

PROPOSED TECHNICAL FRAMEWORK FOR GREAT LAKES HABITAT/SPECIES CONSERVATION

As Great Lakes Tribes and First Nations remind us, the health of Great Lakes habitats and species is dependent on sustaining the processes and functioning of the following systems: open/nearshore waters; coastal wetlands; coastal shore; streams, tributaries, connecting channels; inland lakes and wetlands; and uplands. Human health as well is dependent on the vitality of these systems, for they comprise the

life support system upon which all else depends. The Lakes, for example, provide us with drinking water; wetlands help control floodwaters; forests provide oxygen while reducing erosion and sedimentation; coastal habitats provide stability; upland landscapes produce topsoil and habitats for pollinators and biocontrol agents. These systems are the natural capital of the Great Lakes region. When they are healthy,

we enjoy abundant natural capital. Conversely, when these systems are degraded, polluted, over-used, or wasted, this and future generations of all living species are impoverished.

GREAT LAKES SYSTEMS Outlines six systems and their processes and functions in order to frame the issues and recommendations and lists major habitats and species within each system. This is not an exhaustive listing; however, it will form the basis for further goal and objective setting.	DESIRED STATE Presents a general vision statement for each system. Needs to be concrete, compelling, and synergistic, and build on existing efforts.	KEY THREATS Lists the current and major threats to habitats and species within each system; general statements of the human activities that contribute to the threats. These are the organizing principles by which goals and objectives are set and decisions are made.		CURRENT ISSUES Lists the current and critical problems that need our immediate attention. To preserve ecosystem processes and functions, however, all key threats must be addressed, perhaps in a long term strategy yet to be developed.	RESEARCH/MONITORING INFORMATION NEEDS Statements of known research, monitoring and information needs for each system. This listing is incomplete.	POLICIES/LAWS/REGULATIONS An initial, incomplete list of just a few laws for each system. Most of the laws (e.g., Lacey, Fish and Wildlife, Clean Water, Endangered Species, Food Security, and Federal Highway Aid acts) apply to or impact (by design or default) more than one or even all systems. Decision criteria for inclusion needs to be developed. Once a coastal strategy is crafted, the list should be reviewed to include amendments, implementing regulations, and court interpretations. Relevant state and local authorities need to be incorporated at least by the implementation phase. "Research/Monitoring/Information Needs" contains statements of known research, monitoring and information needs for each system. This listing is incomplete.	ONGOING EFFORTS An incomplete listing of plans, restoration activities, and efforts by federal, state, tribal, local, NGO, academic entities. The listing needs to be categorized to make it more understandable.	RECOMMENDATIONS Intended to list concise recommendations to begin to deal with the current issues. Recommended actions should address multiple threats and issues. Meaningful restoration can occur only in the context of ongoing protection. Therefore, a long term strategy that outlines habitat/species goals and objectives, as well as includes provision for ecosystem outcome-based evaluation of protection/restoration actions, is recommended. Some issues may be addressed by other strategy teams or ongoing efforts (e.g.: Annex 2001)
		Stresses	Sources of Stresses					
<p>Open/nearshore waters—Lakes Superior, Michigan, Huron, Erie and Ontario exert climatic influence over the entire region. The Lakes are among the world's largest freshwater bodies and the only ones of such scale located in a temperate climate. The Lakes provide the bulk of the basin's human population with drinking water, commerce and recreation. Phytoplankton convert the energy of sunlight and chemical nutrients found in the surrounding waters to biomass via photosynthesis. The Great Lakes fishery is dependent on nearshore aquatic habitats for spawning and life cycle needs. Waterfowl, raptors and colonial waterbirds dependent on open waters for food.