

13. Nemadji to Fish Creek

Nemadji to Fish Creek Regional Plan

This is one of twenty Regional Plans that support implementation of the Lake Superior Biodiversity Conservation Strategy (Strategy). The Strategy, prepared and overseen by the Lake Superior Partnership, contains information and 62 sub-strategies to provide guidance to restoring and protecting biodiversity (www.natureconservancy.ca/superiorbca).

Regional Plans are intended to be adaptive documents which support and respond to local conservation efforts and contribute to lakewide biodiversity goals. To contribute an update to this Regional Plan, please contact superiorplans@glno.net



The Nemadji to Fish Creek unit is located on the southwestern shore of Lake Superior in both Minnesota and Wisconsin. The Nemadji to Fish Creek regional unit includes the Apostle Islands National Lakeshore, Chequamegon National Forest, and the Red Cliff Reservation. The

National Oceanic and Atmospheric Administration's Coastal and Estuarine Land Conservation has helped protect additional lands throughout the unit, including 89 acres at Frog Bay Tribal National Park, 77 acres at Houghton Falls nature Preserve and nearly 4,000 acres in the Nemadji River corridor of Douglas County. Defining features of the unit include the Lake Superior clay plain, many coastal wetlands and rocky shores with cliffs. There is little development along the shorelines of this unit, with 88% natural cover in the coastal zone. The watersheds in this unit are nearly 53% forested; however, at just over 7% there is more agricultural land use than in other regional units. Of all the regional plans, the Nemadji to Fish Creek unit contains the greatest amount of nearshore waters at nearly 2,400 km² and just over 35% of the unit, including the relatively shallow waters around the Apostle Islands and in Chequamegon Bay. These areas provide important habitat for Lake Trout and Whitefish.

The Nemadji watershed is included in the boundaries of the St. Louis Area of Concern (AOC). The Remedial Action Plan (RAP) for the St Louis AOC identifies two projects in the Nemadji River that will address beneficial use impairments and are important to preserving biodiversity. This unit also contains two Superfund sites in Chequamegon Bay. Remediation of these sites would further enhance the health of critical habitats, such as fish spawning grounds, for key species in the basin.

Coastal wetlands comprise 14% of the coastal area in this unit, and nearly 9% of the coastal wetland throughout Lake Superior (LAMP 2013). These wetlands provide highly productive habitat for a wide range of species. Many coastal wetlands occur at river mouths and are connected to Lake Superior, providing essential habitat for spawning and early life history stages of Lake Superior fish. Development pressures threaten the continued existence of these areas. At least 207 species and communities of conservation concern have been documented in this regional unit, including Wood Turtle and Long-eared Owl.^{1,2}

¹For the Minnesota portions of this unit, data included here were provided by the Division of Ecological and Water Resources, Minnesota Department of Natural Resources (DNR), and were current as of December 3, 2014. These data are not based on an exhaustive inventory of the state. The lack of data for any geographic area shall not be construed to mean that no significant features are present.

Report Card ³		Overall Grade: B
Conservation Target	Grade	Conservation Target Notes
Nearshore	C	Habitat degradation from sedimentation is a concern for nearshore habitats in this unit, but not uniformly. Chequamegon Bay is of particular concern, while other nearshore areas provide quality habitat.
Embayments	C	Chequamegon Bay is the primary embayment in this unit. With shallow depths it is vulnerable to increasing temperatures associated with climate change. Coastal development has hardened shorelines in the bay.
Islands	A	Protected as a National Park, the Apostle Islands provide important habitat for a variety of species and ample recreational opportunities.
Coastal Wetlands	B	The wetland complex at the mouth of the Nemadji River is negatively affected by sedimentation and development. However, many coastal wetlands at river mouths throughout the unit have been identified as intact and ecologically significant. Coastal wetlands in this unit are threatened by invasive species.
Coastal Terrestrial	A	There is a high amount of natural land cover in this unit. However, conversion of conifers to aspen and fragmented habitat threaten coastal terrestrial habitats.
Tributaries & Watersheds	C	The combination of soils, landform and land use result in flashy stream systems and heavy erosion in streams throughout the unit. Potential barriers to fish passage at the over 2,600 road stream crossings may limit aquatic populations.

For the Wisconsin portions of this unit, data included here were provided by the Bureau of Natural Heritage Conservation, Wisconsin Department of Natural Resources (DNR). Although the Natural Heritage Inventory database is the most up-to-date and comprehensive database on the occurrences of rare species and natural communities available, many areas of the state have not been inventoried. Similarly, the presence of one rare species at a location does not imply that all taxonomic groups have been surveyed for at that site. As such, the data should be interpreted with caution and an "absence of evidence is not evidence of absence" philosophy should be followed.

