

CHAPTER 11 SUMMARY OF AREA OF CONCERN STATUS

11.1 Summary

There are nine Areas of Concern (AOCs) identified around Lake Ontario. Two of these AOCs are binational and are located at the inlet (Niagara River) and outlet (St. Lawrence River). For each AOC, a Remedial Action Plan (RAP) has been developed and is being implemented. The table lists the status of the fourteen use impairment indicators developed by the International Joint Commission (IJC) to assess beneficial uses in the Areas of Concern. This chapter provides a summary of progress as of January 2008.

11.2 Background and Current Status

Use impairment indicators have been applied in the Lake Ontario Lakewide Management Plan to assess lakewide beneficial uses. In addition to lakewide impairments, the AOCs served to identify problems found in localized nearshore areas, embayments, and tributaries watersheds. This is not surprising as industrial and municipal contamination can become concentrated at the mouths of rivers or harbors. Remedial Action Plans (RAPs) serve as the primary mechanism for addressing these localized contaminant problems and other issues unrelated to lakewide impairments. Table 11-1 summarizes the status of these beneficial use impairment (BUI) indicators for the Lake Ontario LaMP and AOCs.

Each AOC is required to develop and implement a Remedial Action Plan (RAP) in accordance with the 1987 amendments to the Great Lakes Water Quality Agreement, signed by the federal governments of the United States and Canada. The federal governments, in cooperation with state and provincial governments, committed to developing and implementing RAPs in 43 Areas of Concern (AOCs). The RAP process strives to identify environmental problems (beneficial use impairments); identify pollutants and other causes of the problems; identify the sources of the pollutants; recommend and implement remedial activities to restore the beneficial uses and document progress towards restoration. The ultimate goal, therefore, is to restore the area's beneficial uses and delist the AOC. This chapter provides a summary of the status of each AOC associated with the Lake Ontario LaMP.

On July 25, 2006, the Oswego River, New York Area of Concern was formally delisted. This celebration of success completes a rigorous process to assure that beneficial uses are restored and protected in an AOC and means that the AOC designation no longer applies. The delisting of the Oswego River AOC has set the stage for achieving progress in addressing all of Lake Ontario's nine AOCs. Figure 11.1 shows the location of the nine AOCs around Lake Ontario. The two binational AOCs (the Niagara River and St. Lawrence River at Cornwall and Massena) actually have separate Canadian and U.S. Remedial Action Plans. In New York, the other AOCs are Eighteenmile Creek and Rochester Embayment. And in Ontario, Canada the other AOCs are Hamilton Harbour, Toronto and Region, Port Hope Harbour, and the Bay of Quinte.

The current focus on applying resources to resolve the BUIs in all of the AOCs along with implementation of remedial measures that further nearshore protection and restoration initiatives, will contribute to overall improvements in the Lake Ontario ecosystem. On varying magnitudes, each of the Lake Ontario RAPs as well as the Lakewide Management Plan (LaMP) employ the fundamental principles of applying an ecosystem approach and conducting public involvement in implementing remedial activities.

Table 11.1 Summary of Beneficial Use Impairments for Lake Ontario Lakewide, Nearshore, and Areas of Concern
(Based on the 14 IJC Use Impairment Indicators)

| Use Impairment Indicator | Lakewide Lake Ontario | Niagara River (U.S.) | Niagara River (Canada) | St. Lawrence at Massena+ (U.S.) | St. Lawrence at Cornwall (Canada) | Eighteenmile Creek | Rochester Embayment | Oswego River | Hamilton Harbour | Toronto & Region | Port Hope Harbour | Bay of Quinte |
|--|-----------------------|----------------------|-------------------------|---------------------------------|-----------------------------------|--------------------|---------------------|--------------|------------------|------------------|-------------------|---------------|
| 1. Restrictions on Fish and Wildlife Consumption | I | I | I (fish; not wildlife?) | I | I | I | I | O | I | I | | I |
| 2. Tainting of Fish and Wildlife Flavor | | | | | | | ? | | ? | | | |
| 3. Degradation of Fish and Wildlife Populations | I | ? | I | ? | I | ? | I | O | I | I | | I |
| 4. Fish tumors or Other Deformities | | I | | ? | ? | ? | ? | | I | ? | | ? |
| 5. Bird/Animal Deformities or Reproductive Problems | I | ? | ? | ? | | ? | I | | I | ? | | |
| 6. Degradation of Benhos | I | I | I | ? | | I | I | | I | I | | I |
| 7. Restrictions on Dredging Activities | | I | | | | I | ? | | I | I | I | I |
| 8. Eutrophication or Undesirable Algae | | | I | | I | | I | R | I | I | | I |
| 9. Drinking Water Restrictions or Taste and Odor Problems | | | | ? | | | I* | | ? | | | I* |
| 10. Beach Closings | | | I | | I | | I | | I | I | | I |
| 11. Degradation of Aesthetics | | | | | | | I | | I | I | | I |
| 12. Added Costs to Agriculture or Industry | | | | | | | I | | I | | | |
| 13. Degradation of Phytoplankton and Zooplankton Populations | I | | ? | ? | ? | | I | | I | ? | | I |
| 14. Loss of Fish and Wildlife Habitat | I | I | I | I | I | | I | R | I | I | | I |

