippewa Reservation of Ashland County.

The North Central Forest Ecological Landscape covers the southern half of Ashland County (Figure 3), transitioning from the Superior Coastal Plain located to the north. Landforms in this region are often features of terminal and ground moraines, and till and outwash plains (WDNR, 2014). The Winegar end moraine, known for its hummocky character and abundant lakes and bogs is prominent just south of Mellen, Wisconsin. Another important landscape feature is the noticeably hilly and rocky terrain of the Keweenaw Fault and Penokee-Gogebic Range, running northeast across Ashland County into Iron County and the Upper Peninsula of Michigan. The landscape is largely forested with mesic northern hardwoods being the predominant forest type with scattered pockets of hemlock, yellow birch, and white pine. Wetlands are very common in this landscape as are rivers, lakes, and streams. Lakes in the North Central Forest portion of Ashland County are often a result of densely packed glacial till with a high water table (WDNR, 2014). The abundant wetlands in Ashland County and throughout the North Central Forest are relatively undisturbed in contrast to wetlands located in other areas of Wisconsin and are of high ecological value. As a result, conservation and management of wetlands and their associated habitats is critical in Ashland County (WDNR, 2014).

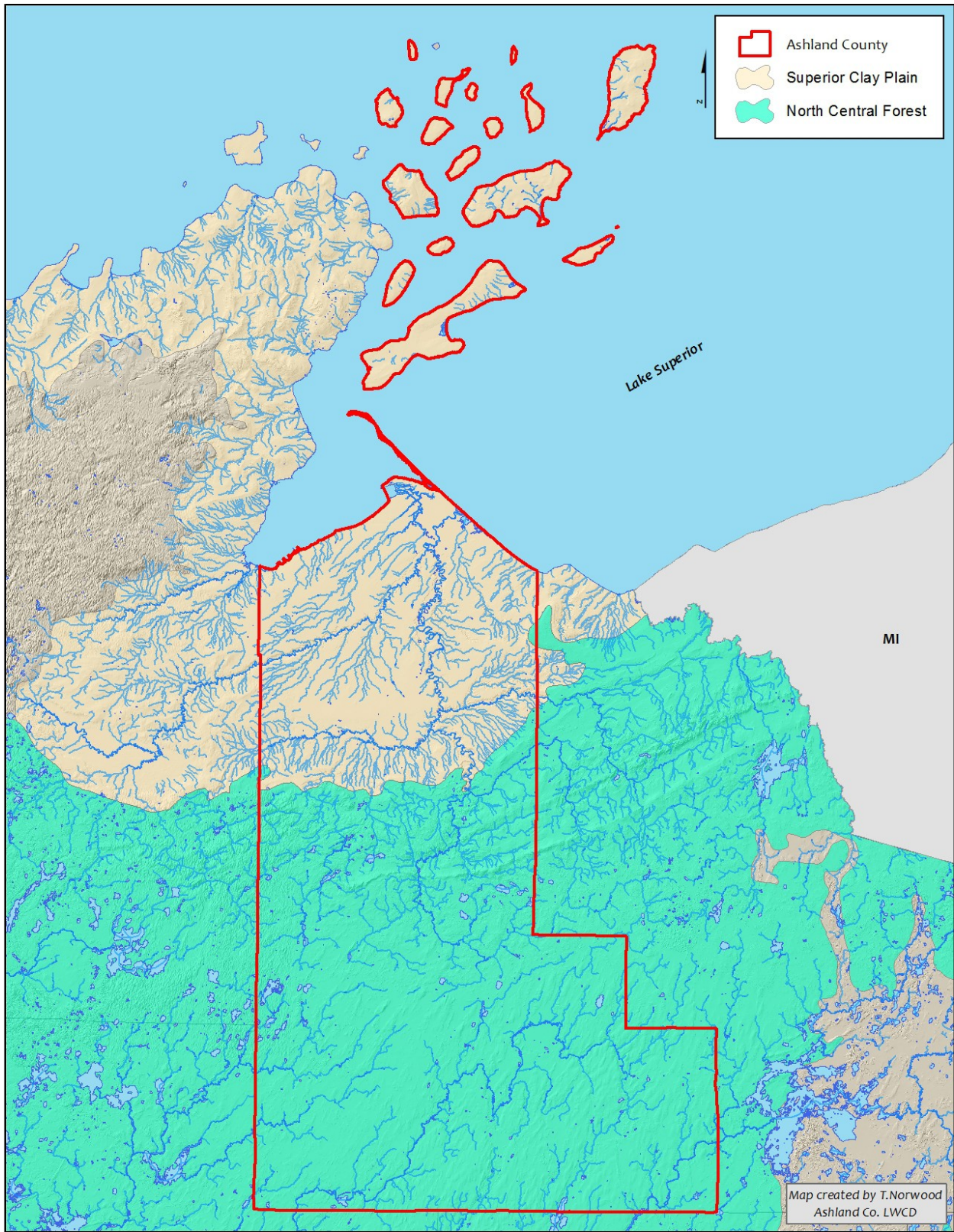


Figure 3: Ecological Landscapes of Ashland County, WI

Goals, Objectives, and Activities

The goals of the Ashland County Invasive Species Strategic Plan reflect those of the State of Wisconsin: **Education, Prevention, Monitoring, and Control**. For each broad goal, an objective identifies a desirable change and lists specific activities that describe how each objective may be achieved. The battle against invasive species at the County level must be continuous and un-relenting, but has to be balanced with the realities of funding shortfalls, staffing limitations, cooperator priorities, and political will. For these reasons, the objectives and activities in this plan lack specific measurable outcomes - relying on annual work plans and grant agreements to spell out the “who, what, when, why, and how many” questions typical of project plans.

Education

Outreach and education regarding invasive species is an essential component of preventing the expansion of known county invasive species or the establishment of new populations. This goal requires providing invasive species education, outreach, and training materials to a diverse audience of residents, visitors, agencies, public officials, and commercial interests. Some critical aspects of consideration are invasive species biology, introduction and dispersal routes, and in some cases their commercial use (e.g. aquatic plants for home water gardens or *Phragmites* at water treatment plants).

