

Lake Erie Lakewide Management Plan

Draft Habitat Strategy

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Prepared by the Habitat Task Group

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LAKE ERIE LAMP HABITAT STRATEGY

Background

The loss and fragmentation of aquatic and terrestrial habitats is affecting ecosystem function in Lake Erie and its watersheds (Figure 1). The 1995 Lake Erie LaMP Concept Paper identified habitat loss and degradation as one of the three key stressors that must be addressed to restore Lake Erie. Several LaMP beneficial use impairment assessment reports have also outlined impairments to terrestrial, tributary, shoreland/wetland, nearshore and offshore habitats that are affecting benthic invertebrate, fish and wildlife populations (Halyk and Davies 1999; Lambert *et al.* 2001; Lake Erie LaMP 2000; Lake Erie LaMP 2002; Ciborowski in prep.).

Recent results from a Lake Erie LaMP ecosystem objective modeling process have shown that land use is a key factor responsible for impairments to Lake Erie, along with nutrient loading, natural resource use (exploitation) and disturbance and contaminants. All of these factors need to be managed to protect, restore and rehabilitate habitats and their integrity in the Lake Erie basin. This strategy presents some key objectives that the Lake Erie LaMP partners are working toward over the next few years.

Guiding Principles

The habitat strategy for the Lake Erie LaMP must adopt a holistic program for conserving the biodiversity and ecological processes in both terrestrial and aquatic systems in the Lake Erie basin. Protection of natural habitats is the primary goal followed by habitat restoration and then habitat rehabilitation. Due to limited resources, funding efforts may focus on programs that will restore the integrity of aquatic systems in lake-effect habitat zones (e.g., lower reaches of tributaries) and Lake Erie proper. In moving forward with the habitat strategy and research on habitat issues, Lake Erie LaMP partners will adopt 7 principles to conserve aquatic biodiversity adapted from Noss and Cooperrider (1994). LaMP agencies will use the guidelines and following objectives and actions in some priority (target) watersheds, monitor the success of this approach, and adapt the process if management actions are not having noticeable, positive impacts on Lake Erie habitats. The LaMP approach will not prevent existing habitat initiatives or re-direct funds from those agencies receiving resources already. The hope is that the LaMP can show that these principles, if taken to heart by management agencies and management programs, can expedite positive change in Lake Erie basin habitats.

1. **Scale** - Address aquatic and terrestrial issues at the proper scale of resolution (ecoregions and ecodistricts, ecological drainage units, watershed/subwatershed, etc.). Watersheds or hierarchical classifications of watersheds (e.g., tertiary, quaternary) are generally regarded as the proper units for aquatic system management. *Gene and species level research on plant and animal populations within the Lake Erie Basin is another valuable component that could be used to define scale. For example, a genetically unique population of walleye in the Grand River is being considered for management options in the watershed.*
2. **Baseline** - The baseline for management should be pre-European settlement vegetation communities in terrestrial landscapes and historical flow patterns for aquatic systems. In some cases, guiding principles clearly reflect the ideal scenario that may never be achievable in a heavily human-influenced system such as Lake Erie. *Restoration and rehabilitation efforts need to approximate original flow patterns, natural seasonal cycles, and continuous (i.e., un-fragmented) landscapes, wherever possible, to restore ecosystem processes and habitat function.*
3. **Integrated management of land and water** - Better integration of aquatic and terrestrial ecosystem planning will be key to the success of the Lake Erie LaMP. *The Lake Erie ecosystem objective modeling process (Colavecchia et al. 2000) showed that lake conditions largely result from human activities on land.*
4. **Protected areas** - A well-dispersed network of protected areas (reserves) or habitat refugia with natural ecosystem features is needed to restore and maintain biodiversity. Habitat fragmentation effects and corridors should be considered in the selection and management of new protected areas. *Although pristine conditions will no longer occur in many areas of the Lake Erie basin, the aim should be to restore areas and include them in protected area systems, wherever possible. Place priority on protection of areas of high native species diversity, species endemism, number of species at risk or species of management concern, and areas of critical*

importance to aquatic systems. Areas adjacent to these high priority areas would then receive secondary priority.