</p> <p><i>Habitats/Biodiversity:</i> Reefs (natural and artificial), islands</p> <p>Phytoplankton, algae, zooplankton, benthic invertebrates, and numerous species of fish, both native and non-native. Importance of submersed aquatic plants</p>	<p>Great Lakes open and nearshore waters are free of toxic contamination; non-indigenous species have been prevented and controlled; and the lakes contain a full array of natural habitats and species. Water is of sufficient quality and clarity to support submersed aquatic plants. Native species are a functioning, self sustaining component of the fish community.</p>	<ol style="list-style-type: none"> 1. Competition /altered food webs by invasive non-indigenous species 2. Toxic compounds 3. Introduction of nutrients/sedimentation 4. Changes in the acid-base balance 5. Salinity changes 6. Depletion of fish populations 7. Temperature increases 8. Disruption of sediment transport 9. Altered lake levels 	<ol style="list-style-type: none"> 1. Ballast water, aquaculture, pet trade, bait. 2. Atmospheric deposition (energy production); industrial discharge. 3. Non-point source runoff from incompatible agricultural, development, and forestry practices; incompatible waste-water treatment 4. ? 5. ? 6. Overfishing 7. Climate change, industrial discharge. 8. Shoreline hardening, lake level management (dams), dredging 9. Climate change, lake level management 	<ol style="list-style-type: none"> a. The aquatic food web has been severely—some would say catastrophically—disrupted. b. Aquatic non-indigenous species continue to enter the Lakes via ballast water. c. Periodic outbreaks of botulism in Lakes Erie and Ontario are little understood. d. <i>Diporeia</i> have largely disappeared from Lake Michigan. e. Spawning substrates and submersed aquatic plants have been disrupted by sedimentation and dredging f. Loss of species and biodiversity continues. 	<ol style="list-style-type: none"> a. Continue to investigate food web interactions. b. Set up a system of early detection monitoring of non-indigenous species. c. Continue research into reasons for botulism outbreaks. d. Continue research into the disappearance of <i>Diporeia</i>. e. Classify, inventory, and map nearshore substrate and fish and wildlife habitats, as well as the severity of sedimentation and dredging impacts. f. Evaluate the success of native fish species protection and restoration. 	<p>International: U.S.-Canada Great Lakes Water Quality Agreement</p> <p>Federal Laws: Clean Water Act of 1986; Great Lakes Legacy Act of 2002; Non-indigenous Aquatic Invasive Species Act of 1990; Water Resources Development Act of 1976; Lacey Act of 1900; Fish and Wildlife Act of 1956; Fish and Wildlife Conservation Act; Comprehensive Environmental Response, Compensation, and Liability Act of 1980</p>	<p>NISA Great Lakes Panel on ANS Great Lakes Fishery Commission plan, goals and objectives LaMP/Lakes Huron and St. Clair goals and objectives L. ER Protection and Restoration Plan Lake Ontario Study Great Lakes Observing System IADN GLERL (NOAA) Water quality/fish monitoring programs RAPs for Areas of Concern Riparian work through NAWMP Binational Toxic Strategy Farm Bill Conservation Programs EPA 319 NOAA Partners for Fish and Wildlife Program USGS Coastal and Wetland Ecology Branch and National Water</p>	<p>Invasive non-indigenous species: - Set up a system of early detection monitoring of non-indigenous species to prevent non-indigenous species from entering the Lakes.</p> <p>Toxic compounds: - Appropriate full amount for the Legacy Act plus funding for technology research and education.</p> <p>Nutrients/sedimentation: - Identify, eliminate, control and monitor point and non-point sources of pollution and excess sedimentation. - Reduce or stop open lake disposal of fine-grained dredge material. - Re-establish construction grants or SRF program. - Support and recommend \$xxx for the 319 Program. - Regulate and enforce stormwater discharges to ensure that quality, quantity, and hydro period of receiving waters are not adversely impacted.</p> <p>Habitat/species conservation: - Collaboratively inventory, assess, protect, and restore nearshore aquatic habitats in order to improve the health and productivity of Great Lakes fishery and wildlife populations. - Maintain widely distributed, self-</p>