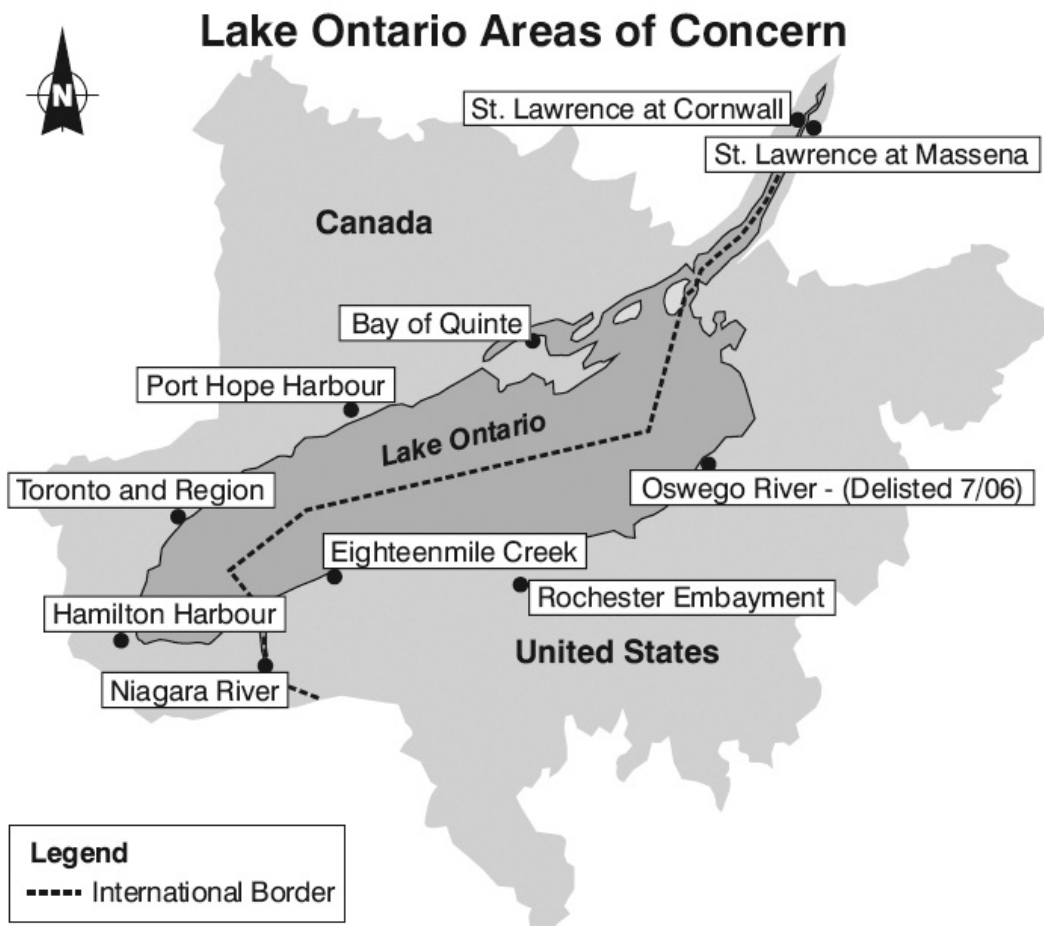
See key next page

Key: Use Impairment Status for Table 11.1

- I = Impaired
- R = Beneficial Use Restored
- O = Resolution by Other Responsibility
- ? = Further Assessment Needed
- (Blank) = Not Impaired

Key: Other Notations for Table 11.1

- I* = Taste and Odor Problems unless otherwise not marked for indicator #9 only
- I- = Lower Genesee River Impaired; Rochester Embayment Needs further study
- + = "Transboundary Impacts" is an added indicator in this RAP



11.3 Binational Areas of Concern

Canada and the United States have agreed to independently develop Remedial Action Plans for the Binational AOCs within a broader context of intergovernmental cooperation. Separate RAP documents have been developed and are being implemented for the two binational AOCs: the Niagara River, and; the St. Lawrence River at Massena, New York and Cornwall Ontario. Joint participation on technical and public participation activities is part of this RAP Process for these shared waterbodies.

11.3.1 Niagara River Area of Concern

The Niagara River flows 60 kilometres from Lake Erie to Lake Ontario. Downstream from Niagara Falls the river flows for a 15 kilometre stretch through a gorge 100 metres deep and 1 kilometre wide. The binational AOC extends the entire length of the Niagara River and includes the Welland River drainage basin on the Canadian side. The Niagara River passes through heavily industrialized areas, residential and parkland interspersed with remnant natural areas, and drains extensive farmland on the Canadian side. The AOC borders Erie and Niagara counties in western New York, and extends from Smokes Creek near the southern end of the Buffalo Harbor, north to the mouth of the Niagara River at Lake Ontario.

Past municipal and industrial discharges and waste disposal sites have been sources of contaminants to the Niagara River. A long history of development has also changed the original shoreline along much of the river, affecting fish and wildlife habitat. More than half of the flow of the river is diverted for electric power generation on both sides of the river. The gorge and cliff face are habitat for some of the highest concentrations of rare plant species in Ontario. The Niagara River annually supports one of the largest and most diverse concentrations of gulls in the world.

Joint participation includes the Niagara River Toxics Management Plan (NRTMP), the Important Bird Area Program and the International Board of Control.

The International Joint Commission has completed the RAP Status Assessment for the Niagara River Area of Concern. The findings and recommendations report notes significant progress in documentation for the Niagara River under the Niagara River Toxics Management Plan. This NRTMP plan identifies challenges and opportunities for the binational community to accomplish RAP goals under the Great Lakes Water Quality Agreement. The October 2007 Public Meeting on the NRTMP documented significant reductions in contaminants to the river as well as significant progress in hazardous waste site remediation (in New York, 21 of 26 major sites are completed).

Environment Canada and MOE are responsible for the delivery of the Canadian RAP. USEPA Region 2 and NYSDEC deliver the US portion of the RAP. Both RAPs were established in 1989. Summaries of the Remedial Actions plans follow.

11.3.1.1 Niagara River (U.S. Side)

Background: A representative group of Niagara River stakeholders was appointed by NYSDEC as an advisory committee to help develop the RAP. The committee members and NYSDEC direct RAP development. Goals were established, a workplan was developed, responsibilities were defined to complete the RAP document. This RAP document effectively combines the Stage 1 and Stage 2 RAP elements and was completed in September 1994. A Status Report for the Niagara River RAP that updates remedial actions was published in June 2000. The RAP addresses use impairments, sources, and existing remediation programs, and recommends future remedial strategies. A multiple subcommittee approach was utilized to address the complexities of implementation. A technical subcommittee was formed to develop ways to quantify concerns and to communicate progress to address the impaired uses. A public outreach subcommittee was created to develop a binational strategy to address the many issues involved with achieving sustainable development, and an International Advisory Committee was established to foster binational cooperation.

Impairments: The Remedial Action Plan (RAP) identifies five BUIs based on the fourteen possible International Joint Commission (IJC) impairments. Two other use impairments are listed that will require further investigation to determine the extent of their existence. The major BUI is restrictions on fish and wildlife consumption, primarily due to PCB and dioxin contamination. Mirex and chlordane also are chemicals of concern contributing to the consumption restriction use impairment. These restrictions are part of a lakewide advisory for Lake Ontario. Based on the presence of contaminated sediment pockets at certain tributary mouths and nearshore areas, the sediments were evaluated as contributing to a degradation of benthos use impairment at these areas.

Existing restriction on open lake disposal of contaminated sediments from the Niagara River cause the AOC to have a dredging restrictions use. In the upper Niagara River, fish tumors have been reported and the loss of fish and wildlife habitat due to human activities has been dramatic. Degradation of fish and wildlife populations and the presence of bird or animal deformities or reproductive problems will require further investigations.

RAP Structure: Most recently, combined efforts of local organizations and citizens [e.g. the Buffalo Niagara Riverkeepers (BNR)] have been advising and assisting NYSDEC on the Niagara River RAP implementation. This RAP committee, when fully active, involves local government, academia, public and economic interest groups, and private stakeholders. The RAP process involves various components: periodic progress status reports with remedial strategy identification; regular Remedial Advisory Committee (RAC) meetings; project and plan reviews as part of ongoing activities; monitoring and tracking progress; and, public participation coordinated through the RAC. In the Niagara River RAP, priority activities and strategies address: stream water quality; inactive hazardous waste site remediation; contaminated river sediments; point source control programs; fish and wildlife habitat improvements; and, enhanced environmental monitoring activities. The committee is to be “reenergized” in 2008.

