

## CHAPTER 5 HABITAT ASSESSMENT AND RESTORATION

### 5.1 Summary

This chapter provides an overview of the types of habitat in the Lake Ontario basin, status of the habitat, and the restoration and protection activities that have been completed or are still ongoing in the U.S. and Canada. The material presented is based on information that existed as of December 2007.

### 5.2 Habitat Types of the Lake Ontario Basin

Clean water alone cannot restore the Lake Ontario ecosystem. Habitat of sufficient quality and quantity is essential to achieve the restoration and protection of a fully functioning ecosystem. The Lake Ontario LaMP will work with its partners to identify priority lakewide habitat issues and will work to coordinate government and voluntary efforts so that degraded habitat will not limit the restoration of the Lake Ontario ecosystem.

#### 5.2.1 Habitat Zones and Foodwebs

Habitats that are critical to the health and functioning of Lake Ontario's aquatic foodweb are: (1) nearshore fish spawning grounds; (2) nearshore wetland and coastal bird and fish nesting and spawning grounds; and (3) tributaries. In turn, the lake can be partitioned into two major overlapping and interacting habitat zones: the nearshore and the offshore. The boundary between these two zones is loosely defined as the 15-metre depth contour.

The feeding relationship among the fish and other organisms within each zone is called a foodweb. All aquatic foodwebs depend on the production of microscopic algae that require adequate light and nutrients to thrive. Algae are fed upon by microscopic zooplankton or by bottom-dwelling benthos (bottom-dwelling organisms that depend on living and dead material that settles to the bottom). Zooplankton and the benthos provide the link from algae to fish and sustain the cycle of material through the foodweb.

#### 5.2.2 Nearshore Habitat

The nearshore zone includes the shallow coastal waters adjacent to shore and all embayments. Within this zone, the degree of wind and wave exposure varies from very shallow protected embayments with little water exchange with the open lake, to exposed coastal areas. Similarly, nutrient levels and the impact of shoreline development vary widely in this zone. The type of aquatic plants, bottom characteristics, water flow, light and temperature found in nearshore zones determines where fish can find food, avoid predation, or spawn.

The importance of the nearshore zone to Lake Ontario fish communities cannot be over-emphasized. With very few exceptions, most Lake Ontario fish species spend part of their life cycle in the nearshore zone. For many species, the earliest and most critical life stages of egg, larvae and juveniles depend on nearshore habitat. The nearshore resident fish community varies with season, the degree of nutrient enrichment, temperature and available habitat. Dominant fish species spending most of their life cycle in the nearshore include walleye, smallmouth and largemouth bass, freshwater drum, yellow perch, white perch, gizzard shad, various minnows, and several sunfish species.

The invasion of the zebra and quagga mussels has caused significant long-term ecosystem disruptions to the nearshore zone of Lake Ontario and the other Great Lakes. These mussels have re-engineered the flow of nutrients in the lake causing a "nearshore shunt" where nutrients are concentrated close to the shore. The result has been increases in growth of the nuisance algae, *Cladophora*, and other water quality effects. The longer term effects of these changes on fish habitat have yet to be fully realized.

### **5.2.3 Offshore Habitat**

Temperature has a dominant influence on fish distribution in the offshore zone. The development and expansion of the thermal bar in spring (a band of warm nearshore water), the establishment of the thermocline in mid-summer, and the wind driven mixing and movement of water results in large variations in temperature over depths and regions. The mixing of offshore waters results in more uniform water quality when compared to the nearshore. Many fish species associated with the offshore rely on the nearshore zone or tributaries for spawning and nursery habitat for young.

### **5.2.4 Nearshore Wetlands**

Sixty-eight species of fish use coastal wetlands of Lake Ontario, either as permanent residents or for spawning, nursery or feeding during their lifecycle. The ecosystem and fish and wildlife values associated with wetlands are difficult to quantify systematically. However, protection and rehabilitation of wetlands offers improved habitat for fish and wildlife species. Throughout Lake Ontario, water level regulation is a major stress on remaining wetlands. Low water levels are thought to have led to dominance by cattails and reduced diversity of other plant species. More variable water levels can lead to greater diversity of wetland plant communities and improve fish and wildlife habitat. Other wetland rehabilitation techniques include planting of aquatic vegetation, creating channels in cattail marshes, excluding carp, and local control of water levels through diking.