Objective: Promote and support invasive species education across diverse audiences in Ashland County and the surrounding region.

Activities:

1. Identify Target Audiences

- | | |
|--|---|
| <ul style="list-style-type: none">○ Residents○ Public Officials○ Schools○ Municipalities (Town, Village, City)○ Recreational (e.g. boaters, atv, hunters)○ County Departments (forestry, parks, sheriff, highway) | <ul style="list-style-type: none">○ Visitors/Tourists○ Lake and River Associations and groups○ Commercial (bait shops, nurseries)○ Non-Governmental Organizations○ Tribal Governments and Reservation Residents○ Other |
|--|---|

2. Develop and Acquire Current Education Materials

- | | |
|---|--|
| <ul style="list-style-type: none">○ DNR publications○ UWEX publications○ NCWMA publications○ Brochures○ Invasive species websites and databases○ Tribal websites, GLIFWC | <ul style="list-style-type: none">○ Presentations○ Fact sheets○ Photos○ Identification cards○ County and Department Websites |
|---|--|

3. Identify Outreach Opportunities and Increase Participation

- | | |
|---|---|
| <ul style="list-style-type: none">○ Clean Boats Clean Waters○ Lake and River Association meetings○ Media releases (newspaper, radio)○ Boat Landing Signs○ Schools/School Projects○ County and Department Websites○ Partnership events (Drain Campaign, Landing Blitz, NCWMA events) | <ul style="list-style-type: none">○ Kids fishing events (NGLVC, Kreher Park)○ Conferences and Workshops○ Local Events (fishing events, county fair, etc.)○ Stream Access Signs○ Communication with Local Government○ AIS materials at fishing/bait shops○ IS Coordinator attendance at trainings, conferences, meetings |
|---|---|

Prevention

Containing the spread of invasive species, and more importantly preventing their initial establishment, is the most effective method for invasive species management. Prevention is highly correlated with the education aspects outlined in this plan and has a great amount of overlap, as this goal relies on an informed public's effort to prevent invasive species spread.

Objective: Prevent the introduction and spread of invasive species in Ashland County while keeping updated on new threats.

Activities:

1. Remain updated on and provide support and recommendations for federal, state, and local policies and regulations intended to minimize invasive species spread.