²For a full list of the species and communities documented in the regional unit please see the corresponding [regional unit chapter](#) in Volume 2 of the Lake Superior Biodiversity Conservation Assessment.

³Report Card grades are intended to denote relative (within Lake Superior basin) condition/health and stresses for each biodiversity target in the region based on available condition and stress indices. A more detailed explanation and expert comments on grades are available in the Lake Superior Biodiversity Conservation Assessment - Volume 2: Regional Unit Summaries.

Conservation Opportunities

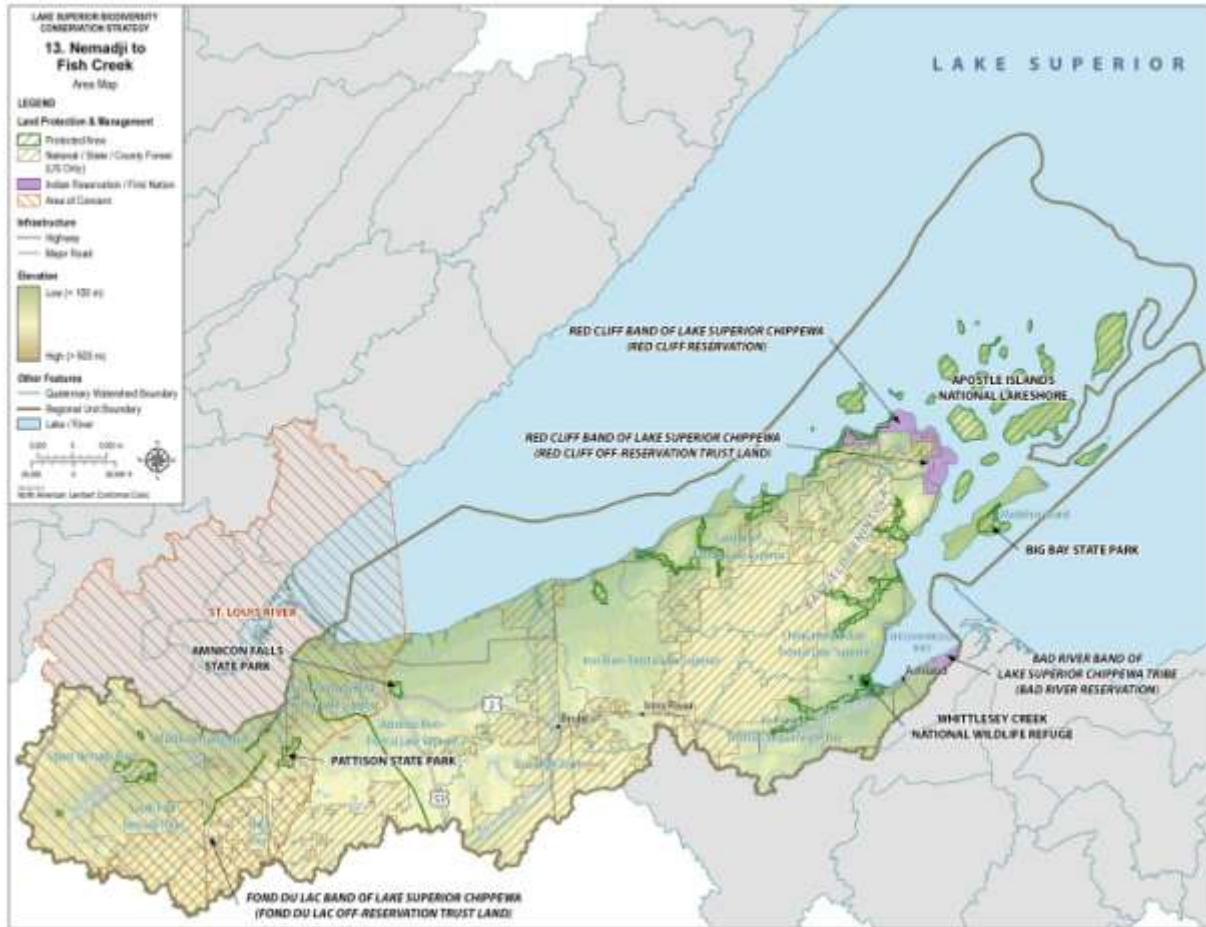
The Nemadji to Fish Creek regional unit is prone to erosion and sedimentation issues and is one of the largest sources of sediment to Lake Superior (NRCS no date). Accelerated runoff and non-point source pollution affecting both in-channel and nearshore habitats are major threats to biodiversity. The region's soils, land form and land use (in particular the conversion of native forests to agricultural and open lands at the beginning of the 20th century), result in rapid runoff and increased peak flows. This altered hydrology increases erosion and sedimentation, with significant effects on streams by smothering spawning habitat and simplifying stream channels. Accelerated sedimentation also results in substantial amounts of dredging in Superior Bay. Opportunities to prevent sedimentation and tributary erosion are outlined in the Nemadji River Basin Plan (NRCS 1998), and should be implemented in the Nemadji River watershed to preserve instream and estuary habitats for biodiversity.