5. Restoration goals and priorities - Restoration should focus on restoring underlying habitat structuring processes and solving root causes of environmental problems (e.g., restoring hydrological function, migratory pathways). Work toward removing existing problem areas that may cause extreme damage to watersheds now or in the future. Problems could include contaminated sites and sites with high nutrient inputs (either due to agricultural runoff or insufficient wastewater treatment). Set priorities on activities that accomplish the most good for the least investment. Ensure that cost-benefit analyses be done at a larger scale (landscape, watershed) than just simply on a project-by-project basis. Take into consideration the cumulative effects of protection and restoration activities.
6. Key threats to aquatic systems -
 - Dams and diversions - Avoid construction of new dams and diversions unless these structures provide a net benefit to the Lake Erie fish community such as in the management of non-indigenous invasive species (NIS), or unless appropriate measures to mitigate fish community effects are included in the construction. Barriers are an important component in the control of non-indigenous invasive species such as sea lampreys. Removal projects should address the implications of range expansion of non-indigenous invasive species, impacts of changed hydrology, potential impacts from disturbed sediments, biodiversity, and overall benefits to aquatic systems.
 - Non-indigenous Invasive Species - Work toward prevention of future introductions of non-indigenous invasive species in the Lake Erie basin. Control or eliminate established NIS wherever possible.
7. Address key and emerging information needs - Inventory, monitor and conduct research to continue to conserve and restore terrestrial and aquatic biodiversity in the Lake Erie basin. *Policy is needed to accommodate shoreline habitat protection and private interests related to the impacts from fluctuating lake levels and climate change.*

Goals

1. Protect and maintain high-quality habitats and the ecosystem processes that sustain them in the Lake Erie basin. To help accomplish this, guide development practices such that they maintain or minimize impacts to ecological processes.
2. Restore, rehabilitate, enhance and reclaim degraded habitats and impaired hydrological function in the Lake Erie basin. Emphasis will be placed on habitats in the lake-effect zone of tributaries influencing Lake Erie.
3. Continue to promote the recognition that non-indigenous invasive species have negative impacts on habitats in the Lake Erie ecosystem. Work toward prevention of further introductions of NIS into Lake Erie.
4. Develop an integrated framework that will result in a consolidated vision of habitat for Lake Erie by adopting a common, basinwide standard for classifying, mapping, evaluating, tracking, and valuing habitats, their key attributes, and their regulating factors.

General Objectives

Objective 1: Expand and improve connectivity and habitat function of protected areas network in the Lake Erie basin

Short term actions:

- Network with other groups to identify existing protected areas and possibilities for expanding the protected areas network.
- Identify existing special management zones/protection measures for lake use (e.g., boating, hunting and dredging restrictions) designated by all government agencies (i.e., federal, provincial, regional and municipal).
- Support opportunities for the establishment of appropriate conservation areas (e.g., National Marine Conservation Areas) in Lake Erie.

- Encourage protection of more natural areas in the Lake Erie basin.
- Determine research needs, information gaps, and additional programs to further habitat protection/restoration and improve habitat function through the Lake Erie Millennium Network.
- Encourage better management practices in landscapes containing natural areas or in buffer zones surrounding natural areas. Implement measures to address erosion and runoff, reduce nutrient loadings, and pesticide use in the basin.
- Establish more functional linkages between protected areas throughout the watershed, particularly in priority watersheds.
- Characterize submerged moraines such as the Norfolk moraine.
- Establish an emergency response framework to protect key habitats in the Lake Erie basin from development pressures and emerging issues (e.g., West Nile virus and potential larvicide/adulticide spraying in wetland habitats).

Longer term actions:

- Incorporate lake objectives for benthic, fish and wildlife habitat into other initiatives.
- Encourage adoption/implementation of any relevant Lake Erie LaMP indicators by groups and agencies working in protected areas management.
- Characterize other submerged moraines and other lake bed features in Lake Erie.