							Quality Assessment Program Great Lakes Fishery and Ecosystem Restoration Program (USACE) Great Lakes Coastal Restoration Program (USFWS) GLNPO habitat funds Lake Sturgeon Rehabilitation Plan for L. SU 208 Water Quality Mgmt. Plans	sustaining populations in as many original habitats as is practical. - Maintain, enhance and rehabilitate self-sustaining populations where the species occurred historically basinwide. - Restore and reestablish lake trout, lake herring, deepwater ciscoes, and open water habitats to sustain native and introduced salmonid and percid predators in support of support sport and commercial fisheries.
<p>Coastal wetlands—More than 216,000 hectares of coastal wetlands have been recently classified binationally. Coastal wetlands are dominated by large lake processes, including major water level fluctuations, severe wave action and wind tides or seiches. They store and cycle nutrients and organic material from the land into the aquatic food web. They sustain large numbers of common or regionally rare bird, mammal, herptile and invertebrate species, including many land-based species that feed from the highly productive marshes. Fish species depend upon them for some portion of their life cycles. They are migratory bird staging and feeding areas. Periodic inundation re-sets succession and maintains the highly productive herb-dominated system. In many areas where the natural systems have been highly modified, vegetated coastal wetlands persist only because of intensive management.</p> <p><i>Habitats/Biodiversity</i> Lacustrine, riverine, barrier protected (plus sub-categories including estuaries and island coastal wetlands)</p> <p>Wide diversity of plant and animal species – many of which breed in coastal wetlands Coastal wetlands provide critical staging habitats for migratory birds and waterfowl.</p>	Coastal wetland quantities remain consistent at baseline levels and quality is restored for fish and wildlife. Targeted and coordinated restoration and protection of high potential/critical need wetlands results in a net gain. Hydrologically modified environments are maintained and improved to provide for fish and wildlife benefits. Native species are a functioning, self sustaining component of the fish community.	<ol style="list-style-type: none"> 1. Alteration of lake levels and natural fluctuations 2. Competition/altered food webs/altered structure by invasive non-indigenous species 3. Addition of toxic compounds 4. Temperature increases 5. Alteration of sediment transport 6. Direct destruction 7. Sedimentation 	<ol style="list-style-type: none"> 1. Lake level management (dams), climate change. 2. Ballast water, aquaculture, pet trade, bait, landscaping 3. Atmospheric deposition (energy production); industrial discharge. 4. Climate change, industrial discharge. 5. Shoreline hardening (jetties, seawalls, etc.), lake level management (dams), climate change 6. Draining/filling for development, agriculture 7. Non-point source runoff from incompatible agricultural, development and forestry practices 	<ol style="list-style-type: none"> a. Wetland loss and degradation continues, but since coastal wetland quality and quantity are not currently consistently monitored across the basin, impacts to fish and wildlife are difficult to calculate. b. Water level controls and hydrological modifications in many areas have diminished wetland diversity and function. c. Intact coastal wetlands are breeding habitat or refugia for native fish and wildlife; however, such areas are in need of restoration to maintain current functioning. d. Loss of species and biodiversity continues. e. Non-indigenous species continue to invade coastal wetlands. 	<ol style="list-style-type: none"> a. Regular coastal imaging with high enough resolution to detect wetland boundary and land cover change. b. Research the effects of reducing coastal ecosystems, including functioning, processes and human disturbance impacts. c. Research the effects of reducing fluctuations of Great Lakes water levels on wetlands and how to manage water levels in ways that minimize these impacts. d. Spring migrant bird staging study by DU/TNC others. Long-term trend data on wetland biota-stressor interactions. e. Set up a system of early detection monitoring of non-indigenous species. 	<p>International: North American Waterfowl Management Plan; Tripartite Agreement on wetlands between Canada, U.S. and Mexico</p> <p>Federal Laws: Sections 401 and 404 of the Clean Water Act; Clean Water Act's 1987 National Estuary Program; State Wetland Protection Grants; recent court ruling on definition of wetland; North American Wetlands Conservation Act of 1989; Rivers and Harbors Act of 1938</p>	<p>Great Lakes Coastal Wetlands Consortium State/Provincial wetland monitoring programs Lake Ontario Study The Nature Conservancy Blueprint Numerous restoration projects RAPs for Areas of Concern NAWMP DU Strategic Plan The Nature Conservancy Blueprint FWS Coastal Program State Wildlife Programs National Estuary Program National Wetlands Research Center GLNPO habitat funds USGS Coastal and Wetland Ecology Branch</p>	<p>Habitat/species conservation: - Implement the Coastal Wetland Consortium's long term coastal wetland monitoring program that utilizes Great Lakes indicators and based on the monitoring information, expand wetland protection, restoration and enhancement programs to protect and restore priority coastal wetlands in order to provide healthy habitats for fish and wildlife. - Maintain widely distributed, self-sustaining populations in as many original coastal wetland habitats as is practical. - Maintain, enhance and rehabilitate self-sustaining populations where the species occurred historically basinwide. - Maintain/enhance the yellow perch/walleye fishery.