Since 1960, Lake Ontario's water level has been regulated by a series of dams on the St. Lawrence River. Water levels are determined by the International Joint Commission (IJC) under a formula that seeks to balance a number of interests. Many biologists believe that water level regulation has had serious and lasting impacts on Lake Ontario's natural resources, including fish and wildlife (particularly shorebirds and spawning fish), shoreline habitat and dune barrier systems, and the numerous wetland complexes that line the shoreline. The IJC has completed a five-year binational study of the effects of water level control on shipping, riparian property owners, boating and the environment. The IJC is currently evaluating the recommendations of the study and several possible new plans for water level control, including a plan that would increase water level variation and benefit wetlands, fish and wildlife habitat. The IJC is continuing government and public consultation before a new plan is selected.

### **5.2.5 Tributaries**

Recent observations of large numbers of wild Chinook salmon and rainbow trout in tributaries have increased the recognition of the potential for greater contribution from wild fish to the Lake's aquatic ecosystem. The main spawning and nursery habitats for approximately one-third of the fish species in the Great Lakes are located within tributaries. The value of most tributaries to Lake Ontario, for migratory trout and salmon spawning and nursery use, has been limited by barriers blocking access, poor water and habitat quality, and unsuitable flow regimes. Stream rehabilitation programs, management of fish passage, and storm water management can improve the spawning and nursery habitat for cold water fish species and increase wild fish production. Land use practices that better control erosion can reduce run-off of sediments and associated nutrients and contaminants into streams, and act in concert with other water quality control programs.

## **5.3 Current Status of Basin Habitat**

It has been estimated that since colonial times about 50 percent of Lake Ontario's original wetlands have been lost. In areas of intense coastline urbanization, 60 to 90 percent of wetlands have been lost. These losses are a result of the multiple effects associated with urban development and human alterations, such as draining wetlands to establish agricultural land, marina construction, diking, dredging, and disturbances by public utilities. Currently, approximately 80,000 acres of Lake Ontario's wetlands remain. The largest expanses are located in the eastern portion, along the coastline of Presqu'ile Bay and the Bay of Quinte in Ontario and Mexico Bay in New York. More than 20 percent of Lake Ontario's wetlands are fully protected in parks,

while additional areas are subject to a variety of municipal, state/provincial or federal rules, regulations, acts or programs. Opportunities to protect, restore or replace these valuable habitats need to be explored.

Several Lake Ontario basin habitat assessments and inventories have been conducted by U.S. and Canadian governments over the last few decades.

On the U.S. side, the 24,720-square mile portion of the Lake Ontario basin, from the St. Lawrence River and including the Niagara River corridor, is diverse in fish and wildlife habitat. Along the shoreline are sand beaches, sand dunes, and wetlands including fens and coastal marshes, significant habitats for shorebirds, raptors, passerines, and waterfowl. Black terns and common terns nest and forage in the marshes. Sprinkled at the eastern end of the lake, alvars, which are areas of flat limestone bedrock where soils have been scraped away by ice, wind, and water, are habitats for grasses, wildflowers, mosses, lichens, stunted trees, and specialized birds and invertebrates. Upland are forests of oak, ash, white cedar, and hickory.

Habitats have been altered by physical, chemical, and biological changes. Sand transport mechanisms needed to nourish sand beaches, dunes, and coastal wetlands have been disrupted. Shoreline development has impacted terrestrial and aquatic habitats. Urban and agricultural runoff continue to impact tributary and nearshore habitats. Non-indigenous invasive species are replacing native species in both terrestrial and aquatic habitats. The reduced variation in lake levels under the current regulation regime has had a profound impact on shoreline habitats.

The current status of fish and wildlife habitats that takes into account natural resource values and threats is incomplete. Efforts are now underway to assess particular habitats by a number of agencies and organizations. The U.S. Fish and Wildlife Service is continuing to update endangered species, wetland inventory, and aquatic habitat information and inventories. New York State habitat status has been updated in New York State's Comprehensive Wildlife Conservation Strategy which identifies the species in greatest need of conservation, and also includes a full array of wildlife and related issues. The strategy identifies the species in greatest need of conservation; compiles information about those species and their habitats, threats to the species, population trends, conservation goals and objectives and recommends and prioritizes conservation actions. Regional bird conservation mapping being undertaken by Vermont University will help to characterize habitat used by songbird migrants. A binational biodiversity blueprint for the Great Lakes ecoregion has been completed and released by a team of partners including the Ontario Ministry of Natural Resources, Nature Conservancy of Canada and The Nature Conservancy. This blueprint provides guidance conservation action, and reflects the contributions of 200 other agencies and partner organizations throughout the basin. Local watersheds and partnerships, such as the Ontario Dunes Coalition, are conducting assessments of local natural resources and threats.