- | | |
|--|--|
| <ul style="list-style-type: none">○ NR 40○ State Agencies (DATCP, WDNR)○ Tribal Government and Departments○ Municipalities (Town, Village, City)○ Municipal Departments (roads, water, etc.)○ Best Management Practices | <ul style="list-style-type: none">○ APHIS quarantines○ Federal Agencies (FS, FWS, NPS, NRCS, USGS)○ GLIFWC○ County Government (County Board)○ County Departments |
|--|--|

2. Encourage participation in prevention efforts by Ashland County and other stakeholders and partners.

- | | |
|--|---|
| <ul style="list-style-type: none">○ Maintain County Coordinator Position○ Maintain & Update Boat Landing Signs○ BMP's (forestry, public works, others)○ Field Equipment Cleaning & Sterilize○ Municipal Departments (roads, forestry, public works)○ Review databases (SWIMS, GLIFWC, MISIN, GLEDN) | <ul style="list-style-type: none">○ CBCW (especially Lake Superior)○ Maintain & Update River Access Signs○ Prioritize Species for Prevention & Control*○ Reduce or Eliminate IS on County Property○ Communication Among Governments, Partners, and Stakeholders○ IS in trade (nurseries, farmers market, others) |
|--|---|

*See Appendix A

Monitoring

Monitoring is an important component of invasive species management, especially for the early detection of new introductions to the county or for those species that are not widespread. When species are newly introduced or at low abundance, eradication or control efforts are much more likely to be successful and cost effective. Partnerships in monitoring, along with communication between partners is essential to locating and responding to pioneer populations. A number of databases containing invasive species locations (and sometimes control efforts) are available for monitoring species' locations or reporting new populations. The WDNR maintains their Surface Water Integrated Monitoring System (SWIMS) and is used for AIS-related projects and species. GLIFWC manages an invasive species data portal linked to multiple databases in an attempt to keep updated on all invasive species reports. Frequent updates and review of these databases is critical to knowing the many attributes of invasive species populations throughout the county and region.

The Ashland County Forestry Department actively monitors County Forests for invasive species while conducting annual stand inventories, timber sale development, and during daily activities that require traversing portions of the forest. All county foresters are trained for invasive species identification and provide location data on invasive species found while conducting field work. This data is maintained in the department's GIS and forest inventory database (M. Schultz, personal communication, July 30, 2015).

Objective: Support, maintain, and enhance monitoring efforts conducted by Ashland County and its partners.

Activities:

- | | |
|--|---|
| <ul style="list-style-type: none">○ Continue WDNR EDRR assistance○ Promote CLMN○ Promote Lake & River Associations
○ Identify High Priority Species*○ Maintain Ashland Co. GIS Geodatabase○ Use & Refine Technologies such as Sonar Lake Habitat Mapping for Monitoring & Inventory | <ul style="list-style-type: none">○ Promote Project RED program/events○ Maintain & Enhance Data Sharing○ Facilitate Database Entry (SWIMS, GISN, GLIFWC, MISIN)○ Identify High Priority Areas*○ Maintain Lake, River, & Wetland Data Files○ Maintain Partnerships (GLIFWC, NCWMA, Counties, Lakes, others) |
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**See Appendix A*

Control

Invasive species that are established require control measures to prevent their spread to other areas. For some species, eradication may be possible if a new pioneer population is found early in its establishment and if diligent control and follow-up monitoring are employed. If eradication is not achievable, control methods are used to limit the spread to other areas and reduce the impact to the affected area. Furthermore, some species once established are nearly impossible to eradicate or limit impacts through control methods (e.g. zebra mussels, emerald ash borer). Education and prevention strategies are extremely important in these situations and may be the only means for slowing the spread.

Integrated Pest Management:

Control efforts are best determined on a case-by-case basis since many factors will dictate which strategies are best for the individual situation. Species presence, abundance, and lifecycle, quality of the affected habitat, landownership, control method effectiveness, state or federal guidelines or policy, and other factors may influence management decisions. Assessing these influential factors is part of an Integrated Pest Management (IPM) strategy that seeks to manage invasive species economically and with the least amount of damage to the environment and human health. IPM often uses a combination of methods that work better together than separately and may include mechanical, physical, biological, or chemical aspects. For example, a biological control beetle may be used to reduce the abundance of an invasive plant species in an area, while follow-up chemical spot treatment provides additional control but with reduced chemical use in the environment, and reduced costs in supplies and staff time.

Invasive species control is conducted in Ashland County by multiple county departments including the Ashland County LWCD and Forestry Department and through partner groups such as GLIFWC, Bad River Tribe, NCWMA, and the US Forest Service. Funding can often be a limiting factor on control efforts which depend primarily on grants. Volunteer efforts and events coordinated by partner organizations and the LWCD are often needed to assist in controlling invasive species in Ashland County. Currently, the Ashland County Forestry Department has a small budget line specifically for invasive species control on county land. Invasive species populations within the county forest are generally isolated and limited. The Forestry Department provides management for invasive species with follow-up monitoring during subsequent years for control effectiveness and adjacent area establishment. Species locations and control efforts are tracked by the Forestry Department in GIS and their forest inventory database (M.Schultz, personal communication, July 30, 2015).