</p> <p>Invasive non-indigenous species: - Set up a system of early detection monitoring of non-indigenous species to prevent non-indigenous species from entering coastal wetlands (currently the refugia for native species).</p> <p>Sedimentation/non-point sources: - Identify, eliminate, control and monitor point and non-point sources of pollution and excess sedimentation.</p>
<p>Coastal shore—Water levels, surface and groundwater interactions, wind, waves and longshore sediment transport are the dominant forces shaping some 11,000 lineal miles of coastal ecosystems, including more than 30,000 islands. The coastline is dominated by the effects of the Great Lakes, including wind, wave action, hydrology, temperature and humidity. Extensive freshwater sand dunes support more endemic species than any other part of the Great Lakes basin. Sandy sediments from eroding banks and tributary mouths are carried by longshore currents and form dunes as well as bars and spits that shelter many highly productive marshes. Lake level fluctuations are important in this cycle of erosion, sediment transport and dune maintenance. Shoreline systems absorb the brunt of wind and wave energy from the lakes, buffering the inland systems from disruptive forces.</p> <p><i>Habitats/Biodiversity</i></p>	A representative number of coastal shore habitats are protected/restored and functioning as buffers to inland systems. Sufficient diversity and amount of coastal habitat is protected to sustain endemic species populations.	<ol style="list-style-type: none"> 1. Competition /altered food webs/altered structure by invasive non-indigenous species 2. Alteration of sediment transport 3. Direct destruction 4. Sedimentation 	<ol style="list-style-type: none"> 1. Landscaping, introductions 2. Shoreline hardening (jetties, seawalls, etc.), lake level management (dams), climate change 3. Sand dune and alvar mining, shoreline hardening, home and commercial development 4. Non-point source runoff from incompatible agricultural, development and forestry practices 	<ol style="list-style-type: none"> a. Development, including home, agriculture, shipping, industry, marina, etc., is continuing to destroy coastal shore habitats and disrupt shoreline replenishment processes. b. Channel expansion—both historical and future—continues to disrupt habitats. c. Shoreline habitats are not well inventoried; therefore, it is difficult to track changes. d. Loss of species and biodiversity continues. e. Wind farm construction has the potential to impact migratory birds. f. Non-indigenous invasive species continue to disrupt 	<ol style="list-style-type: none"> a. Increase scientific understanding of coastal ecosystems, including functioning, processes and human disturbance impacts. b. Research the impact of channel expansion/dredging on nearshore habitats. c. Regular coastal imaging with high enough resolution to map and classify coastal habitats and land cover change. d. Monitor shoreline species for trends in biodiversity loss. e. Research impact of wind farms to migratory bird species. f. Universally accepted risk assessment protocols for non-native 	<p>International: Kyoto Agreement</p> <p>Federal Laws: Coastal Zone Management Act of 1972; Endangered Species Act of 1973; Federal-Aid Highways Act of 1968 -- As amended by the Department of Transportation Act of 1966 (requires approval to build Federal highways through wildlife refuges and other designated areas); Migratory Bird Conservation Act of 1929</p>	<p>Great Lakes Islands Collaborative Lake Ontario Dunes Coalition Lake Michigan Dunes Alliance Areas of Concern The Nature Conservancy Blueprint GLEI RAPs for Areas of Concern NOAA Great Lakes Coastal Program GLNPO habitat funds</p>	<p>Habitat/species conservation: - Inventory and assess Great Lakes coastal habitats (islands, sand beaches and dunes, cobble/bedrock shores, jack pine barrens, alvars and consolidated bluffs; prioritize them for protection and restoration; implement protection and restoration activities. - Maintain widely distributed, self-sustaining populations in as many original habitats as is practical. - Maintain, enhance and rehabilitate self-sustaining populations where the species occurred historically basinwide.</p> <p>Areas of Concern: - Conduct detailed monitoring of Areas of Concern. - Provide ongoing funding leading to de-listing of habitat-related beneficial use impairments in Areas of Concern.</p>