RAP Status and Progress: A Niagara River RAP public information video was completed by the RAC members. This accomplishment of a video by the RAC was based on earlier international cooperation in the development of a slide show. The RAP continues to benefit from New York’s Environmental Protection Fund as well as other agency funding sources, such as Bond Act funding of a \$1 million habitat restoration project for Strawberry Island. A full day RAP workshop was conducted in July 2006 to start the process of updating and evaluating progress towards meeting goals.

RAP Outlook on the U.S. Side: 2008 presents opportunities for the Niagara River RAP in receiving federal funding for the AOC to revitalize its RAC to address the BUIs. Implementation of the Niagara River RAP is to be a continual improvement process that commits to periodic updates and improvements as knowledge of the use impairments, sources and the effectiveness of remedial measures increases. Remedial actions will be evaluated and coordinated as to their impacts on restoration of beneficial uses. Within the AOC and watershed, a number of studies and assessments will continue to be priorities. These address fish and wildlife consumption restrictions, habitat evaluation, sediment investigation, and contaminant trackdown. Restoring and maintaining an improved quality of life in the ecosystem of the Niagara River and its watershed is the goal. With federal funding in 2008, NYSDEC is to address the BUIs as steps are taken to establish the framework for delisting of the AOC. For additional information see the USEPA website at: <http://www.epa.gov/glnpo/aoc/niagara.html>.

11.3.1.2 Niagara River (Canada Side)

Background: Much of the impact to the river is from the U.S. side, specifically from past industrial management practices. Efforts on the US side are addressing these issues. Most of the environmental issues on the Canadian side of the river are associated with non-point sources within the rural watersheds of the Niagara-Welland River watershed. Former industrial activities have resulted in contaminated sediment in the Welland River (remediated) and Lyons Creek (strategy under development). Pesticide use, nutrient runoff, wetland and habitat loss, riparian zone impacts and the health of fisheries all remain concerns.

Impairments: There are seven BUIs in the Canadian portion of the AOC. These include restrictions on fish consumption, degradation of fish populations, bird or animal deformities and reproductive problems, degradation of benthos, eutrophication, beach closings, and loss of fish and wildlife habitat. The status of the following four impairments requires further assessment: restrictions on wildlife consumption, degradation of wildlife populations, fish tumours and deformities, degradation of phyto/zooplankton populations. Taste and odor problems persist in drinking water; however, this impairment is not due to local sources.

RAP Structure: Through an agreement signed in 1999, the Niagara Peninsula Conservation Authority (NPCA) has assumed responsibility for coordinating the implementation of the RAP and has developed an Implementation Annex that provides a practical strategy for doing this.

RAP Status and Progress: A rural watershed heritage strategy is being implemented for the Welland River. Actions have included the planting of more than 96,000 trees, rehabilitation of 10.5 hectares of wetland habitat, the installation of over 18 kilometres of fencing to protect riparian habitat adjacent to watercourses and the reduction of phosphorus entering local watercourses by more than 1,500 kilograms per year. By 2002, 135 projects were completed. To date, these activities have increased forest cover on 90 hectares of land, restored 21 kilometres of riparian habitat and seven hectares of wetlands. The NPCA has also been actively involved with local landowners since 1994 to improve water quality in streams. Nutrient and bacterial loadings have been reduced through livestock fencing and manure storage projects. Through a grant program, the NPCA will provide incentives to local landowners within the Niagara-Welland basin in order to foster best management practices for agriculture, create habitat and protect ecologically sensitive land.

Urban stormwater and combined sewer overflows (CSOs) are also being addressed. In the City of Niagara Falls, 4300 urban homeowners were asked to disconnect their roof downspouts. The City also continues to actively promote water conservation through a newly developed corporate water conservation strategy and is now proceeding with full scale implementation of innovative technology for High Rate Treatment of combined sewer overflows. Another large scale initiative is an ongoing program to separate domestic and storm sewers to reduce combined sewer overflow events. Fort Erie and Welland have also initiated projects intended to reduce combined sewer overflows.

The extensive loss of fish and wildlife habitat in the AOC is being addressed by the NPCA and the Niagara Restoration Council. Habitat restoration is ongoing and significant progress has been made towards meeting delisting criteria. The Niagara River corridor was named as a binationally Important Bird Area (IBA) in 1996. A conservation plan for this IBA is being developed through a coalition of interested groups. The Niagara Restoration Council is undertaking a project to remove all barriers to fish passage in the watersheds within the Niagara River Canadian AOC. In 2001, all barriers to fish passage were identified, mapped and classified by type and size. It is anticipated that the majority of barriers will be removed or mitigated by 2005, thus making hundreds of kilometres of upstream fish habitat available to spawning fish.

Progress has also been made in addressing contaminated sediments. Based on the contaminated sediments sites identified in the Stage 2 Niagara River RAP report, the NPCA has submitted a management proposal for all known sites. In 1995, approximately 10,000 cubic metres (13,080 cubic yards) of contaminated sediments were remediated in a section of the Welland River adjacent to Atlas Specialty Steels. Since the sediments were remediated, biological sampling indicates that this section of the river is recovering as anticipated. A sediment management strategy is being developed for Lyons Creek.

Very substantial progress has also been made jointly with the U.S., especially in reducing inputs of toxic chemicals. Monitoring results in the Niagara River show that the concentrations for most of the 18 priority toxics targeted by the NRTMP have been significantly reduced, in many cases by more than 50 percent. On the Canadian side, monitoring results for point sources between 1986 and 1995 showed loading reductions of 99 percent for the 18 chemicals of concern.

RAP Outlook: Full implementation of remedial actions in the Niagara River AOC will require many years, and is contingent on federal, provincial and/or municipal funding availability, and in some cases private sector involvement. MOE has lead responsibility for the RAP and Environment Canada and the Niagara Peninsula Conservation Authority will continue to work in partnership as they move towards delisting. Remediation of CSO discharges is essential to complete RAP implementation and several large infrastructure needs have been identified. Infrastructure costs are estimated at CDN\$26M for high

rate treatment of combined sewer overflows for the cities of Niagara Falls and Welland. Developing and implementing a contaminated sediment strategy for Lyons Creek will also require significant funding.