On the Canadian side, an assessment of the status of Canadian habitat in the Lake Ontario basin in the year 2000 developed the following findings:

- Nearshore terrestrial habitats in a natural state (such as forests, dunes, beaches and shorecliffs) are in very limited supply and are continuing to decline further. There are many examples of specialized lakeshore natural communities lacking long-term protection. Coastal wetlands have been heavily impacted by historic development activities and remaining wetlands are threatened by habitat alteration, water level controls and sedimentation. The regulation of lake levels since 1960, together with hardening of shoreline areas, have degraded natural shoreline processes (such as erosion and sand transport) affecting the health of nearshore habitats.
- One area of improvement relates to tributary habitats: suspended sediment loadings have declined in most tributaries over the past 26 years. On the other hand, an increasing variability of streamflow is being measured in watersheds associated with intensive agricultural and urban land uses.
- Historic wetland losses have been significant, and the remaining concentrations of wetlands are associated with the Peterborough drumlin field, the edge of the Canadian Shield, and

the Niagara Escarpment. Rare vegetation communities also tend to be clustered, but rare species are broadly distributed with a particular concentration in the Niagara area.

- Human population growth is a major stressor, especially in the urban fringe areas of the Greater Toronto Area and the Hamilton to Niagara corridor. Land uses are changing rapidly as a result of urban sprawl. Rural areas are also changing relatively quickly, with the most intensive agricultural practices and the greatest rates of farmland loss in the western parts of the watershed. The number of active farmers is rapidly decreasing, as are the number of farms and total area farmed.
- Protective policies through municipal official plans and habitat areas of provincial interest (such as the Niagara Escarpment and Oak Ridges Moraine) are in place for about half of the regions and counties within the watershed. Private land stewardship programs and property tax incentives have been important factors in encouraging habitat conservation in some areas. Overall, however, the Canadian Lake Ontario watershed is deficient in protected areas that represent the full range of its habitat types.
- A broad mix of government and non-government activity has also taken place to address the rehabilitation of various habitats. Many rehabilitation projects are associated with the four Remedial Action Plans (RAPs) along the Canadian Lake Ontario shore. Wetland, shoreline and stream rehabilitation projects are the most common types, with agricultural programs receiving particular attention. Many rehabilitation projects feature community and volunteer involvement, often with the support of federal or other funding.

## **5.4 Ongoing Work**

Many habitat restoration and protection projects are underway in the Lake Ontario basin. The following information provides some highlights of the projects supported, in part, by federal, provincial, and state agencies as well as various county, conservation authority, municipal, and private organizations.

Over the last two decades, governmental regulations protecting lake-connected wetlands, shorelines, and littoral zones have significantly reduced the rate of loss of these valuable habitats. More attention is now being given to identifying the opportunities to restore and replace degraded or lost habitats.

### **5.4.1 Binational Activities**

#### Binational Biodiversity Conservation Strategy for Lake Ontario

Lake Ontario is an ecosystem at a crossroads. On one hand, the lake still harbors significant biodiversity in its native fish, thriving populations of migratory birds, extensive coastal wetlands, and magnificent barrier beaches and dunes. On the other hand, it is threatened by hydrological alteration, nutrient enrichment, and continued invasive species introductions, which have vastly altered the food web.

The LaMP, in collaboration with 25 agencies, universities, and non-profit organizations in the U.S. and Canada is developing a binational roadmap to protect and restore Lake Ontario's biological diversity. This process, which is being facilitated by The Nature Conservancy and Nature Conservancy of Canada, will integrate the natural resource information and habitat priorities of Ontario and New York into a binational action agenda for Lake Ontario as a single ecosystem.