<p>Dunes, beaches, islands, alvars, cobble/bedrock shores, jack pine barrens, consolidated bluffs.</p> <p>Migratory birds and waterfowl, shore birds Examples of rare endemic species found on coastal shores: Dune thistle (<i>Cirsium pitcheri</i>), Houghton's goldenrod (<i>Solidago houghtonii</i>) and the Lake Huron locust (<i>Trimerotropis huroniana</i>), dwarf lake iris (<i>Iris lacustris</i>) and ram's head lady's slipper (<i>Cypripedium arietinum</i>).</p>				coastal habitats.	invasive plants and animals.			
<p>Streams, tributaries, connecting channels— These are the primary conduits for drainage of waters from the basin's landscape to the Great Lakes. They transport sediments, nutrients and organic material throughout the watershed. Biodiversity elements of tributaries depend upon the oxygenation of water and the balance of nutrients and organic materials to maintain favorable habitat conditions. Tributaries provide important spawning habitat for several Great Lakes fish, as well as migration corridors for other wildlife, including migratory birds.</p> <p><i>Habitats/Biodiversity:</i> Coldwater, warmwater fish and wildlife habitats, islands</p> <p>World's richest freshwater mussel fauna. Two endemic species: the copper redhorse (<i>Moxostoma hubbsii</i>), Hungerford's crawling water beetle (<i>Brychius hungerfordi</i>); several rare fish species including the lake sturgeon.. Migrant bird corridors, resident wildlife habitats.</p>	<p>Cold and warm water tributary access is sufficient to allow natural sustainability of native fisheries. Buffers adequately reduce sedimentation and nutrient inflow. Riparian floodplains and wetlands are reconnected. Stream habitat is improved to support migratory birds and other wildlife. Native species are a functioning, self sustaining component of the fish community.</p>	<ol style="list-style-type: none"> 1. Direct destruction 2. Alteration or disruption of amount and frequency of stream flows 3. Alteration of water table 4. Toxic compounds 5. Competition /altered food webs/altered structure 6. Temperature increases 7. Altered sediment regime 8. Fragmentation 	<ol style="list-style-type: none"> 1. Stream channelization, road building, and shoreline hardening. 2. Dams and dam operation, diversions, withdrawals, agricultural drainage (tiling), incompatible stormwater management 3. Excessive groundwater withdrawal 4. Industrial/municipal discharge; incompatible mining practices 5. Aquatic invasive species introduced through ballast water, aquaculture, pet trade, bait, recreation (boating); direct stocking 6. Stream channelization, incompatible forestry, industrial discharge, climate change 7. Incompatible agricultural practices (tiling, tillage), incompatible forestry, incompatible development, road building and maintenance 8. Dams, culverts, road/stream crossings 	<ol style="list-style-type: none"> a. Thousands of dams block water flow as well as fish passage, thus fragmenting habitats in streams and rivers and disrupting the rate and flow of water to the Lakes. b. Non-point source runoff into streams contributes to contamination at river mouths and in the Lakes. c. Legacy sediment contamination is still impacting species. d. Loss of floodplains, riparian buffers and channelization, continued tile and surface drainage, and groundwater depletions are impacting habitats. e. Loss of species and biodiversity continues. f. Non-indigenous invasive species continue to disrupt tributary habitats. 	<ol style="list-style-type: none"> a. Study the impacts of dam removal at specific locations. b. Evaluate buffers in reducing nutrient and sediment inflow. c. Continue to research the impact of contaminated sediments on species. d. Continue to research loss of floodplains, riparian habitats, and groundwater and surface water changes to habitats. e. Monitor species for trends in biodiversity loss. f. Universally accepted risk assessment protocols for non-native invasive plants and animals. 	<p>Federal Laws: Wild and Scenic Rivers Act of 1968; Watershed Protection and Flood Prevention Act of 1954</p>	<p>Annex 2001 The Nature Conservancy Blueprint Numerous watershed plans (Little Traverse Bay Watershed Protection Plan Clinton River Watershed Council Watershed Diagnostic of the Little Calumet-Galien River Watershed Sheboygan County Natural Areas and Critical Resources Plan) RAPs for Areas of Concern Conservation Programs NAWMP/Joint Ventures USDA Farm Bill EPA 319 TMDLs GLNPO habitat funds Brook Trout Rehabilitation Plan for Lake SU Eastern Brook Trout Venture (USDA Forest Service) Coaster Brook Trout Initiative (USDA Forest Service) USFWS National Fish Passage Program</p>	<p>Dams: - Prioritize and coordinate dam removal and tributary restoration projects.