11.3.2 St. Lawrence River Area of Concern

The St. Lawrence River drains the Great Lakes and is among the largest rivers in the world. The AOC is an 80 kilometre stretch of the river that extends upstream from the Village of Massena through the Moses-Saunders power dam at Cornwall, Ontario, downstream to the eastern outlet of Lake St. Francis in Quebec. This AOC is a complex jurisdictional area involving Canada, the United States, Ontario, Quebec, New York State and Mohawks of Akwesasne interests. To divide the work in manageable parts, separate RAPs were developed for the Canadian (Cornwall) and U.S. (Massena) sides of the St. Lawrence River starting in 1988. Multi-national components of the AOC from New York, Ontario, and the St. Regis Mohawk Tribe continue to present opportunities for international cooperation. To the credit and progress of the RAP, examples of this cooperation include stakeholder representation at RAP meetings, preparation of a joint Problem Statement, joint monitoring workshop and information table in 1994, annual St. Lawrence River Ecosystem Conference (primarily Canadian sponsored), and a working relationship to share information from international research and regional area studies.

11.3.2.1 St. Lawrence River at Massena, New York

Background: NYSDEC began development of the St. Lawrence River at Massena RAP in 1988. This process is assisted by the Massena Remedial Advisory Committee (RAC) which consists of members from industry, local government, environmental groups, sporting interests, academia, and business. The Stage 1 report was completed in 1990 and identifies use impairments, their causes, and sources. The Stage 2 report was completed in 1991 and includes the development of remedial strategies to: restore water quality and beneficial uses of the tributary rivers and the St. Lawrence River; to eliminate adverse impacts from sources of pollutants at major local hazardous waste sites and other sources within the Area of Concern. A comprehensive RAP Update document was published in April 1995 that consolidated the Stage 1 and 2 documents and established a format to identify remedial strategies and track progress. The most recent Status Report was completed in October 2006.

Impairments: The waters and river bottoms of the AOC are impacted to various degrees by industrial pollution sources, Lake Ontario, municipal treatment facilities, atmospheric deposition, nonpoint pollution from the watershed, and physical disturbances as a result of the power dam and seaway construction.

The Stage 1 RAP identified industry as a major source of contaminants to the AOC. Stage 1 also confirmed two BUIs (fish consumption advisories and loss of fish habitat) and identified five other BUIs that will require further evaluation. A “transboundary impacts” BUI indicator was added to the standard fourteen BUI indicators that were originally developed by the International Joint Commission’s (IJC) as listing and delisting guidance for the indicators. Assessment of threats and restoration of beneficial uses are needed to complete RAP implementation for the AOC.

RAP Structure: Because of the international aspect of this RAP, an evaluation of the possible transboundary effects associated with the downstream interests and jurisdictions (Canada, Ontario, Quebec, and the St. Regis Mohawk Tribe) are an important consideration for this “binational connecting channel Area of Concern”. The Mohawks have received grant funding to implement an erosion and nonpoint source pollution protection project and study fish population and impacts. As New York State has taken the lead to address the Massena area BUIs, the Canadian jurisdictions have taken responsibility for RAP implementation concerning the Ontario and Quebec side of the river. The Mohawks at Akwesasne contribute to both of these RAP processes.

RAP Status and Progress: Priority actions include: completing the land-based and contaminated river sediment remediation (nearing completion), conducting further investigations (as determined necessary), and reassessing BUI status in light of remedial progress and available study results and information (this is the current focus). The most recent RAP Status Report was published in October 2006 and identifies

the remedial progress, includes delisting criteria, and links available information to the relevant BUI indicators for the AOC. Significant progress has been made with land-based remediation at the ALCOA (west), Reynolds Metals (now ALCOA east), and General Motors industrial sites, as well as with the contaminated sediment removal in the St. Lawrence River at General Motors and ALCOA east. Remedial alternatives are under consideration to address contaminated sediment at the Grasse River site. Some alternatives may provide for treating contaminated sediments in place as well as removal from the site.

RAP Outlook on the U.S. Side: International cooperation continues to benefit the RAP process for the St. Lawrence River AOC. Funding opportunities exist to assist the Great Rivers Institute (GRI) at Clarkson, RAP Coordination by NYSDEC, and research projects to meet the needs to address assessment of the BUI indicators. The International Joint Commission completed its RAP Status Assessment of the Area of Concern in May 2003. The document notes the accomplishments in the AOC and makes recommendations to further address BUIs including contaminated sediments. The Massena RAC has focused on the identification of endpoints and then taking the necessary steps to complete the BUI assessment. A technical sub-committee has been formed to facilitate the focus on the indicators and report to the larger RAP committee. Most land and river based remedial measures have been completed (except for the Grasse River tributary which is totally in New York) thus setting the stage for monitoring data collection, review, and assessment. Participants in the RAP process can identify that a “Binational Area of Recovery” designation for the AOC is a near-term possibility. For additional information see the USEPA website at: <http://www.epa.gov/glnpo/aoc/stlawrence.html>.

11.3.2.2 St. Lawrence River at Cornwall, Ontario

Background: The Cornwall waterfront has been the site of industrial activities for more than 100 years. Although many of the contaminant sources have been eliminated, historical inputs have continued to impact the aquatic environment as contaminated sediment and organisms transfer and cycle mercury and other metals. Local contaminant sources included direct industrial and municipal discharges, and diffuse sources such as urban stormwater and agricultural runoff. (All industrial releases of effluent directly to the St. Lawrence River have ceased). Contaminants also enter the AOC from upstream, from the Great Lakes via Lake Ontario and from air deposition. Land use practices, shipping and the extensive shoreline and water flow alteration that resulted from the construction of the St. Lawrence Seaway continue to alter the natural ecosystem.

Impairments: The following seven BUIs have been identified for the Canadian portion of the AOC:

- Restrictions on fish consumption
- Degradation of fish and wildlife populations
- Degradation of benthos
- Restrictions on dredging activities
- Eutrophication or undesirable algae
- Beach closings/water contact sports
- Loss of fish and wildlife habitat

Three more BUIs - fish tumours and other deformities, bird and other animal deformities, and degradation of plankton populations - are listed as “possibly impaired” and require further assessment work to confirm their status. Table 11.1 provides an up-to-date summary on the status of these additional impairments, as well as the BUIs originally identified within the St. Lawrence River (Cornwall) AOC.

RAP Structure: There are 64 RAP recommendations for improving the aquatic environmental conditions in the AOC, most of which have been implemented or are in progress. The St. Lawrence River Restoration Council provides the local lead for RAP implementation. The group has members from Environment Canada, the Ontario Ministry of the Environment, the Ontario Ministry of Natural Resources, the Mohawk Council of Akwesasne, local municipalities, environmental groups, the Raisin Region Conservation Authority (RRCA) and other groups.