The end result will be a scientifically grounded, common vision of priority strategies that partner organizations can pursue. The process involves selecting important conservation targets, ranking threats to them, and then comparing the recommended strategies to the present actions of public and private partners. This process will enable us to identify gaps in conservation efforts that need to be filled through binational collaboration.

Three workshops have been held thus far, and the collaborators have made progress in many important areas.

During the first phase, a binational basin-wide dataset of species-at-risk, exemplary, threatened natural communities, and protected areas was assembled. Then, conservation targets were identified. Conservation targets are important species, natural communities, or ecological systems that serve as the focus for conservation analysis and planning. Eight ecosystem-level targets were selected for analysis and discussion:

- Open water ecosystems—the pelagic zone of the lake;
- The ecosystem of the lake’s bottom in permanently cold waters;
- The nearshore waters that support submerged aquatic plants, and the fish, amphibians, and dabbling ducks that depend on these aquatic habitats;
- Coastal wetland ecosystems of the lake;
- Native fish, including lake trout, Atlantic salmon, lake sturgeon, American eel, and northern pike;
- Coastal terrestrial habitats, such as beaches, dunes, and eroding bluffs;
- Islands that serve as nesting habitat for birds such as the common tern; and
- Tributaries, estuaries, and connecting channels, including major inlet and outlet rivers of the lake.

Finally, the threats that endanger the conservation targets were identified and ranked. The top ranked threats included dams and barriers on tributaries; current aquatic invasive animals; future aquatic invasive animals; and incompatible residential and commercial development.

Other highly ranked threats included pollution from industrial, agricultural, and non-point sources; hydrologic alteration from water level regulation; and climate change.

The next steps will include a more detailed mapping analysis of the threats so that watersheds for conservation action can be prioritized. One major task will be to make the strategies as geographically specific and action-oriented as possible. Questions that need to be answered include:

- Which watersheds most need forested buffers around tributaries to reduce sediment run-off and restore natural flows?
- Which dams are blocking access to important habitat and can be removed or the effects mitigated with minimal environmental and economic impacts?

A second major task will be the identification of a suite of indicators to measure the success of conservation strategies and the status of threats. The objective will be to match the key attributes of the targets (i.e., the density of *Diporeia*, a native shrimp-like animal, as an indication of the status of the benthos) with the existing and future monitoring programs of natural resource organizations in the two countries. A “gap analysis” will compare the monitoring needs with existing monitoring efforts.

By engaging a binational network of partners in developing this action agenda, this project will enhance collaboration and integration of efforts toward achieving the habitat restoration goals of the LaMP.

#### Great Lakes Fishery Commission’s Lake Ontario Committee

Fish population restoration activities are managed jointly by the natural resource agencies with jurisdiction for Lake Ontario and are coordinated through the Great Lakes Fishery Commission’s Lake Ontario Committee. The Lake Ontario Committee includes agencies with primary responsibility for managing the fisheries: the Ontario Ministry of Natural Resources (MNR); and the New York State Department of Environmental Conservation (NYSDEC). The Lake Ontario Committee works closely with the federal agencies: the Canadian Department of Fisheries and Oceans (DFO), the U.S. Fish and Wildlife Service (USF&WS), and the U.S. Geological Survey (USGS). As prescribed in the Joint Strategic Plan for Great Lakes Fisheries Management, the Lake Ontario Committee has defined Fish Community Objectives for Lake Ontario. These Objectives

were developed following extensive expert and public consultation. The objectives define desired states for the fish communities of the nearshore zone, the offshore pelagic and the offshore benthic zones. The objectives sought to balance the demands of fishers within the constraints of the food web and in the context of changes to the Lake Ontario ecosystem. The Fish Community Objectives are being reviewed and updated this year.

The Fish Community Objectives do not have specific objectives for aquatic habitat. They do include long term directions for management actions such as fish stocking, commercial and recreational fisheries regulation, sea lamprey control, and habitat protection and rehabilitation. Habitat restoration and improvements in connectivity have been identified as key objectives in binational management plans being developed for restoration of Atlantic salmon, lake sturgeon, American eel and lake trout. Rather than define new environmental objectives that prescribe the habitat requirements for fish, the Lake Ontario Committee plans to use the Lake Ontario LaMP's Ecosystem Objectives (see Chapter 3 of the Lake Ontario LaMP Status Report) to define these habitat requirements.