</p> <p>Buffers: - Establish development setbacks and vegetated buffers sufficient to protect water quality and habitat from new development.</p> <p>Altered sediment regime: - Implement watershed plans to reduce nutrient and sediment inputs, including wetland restoration and riparian buffers.</p> <p>Habitat/species conservation: - Maintain widely distributed, self-sustaining populations in as many original habitats as is practical. - Maintain, enhance and rehabilitate self-sustaining populations where the species occurred historically basinwide. - Restore and reestablish lake sturgeon.</p> <p>Invasive non-indigenous species: - Develop an invasive species mitigation plan for each major tributary.</p>
<p>Inland lakes and wetlands--These are important reservoirs for water within the basin's drainage system, regulating volumes, periodicity, sediment content and chemical/temperature characteristics. They also serve as centers of nutrient retention, storage and exchange. Wetlands are often highly productive from a biological standpoint and are important to the life cycles of many species, including wetland, threatened and endangered species and many upland species which breed or feed in wetlands.</p> <p><i>Habitats/Biodiversity:</i> bogs, fens, islands threatened and endangered species, e.g.: Mitchell's satyr butterfly (<i>Neonympha mitchellii</i>) Resident breeding birds, amphibians, reptiles & mammals.</p>	<p>Inland wetlands have been inventoried and losses from development tracked basinwide. Wetland complexes increase/are restored (net gain) to sufficiently meet the needs of wildlife, water quality, ground water recharge, flood attenuation and recreation. Native species are a functioning, self sustaining component of the fish community.</p>	<ol style="list-style-type: none"> 1. Direct destruction 2. Altered hydrology 3. Toxic compounds 4. Competition /altered food webs/altered structure 5. Temperature increases 	<ol style="list-style-type: none"> 1. Draining and filling for home and commercial development and agriculture. 2. Dams and dam operation, diversions, withdrawals, agricultural drainage (tiling), incompatible stormwater management, excessive groundwater withdrawal. 3. ? 4. Aquatic invasive species introduced through aquaculture, pet trade, bait, recreation (boating), landscaping; direct stocking. 5. Incompatible forestry, incompatible water management, climate 	<ol style="list-style-type: none"> a. Loss and degradation of wetlands/lakes and their functions are continuing. b. Aquatic invasive species are impacting inland wetland/lake species and communities. c. Loss of species and biodiversity continues. 	<ol style="list-style-type: none"> a. Monitor wetlands/lakes for changes. Inventory/classify wetlands/lakes. Update the National Wetlands Inventory. Identify and evaluate potentially restorable wetlands. b. Set up a system of early detection monitoring of non-indigenous species. c. Monitor species for trends in biodiversity loss. 	<p>Federal laws: Section 319 of the Clean Water Act (nonpoint source grants to states); Clean Lakes Program of 1972 (as section 314 of the Federal Water Pollution Control Act)--not funded in recent years); Transportation Equity Act for the 21st Century of 1998</p>	<p>Joint Ventures The Nature Conservancy Blueprint DU Strategic Plan FWS Partners Program Farm Bill conservation Programs National Wetlands Research Center GLNPO habitat funds WI DNR Wetlands Inventory Strategy MN Wetlands Conservation Plan Mentor Marsh Special Area Management Plan Issues Identification</p>	<p>Buffers: - Establish development setbacks and vegetated buffers sufficient to protect water quality and habitat from new development.</p> <p>Regulations: - Amend existing wetland regulatory frameworks to ensure that all wetlands are protected, including isolated wetlands.</p> <p>Habitat/species conservation: - Update the FWS National Wetlands Inventory. - Prioritize and conserve areas of key wetland complexes (focus areas). - Reestablish sufficient quantity of wetlands to achieve desired ecosystem benefits. - Maintain widely distributed, self-sustaining populations in as many original habitats as is practical. - Maintain, enhance and rehabilitate self-sustaining populations where the species occurred historically basinwide.</p>