Objective 2: Restore, rehabilitate or reclaim functional habitats and ecosystems

Short term actions:

- Identify and focus efforts on some pilot watersheds and work to ensure that management plans adequately address lake-effect zones of tributaries along with headwater and upper tributary sections. Target efforts in reaches of tributaries that will have the most benefit to the health of Lake Erie. Identify key actions needed in tributaries to improve ecosystem function (e.g., dam removal, habitat protection/restoration, modification of land use practices, etc.) and hold workshops to initiate action. Monitor before, during and after restoration.
- Prepare status reports for priority watersheds (if necessary) that outline the current status of the system, including headwater and upper reaches of the tributary. Encourage work in headwater areas if they are key contributors, although this will not be the focus of LaMP efforts.
- Identify and characterize the condition of priority habitats for restoration work. Determine where Lake Erie LaMP habitat priorities match or overlap with priorities and objectives of other habitat protection and restoration initiatives.
- Notify agency offices in the Lake Erie basin of LaMP habitat protection and rehabilitation priorities to encourage more funding for rehabilitation work. Review and evaluate grants, loan and other financial assistance programs to determine their current and potential impact on improving Lake Erie habitats.
- Identify any restoration and rehabilitation efforts already recommended or underway in Lake Erie basin, particularly in priority watersheds. Provide input, from a Lake Erie LaMP perspective, to habitat protection and restoration efforts in the 12 AOCs in the Lake Erie basin.
- Facilitate and encourage the adoption of sustainable land use practices in priority watersheds and throughout the basin. Hold local workshops to draw together communities and explain goals and targets of land use/habitat components of Lake Erie LaMP. Network with individuals implementing federal, state/provincial agricultural improvement programs.
- Raise awareness of Lake Erie LaMP among member municipalities. Prepare a short (5-10 minute) presentation about the LaMP.

Longer term actions:

- Develop targets to work toward in terms of habitat and biodiversity protection in the Lake Erie basin through LaMP indicators process.
- Examine existing management strategies for tributaries in the Lake Erie basin, watershed/subwatershed management plans, and relevant policies and legislation for gaps that need to be addressed to meet Lake Erie LaMP habitat restoration objectives.
- Provide input to the RAP teams working on AOCs on the testing and outcomes of Lake Erie LaMP indicators.
- Protect habitats from further chemical contamination and encourage restoration of contaminated sites.

Objective 3: Prevent further introductions of aquatic and terrestrial non-indigenous invasive species and reduce their impacts on habitat in the Lake Erie basin

Short term actions:

- Identify initiatives, policy/legislation, and remedial options available for aquatic and terrestrial non-indigenous invasive species in the Lake Erie basin. Actively work toward development and implementation of legislation and policies protecting Lake Erie from further invasions.
- Publicize need for prevention of further NIS introductions by holding workshops and information sessions at key forums.
- Facilitate preparation of educational materials for the public and politicians.

Objective 4: Produce a binational map of the Lake Erie Basin

Introduce an integrated, binational mapping system for the Lake Erie Basin that identifies land use, habitat types, elements of species biodiversity, and key hydrological and physiographic features. This mapping system will harmonize existing spatial data in the Lake Erie basin and establish restoration priorities for the Basin.

- Hold workshops to expedite the development of a binational map that can be used in setting priorities for habitat protection and restoration, monitoring change in habitat quantity and quality over time, and public education about the biodiversity of Lake Erie.
- Adopt habitat classification systems. Use standardized habitat zones and biologically-defensible classifications that reflect functional use and interrelationships of each watershed and the Lake Erie basin as a whole.
- Incorporate biodiversity layers and physiographic layers and use to help in identifying areas for protection/restoration and monitoring change (ideally habitat improvements) over time.
- Attempt to classify Lake Erie and associated watersheds in terms of focal or refuge habitats, adjunct habitats, nodal habitats, source areas, and degraded habitats.
- Use elements of this map with information at the appropriate scale in land-use zoning and setting restoration priorities across the Lake Erie basin.