### Binational Marsh Monitoring Program

The binational Marsh Monitoring Program utilizes citizen volunteers to monitor coastal wetlands and their amphibian and marsh bird populations. It is a long-term monitoring program that coordinates the skills, interests and stewardship of hundreds of citizens across the Great Lakes basin to help understand, monitor and conserve the region's wetlands and their amphibian and bird inhabitants. Each spring, volunteers following a standard sampling procedure conduct surveys of marsh bird and amphibian populations and habitat in their local wetlands. To date, amphibians, marsh birds, or both have been surveyed on over 500 routes in the Great Lakes basin. This work has been done by more than 300 volunteers, contributing over 6000 hours of their collective time. Information gathered through the monitoring program will help guide the management and remediation of marshes in the Lake Ontario basin by serving the following objectives:

- monitor populations of marsh birds and amphibians over time on a variety of spatial scales;
- investigate habitat associations of marsh birds and amphibians;
- contribute to the assessment of Great Lakes Areas of Concern (AOCs) and other wetland conservation initiatives with respect to marsh bird and amphibian communities; and,
- increase awareness of marsh bird, amphibian and wetland conservation issues through volunteer participation and communication to the public, scientists and regulators.

### **5.4.2 U.S. Activities**

Several New York State habitat restoration and protection projects are being conducted through the cooperative efforts of county, city, local, and private organizations as well as state and federal agencies. The New York State Open Space Conservation Plan provides a statewide process to identify and acquire undeveloped habitats. The state works in partnership with local governments, non-profit conservation organizations, and private landowners to establish and achieve land conservation goals. Funding for the program is provided by the state's Environmental Protection Fund and, where possible, leveraged by federal and other sources of funding. Ongoing habitat acquisition programs include: Salmon River Corridor, Northern Montezuma Wetlands, Genesee Greenway, and Eastern Lake Ontario shoreline.

The USEPA's Great Lakes National Program Office provides funding for a variety of Great Lakes habitat restoration projects. Projects have included, but are not limited to: wetland creation in the Lower Genesee River/Irondequoit Bay; barrier beach and wetlands habitat restoration on the Lake's shoreline; public education; creation of wildlife nesting habitat and exotic vegetation control at Deer Creek Marsh Wildlife Management Area; protection and restoration of Sandy Pond Peninsula and supporting efforts to protect and restore the bald eagle in the Lake Ontario basin.

There are many habitat restoration and protection projects currently underway in the U.S. Lake Ontario basin, by both government and private partners. While the list is very extensive, here are some examples of the type of work being done:

- A community-based conservation program to protect the wetlands, rivers, streams, and working forests of the Tug Hill region in New York has led to protection of over 45,000 acres within the 150,000 acre Tug Hill core forest. Combined efforts of New York State's Department of Environmental Conservation (NYDEC), Department of State, Tug Hill Commission, a timber investor, Tug Hill Tomorrow Land Trust, and The Nature Conservancy (TNC) have protected a large timber company tract, preserved a portion of the 45,000 acres as a conservation area, provided public access, and ensured sustainable forestry on a major portion of the land.
- Lake Sturgeon projects are ongoing. In the St. Lawrence River, New York Power Authority is investigating the creation of sturgeon spawning beds at the Iroquois Dam. USGS and the State University of New York College of Environmental Sciences and Forestry are currently doing a feasibility study on the viability of reintroducing Lake Sturgeon as a top benthic predator. The early history of the Genesee River, a major tributary to Lake Ontario, records the existence of giant sturgeon in the lower portions of the river, but sturgeon population has declined over the years. Now there is great interest in restoring the sturgeon to the river. An evaluation of lake sturgeon habitat by USGS and USFWS in the Genesee River has been completed. The final report verifies that the river provides good lake sturgeon juvenile habitat and the stocked juvenile lake sturgeon are successfully using the available nursery habitat. USGS plans to continue annual monitoring of the stocked lake sturgeon.
- Protection efforts in the Finger Lakes area are focused especially on the watersheds of the three western Finger Lakes (Hemlock, Canadice, and Honeoye), which remain largely intact and unfragmented. Hemlock Lake and Canadice Lakes are both part of the City of Rochester's water supply system; the city owns 7,200 acres of land within the watershed of the lakes, including their entire shorelines. South of Honeoye Lake lies the Bristol Hills, a relatively intact forest system that stretches east to Naples. This area is the largest documented Appalachian oak-hickory forest in New York. The site also includes a large swamp and wetland complex at the south end of Honeoye Lake. TNC and the Finger Lakes Land Trust are both working to expand protection of the western Finger Lakes by identifying and acquiring important lands and conservation easements in the Bristol Hills, and in the Hemlock, Canadice, and Honeoye watersheds. TNC has protected over 3,500 acres in the western Finger Lakes since 2000. Future strategies will include land acquisition to protect key tracts; land management to restore native forests; and outreach programs to build awareness of the importance of safeguarding watersheds and preventing forest fragmentation.
- The Montezuma wetlands complex, located between Syracuse and Rochester, once comprised more than 40,000 acres of contiguous marshland. Although agricultural activities have drained nearly half of these wetlands, Montezuma is still considered one of the state's premier wetland conservation areas and is one of the most important sites in the state for migratory birds. Every spring and fall, hundreds of thousands of ducks, geese, and shorebirds utilize the complex as a staging area. Both the U.S. Fish & Wildlife Service (USFWS) and the NYSDEC are protecting and restoring wetlands at Montezuma, with a goal of returning the complex to its original size. These two agencies are working in partnership with TNC, Ducks Unlimited, Audubon New York, and Friends of the Montezuma Wetlands Complex in protecting and restoring key parcels, and making Montezuma more accessible to the public. Montezuma is a laboratory for invasive species control, where USFWS officials are releasing beetles to control purple loosestrife and experimenting with fire and herbicides to control phragmites.
- At Eighteenmile Creek, an ongoing wetlands protection project of the Western New York Land Conservancy, partially funded by the USEPA, is coordinating the towns in the watershed to help design best management practices and zoning ordinances; conduct decision making exercises in each