Objective: Promote and support county and partner control efforts of invasive species in Ashland County and surrounding region.

Activities:

- | | |
|--|--|
| <ul style="list-style-type: none">○ Inventory & Monitor IS Locations & Abundance○ Prioritize Species for Control*○ Obtain Funding for Control Efforts○ Establish & Maintain Partnerships & Volunteers to Efficiently Address Control Efforts○ Maintain Current Knowledge of Management Strategies for Specific Species | <ul style="list-style-type: none">○ Encourage restoration of native species○ Prioritize Areas for Control*○ Monitor and Evaluate Control Efforts○ Assist Partners and the Public on Control Efforts○ Use Integrated Methods (mechanical, biological, chemical) Whenever Possible |
|--|--|

**See Appendix A*

Coordination

The Goals, Objectives, and Activities outlined above describes the need for developing, maintaining, and participating in partnerships with other resource management agencies, local governments, and non-governmental organizations. Working at a county-wide level that incorporates diverse land ownership and land use requires an integrated approach and close working relationships with partners. The following list provides existing and potential future partnership needs and offers example concerns or activities in parenthesis.

Local Government

- City of Ashland (City of Ashland invasive species collaboration)
- County Forestry Department (Ashland County owned-land invasive species collaboration)
- County Highway Department (roadside invasives mowing, BMP's)
- County Land Conservation Departments(AIS/IS programs coordination)*
- Municipal Governments (roadside invasives, water treatment facilities)

* *The Counties bordering Lake Superior (Douglas, Bayfield, Ashland, and Iron) have a special relationship and responsibility to coordinate efforts across the Lake Superior Basin where many high quality resources exist.*

State Agencies

- Department of Agriculture, Trade, and Consumer Protection (Emerald Ash Borer)
- University of Minnesota Sea Grant
- University of Wisconsin Sea Grant
- University of Wisconsin Extension
- Wisconsin Department of Natural Resources (AIS partnership events, NR40, State Parks and properties)

Federal

- Fish and Wildlife Service
- National Park Service (Apostle Islands park-specific invasive species)
- Natural Resources Conservation Service (Lake Superior Landscape Restoration Partnership, Environmental Quality Incentives Program, agricultural BMPs)
- USDA - APHIS
- U.S. Forest Service (Chequamegon National Forest invasive species)

Tribal

- Bad River Band of Lake Superior Chippewa (tribal reservation invasive species)
- Great Lakes Indian Fish and Wildlife Commission (ceded territory invasive species)
- Red Cliff Band of Lake Superior Chippewa (fishery around the Apostle Islands)

Non-Governmental Organizations (NGO)

The following organizations are a sample of local NGO partners that the Ashland County Land and Water Conservation Department and its Invasive Species Program collaborate with on various invasive species projects and educational outreach.

- Bad River Watershed Association

- Chequamegon Bay Area Partnership
- Local schools (zebra mussel monitoring with Ashland High School)
- Northern Great Lakes Visitors Center
- Lake Associations (Lake Galilee Association, others)
- River Associations (Friends of the White River, others)
- Northland College/Sigurd Olsen Environmental Institute
- Wild Rivers Chapter of Trout Unlimited
- Northwood Cooperative Weed Management Area

Implementation

In 2015 the Ashland County LWCD Invasive Species Program is still relatively young, as the majority of funding was secured in the last five years with limited-term grants provided through the WDNR and Wisconsin Coastal Management Program. These grants allowed the LWCD to establish an invasive species program and develop an AIS Coordinator staff position to maintain and advance the program. The future holds the challenge of sustaining and advancing the program structure while also maintaining funding that allows for the continued focus of our goals, objectives, activities and the associated projects and successes. County support of the program and Invasive Species Coordinator position will assist the department's future ability to secure invasive species related grants through matching funds and services.