RAP Status and Progress: Significant progress has been made on implementing the RAP and the focus is now on completing priority actions for delisting this AOC by 2010. An update to the 1997 Stage II report has been prepared for the St. Lawrence River (Cornwall) AOC and provides a summary of efforts to focus the RAP towards achieving ecosystem recovery, revisions to delisting criteria and updates the status of BUIs. Highlights of progress to restore beneficial uses are:

Lake St. Francis Tributary Restoration

This highly successful tributary restoration program has been ongoing for 11 years, and is run by the Raisin Region Conservation Authority with support from the Federal, Provincial governments and farm and land owners. Since 1994, the program has achieved the following gains in implementation of beneficial land management practices (BMPs) and habitat and nonpoint source pollution reduction (current to March, 2006):

- 258,228 trees planted in riparian areas
- 40,068 m² (9.9 acres) of grassed buffer zones along watercourses
- 60,708 m (66,391 yards) of cattle exclusion fencing, restricting 9,457 cattle from watercourses
- Provision of 52 alternate watering sources for cattle
- 56 manure storage upgrades
- 31 milkhouse washwater projects
- 9,857 acres converted to conservation tillage
- 4 projects to divert clean water around manure storage or other areas
- 47 wellhead protection projects
- 11 abandoned or unused wells plugged
- 13 erosion control projects
- 14 septic system upgrades

This program is ongoing and future actions include applying the Agricultural Non-point Source (AgNPS) model to target important areas for attention.

Cornwall Sediment Strategy

Environment Canada and the Ontario Ministry of the Environment, in partnership with local municipalities, the Mohawks of Akwesasne, industry and environmental groups, developed a strategy for managing contaminated sediment in three zones along the Cornwall waterfront. After five years of working collaboratively through detailed science review and conducting additional technical studies to fill gaps and to evaluate sediment management options, the Cornwall Sediment Strategy was finalized. This strategy states:

- Contaminated sediments should be left in place. As they currently exist, the historically contaminated sediments in the three zones (1,2 and 3) along the Cornwall waterfront are stable and covered with a cleaner layer of sediment and therefore do not pose a significant ecological risk.
- Implement effective Administrative Controls to protect the sediments from being disturbed. This ensures the natural cap is maintained and allows continued deposition of cleaner sediment particles which will further cover and isolate the deeper more contaminated material.
- Implement a comprehensive ongoing monitoring program of environmental conditions and sediment stability to ensure conditions continue to improve.
- This decision is supported by extensive and detailed scientific study, input from local community representatives and input from nationally and internationally recognized experts in mercury research and ecological assessment of contaminated sediment.

Lake St. Francis Fish Habitat Management Plan

A Fish Habitat Management Plan for Lake St. Francis was completed in March 2006 by the Raisin Region Conservation Authority and MNR. It summarizes known critical and sensitive fish habitat areas and degraded fish habitat areas, prioritizes issues of concern and identifies opportunities for habitat enhancement and restoration. The document was prepared in concert with a Fisheries Management Plan that addresses fish population issues for the area. Prepared by the MNR Lake Ontario Management Unit, the Fish Habitat Management Plan includes direction for the enhancement of Walleye spawning/nursery habitats, creation of Walleye resting habitats, shoreline revegetation and erosion protection programs and wetland securement.

Fish Management Plan

MNR developed a Fisheries Management Plan (FMP) in 2005-06 for the Ontario portion of Lake St. Francis, including the Ontario portion of the St. Lawrence River downstream of the Moses-Saunders Dam. The purpose of the plan is to guide the management of fisheries resources for a period of five years (2005-2011), after which it will be revisited and revised if necessary on a five-year cycle. The plan was developed in consultation with a range of stakeholders including First Nations, federal and provincial government agencies, non-government organizations, and the general public. The plan includes strategies for implementation and monitoring along with a set of Fish Community Objectives (FCOs). FCOs are targets for a healthy fish community, and monitoring data can be compared against them to ensure that fisheries management is maintaining fisheries resources.

Other Progress

Since 1990, the Government of Canada's Great Lakes Sustainability Fund has provided over \$4.1 million towards 30 restoration projects in the AOC. These projects support activities to reduce pollution from rural non-point sources; improve habitat for aquatic and terrestrial species; manage contaminated sediment; provide outreach and education to local stakeholders and landowners; manage municipal wastewaters (including sewage, combined sewer overflow and stormwater); and incorporate natural heritage protection components into municipal Official Plans.

This funding has, in turn, been used to leverage partnership contributions of more than CDN\$13M from a variety of partners including municipalities, conservation authorities, educational organizations, provincial agencies, NGOs, industry, and local farm/landowners and volunteers. These contributions take the form of cash, in-kind materials and service, and/or volunteer labour.

Municipal Wastewater Issues - Candidate projects include: 1) facilitating upgrades of smaller, downstream sewage treatment plants by providing technical assistance or assistance in obtaining infrastructure financing; 2) the completion of pollution prevention and control plans to manage stormwater and combined sewer overflows for communities within the AOC; 3) assisting small and rural communities in the AOC address issues of potential water contamination caused by inadequate septic systems. In 2005, the City of Cornwall completed an Environmental Assessment for the upgrade of their sewage treatment plant from primary to secondary treatment. A subsequent application for Federal and Provincial Infrastructure funding (COMRIF) was not successful. The Federal, Provincial and municipal governments have had further discussions regarding funding for the upgrade however, to date, no progress has been made on finalizing plans for this important project.

RAP Outlook: The goal is to complete all priority actions required for delisting this AOC by 2010. To achieve this goal, an aggressive workplan has been developed and is being implemented to complete all non-point source and habitat projects. A dedicated effort to implement mechanisms that will maintain environmental quality is critical. Municipal infrastructure upgrades required to address the management of sewage and wastewater in some communities within the AOC are being pursued. When RAP implementation actions have been successfully completed, it will be imperative to monitor ecosystem recovery. This may be one AOC which becomes an Area in Recovery while the environment needs time to respond to the positive actions that have taken place.

Outstanding issues in the St. Lawrence AOC include: assessing the status of zooplankton and phytoplankton populations; the restoration and protection of fish and wildlife habitat; a review of sources and levels of bacterial pollution in waters used for body contact recreation.

11.4 U.S. Areas of Concern

11.4.1 Eighteenmile Creek

Background: The Eighteenmile Creek Area of Concern (AOC) is located in the town of Newfane, Niagara County, in western New York State. The creek flows from the south and discharges into Lake Ontario, about 18 miles east of the mouth of the Niagara River, through Olcott Harbor. The AOC includes Olcott Harbor at the mouth of the creek on Lake Ontario and extends upstream to the farthest point at which backwater conditions exist during Lake Ontario's highest monthly average lake level. This point is just downstream of the Burt Dam located about two miles upstream from the harbor in the Hamlet of Burt.

Development of the Eighteenmile Creek RAP was initiated in March 1994. A combined final Stage 1 and Stage 2 RAP document was completed and published in August 1997 by NYSDEC in cooperation with the Eighteenmile Creek Remedial Advisory Committee. A RAP Report card has also been published and is available on the site. It provides information on RAP implementation and indicator status, successes and improvements, current status, trends, and steps needed for restoration of the Area of Concern.