town; produce outreach materials; and prepare criteria for prioritizing acquisition areas and produce a land use/wetland map of the area. Portions of the streambank have been physically re-established and re-vegetated to reduce erosion and instream sedimentation from man-made disturbances.

- A coordinated Dune Steward Program for the beaches and dunes of eastern Lake Ontario is underway with funding from the DEC and support from New York Sea Grant, Oswego County, the Ontario Dune Coalition and The Nature Conservancy. This program has been extended to include stewards on the Salmon River corridor, and its focuses include restoration of beach and dune habitats, sensitive public access and engagement of the local community in conservation.
- Stewards have also worked with The Friends of Sandy Pond Beach, NY State Parks, DEC, private landowners, and TNC to restore about five acres of degraded dunes on four protected sites and two private sites with the rare native Champlain beachgrass. With advice and support from the U.S. Department of Agriculture, NY Natural Heritage Program, and the University of Vermont, The Friends expanded that effort with native material cultured by local farmers to supply local needs.
- Other efforts include development of an interactive dune education website, developed by NY Sea Grant and local school districts.
- The Dune Steward Program began in the Sandy Pond Beach Natural Area, where the DEC, the local community of Sandy Creek, and several NGO partners including TNC, the Ontario Dune Coalition, the Friends of Sandy Pond Beach have worked together to conserve highly significant dune and wetland habitats. Sandy Pond Beach Natural Area is part of the 17-mile beach-dune-lagoon ecosystem of the eastern shoreline of Lake Ontario, where 6,500 acres of land are protected in one state part, three DEC wildlife management areas, and three TNC preserves.
- The St. Lawrence-Eastern Lake Ontario PRISM (Partnership for Regional Invasive Species Management ) is actively engaged in controlling the spread of swallowwort and other invasive species in the eastern Lake Ontario region. This PRISM is one of several such partnerships in place in New York under the auspices of the statewide Invasive Species Task Force.
- A partnership between the US Army Corps of Engineers and The Nature Conservancy, with further support from New York's Environmental Protection Fund, has investigated the dynamics of sand movement and coastal processes shaping the eastern Lake Ontario shoreline. This project contributed to the International Joint Commission's five-year study to develop a new regulation plan for Lake Ontario and the St. Lawrence River.

#### Great Lakes Regional Collaboration Habitat and Wetlands Initiative

The Great Lakes Regional Collaboration's December 2005 Strategy to Restore and Protect the Great Lakes committed to implement several near term actions that would address key habitat and wetland issues. These near term actions include a wetlands challenge to federal and non-federal partners to achieve a goal of protecting and restoring 200,000 acres of wetlands in the Great Lakes basin, improving coordination of Federal wetlands management programs, streamlining the wetland restoration permitting process and updating the national Wetlands Inventory.