Implementing a comprehensive invasive species program in a County and region where human populations are low, distances are vast, funding is scarce, and resources are exceptional (in comparison to many other parts of the state) presents special obstacles and provides unique opportunities. Communication, education, cooperation, and collaboration are the keystones of our approach. To be useful, the Ashland County Invasive Species Strategic Plan will be implemented in the following ways:

1. The plan will be approved by the Ashland County Land Conservation Committee (LCC)
2. The plan will be provided to all members of the Ashland County Board of Supervisors and County Administrator
3. The plan will be delivered to all members of the Strategic Plan Advisory Committee and other cooperators not represented by that committee
4. The plan will be made available on the Ashland County LWCD website
5. Cooperators and partners will be encouraged to post the plan on their respective websites or link to the plan on the LWCD website
6. The LWCD and LCC will periodically review and update the plan contents and notify cooperators and partners of updates

Appendix A

Prioritizing species:

Identifying and prioritizing which species to focus prevention and control efforts on is difficult due to its subjective nature. Preventing new species introductions to the county must be a priority, but, some species are already highly established across the landscape making prevention and control difficult or impossible. The following list of factors should be considered when determining which species to focus prevention and control efforts:

- High potential for ecological impact
- High potential for economic impact
- High potential for adverse human health impact
- Low abundance on the landscape
- Low abundance in county waters (especially inland waters)
- High invasive potential
- Partner and landowner support
- Spread prevention and control options are feasible
- Opportunity for public education (e.g. purple loosestrife bio-control with schools)

Prioritizing locations:

Much like prioritizing species for focusing prevention and control efforts, attempting to prioritize locations for these efforts is also difficult and prone to subjectivity. However, the following list offers some factors for consideration when attempting to prioritize sites:

- Areas of high ecosystem integrity or high quality resources
- Areas of elevated dispersal vectors (e.g. riparian corridors, roadways, logging trails)
- Recreational areas (e.g. lakes, rivers, ATV trails, hiking trails, campgrounds)
- "Super-spreader" locations (e.g. Lake Superior, municipal properties)
- Areas with potentially high economic impact

Areas of high ecosystem integrity or high quality resources are often relatively invasive free and provide important ecosystem benefits as a result of their intact functionality. These areas should be a focal point for prevention and control efforts because of their high value. Control efforts in these locations may have greater potential for success if invasive numbers are low and native species competition is present. Areas that are highly disturbed, recreational hotspots, or are "super-spreaders" may also be important focal points for prevention (and control) strategies. Though successfully eliminating invasive species in these locations may not be feasible, preventing and controlling new species establishment and limiting the dispersal of existing invasive species is still important. For example, preventative strategies such as CBCW or boat washes at popular boat landings help limit the spread of invasive species to new locations from super-sources such as Lake Superior.

High quality coastal wetland sites and select Lake Superior Basin inland wetlands have previously been identified and prioritized (Epstein, et al., 1999; Epstein, et al., 2002). These wetlands are already designated as exemplary and recommended for protection and/or restoration and should be a focal area for invasive species monitoring and control. However, one should not overlook Ashland County's extensive complex of undisturbed inland wetlands that are no less vital and often located in critical locations such as the rich headwaters region of the Penokee Mountains and Winegar Moraine (Epstein et al., 1999). The following is a list of priority Lake Superior Basin wetlands and aquatic sites located in Ashland County as determined by Epstein et al. (1999, 2002):

Wetland Priority Sites

Outer Island Sand Spit and Lagoon
Stockton Island Tombolo
Big Bay Wetlands
Fish Creek Sloughs
Long Island-Chequamegon Point
Bad River-Kakagon Sloughs
Bad River Reservation
Caroline Lake Wetlands

Aquatic Priority Sites

Bad River Slough
Bad River

In addition to the wetland and aquatic priority sites outlined above, the WDNR designated many of the state's quality waters as Outstanding Resource Waters (ORW) and Exceptional Resource Waters (ERW). Waters designated in this program "are surface waters which provide outstanding recreational opportunities, support valuable fisheries and wildlife habitat, have good water quality, and are not significantly impacted by human activities" (WDNR, 2013b). These designated waters may also provide a focal area for AIS prevention, monitoring, and control. Similar to the priority wetlands above, efforts for these ORW/ERW waters should not exclude efforts directed toward the many additional lakes and streams throughout the county, most of which are AIS free. Table 1 provides a list of ORW/ERW in Ashland County totaling 327 stream miles and Figure 4 displays the locations of these resources.

Species and location specific data is occasionally available that will assist in prioritizing locations for monitoring efforts. For example, Table 2 provides a list of Ashland County lakes that exhibit suitable water chemistry for zebra mussel establishment. These lakes should be prioritized during early detection monitoring of zebra mussels.