Objective 5: Increase public awareness and involvement in protecting and restoring Lake Erie habitats

Publicize information concerning habitat and biodiversity in the Lake Erie basin; protection, restoration and reclamation efforts; policies and regulations relating to biodiversity and key threats to biodiversity (e.g. NIS); and encourage public involvement in Lake Erie protection and restoration efforts.

- Develop and distribute brochures, CDs, and/or fact sheets for priority watersheds. Coordinate, where possible, with existing watershed, habitat stewardship or lake programs.
- Communicate habitat protection and restoration success stories in the Lake Erie basin. Link reporting with existing stewardship activities/programs first, wherever possible.
- Develop 4-6 page summary of broad-scale impacts of non-indigenous invasive species on habitats in the Lake Erie basin.
- Catalogue existing habitat protection and restoration information, and put together a “habitat toolbox” for distribution.

Objective 6. Implement a monitoring strategy that tracks changes in habitat quality and quantity and measures the success of protective and restorative activities to improve our understanding of ecological function and ultimately the effectiveness of subsequent projects

Short term actions:

- Monitor progress in habitat protection and restoration on Lake Erie through existing programs and newly created programs.
- Use existing monitoring tools with relevance to Lake Erie habitat goals (e.g., habitat guidelines, documents setting conservation targets, etc.).
- Use combination of GIS-based tools and maps, decision-support systems, and selected indicators relevant to habitat and ecosystem function to evaluate progress in protecting habitats.

- Review adoption/implementation of habitat guidelines and natural heritage plans by municipalities in priority watersheds and elsewhere in the Lake Erie basin.

Longer term actions:

- Use indicators and targets developed by Lake Erie Millennium Network to monitor habitats and changing land use at the appropriate scale (e.g., watershed, subwatershed) and by various habitat zones and types.

Definitions

Habitat - The Lake Erie LaMP Habitat Strategy will use the following definition for habitat: “the dwelling place of an organism or community that provides the requisite conditions for its life processes” (SER 2002).

Some attributes of habitat include:

- “The four basic necessities for wildlife (i.e., food, water, shelter, and space to survive) that are needed in sufficient supply and structural arrangement to meet an animal’s life needs. Wildlife habitats vary over space, time and depending on the life cycle of individual species” (Lambert *et al.* 2001).
- “Specific locations where physical, chemical and biological factors provide life support conditions for a given species.” (IJC 1989). This definition would include non-structural environmental factors such as light intensity, water temperature, dissolved oxygen concentrations, dissolved nutrients, turbidity, water mass movement or thermal regime.

Habitat structure and function - Structure and function can be examined from various perspectives, including productivity, efficiency, linked ecological processes, biodiversity and biological integrity (Halyk and Davies 1999).

Ecological processes or ecosystem functions refer to the dynamic attributes of ecosystems, including interactions among organisms and interactions between organisms and their environment (SER 2002). Ecosystem functions can refer to those dynamic attributes which most directly affect metabolism, principally the sequestering and transformation of energy, nutrients and moisture (e.g., trophic interactions, mineral nutrient cycling, decomposition) while ecosystem processes refers to dynamic attributes such as substrate stabilization, microclimatic control, differentiation of habitat for specialized species, pollination, and seed dispersal (SER 2002).

Restoration - process of working to return a habitat or ecosystem to its original (pre-settlement) state by removing the cause of degradation. Requires an understanding of the physical, chemical and biological processes within an area (e.g., watershed) while recognizing land uses that have caused structural and functional damage to the ecosystem. Goal is to re-establish the pre-existing biotic integrity in terms of species composition and community structure (SER 2002).

Rehabilitation - process of working to recover natural functions, ecosystem processes, productivity and services within the context of the existing disturbance(s) (SER 2002).