At the same time, the U.S. Army Corps of Engineers initiated a 2 year, \$1 million project to develop a Great Lakes Habitat Initiative (GLHI) that builds upon the habitat recommendations of the Great Lakes Regional Collaboration's December 2005 Strategy.



Moving toward implementation, the two initiatives share similar goals and are being merged into one overarching Habitat Initiative. The initial focus of the newly merged Habitat Initiative will be on accomplishing the wetlands challenge to protect and restore 200,000 acres in the Great Lakes basin.

A stakeholder forum that brings together partners will identify restoration projects, identify ways to implement restoration projects, explore ways to develop partnerships and overcome hurdles to project implementation. Databases are being developed which will include: information on more than 150 governmental and nongovernmental programs for funding habitat projects (Funding Programs Inventory); and over 200 potential, site-specific habitat projects entered by federal and non-Federal partners (Restoration Projects Database). Monitoring and tracking progress towards the 200,000 wetland restoration goal will also be done.

Since December 2005, an estimated 65,000 acres of wetlands have been protected, improved or restored by federal agencies working with partners.

### **5.4.3 Canadian Activities**

The 2007 to 2010 Canada-Ontario Agreement Respecting the Great Lakes Basin Ecosystem (COA) is the federal-provincial agreement, signed August, 2007, that supports the restoration and protection of the Great Lakes Basin Ecosystem. The Agreement between the governments of Canada and Ontario outlines how the two governments will cooperate and coordinate their efforts to restore, protect and conserve the Great Lakes basin ecosystem. It builds on the actions taken through previous agreements, and focuses priorities for future actions. The Agreement also contributes to meeting Canada's obligations under the Canada-United States Great Lakes Water Quality Agreement.

Key actions identified in the 2007 to 2010 COA agreement related to the restoration of Lake Ontario habitat include:

- Restoring and protecting fish and wildlife habitats and populations in the Hamilton Harbour, Toronto and Bay of Quinte Areas of Concern (AOC)
- Stewardship work with landowners, community groups and non-government organizations to protect, restore and promote sustainable use of land, water and aquatic resources throughout the Great Lakes Basin.
- Protecting and rehabilitating habitats, including coastal wetlands and Great Lakes Rivers.
- Protecting and restoring heritage fish and wildlife species such as Atlantic salmon, American eel, bald eagle, lake trout and lake sturgeon
- Lessening the threat of aquatic invasive species.
- Applying the new science to understanding the expected impact of climate change on Great Lakes waters, ecosystems and benefits.
- Applying new science to the understanding of habitat restoration activities.

In the Hamilton Harbour AOC, Fish and Wildlife restoration activities continue both in the Harbour and the watershed - with the key focus the restoration of the Cootes Paradise Marsh. Development of a Phosphorus model has provided a tool for the management of Cootes Paradise. The City of Hamilton and Municipality of Halton have developed a Natural Heritage Strategy. Fish and Wildlife Habitat Restoration Program has enhanced 340 ha of habitat at 6 sites in the Harbour. The RAP restoration target is 372 ha of habitat restored

at 9 sites within the AOC. Ongoing COA projects will mitigate the effects of low head weirs, establishing riparian buffers, improve instream habitat and reduce impacts of on-line ponds in tributaries to the Harbour.

Aquatic riparian habitat and conservation is addressed in the Toronto AOC through implementation of the Toronto and Region Conservation Authority's Toronto Waterfront Aquatic Habitat Restoration Strategy. In addition, the removal of barriers along the Rouge River from Lake Ontario to Major Mackenzie Drive for the passage of native fish species has been completed. Fisheries Management Plans have been developed for most of the AOC's watersheds. Work is underway to mitigate 10 barriers to fish movement in the upper Humber and Rouge River systems. In addition, work is underway to rehabilitate 10 hectares of wetlands in the headwaters of the Rouge and Humber watersheds and 2 hectares of coastal wetlands in the Rouge Marshes. An evaluation of the effectiveness of habitat rehabilitation along the Toronto waterfront will guide future restoration projects in the Great Lakes including Lake Ontario.