Restoration opportunities exist on both private and public lands throughout this unit. In areas of private ownership (58% of the unit), any actions to conserve and promote biodiversity must invest and engage the citizenry about the importance of biodiversity and how their actions influence future conditions.

Climate change presents significant threats to resources in this unit, in particular northern forests and species at the southern end of their range. Chequamegon Bay is highly susceptible to climate change impacts. As one of the warmest, shallowest, most isolated and southerly bays throughout the Lake Superior basin, Chequamegon Bay will likely experience climate change impacts sooner than other locations. Establishment of a long term climate change research site in Chequamegon Bay will help identify changes at the leading edge of climate change impacts.

Invasive species are an ecological threat to habitats in the region, particularly the coastal wetlands throughout this unit. Preventing the introduction, establishment and spread of aquatic invasive species (AIS) is an important protection action, including prevention of new introductions from ballast water. The Duluth Superior Harbor receives the greatest volume of ballast water of any of the ports on the Great Lakes. Many of the aquatic invasive species that have been introduced to Lake Superior have come from ballast water.

Area Map: Nemadji to Fish Creek Regional Unit



Conservation Actions

The Lake Superior community has a strong and ongoing history of taking action to restore and protect the lake’s extraordinary biodiversity. Actions are occurring at all scales – from national, state, provincial, tribal, First Nations, Métis, and municipal programs, to lakewide initiatives, to local projects by communities, businesses and households. Some important habitats currently have a conservation designation with a corresponding management strategy. Active supervision of these areas is essential to sustaining biodiversity. The table below presents next steps for conserving and protecting biodiversity in this regional unit. Other existing plans relevant to conserving habitats and species in this region should continue to be implemented. A list of existing plans relevant to the next steps presented below is presented at the end of this document.

Regional Plan Next Steps

There is some variation among Regional Plans in how future actions from existing plans were incorporated into this document, based on advice from the implementers of those plans in the region. Similarly, implementation approaches vary greatly among regional units. The Lake Superior Partnership serves an important role in facilitating cooperation among agencies to support on-the-ground action. Priority implementation actions developed through the Partnership are identified in the Lake Superior LAMP, Lake Partnership committee work plans, and agency specific action plans.

Regional Objective	Next Step	Conservation Target	Primary Lakewide Strategy
Lakewide Strategy 1: Restore and protect a system of representative, high quality habitats.			
<i>Common Actions For All Regional Plans</i>			
Maintain or enhance areas where large blocks of land with natural cover exist or could be expanded, including natural travel corridors to connect these large blocks of land.		Multiple	1.1
Preserve sites that have high species diversity and/or critical habitat for fish or wildlife.			
Maintain or enhance large blocks of protected land with natural cover along the mainstem and at the mouth of the Brule River for protection for cold water species and aquatic habitat.	Support consolidation of large blocks of public land through acquisition, strategic land exchanges or conservation easements.	Tributaries & Watersheds	1.2
Maintain or enhance large blocks of protected land with natural cover at the mouth of the Amnicon River for protection of migratory birds and other wildlife.	Support consolidation of large blocks of public land through acquisition, strategic land exchanges or conservation easements.	Tributaries & Watersheds	1.2
Maintain or enhance large blocks of protected land with natural cover by expanding the Nemadji River Protection Area for water quality and wildlife.	Support consolidation of large blocks of public land through acquisition, strategic land exchanges or conservation easements.	Tributaries & Watersheds	1.2