Impairments: Past industrial and municipal waste disposal practices have contributed to BUIs in Eighteenmile Creek. Fish consumption restrictions exist because of PCBs and dioxins found in fish flesh; however, these are closely linked to Lake Ontario and are not unique to the AOC. PCBs and metals in sediments have contributed to degradation of benthos. Contaminated sediments cause restriction of dredging to exist. Bird and animal health is likely impaired by the PCBs, dioxins, DDT and its metabolites, and dieldrin found in fish flesh. PCB and metal contamination prevents open lake disposal of dredged sediment material. Additional investigations are to be conducted to assess the status of fish and wildlife populations and the presence of fish tumors or other deformities.

RAP Structure: In January 2005, EPA awarded the Niagara County Soil and Water Conservation District (NCSWCD) grant funding for RAP coordination over a five year period. RAP management and outreach efforts continue to include conducting committee meetings, workshops, public information outings, and field trips. NCSWCD has established a website to assist in communication on the Area of Concern at: www.eighteenmilerap.com.

RAP Status and Progress: Niagara County SWCD completed a RAP Status Report in December 2006. The previous 2001 report was completed by NYSDEC and the RAP committee. An investigative study of the plankton community was conducted by SUNY at Brockport under an EPA grant, and the results establish that the plankton populations BUI is not impaired. The New York State Environmental Bond Act has provided funding to address the City of Lockport's municipal wastewater and combined sewer overflows. All significant CSO correction work has been accomplished, and remaining CSO mitigation work is under engineering evaluation for project needs. NYSDEC and the Niagara County Department of Health have initiated a comprehensive trackdown sampling project to locate and identify sources of various contaminants in the area of the Flintkote Plant Site. This upstream area is linked as a contaminant source area that is emitting various concentrations of PCBs, mercury and lead into Eighteenmile Creek.

RAP Outlook: RAP activities are now focused on the evaluation of the BUI indicators and establishing delisting criteria to assist in this process. At the same time, continued investigation and assessment of creek sediments and water quality to determine the need to address upstream sediments is a priority. The AOC boundary can be extended upstream to address sources causing impairments in the AOC; hence, the evaluation of PCB and other contaminants sources in the watershed along with continued remediation of inactive hazardous waste sites is also a focus. Planning efforts are underway to develop a Comprehensive Watershed Management

Plan in conjunction with the U.S. Army Corps of Engineers. From this plan, project components to address habitat restoration to benefit the AOC are to be identified. Such projects provide for streambank stability, sediment assessment, best management practices, and community outreach. A separate New York State Department of State grant will develop and implement a monitoring plan to document restoration activities. For additional information see the USEPA website at: <http://www.epa.gov/glnpo/aoc/eighteenmile.html>.

11.4.2 Rochester Embayment

Background: The Rochester Embayment formed by the indentation of the Monroe County (New York) shoreline between Bogus Point in the town of Parma and Nine Mile Point in the town of Webster, both in Monroe County. The northern boundary of the embayment is delineated by the straight line between these two points. The southern boundary includes approximately 9.6 km (6 miles) of the Genesee River that is influenced by lake levels, from the river's mouth to the Lower Falls. The drainage area of the embayment is more than 7,770 km² (3,000 sq. mi.) in area. This area consists of the entire Genesee River Basin and parts of two other drainage basins: the easternmost area of the Lake Ontario West Basin and the westernmost area of the Lake Ontario Central Basin.

The Stage 1 document was completed in August 1993. Starting in October 2003, the Monroe County Department of Health received EPA funding for RAP management and coordination. The focus is on research, priority project implementation, and delisting considerations. Ongoing initiatives include: Monroe County's source trackdown, CSO mitigation and abatement, and funded studies of local aquatic conditions. Monroe County has developed RAP related projects and seeks funding to address gaps and needs for watershed improvements including nonpoint sources, habitat restoration and watershed openspace.

Impairments: Twelve of the fourteen BUIs were identified in the Area of Concern. The Stage 2 RAP report was completed and published in September 1997. The Area of Concern includes a 35 sq.mi. (91 km²) portion of Lake Ontario and a six mile reach of the lower Genesee River. RAP remedial measures address lawn care practices, wetland education, pollution prevention for auto recyclers and dentists, volunteer stream and wetland monitoring programs, advancement of phosphorus removal at small wastewater treatment facilities, and a streambank erosion assessment program.

RAP Structure: The Monroe County Water Quality Management Advisory Committee (WQMAC) and its subcommittees provide advice and oversight on general water quality, public participation, and RAP implementation activities. Further, the Monroe County Water Quality Coordinating Committee (WQCC), continues to provide guidance contributing to RAP progress.

RAP Status and Progress: Watershed planning projects are in various phases of implementation. A Stormwater Coalition was formed to plan for compliance with new stormwater regulations. Completed projects include: several point and nonpoint source pollution abatement projects, extensive combined sewer overflow abatement, and a mercury pollution prevention project. Publications include: manuals for hospital mercury pollution prevention, auto recyclers, volunteer stream monitoring and volunteer wetland monitoring; a biannual newsletter; two watershed plans; a watershed developer's packet; and a report on a water quality opinion survey.

Grants have been received for hyperspectral imaging of algae beds along the Lake Ontario shoreline, a study of the benthic health of the Rochester Embayment, and further development of monitoring methods for toxic-related BUIs. To address algae and nutrients, Monroe County sponsored a "Lake Ontario Algae Cause and Solution Workshop" in 2002 and later participated in a conference entitled "New York's North Coast: A Troubled Coastline". These activities led to the formation of the Lake Ontario Coastal Initiative, which is a public/private, grassroots, regional partnership. The mission of the Lake Ontario Coastal Initiative (LOCI), encompassing all of New York State's North Coast stakeholders from the Niagara River to the St. Lawrence River, is to enlist and retain broad public commitment for remediation, restoration, protection, conservation and sustainable use of the coastal region. This mission is to be accomplished by securing funds and resources to achieve scientific understanding, educate citizens, and implement locally

supported priorities, programs and projects as identified through LOCI's Action Agenda, released in 2006 and available on this website For addition information on LOCI see their website at: <http://ceinfo.org/loci/>

RAP Outlook: Delisting criteria and monitoring methods for BUIs have been developed. Remedial Advisory Committee members have prepared a detailed summary of the status of each of the BUI indicators showing the delisting criteria and information available that will be very useful in addressing the BUIs. RAP reporting was updated in a report in 2001 and in an Addendum report at the end of 2002. Currently, an Addendum update is in preparation. A Water Education Collaborative exists to coordinate all public participation activities regarding water quality in the County. The US Army Corps of Engineers has proposed funding assistance for a sediment transport study led by SUNY at Geneseo. Because an extensive watershed plan has also been incorporated into the RAP process, the stakeholders now have to focus on the lower Genesee River and Embayment area to evaluate conditions, identify useful monitoring data/needs, and conduct an assessment of the beneficial uses.