Table 1: Outstanding and Exceptional Resource Waters in Ashland County, WI

Official Waterbody Name	Local Waterbody Name	WBIC	ORW/ERW	ORW/ERW ID	Start Mile	End Mile	Mileage
Augustine Creek	Augustine Creek	2410600	ERW	689	1.88	9.59	7.71
Bad River	Bad River	2891900	ORW	2011	62.2	71.28	9.08
Bad River	Bad River	2891900	ORW	2011	71.28	74.06	2.78
Bad River	Bad River	2891900	ERW	2012	37.23	43.76	6.53
Bad River	Bad River	2891900	ERW	2012	43.76	51.62	7.86
Bad River	Bad River	2891900	ORW	2011	51.62	62.2	10.58
Bad River Slough	Bad River Slough	2892100	ORW	958	null	null	0
Ballou Creek	Ballou Creek	2930700	ERW	1007	0.43	2.71	2.28
Beartrap Creek	Beartrap Creek	2891400	ORW	2111	11.88	23.03	11.15
Bosner Creek	Bosner Creek (Rapid Creek)	2291000	ERW	617	3.63	4.61	0.98
Brunsweler River	Brunsweler River	2913800	ORW	2052	21.56	24.4	2.84
Brunsweler River	Brunsweler River	2913800	ORW	2052	26.17	29.54	3.37
Brunsweler River	Brunsweler River	2913800	ORW	2054	10.38	11.37	0.99
Brunsweler River	Brunsweler River	2913800	ORW	2054	14.01	15.38	1.37
Brunsweler River	Brunsweler River	2913800	ORW	2054	11.37	14.01	2.64
Brunsweler River	Brunsweler River	2913800	ORW	2053	0	1.02	1.02
Brunsweler River	Brunsweler River	2913800	ORW	2054	9.54	10.38	0.84
Brunsweler River	Brunsweler River	2913800	ORW	2052	19.8	21.56	1.76
Brunsweler River	Brunsweler River	2913800	ORW	2054	4.2	9.53	5.33
Brunsweler River	Brunsweler River	2913800	ORW	2054	2.82	4.2	1.38
Devils Creek	Devils Creek	2929300	ERW	1006	0	7	7
East Fork Chippewa River	East Fork Chippewa River	2399800	ORW	2033	13.57	32.42	18.85
East Fork Chippewa River	East Fork Chippewa River	2399800	ERW	2032	32.83	52.23	19.4
East Fork Chippewa River	East Fork Chippewa River	2399800	ORW	2031	63.5	74.07	10.57

East Fork Chippewa River	East Fork Chippewa River	2399800	ORW	2031	52.22	63.5	11.28
East Fork Chippewa River	East Fork Chippewa River	2399800	ORW	2033	0	1.33	1.33
Flambeau River	Flambeau River	2225000	ORW	2642	71.84	121.84	50
Kakagon Slough	Kakagon Slough	2891700	ORW	956	null	null	0
Krause Creek	Krause Creek	2929000	ERW	1005	0	6	6
Marengo River	Marengo River	2911900	ORW	2122	11.74	38.51	26.77
Marengo River	Marengo River	2911900	ORW	2121	39.25	53.25	14
Pine Creek	Pine Creek	2278700	ERW	612	12.77	18.69	5.92
Spring Brook	Spring Brook	2915200	ERW	993	0	8	8
Troutmere Creek	Troutmere Creek	2919300	ERW	995	0	3	3
Tyler Forks	Tyler Forks	2923100	ORW	2073	0	1.72	1.72
Tyler Forks	Tyler Forks	2923100	ORW	2073	2.24	6.57	4.33
Tyler Forks	Tyler Forks	2923100	ORW	2073	1.72	2.25	0.53
Unnamed	Hildebrandt Creek	2285500	ERW	63	0	1.2	1.2
West Fork Chippewa River	West Fork Chippewa River	2414500	ORW	2723	0	1.39	1.39
West Fork Chippewa River	West Fork Chippewa River	2414500	ORW	2722	0	1.53	1.53
West Fork Chippewa River	West Fork Chippewa River	2414500	ORW	2721	0	4.6	4.6
White River	White River	2892500	ERW	null	13.96	63.03	49.07