Regional Objective	Next Step	Conservation Target	Primary Lakewide Strategy
Maintain or enhance large blocks of protected land with natural cover at Mount Ashwaybay, a remnant old growth forest.	Support consolidation of large blocks of public land through acquisition, strategic land exchanges or conservation easements.	Tributaries & Watersheds	1.2
Protect the habitats of biological significance with special consideration of the barrens of the interior Bayfield peninsula.	Implement best management practices for Kirtland’s Warbler and other barren depended bird species (Anich et al. 2014).	Tributaries & Watersheds	1.1
	Discourage loss of Jack Pine to Red Pine.		
Protect the habitats of biological significance, with special consideration to promoting softened, natural shorelines on Lake Superior.	Investigate the possibility of removing the old landfill on Wisconsin Point to restore ecosystem and hydrologic connectivity to a Lake Superior coastal wetland and embayment.	Coastal Wetlands	1.3
	Manage beach and dune habitat at Wisconsin Point near Superior as part of a vegetation mosaic that includes forested ridge and swale, interdunal wetland, shrub carr, and swamp conifer forest with older age classes.		
	Investigate the possibility of removing of unused ore docks at the mouth of the Nemadji River in the St. Louis River Estuary and subsequent restoration of coastal wetlands, habitat for the piping plover and wild rice.		
Protect the habitats of biological significance, with special consideration to promoting softened natural shorelines on inland lakes.	Focus restoration efforts on lakes that have completed management plans. Top priority lakes include Lake Nebagamon and Lake Amnicon. Moderate priority lakes include Lake Minnesuing and Half Moon Lake.	Tributaries & Watersheds	1.3
	Conduct shoreland inventories to identify restoration priorities when needed.		1.9
	Restore in-lake woody habitat and multi layered, vegetated shoreline with native species.		1.3

Regional Objective	Next Step	Conservation Target	Primary Lakewide Strategy
Protect habitat of biological significance for Common Tern.	Maintain the structural integrity of Tern Island, a former wooden pier remnant that contains one of two colonies of this state-endangered species in Lake Superior.	Inshore & Embayments	1.3
	Ensure predator exclusion structures are functioning on Tern Island.		
	Monitor Emerald Shiner and Spottail Shiner populations in Chequamegon Bay to evaluate prey base for terns.		
Protect the habitats of biological significance for the Alkali Bluet Dragonfly. Allouez Bay is the only site east of the Rocky Mountains where the Alkali Bluet Dragonfly (an S1/endangered & species of greatest conservation need) is found.	Protect habitat including littoral areas less than 1 foot deep for egg laying.	Inshore & Embayments	1.1
Protect the habitats of biological significance for early successional species, in particular the Golden-Winged Warbler.	Protect and restore deciduous forests and shrub communities near the Lake Superior shoreline.	Coastal Terrestrial	1.3
	Promote best management practices outlined in the Golden-Winged Warbler Working Group (2013).	Multiple	
Promote landscape scale approaches to maintain or restore hydrology and water quality in catchments that contribute to peak flow increases (Wheeler et al. 2015).	Re-establish conifer forests.	Tributaries & Watersheds	1.1
	Disrupt flow paths in ditch networks associated with roads or agricultural lands, wetlands, dams, etc.		1.3
	Encourage cover crops and filter strips in agricultural lands.		1.3
	Establish a demonstration project at the appropriate spatial scale to evaluate slow the flow management practices under present day and future climate scenarios.		1.10
	In the City of Superior, offer additional funding for clean-up or incentives to encourage developers to build on brownfields and preserve green spaces to protect habitat and reduce runoff by minimizing impervious area.		1.8

Regional Objective	Next Step	Conservation Target	Primary Lakewide Strategy
Promote landscape scale approaches to maintain or restore wildlife habitat, hydrology and water quality in wetlands.	Restore wetlands in areas identified by the “Potentially Restorable Wetlands” project.	Multiple	1.3
	Restore wetlands in areas identified by the “Functional Wetland Assessment” project.		
	Restore migratory bird habitat on Mud Lake.	Tributaries & Watersheds	
	Restore wetlands at Stora Enso Bay and Coffee Grounds Flats.		
	Restore wetland functions at the abandoned wastewater treatment lagoons in Port Wing.		
	Continue to monitor the biodiversity composition and threats to estuaries and associated rare species along Wisconsin’s Lake Superior shoreline.	Coastal wetlands	
	Restore Wild Rice in Allouez Bay.		
	Promote diverse wetland habitat by preventing development in wetlands.		
Promote landscape scale approaches to maintain or restore hydrology and water quality from non-point source pollution impacts.	Conduct outreach about effects on water quality from: Loading of salt/sand on road networks,	Tributaries & Watersheds	1.8
	Street cleaning programs, improved snow management and sediment traps in storm sewers in urban areas,		
	Agricultural best management practices such as vegetative buffers, cover cropping and manure management,		
	Acute/chronic sedimentation at road stream crossings.		
Gain a greater understanding of observed increases in levels of bacteria at beaches and effects on aquatic systems.	Investigate possible climate related impacts.	Multiple	1.11
	Investigate tributary loading as a source.		
	Investigate effects on nearshore food web.		