The Rochester Embayment Remedial Action Plan Oversight Committee has summarized data on BUI remediation and identified monitoring that still needs to be undertaken to determine if delisting can occur. The committee also has plans to undertake monitoring that remains to be accomplished in the lower Genesee River AOC. As part of recent activities to solicit input on both new remedial measures and possible changes in priorities from what were included in earlier listings, the RAP Committee has updated its matrix of existing data and data gaps. Plans for the next year are to review current information and reach consensus on delisting for the BUI indicators where delisting criteria have been met. The RAP Oversight Committee will also be looking for opportunities to complete data gaps, especially for the two BUIs rated as unknown in the Stage I report. These are tainting of fish flavor and incidence of fish and wildlife tumors or deformities. For additional information see the USEPA website at: <http://www.glc.org/raptest/rochester>

11.4.3 Oswego River - (AOC Delisted July, 2006)

Background: The delisted Oswego River/Harbor Area of Concern (AOC) is located on the southeastern shore of Lake Ontario and is centered in the City of Oswego, New York. The AOC includes the harbor area and the lower segment of the Oswego River up to the Varick power dam. The harbor itself is characterized as a multiple-use resource and over 1.2 million people live in the drainage basin. The Oswego River watershed includes the Finger Lakes, industries, municipalities, and extensive areas of farmland and forest that expand an area of over 5,100 square miles. The Oswego River is second only to the Niagara River in size as a tributary to Lake Ontario. The Oswego River RAP process began in 1987, and the Stage 1 document was completed in 1990. The impairments were originally linked to Lake Ontario and upstream sources. The Stage 2 RAP, completed in 1991, identified remedial strategy activities necessary to restore water quality in the lower river and harbor and to eliminate adverse impacts to Lake Ontario from sources of pollutants carried by the Oswego River.

Impairments: Historically, upstream pollutants are known to have traveled through the river and harbor and impacted the Lake Ontario ecosystem, and ultimately led to the Area of Concern designation. For the Oswego RAP, impairments for fish consumption, fish habitat and populations, and eutrophication and algae were identified.

RAP Structure: The advisory committee consisted of a multi-stakeholder group included persons from industry, environmental organizations, government agencies, academia, and private interests.

Delisted: On July 25, 2006, the Oswego River, New York Area of Concern became the first AOC from among the 31 United States AOCs identified in the Great Lakes Water Quality Agreement to be delisted. As a result of much hard work and cooperation (among stakeholders, New York State DEC, USEPA, and IJC), the lower Oswego River and Harbor is once again the crown jewel of the City of Oswego! Through coordinated efforts, the City of Oswego has revitalized the downtown area, the harbor Port Authority has made many improvements, boating and fishing interests have grown, and water access and water quality have improved tremendously.

Through public participation, investigative studies, expert involvement and assessment efforts, the indicators and BUI for the Oswego AOC were addressed and resolved through: pollution reduction activities to reduce point and non-point water discharges; watershed actions to address best management practices and pollution sources; and local agency river corridor enhancement activities. Consistent with U.S. Policy Committee's Delisting Principles and Guidelines, the larger Lake Ontario Lakewide Management Plan responded to the fish consumption advisories; the FERC relicensing of the power dam responded to the fish habitat and population recovery; and eutrophication, algae, and weed characteristics have improved to the point where they are no longer impaired and are managed as nuisance conditions where they occur in isolated areas. Watershed restoration and protection activities, as well as Lake Ontario initiatives, all contribute to the desired results.

There is a true success story behind the preparation of the Stage 3 document and delisting of the Oswego River Area of Concern. By representing stakeholder interests, the RAP Remedial Advisory Committee (RAC) has determined, influenced, and observed the implementation of many supportive activities in the Oswego watershed and accomplished the community's recognition of the importance of this area as a natural resource, thereby encouraging others to act responsibly to restore and protect the environment and the beneficial uses of the AOC. In addition to the implementation of remedial activities, accomplishments for the RAC include: a number of investigative studies and report review activities, the FERC power dam license provisions which fully respond to the needs identified in the Fisheries Enhancement Plan for the Oswego River, significant waterfront revitalization by the City of Oswego, and the benefit of locally-funded environmental enhancement projects. Recreational interests have also been protected and improved through the oversight of responsible agencies.

The RAC effectively applied a wide variety of strategies including the ecosystem approach to address the problems. As a result, the status of each BUI Indicators was resolved and an understanding was achieved that a significant impairment and/or threat to the AOC environment does not exist. The conclusion was that the lower Oswego River and harbor area no longer warrant the AOC designation. NYSDEC, USEPA, and other agencies will continue to use the existing suite of environmental laws and regulatory instruments to implement, monitor and enforce programs that protect the environment in and around the area. The presence of local area environmental groups, concerned citizens, and the agencies' purview provide a vigilance that assures beneficial uses will remain intact and that the riverine system will not revert back to an impaired status.

For more on this delisted AOC see the USEPA website at: <http://www.epa.gov/glnpo/aoc/oswego.html>.

11.5 Canadian Areas of Concern

11.5.1 Hamilton Harbour

Background: Hamilton Harbour is a 2,150 hectare (5,313 acres) embayment located at the western tip of Lake Ontario. The AOC includes the harbour, Cootes Paradise wetland and open water, and the surrounding watershed drained by three main tributaries: Grindstone Creek; Red Hill Creek; and Spencer Creek, covering a total of 50,000 hectares (123,552 acres). The urban population, which includes Hamilton, Burlington, Stoney Creek, Dundas and Ancaster, is growing rapidly and now is approaching 700,000.

The ecosystem of the harbour reflects its natural conditions (a small water body with a long retention time), a high volume of sewage treatment plant discharges, large scale industrial activities and extensive land use changes. The water and sediments are contaminated by metals, pesticides, PCBs, and PAHs. The sediments of Randle Reef and industrial boat slips are highly contaminated with PAHs and have an adverse effect on the local ecosystem. In addition, the shoreline has been radically transformed with 75 percent of wetlands eliminated and 25 percent of the harbour filled in. Habitat for fish and wildlife is greatly reduced and resident species are exposed to toxic contaminants. The water quality of the harbour continues to be characterized by poor water clarity, low oxygen levels, high nutrient levels and high bacterial levels.

Impairments: Hamilton Harbour AOC has twelve BUIs: restrictions on fish consumption; degradation of fish and wildlife populations; fish tumours; animal (snapping turtle) deformities; degradation of benthos; restrictions on dredging activities; eutrophication and undesirable algae; beach closures; degradation of aesthetics; added costs to agriculture and industry; degradation of phyto/zooplankton populations; and the loss of fish and wildlife habitat.