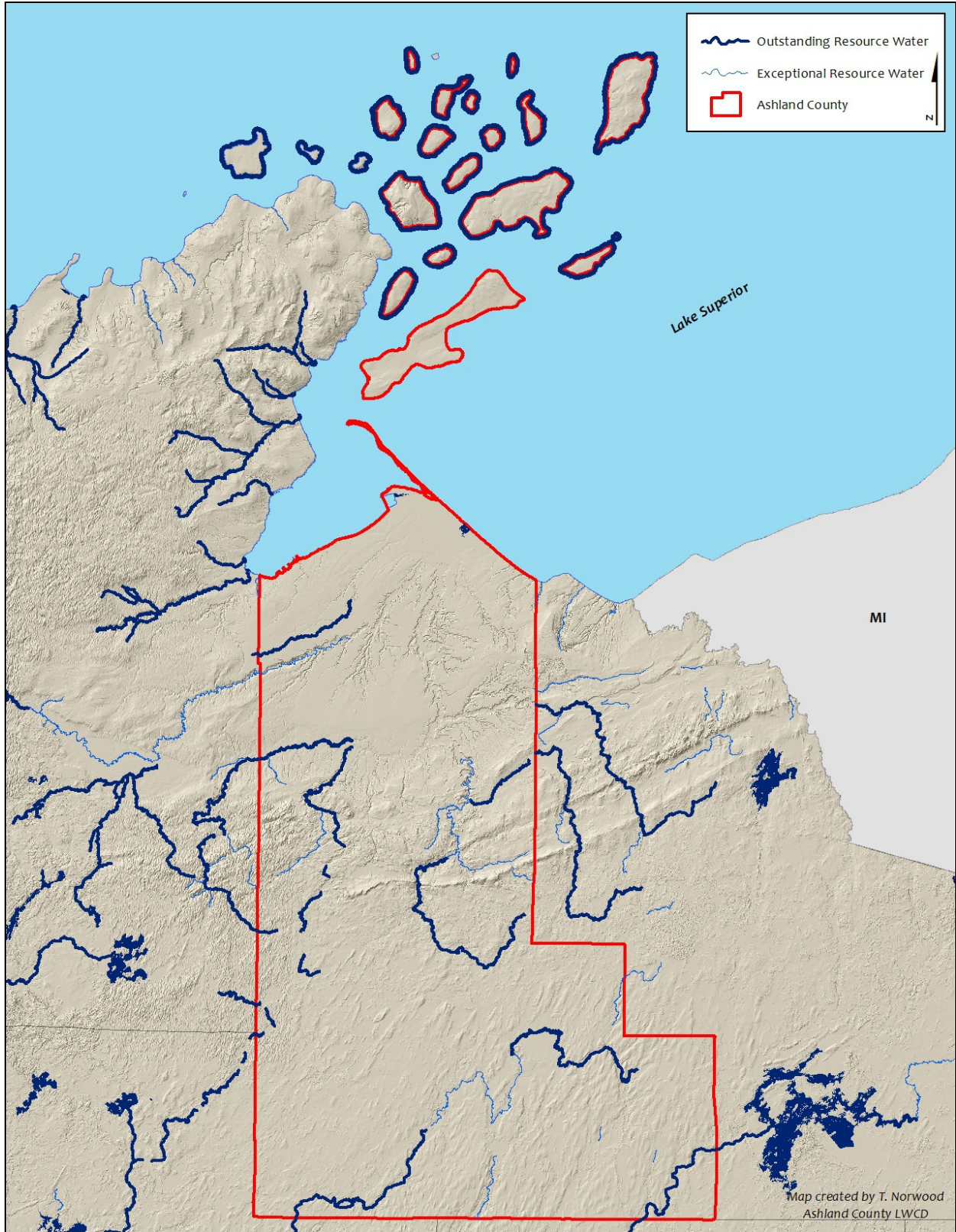


Figure 4: Outstanding and Exceptional Resource Waters

The following tables display lakes in Ashland County that exhibit predicted zebra mussel suitability. This data is extracted from Papes and Vander Zanden (2009) who predicted lake specific calcium levels based on existing conductivity data and linear regression analysis on lakes without actual measured calcium. The column "lnCa" is the natural logarithm of calcium concentrations and determines zebra mussel suitability based on the following scale:

Suitable = $\ln Ca > 3.044$

Borderline Suitable = $\ln Ca \geq 2.302$ and $\ln Ca \leq 3.044$

Unsuitable = $\ln Ca < 2.302$

Of the 202 Ashland County water bodies provided in Papes and Vander Zanden, 62 are missing conductivity levels and therefore had no suitability analysis completed suggesting the need for further data collection and research.