Regional Objective	Next Step	Conservation Target	Primary Lakewide Strategy
Gain a greater understanding of water quality conditions.	Continue tributary nutrient and sediment monitoring on the Nemadji, Sioux, South & North Fish Creeks and smaller tributaries draining to Chequamegon Bay to determine loading and priority watersheds for restoration.	Tributaries & Watersheds	1.11
	Continue tributary nutrient monitoring on the Bois Brule to determine loading and priority watersheds for restoration.		
	Identify cause of high turbidity in Allouez Bay by investigating re-suspension, small tributary and Nemadji River inputs.	Inshore & Embayments	
Increase people's awareness of and challenges to conserving critical aspects of Lake Superior's biodiversity, with emphasis on describing the importance of cold water tributaries, wetlands and unique habitats.	Utilize existing GIS information and tools to encourage protection of biodiversity features and functions into local land use planning/zoning (e.g. conservation overlay).	Tributaries & Watersheds	1.8
Lakewide Strategy 2: Manage plants and animals in a manner that ensures diverse, healthy and self-sustaining populations.			
<i>Common Next Steps For All Regional Plans</i> Review lists of regional species of conservation concern and identify gaps in monitoring, planning, and related conservation actions.		Multiple	2.7
Achieve and maintain genetically diverse self-sustaining populations of Lake Trout that are similar to those found in the lake prior to 1940 (Horns et al. 2003).	Conduct annual surveys to determine Lake Trout population status and trends.	Nearshore	2.4
	Suppress Sea Lamprey populations to levels that promote sustainable fisheries (Strategic Vision of the Great Lakes Fishery Commission 2011-2020).	Tributaries & Watersheds	3.2
	Identify any new potential Lake Trout restoration or protection actions in the region.	Multiple	2.4

Regional Objective	Next Step	Conservation Target	Primary Lakewide Strategy
Restore and protect self-sustaining Brook Trout populations in as many of the original, native habitats as is practical, with emphasis in priority areas (Quinlan et al. 2015).	Conduct barrier removal projects that do not expand available spawning habitat for Sea Lamprey.	Tributaries & Watersheds	2.4
	Install in-channel structures that increase cover and channel complexity in areas outside of hydrologically degraded catchments (Wheeler et al. 2015).		2.3
	Conduct barrier removal projects that do not introduce non-native salmonids into areas currently without them.		2.3
	Establish forested riparian areas for stream shading and long term wood recruitment.		2.2
	Incorporate protective harvest regulations in some streams.		2.4
	Continue stocking Lake Superior strain Brook Trout.		2.4
Protect and restore Wood Turtles with priority in the Nemadji watershed.	Identify and protect nesting areas utilized by Wood Turtles.	Tributaries & Watersheds	2.9
	Create and maintain nest sites in open sandy areas away from roads and within 200 feet of over-wintering streams.		
	Determine if nest predators are having a significant effect on Wood Turtle populations and explore nest caging or lethal control of predators in the vicinity of nest sites during nesting season.		
	Determine where turtles are most vulnerable at road-stream crossings and install turtle crossings signs or underpasses for safe passage.		
Inventory and monitor the distribution of and trends in herptile populations.	Continue and expand volunteer based call surveys for frogs and toads.	Multiple	2.9
	Investigate the performance of automated frog call loggers.		
	Survey herptile populations utilizing multi-gear approaches (Hecnar and Casper 2009).		

Regional Objective	Next Step	Conservation Target	Primary Lakewide Strategy
Protect and restore Piping Plover and their biologically significant habitats.	Complete and implement a regional management plan for Piping Plover in the Lake Superior Basin.	Coastal Terrestrial	2.3
	Band all Piping Plover chicks within 7-10 days of hatching.		
	Install predator exclosures over Piping Plover nests to deter mammalian predation.		
	Protect nesting Piping Plover from public disturbance on Wisconsin Point and Allouez Bay.		
	Remove large wood that can serve as cover for Piping Plover predators.		
Protect and restore native mussels and their biologically significant habitats.	Determine the effect of manmade structures on mussel beds.	Multiple	2.10
	Investigate the health of the Eastern or Atlantic Elliptio (<i>Elliptio complanata</i>), a State Special Concern mussel.	Tributaries & Watersheds	2.9
	Inventory mussels in un-surveyed streams and rivers, including small headwater streams.		
	Identify the presence, distribution and available habitat of threatened, endangered, and native mussels.		
Protect the habitats of biological significance for grassland birds, in particular Sharptail Grouse (Naas et al. 2014).	Maintain or develop sites with 10-30% patchy brush cover no greater than six feet in height.	Tributaries & Watersheds	2.3
	Promote dispersal corridors between open grassland patches.		
	Maintain or create rough edge along the field-forest transition, leaving some pole sized trees for other species (consistent with the Young Forest Initiative).		
	Encourage no haying and or mowing prior to July 15.		
	Convert the species composition of grasslands to diversify the structural and floral components.		2.2