		6. Eutrophication (nutrient enrichment) 7. Fragmentation of wetlands	change. 6. Incompatible development, incompatible wastewater treatment. 7. Dams, culverts, road/stream crossings.					- Increase the net wetland resource base by one million acres by the year 2025. Invasive non-indigenous species: - Develop an invasive species mitigation plan for inland lakes and wetlands.
<p>Uplands-- This system covers a large percentage of the basin and forms the principle collector for precipitation inputs to the rest of the system. 51% of the basin is forested. Through their character and health, inland terrestrial communities influence the rate, periodicity and quality of incoming precipitation, and direct its flow to surface drainage and groundwater recharge. The ecological integrity of this system is also important in controlling erosion, which is a major factor in the ecological health of tributaries and coastal areas. The inland terrestrial system provides migration corridors and habitat for portions of the life cycles of species principally associated with other systems.</p> <p><i>Habitats/Biodiversity:</i> Forest lands, oak savannas, prairies, oak and pine barrens, agricultural lands, islands</p> <p>Moonwort, neotropical migrant birds, endemic Kirtland's warbler (<i>Dendroica kirtlandii</i>)</p>	Sufficiently large and connected habitats to allow upland diversity and population sustainability are protected and restored. There is a net gain in prairies/grasslands and savannas. Native species are a functioning, self sustaining component of upland communities.	1. Fragmentation and direct destruction 2. Altered fire regimes 3. Altered composition/alterd structure	1. Incompatible development, conversion to agriculture, incompatible forestry practices. 2. Fire management policy (suppression). 3. Management of/for certain species (deer, maple, aspen, etc.); invasive species from management activities, accidental introduction, landscaping; pathogens; climate change.	a. Value of prairies/grasslands, savannas, barrens, and other upland habitats are consistently undervalued. b. Loss of species and biodiversity continues. c. Non-indigenous invasive species continue to disrupt upland habitats.	a. Inventory and assess the functioning of existing prairies, significant grassland and other upland habitats. b. Monitor species for trends in biodiversity loss. c. Inventory of non-native invasive species. Universally accepted risk assessment protocols for non-native invasive plants and animals. Effective treatment protocols for priority species.	<p>Federal Laws: National Forest Management Act of 1976; Food Security Act of 1985; Wilderness Act of 1964; Safe Drinking Water Act Amendments of 1996; Organic Administration Act of 1897; Knutson-Vanderberg Act of June 9, 1930, 46 Stat.527, as amended; 16 U.S.C. 576, 576a-576b); Bankhead-Jones Farm Tenant Act of 1937; Anderson-Mansfield Reforestation and Revegetation Joint Resolution, Act of October 11, 1949; Granger-Thye Act of 1950; Sikes Act (Fish and