In the Bay of Quinte AOC, a Fish Habitat management plan and Natural Heritage studies have been completed for all coastal municipalities as well as Mohawk Tyendinaga Territory. A wildlife impairment strategy and a Fisheries Management Plan will be complete by March 2007. These plans will guide future restoration activities in the AOC. The Salmon River and Wilton Creek habitat stewardship projects has implemented over 50 stewardship plans with landowners to increase riparian vegetation and wildlife habitat around wetlands and stream banks.

Many lake wide restoration, conservation and protection projects are being implemented during this COA agreement. U.S. EPA and COA funded the development of a biodiversity conservation strategy for Lake Ontario and its watershed. This initiative brought all of the agencies and NGOs from both sides of the lake together to develop a consensus on biodiversity targets, threats and actions needed for biodiversity conservation in the Lake Ontario watershed. After the completion of this report, Ontario will be building on the strategy by developing a more detailed place-based action plan that will prioritize and guide conservation actions for the Canadian side of Lake Ontario.

Specific habitat conservation projects underway on the Canadian side include work to restore/protect habitat for native populations of Atlantic salmon, American eel, bald eagle and Lake Trout. Examples of these projects include:

- Improvements to stream habitats for Atlantic salmon such as mitigation of barriers to fish passage in the Credit River, tree planting and stream bank stabilization in Cobourg Brook and Duffin's Creek.
- Identification of barriers to eel and other fish species migration throughout the Lake Ontario watershed
- Identification and protection of high priority bald eagle nesting sites and establishment of eagle nesting platforms.

Canada's Great Lakes Wetlands Conservation Action Plan (GLWCAP) focuses on the conservation of coastal wetlands, developed a priority acquisition list for coastal wetland sites along the lower Great Lakes (Great Lakes Wetlands Conservation Action Plan, 1995a). Specific actions and priority areas for protection and rehabilitation were also identified along the entire Canadian shore of Lake Ontario (Great Lakes Wetlands Conservation Action Plan, 1995b). The GLWCAP is being implemented through a cooperative partnership between governments and non-governmental organizations in Canada. Wetland evaluations have been updated for coastal wetlands all along the Canadian shoreline of Lake Ontario. To promote protection of wetland resources these data are being tracked in the Natural Resources Values Inventory System and the Great Lakes Coastal Evaluated Wetlands Database. Analysis of these databases will provide updated estimates of wetland loss/gain across southern Ontario. Wetland creation and rehabilitation projects have been undertaken across the Canadian shoreline including Martindale Pond, Cootes Paradise, Stoney Creek, several sites along the Toronto waterfront (Ashbridges Bay, Bluffers Park, Chyester Springs, Colonel Sam Smith Park, Humber River Marsh, Highland Creek Wetland Complex, Keffer Marsh, Mimico Creek, Rouge River Marsh, Toronto Islands), Oshawa Second Marsh, Sawguin Creek Marsh, Little Catarauqui Marsh, Butternut Creek Swamp and Bayfield Bay Marsh.

Lake Ontario's aquatic biodiversity is at risk from aquatic invasive species (AIS). Currently, there are 185 AIS found in the Great Lakes causing problems such as food web disruptions, disease introduction, habitat alterations and declines in native diversity. Preventing the introduction of AIS is key to protecting aquatic resources, and one tool being used is risk assessment. Fisheries and Oceans Canada's Centre of Expertise for Aquatic Risk Assessment (CEARA) has developed tools to predict and assess the biological risk of potential AIS. By informing policy makers of future potential invaders and the vectors on which they may arrive, the opportunity to prevent their introduction is provided. Risk assessments have been completed for the Asian carps and northern snakehead, and work is ongoing to assess the risk associated with Chinese mitten crab and *Hemimysis anomala*. It is also important to monitor the distribution and spread of AIS and this work is being done for *H. anomala* by Canadian and American agencies. Research into the inter-lake movement of aquatic species as a pathway for secondary spread of AIS is also being studied. Results from this will be used to provide science advice on ballast treatment technologies for the Great Lakes shipping fleet.

## 5.5 Actions and Progress

The information contained in this chapter has been compiled based on documents produced up to December 2007. The LaMP process is a dynamic one and therefore the status will change as progress is made. This chapter will be updated in future LaMP reports as appropriate.

## 5.6 References

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