Regional Objective	Next Step	Conservation Target	Primary Lakewide Strategy
	Measure genetics of disperse Sharptail Grouse populations to determine if dispersal between populations is achieved.		2.8
Restore and protect a self-sustaining assemblage of preyfish dominated by indigenous species at population levels capable of supporting desired populations of predators and a managed commercial fishery (Horns et al. 2003).	Create a management/recovery plan for select prey species, i.e. Shortjaw Cisco, Cisco and Bloater Chub.	Nearshore	2.3
Maintain self-sustaining populations of Lake Whitefish within the range of abundance observed during 1990-99 (Horns et al. 2003).	Conduct surveys to determine Lake Whitefish population status and trends.	Nearshore	2.4
	Protect nearshore areas used by adult Lake Whitefish for foraging and spawning.		2.3
	Protect embayments and the nearshore areas which provide habitat for developing larvae and juveniles.	Multiple	
	Restore where feasible documented river-spawning populations (Lawrie and Rahrer 1972).	Tributaries & Watersheds	
Lakewide Strategy 3: Reduce the impact of existing aquatic invasive species and prevent the introduction of new ones.			
<i>Common Next Steps For All Regional Plans</i>			
Control high priority infestations of aquatic species, including continued control of Sea Lamprey.		Multiple	3.2
Prevent the introduction and spread of aquatic invasive species: priority control projects.	Maintain Sea Lamprey barriers on the Brule, Middle and Iron Rivers during migration periods. Allow for passage of others species as feasible.	Tributaries & Watersheds	3.4
	Remove the invasive strain of phragmites from the wastewater treatment facilities at Red Cliff, Washburn and Bayfield; conduct additional surveys to identify and treat satellite populations around those facilities.	Coastal Wetlands	3.2
Prevent the introduction and spread of aquatic invasive species: priority early detection projects.	Develop and implement an early detection and rapid response program for invasive plant species in embayments and coastal areas.	Inshore & Embayments	3.1

Regional Objective	Next Step	Conservation Target	Primary Lakewide Strategy	
	Continue fisheries and benthos early detection monitoring in Chequamegon Bay and St. Louis/Nemadji River estuary.			
	Continue early detection monitoring programs in inland lakes.	Tributaries & Watersheds		
	Continue and expand citizen based Riverine Early Detectors program in lotic habitats.			
Prevent the introduction and spread of aquatic invasive species: priority prevention/education projects.	Continue conducting ballast water inspections on at least 25% of all vessels, with emphasis on conducting inspections on vessels previously not inspected.	Multiple	3.8	
	Develop a financially feasible and effective ballast water treatment system that utilizes multi-treatment approach to prevent and reduce transport of viable organisms in ballast water and ballast sediments.			3.11
	Support partnerships between public and academic organizations to research ballast treatment systems.			
	Develop native plant ordinances that could be utilized by local municipalities throughout the basin. The ordinance could require native plantings on municipality-sponsored landscaping projects.			
	Develop incentives and draft ordinances that encourage native plant landscaping on commercial and industrial projects. Could include draft landscaping plans.			
	Install boat wash station at Loonsfoot landing near Superior on Lake Superior.	Coastal Terrestrial	3.9	
	Inform the public about AIS at boat landings and marinas.		3.11	

Regional Objective	Next Step	Conservation Target	Primary Lakewide Strategy
	Implement new cost share programs or continue voluntary programs to monitor for and aggressively eliminate invasive species, especially in beach, dune, barrens, and coastal fen communities.		3.9
Lakewide Strategy 4: Adapt to climate change.			
<i>Common Next Steps For All Regional Plans</i> Incorporate climate change model projections and adaptive management measures into natural resource management plans.		Multiple	4.1
Develop a coldwater resource protection plan that will identify and evaluate probable climate change impacts.	Utilize FishVis (Stewart et al. 2015) stream temperature models to prioritize watersheds with projected persistent cold water habitats.	Tributaries & Watersheds	4.11
	Identify and map groundwater recharge areas.		
	Identify and map groundwater discharge areas.		
	Identify groundwater/surface water interactions.		
	Identify the amount of groundwater withdrawal that will result in a reduction of groundwater contributions to streams.		
Gain a greater understanding of habitat and species' climate change vulnerabilities and management options in the inshore and nearshore.	Develop fine scale modeling of current and wave action that allow us to predict and better understand potential effects of climate change on water quality.	Multiple	4.11
	Identify areas of Lake Superior that are vulnerable to eutrophication.		4.13
Gain a greater understanding of herptile habitat, species vulnerabilities and management options due to climate change.	Conduct a vulnerability assessment for the Mink Frog; Wood Frog; Pickerel Frog; Spotted, Red-backed and Blue-spotted Salamanders; and Northern Ring-necked Snake.	Tributaries & Watersheds	4.13
	Identify and determine management options for projected range expansions/retractions of herptile species.		