Reclamation - process to recreate the functions and processes of a naturally stable ecosystem with the understanding that it will be quite different from the condition prior to the disturbance. Main objectives of reclamation may include the stabilization of the terrain, assurance of public safety, aesthetic improvement, and usually a return of the land to a “useful purpose” (SER 2002). For example, a reclaimed area may be re-vegetated but this may involve the establishment of a limited number of only one or a few species (SER 2002)

Enhancement - any manipulation of the physical, chemical, or biological characteristics of native habitat that improves its value and ability to meet specified requirements of one or more species. The manipulation changes the specific function(s) or the seral stage present. Examples include practices conducted to increase or decrease a specific function, or functions for the purpose of benefiting species at risk and practices conducted for the purpose of shifting a native plant community successional stage. Enhancement does not encompass routine maintenance and management activities, such as annual mowing or spraying for unwanted vegetation (USFWS - <http://southeast.fws.gov/partners/pfwdef.html>).

PILOT OR TARGET WATERSHEDS (Short term - next 5 years)

The LaMP approach for the habitat strategy is to target some key watersheds that are believed to have key linkages to habitat and biodiversity in Lake Erie, monitor and evaluate the success of this approach in these target watersheds, and determine whether this is a valid approach to use or whether another approach is needed. Factors

influencing the selection of these watersheds include substantial impacts on habitat or biodiversity in Lake Erie proper, impacts that have been identified through LaMP beneficial use impairment assessment reports or other information collected through the Lake Erie LaMP process, a large drainage basin, efforts already underway in the watershed, funding and or community support, and data availability.

1. Grand River, Ontario
2. Thames River, Ontario
3. Big Otter Creek, Ontario
4. Rondeau Bay, Ontario
5. Sydenham River, Ontario
6. Maumee River, Ohio
7. Cuyahoga River, Ohio
8. St. Clair River and Detroit River Corridor

(No ranking is implied in the listing above).

CRITERIA AND AVAILABLE TOOLS TO USE TO SELECT OTHER TARGET WATERSHEDS (Longer term - 5 years and beyond)

Other watersheds will be selected for protection and restoration efforts over the course of the Lake Erie LaMP. Criteria and tools that may be used to assist in the selection process of additional watersheds over the longer term will include, but not be limited to the following:

Criteria

- drainage area/volume, water flow (e.g., mean monthly flow)
- sediment input or loadings to Lake Erie (e.g., Rasul *et al.* 1999)
- destructive or habitat-altering adjacent land uses
- nutrient loads
- areas with habitat programs underway and community interest
- turbidity
- ecological sustainable water use
- biodiversity
- vulnerability of watershed to development, habitat degradation
- productivity

Tools

- Biodiversity Investment Areas (BIAs) - Nearshore Terrestrial Ecosystems (Mysz *et al.* 1998). This study selected Lake St. Clair/Detroit River, Western Lake Erie, Presque Isle and Long Point as shoreline BIAs based on ecological features and values
- Biodiversity Investment Areas - Aquatic ecosystems (Koonce *et al.* 1998). This study selected 14 sites in Lake Erie and Detroit River as candidate BIAs; tributaries included Grand River, OH; Maumee River, OH, Old Women Creek estuary, OH; Sandusky River, OH; Spooner Creek, NY; St. Clair River delta, ON/MI; Sydenham River, ON; and Tonawanda Creek, NY. Criteria used included high productivity, high biodiversity and /or endemism, and significant contributions to the integrity of the whole ecosystem.
- Biodiversity Investment Areas - Coastal wetland ecosystems (Chow-Fraser and Albert 1998). This study selected BIAs based on wetland information; some of these were riverine wetlands such as Big Creek and Cedar Creek in Ontario.
- Great Lakes Shoreline Biodiversity Investment Areas (Reid *et al.* 2000). This study produced a composite ranking of shoreline units based on three key criteria: species or communities of special interest; diversity of habitats, communities and species; and productivity and integrity
- The Nature Conservancy - Great Lakes Ecoregional Plan/The Nature Conservancy of Canada - Conservation Blueprint
- US 305(b)/303(e) lists and water quality reports listing impacted stream segments and causes (Integrated Reports)
- United States Environmental Protection Agency, Region 5, Critical Areas GIS project results
- Decision support system for Lake Erie being prepared by the Great Lakes Basin Ecosystem Team. Designed to help select the most important areas for conservation.