Wildlife Conservation) of September 15, 1960; 16 U.S.C.670g-670i, 670o - Sec. 201b); Multiple Use-Sustained Yield Act of 1960; Wilderness Act of 1964; National Historic Preservation Act of 1966; National Environmental Policy Act of 1969; Federal Water Pollution Control Act of 1948, as revised in 1972 and amended in the Water Quality Act of 1987; The Endangered Species Act (ESA) of 1973; Federal Land Policy and Management Act (FLPMA) of 1976; The National Forest Management Act of 1976; Surface Mining Control and Reclamation Act of 1977; Cooperative Forestry and Assistance Act of July 1, 1978; 16 U.S.C. 2101; North American Wetland Conservation Act of December 13, 1989; Section 323 of Public Law 108-7; Consolidated Appropriations resolution, 2003; Healthy Forests Restoration Act (H.R. 1904) of November 21, 2003; The Federal Power Act of June 5, 1920; Wild and Scenic Rivers Act of October 2, 1968</p> <p>Regulations: 36 CFR Part 10 Subpart (b)</p> <p>Executive Orders: Executive Order 11987 (May 24, 1977); Executive Order 13112 (February 3, 1999); Executive Order 13148 (April 21, 2000); Executive Order 13352 (August 26, 2004)</p>	The Nature Conservancy Blueprint Oak Savanna Recovery Plan Numerous restoration projects (DU, PF, FWS, TNC, etc.) Sheboygan County Natural Areas and Critical Resources Plan GLNPO habitat funds Midwest Invasive Plant Network Land and Resource Management Plans for the Superior, Chequamegon-Nicolet, Ottawa, Hiawatha, and Huron Manistee National Forests Non-native Invasive Species Framework for Plants and Animals of the Eastern Region (2003) Native Plant Framework (USDA Forest Service Eastern Region) USDA Forest Service Strategic Plan for the Years 2004-2008 National Strategy and Implementation Plan for Invasive Species Management (USDA Forest Service 2004)	<p>Habitat/species conservation: - Identify existing and significant grassland habitats and evaluate the potential for restoration and implementation of programs to increase these critical habitats. - Maintain widely distributed, self-sustaining populations in as many original habitats as is practical. - Maintain, enhance and rehabilitate self-sustaining populations where the species occurred historically basinwide.</p>

Things that need to be considered as next steps:

Training/Education:

Encourage use of native plant materials.
Expand "train the trainer" workshops (such as the Forest Service for inventory, assessment and design for aquatic and terrestrial organism passage at roads and stream crossings).

Funding/Economics:

Need to develop creative ways to provide long term local funding for watershed stewardship projects.
Need to understand and express the unique economic value of the Great Lakes.

Potential Partnership Projects:

Integrate work of the USGS Aquatic and Terrestrial GAP Analysis efforts for the Great Lakes Basin.

Integrate with the US F&WS National Fish Passage Program.

Outcomes/Measuring Successes:

Monitoring and reporting on outcomes needs to be a part of the overall strategy.