Regional Objective	Next Step	Conservation Target	Primary Lakewide Strategy
Decrease the number and volume of combined sewer overflows and wastewater treatment facility overflows.	Evaluate the stormwater capacity of wastewater treatment facilities with respect to potential increases in flood events associated with climate change.	Tributaries & Watersheds	4.1
Mitigate the contribution of greenhouse gases to the environment.	The City of Superior's landfill generates approximately 2,000 tons of methane annually (according to EPA, equivalent to >50,000 tons of CO ₂ annually). Determine an affordable option to convert the methane to fuel to allow landfill gas to be used in place of diesel for vehicles, reducing the carbon footprint of both the landfill and vehicles using the fuel.	Multiple	4.7
	Work with industry to evaluate and identify ways to reduce carbon footprint in everyday operations.		
Implement adaptation actions to account for changes in variability and/or frequency in air and water temperatures, water levels, storm events, droughts, etc.	Replace inadequate road and stream crossings in vulnerable watersheds; ensure they can sustain at least a 100-year flow event.	Tributaries & Watersheds	4.2
	Identify and manage for travel corridors to allow for species shifts, with emphasis on connecting large blocks of natural habitat.	Multiple	
Implement adaptive plant and forestry management practices that respond to climate change to minimize possible disturbances that impact Lake Superior.	Enhance riparian forest diversity and resiliency, with emphasis on encouraging native spruce.	Tributaries & Watersheds	4.3
Develop and implement a long term climate change monitoring strategy.	Identify and monitor at priority stream gauge stations to track how discharge and temperature could be changing with respect to climate change.	Multiple	4.11
	Identify and monitor at priority watersheds to measure nutrient and sediment loading.		

Regional Objective	Next Step	Conservation Target	Primary Lakewide Strategy
Lakewide Strategy 5: Reduce the negative impacts of dams and barriers by increasing connectivity and natural hydrology between the lake and tributaries.			
<i>Common Next Steps For All Regional Plans</i>			
Address barriers to fish passage created by dams, hydroelectric generation, or misplaced, or wrong sized culverts. Maintain flows and water levels on managed streams, rivers and lakes that emulate natural conditions (i.e., magnitude, duration, timing, and pattern).		Tributaries & Watersheds	5.2
			5.3
Maximize the extent of connected aquatic habitats and stream reaches to provide for self-sustaining native populations of aquatic organisms in the region.	Inventory, assess and prioritize barrier-removal projects in regional unit, without expanding the range of exotic species.	Tributaries & Watersheds	5.2
	Replace perched culverts to restore connectivity to warm water fish habitat, particularly in Bluff Creek in the Allouez Bay watershed.		
	Estimate risk of failure for infrastructure in present and future climates and identify vulnerable subwatersheds.		5.1
	Restore passage to tributary streams with priority on projects that maximize the benefit/cost ratio.		5.2
	Conduct outreach to individuals, townships, counties and other partners to encourage investment in fish friendly culvert design.		5.1
Lakewide Strategy 6: Address other existing and emerging threats that may impact important habitat or native plant and animal communities.			
Conduct sustainable forestry practices throughout the regional unit.	Consider the variability and dynamic ecology of the landscape and forest types to restore more historically natural forest types.	Multiple	6.6
	Increase representation of conifers in riparian areas.	Multiple	6.6
	Promote a variety of age classes, species diversity, and habitat elements such as downed woody debris and snags.	Tributaries & Watersheds	6.1

Regional Objective	Next Step	Conservation Target	Primary Lakewide Strategy
Increase representation of coastal boreal forest, in particular cedar, hemlock, white and yellow birch, red and white pine.	Retain existing boreal species.	Tributaries & Watersheds	6.6
	Utilize sound forest management practices when managing non-boreal species.		6.1
	Planting of boreal species.		
Prevent the spread of high priority terrestrial invasive species in the region.	Eradicate known populations of Japanese Knotweed mapped in Bayfield, Cornucopia, Herbster, Iron River and Washburn.	Tributaries & Watersheds	6.8
	Eradicate buckthorn near Four Mile Creek, part of the South Shore Lake Superior Fish and Wildlife Area, sections 17 and 20 T49N R6W Bayfield County.		

Regional Plan Development

Regional Plans are informed by a technical assessment, including maps of: 1. Coastal and Watershed Features; 2. Condition, and; 3. Important Habitat Sites. This information is available at:

www.natureconservancy.ca/superiorbca .

The public and stakeholders who are connected to these areas provided input to the Next Steps in each Regional Plan. Oversight was provided by a Steering Committee from the Lake Superior Partnership. All input was considered and incorporated whenever possible and when relevant to a lakewide biodiversity conservation targets and threats. To contribute an update to this Regional Plan, please contact superiorplans@glmpo.net.