- The Nature Conservancy's Ecologically Sustainable Water Management Framework (<http://www.freshwaters.org/eswm/framework.shtml>)
- Relevant indicators and thresholds produced from the Indicators Task Group for the Lake Erie LaMP

References

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Attachment 1. Some Management Objectives/Strategies in the Lake Erie basin

(This list of objectives and strategies includes those identified in Lake Erie LaMP Beneficial Use Impairment reports or by experts on the Habitat Strategy Task Group or expert reviewers; it is not a complete list)

Binational

- Restoration of Regional Shorebird Reserve (Western Hemisphere Shorebird Reserve Network) in western basin (Detroit, MI to Huron, OH) and protection of staging and breeding habitats in at key shorebird migration sites such as Long Point, ON and Presque Isle, PA.
- Support the North American Colonial Waterbird Conservation Plan objectives relating to habitat for the Upper Mississippi Basin/Great Lakes Colonial Waterbird Conservation Region which includes Lake Erie basin
- Partners in Flight and Important Bird Area programs in priority watersheds or habitat types for Lake Erie LaMP habitat protection and restoration activities
- Great Lakes Fishery Commission - Lake Erie Fish Community Goals and Objectives which recognize preservation and restoration of habitat as 1 of 8 guiding principles important for the identification of fish community objectives for Lake Erie (available March 2003)
- Great Lakes Fishery Commission - Lake Erie Committee - Draft Environmental Objectives
- Great Lakes Fisheries Commission Habitat Strategy
- Lake Erie LaMP ecosystem objectives (in development)
- The Nature Conservancy and Nature Conservancy of Canada Great Lakes Ecoregional Plan
- Regional Climate Change Guidelines for the Great Lakes prepared by Ecological Society of America Concerned Scientists
- Hartig, J.H. 1993. A survey of fish community and habitat goals/objectives/targets and status in Great Lakes areas of concern (<http://www.glfc.org/pubs/SpecialPubs/Survey1993.pdf>)
- Remedial Action Plans for Lake Erie Areas of Concern

Canada

- Great Lakes Wetlands Conservation Action Plan - strategy to protect area and function of 30,000 ha of wetlands in Great Lakes Basin by 2020.
- Policy for the Management of Fish Habitat
- Decision Framework for the Determination and Authorization of Harmful Alteration, Disruption or Destruction of Fish Habitat, Department of Fisheries and Oceans, Habitat Management Branch. 1998
- Strategic Plan for Ontario's Fisheries
- Ontario Ministry of Natural Resources Five Year Plan for Rehabilitation of Eastern Basin Fisheries 2000-2004
- Conservation Authority Fisheries Management Plans (e.g., Grand River Fisheries Management Plan)
- watershed plan objectives

United States of America

- Habitat acreage objectives for restoration/acquisition of upland marsh habitat in Lake Erie Marshes Focus Area of NAWMP (Lake Erie basin in Ohio). This plan calls for enhancement and restoration of 7,000 acres of existing protected wetland habitat and acquisition or protection of 11, 000 acres.
- United States Fish and Wildlife Service Conservation of Great Lakes islands and coastal near-shore habitats initiative
- Partners for Fish and Wildlife Ohio - <http://midwest.fws.gov/Partners/ohio.html> - habitat restoration on private lands
- Ecologically Sustainable Water Management Framework, Freshwater Institute, The Nature Conservancy - <http://www.freshwaters.org/eswm/framework.shtml>
- Aquatic Life Use Attainment Criteria for Surface Waters (Ohio)
- Ohio Lake Erie Qualitative Habitat Evaluation Index (QHEI)
- Ohio Lake Erie Quality Index
- Ohio Lake Erie Protection and Restoration Plan
- Ohio Environmental Protection Agency Headwater Streams
- Ohio Coastal Management Plan Nonpoint Source Program