Table 2: Zebra Mussel Suitable Lakes in Ashland County, WI

WBIC	Lake Name	Suitability	lnCa
2019100	Unnamed	suitable	3.274053
2285200	Parker Lake	suitable	3.073382
2285700	Lindbergh Lake	suitable	3.630728
2285900	Little Butternut Lake	suitable	3.274053
2405700	Kenyon Springs	suitable	3.234312
2409700	Sells Lake	suitable	3.073382
2407400	Kempf Springs	suitable	3.057382
2407800	Unnamed	suitable	3.049284
2408900	Unnamed	suitable	3.280525
2810800	Unnamed	suitable	3.104634
2754000	Alex Pond	suitable	3.149755
2801200	Unnamed	suitable	3.260981
2811000	Unnamed	suitable	3.366999
2811100	Unnamed	suitable	3.574638
2811200	Unnamed	suitable	3.112297
2811300	Unnamed	suitable	3.598392
2811400	Unnamed	suitable	3.227533
2811500	Unnamed	suitable	3.274053
2894200	White River Flowage	suitable	3.349088
2905000	Pictured Rock Lake	suitable	3.149755
2905400	Sugarbush Lake	suitable	3.089130
2905600	Wolfs Pond	suitable	3.073382
2905800	Unnamed	suitable	3.598392
2912100	Unnamed	suitable	3.510100
2915900	Seitz Lake	suitable	3.104634

Table 3: Borderline Suitable Zebra Mussel Lakes in Ashland County, WI

WBIC	Lake Name	Suitability	InCa
2034700	Unnamed	borderline suitable	2.580905
2034800	Unnamed	borderline suitable	2.314637
2008000	Unnamed	borderline suitable	2.891060
2291800	Hoffman Lake	borderline suitable	2.593809
2430100	Cranberry Lake	borderline suitable	2.527559
2402100	Snoose Lake	borderline suitable	2.891060
2404800	Pelican Lake	borderline suitable	3.007785
2405900	Muskellunge Lake	borderline suitable	2.567833
2406500	Gordon Lake	borderline suitable	2.513766
2407900	Bullhead Lake	borderline suitable	2.347974
2427150	Unnamed	borderline suitable	2.643819
2428900	Woodtick Lake	borderline suitable	2.456608
2429600	Upper Clam Lake	borderline suitable	2.811811
2810700	Unnamed	borderline suitable	2.811811
2767500	Lost Lake	borderline suitable	2.862073
2787700	Unnamed	borderline suitable	2.619127
2810900	Unnamed	borderline suitable	2.909929
2922700	Tea Lake	borderline suitable	2.395983
2916100	Unnamed	borderline suitable	2.655941
2916900	Mineral Lake	borderline suitable	2.411487
2917200	Potter Lake	borderline suitable	2.580905
2918200	Moquah Lake	borderline suitable	2.441793
2918600	Spider Lake	borderline suitable	2.441793
2934000	McCarthy Lake	borderline suitable	2.919231
2936200	Spillerberg Lake	borderline suitable	2.513766
2935500	Lake Galilee	borderline suitable	2.747960
2935600	Eureka Lake	borderline suitable	2.606548

Previously identified locations of high quality resources or high value ecosystems are often available and may assist in prioritizing locations for prevention and control. The Ashland County Forest Comprehensive Land Use Plan (2006) considers one block of Ashland County Forest as High Conservation Value Forest. This block of county forest, located in the southern half of T44N R2W, exhibits the majority of Hemlock-Hardwood forest type located within the Ashland County Forest. Considering hemlock's low abundance at the landscape scale as a result of over-harvesting during the early 1900's and susceptibility to deer herbivory, Ashland County promotes and protects this forest type. Invasive species prevention, monitoring, and control efforts should be directed toward known or previously identified areas such as High Conservation Value Forests to ensure protection and conservation of these unique areas. However, other forest tracts without special designation can be equally important from an ecosystem and/or economic perspective and should not be neglected.

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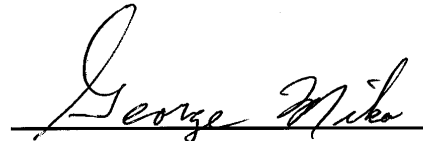
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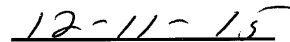
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Approval

**Ashland County
Invasive Species Strategic Plan**

APPROVED FOR FINAL PUBLICATION AND DISTRIBUTION BY THE ASHLAND COUNTY
LAND CONSERVATION COMMITTEE


George Mika, Chairman


Date