Existing Plans

Other existing plans relevant to conserving habitats and species in this region should continue to be implemented, including but not limited to:

- Bird Conservation Plan for the Boreal Hardwood Transition (Bird Conservation regional 12 – US Portion)
- Chequamegon Bay Area Partnership Strategic Plan
- City of Superior Special Area Management Plan
- Coastal and Estuarine Land Conservation Plan
- Great Lakes Fishery Commission - A Brook Trout rehabilitation plan for Lake Superior
- Great Lakes Fishery Commission - A Lake Trout restoration plan for Lake Superior
- Joint Venture Bird Plans
- Piping Plover Management Plan
- St. Louis River Remedial Action Plan
- Wisconsin DNR Copper Falls State Park Master Plan
- Wisconsin DNR Lake Superior Action Plan
- Wisconsin DNR Lake Superior Estuary and Coastal Wetland Biotic Inventory Plan
- Wisconsin DNR Statewide Strategic Plan for Invasive Species
- Wisconsin DNR White River Property Group (Ashland and Bayfield Counties) Master Plan
- Wisconsin DNR Wildlife Action Plan
- Wisconsin Initiative on Climate Change Impacts
- Wisconsin Lake Superior Basin Brook Trout Plan

References

- Anich, N., J. Bodine, T. Doolittle, D. Eklund, K. Grevels, B. Hanson, B. Heeringa, G. Kessler, R. Magana, A. Wydeven. 2014. Recommended practices for Kirtland's Warbler Habitat Restoration in the Lake Superior Basin. Prepared for the Lake Superior Landscape Restoration Partnership.
- Golden-winged Warbler Working Group. 2013. Best Management Practices for Golden-winged Warbler Habitats in the Great Lakes Region.
- Horns, W.H., C.R. Bronte, T.R. Busiahn, M.P. Ebener, R.L. Eshenroder, T. Gorenflo, N. Kmiecik, W. Mattes, J.W. Peck, M. Petzold, D.R. Schreiner. 2003. Fish-community objectives for Lake Superior. Great Lakes Fish. Comm. Spec. Pub. 03-01. 78 p.
- Quinlan, H., T. Koehler, M. Wheeler, P. Piszczek, S. Toshner, T. Fratt, C. Abel, C. Dean, S. Reinecke, J. Mineau-, M. Gardner, G. Haughn, C. Borden, K. Brewster and S. Stipetich. 2014. Recommended Practices for Brook Trout in the Lake Superior Basin. Prepared for the Lake Superior Landscape Restoration Partnership.
- Lake Superior Lakewide Action and Management Plan (LAMP) - Superior Work Group. 2013. Lake Superior Biodiversity Conservation Assessment: Regional Unit Summaries. 222 p.
- Lawrie, A. H. and J. F. Rahrer. 1972. Lake Superior: Effects of Exploitation and Introductions on the Salmonid Community. Journal of the Fisheries Research Board of Canada. Vol29, No. 6. pp 765-776.
- Naas, T., G. Kessler, F. Strand, T. Doolittle. 2014. Recommended Practices for Sharptail Grouse Habitat Restoration in the Lake Superior Basin. Prepared for the Lake Superior Landscape Restoration Partnership.
- Natural Resources Conservation Service (NRCS). No date. Rapid Watershed Assessment Resource Profile Beartrap – Nemadji (MN/WI) HUC: 04010301.
- Natural Resources Conservation Service (NRCS). 1998. Erosion and Sedimentation in the Nemadji River Basin Project Final Report. U.S. Forest Service. January. Ashland, WI.
- Sauer, J. R., J. E. Hines, J. E. Fallon, K. L. Pardieck, D. J. Ziolkowski, Jr., and W. A. Link. 2014. The North American Breeding Bird Survey, Results and Analysis 1966 - 2013. Version 01.30.2015 USGS Patuxent Wildlife Research Center, Laurel, MD. 148 p.
- Stewart, J. S., S. M. Westenbroek, M. G. Mitro, J. D. Lyons, L. E. Kammel, and C. A. Buchwald. 2015. A model for evaluating stream temperature response to climate change in Wisconsin: U.S. Geological Survey Scientific Investigations Report 2014–5186. 64 p.
- Wheeler, M., J. Gallagher, D. Kafura, M. Wick, T. Bernthal, D. Veen, J. Mineau, K. Brewster, M. Hudson, T. Hollenhorst, and T. Fratt. 2014. Recommended Practices for Water Quality/Slow the Flow Restoration in the Lake Superior Basin. Lake Superior Landscape Restoration Partnership.