RAP Structure: In 1991, stakeholders organized into two distinct groups: the Bay Area Restoration Council (BARC) and the Bay Area Implementation Team (BAIT). BARC maintains a balanced voice for all stakeholders of the harbour, performs a watchdog role by monitoring RAP progress, and keeps the public informed. The BAIT is composed of the major implementors of the RAP. The RAP Office has recently completed a RAP Stage 2 Update that provides the current status of the RAP and identifies recommendations from the public. The Update was reviewed by the public, approved by the governments and sent to the IJC in 2003.

RAP Status and Progress: Very positive, visible progress has been made in restoring fish and wildlife habitat. Work at six sites has resulted in: restoration of 340 hectares (840 acres) of habitat; secured habitat for 670 nesting pairs of Caspian and common terns; considerable shoreline rehabilitation; the return of amphibians and reptiles at Cootes Paradise, and increased diversity of native plants and waterfowl partially due to a successful program of carp exclusion. Furthermore, as a result of the Hamilton Harbour Watershed Stewardship Project, over 6500 hectares (16,062 acres) of land have been protected since 1994 through verbal stewardship agreements in the Spencer and Grindstone Creek watersheds including 120 kilometres (75 miles) of riparian habitat and 2900 hectares (7166 acres) of significant wetland and upland habitat.

Sediment remediation remains one of the priorities for Environment Canada in this AOC. Efforts will continue on Randle Reef and the Dofasco boat slip to clean up known sediment hotspots. Environment Canada is working with other government and industrial partners on the Randle Reef Sediment Remediation Project to dredge and contain approximately 500,000 cubic metres (653,975 cubic yards) of contaminated sediment from Hamilton Harbour.

Progress has also been made on improving water quality by reducing the phosphorus, chlorophyll and bacteria levels in the harbour. Reduction of bacterial contamination was achieved by the installation of CSO tanks which store and channel excess storm and sanitary sewage to the Woodward Wastewater Treatment Plant. Further reductions have resulted from low-cost optimization techniques introduced at Halton's Skyway Wastewater Treatment Plant. As a result of these improvements, two beaches were opened in 1993 after a 50-year long swimming prohibition in Hamilton Harbour.

Another notable achievement of the RAP has been the substantial increase in public access to the shoreline and watershed. The Hamilton Harbour Waterfront Trail was opened in 2000 and has increased access to the shoreline to 21 percent. This is a considerable achievement considering that there was essentially no public access to the harbour when the RAP began.

Fisheries and Oceans Canada has implemented monitoring and research programs to assess the status of lower trophic level beneficial uses, the offshore fish community, macrophytes and nearshore fish habitat. This information will guide the evaluation of restoration actions but is also essential for the development of an ECOPATH ecosystem model that is currently under development. These projects have been put in place to guide management decisions on any further habitat restoration initiatives, to assess the effectiveness of remediation actions and understand how invasive species are impacting the food web.

RAP Outlook: The Hamilton Harbour AOC cannot be delisted in the short-term since many of the issues affecting the harbour require significant capital costs and 10-15 years or longer to complete. The total funding required between now and 2015 to achieve delisting of the AOC has been estimated at CDN\$650M. This includes \$543M for upgrades to Hamilton and Halton's Waste Water Treatment Plants and the Hamilton CSOs to meet RAP water quality targets. The other major capital cost is to remediate PAH contaminated sediments in the area of Randle Reef estimated at \$31M. Smaller capital costs are: \$9M for City of Hamilton water metering: \$9M

for further creation and maintenance of fish and wildlife habitat: and an additional \$10M for recreational trail development of and enhancement of lands recently transferred from the Port Authority to the City of Hamilton.

11.5.2 Toronto and Region

Background: The Toronto and Region AOC extends from the Rouge River in the east to the Etobicoke Creek in the west and includes six tributary watersheds which drain into Lake Ontario: Etobicoke Creek, Mimico Creek, Humber River, Don River, Highland Creek and Rouge River. The drainage basin of these watersheds covers 2 000 km² (772 mi²), and over 54 percent of the AOC is considered urbanized and roughly 13% of the area is urbanizing. The AOC includes the City of Toronto and portions of 11 other municipal jurisdictions within the neighbouring Regions of Peel and York. Over 3.4 million people live in the AOC ; approximately 30% of Ontario's population. The population of the Greater Toronto Area (GTA), an area slightly larger than the AOC, is expected to increase by 55.8% (between 1996 -2031).

Over the years, urban growth in the AOC has resulted in extensive physical restructuring of the shorelines, watersheds and landscapes. Through this process, wetlands, forests, fish and wildlife habitat have been lost. Most of the stormwater in the city is discharged into rivers, creeks and ultimately Lake Ontario. The discharge contains high levels of bacteria and nutrients, heavy metals and organic chemical contamination, and this remains the single biggest cause of a degraded aquatic environment. In addition, the many industries of the region discharge into municipal sewage systems which are not designed to remove chemical contaminants. Aging infrastructure and relic systems such as Combined Sewer Overflows (CSOs) continue to impair water quality in the region. Agricultural non-point sources of sediments, nutrients and pesticides contribute to the pollutant loads measured at the river mouths.

Impairments: The RAP has designated the following eight BUIs as impaired: fish consumption restrictions, degraded fish and wildlife populations, degradation of benthos, restrictions on dredging, elevated nutrient levels, beach closures, degradation of aesthetics, and habitat loss. Studies to determine the status of fish tumours, and bird deformities or reproductive problems have been completed and the science indicates that the status of these BUIs is improving. Assessment of the degradation of phyto/zooplankton populations is still required.

RAP Structure: The Toronto and Region RAP Team has representation from TRCA, provincial and federal governments. TRCA is the lead agency for the coordination of the RAP and for many projects which are key to make progress in the Toronto and Region RAP. However, the RAP Team recognizes that its municipal and local partners have a critical role in implementing many of the projects necessary restore environmental conditions. The RAP team continues to provide support (financial and human resources) to the watershed alliances and councils in order to ensure a watershed perspective is adopted and actions are considered and implemented at a watershed level. The RAP program is one of many initiatives in Toronto and Region at work to improve environmental conditions; as this is no small task, it will take the efforts of many to make improvements.

RAP Status and Progress: While certain environmental conditions are improving; there remains much work to do and much room for continual improvement. Many of the water quality parameters have remained fairly constant over the last few years, which is significant and positive in light of the continual development in the Region. However, the effects of development are most apparent during wet weather flows when the rivers and creeks are overwhelmed with stormwater runoff. Pollution loading to the rivers, creeks and Lake Ontario significantly increase during rain and snow melt events. Contaminants such as chlorides are rapidly increasing as new roads are built and other areas are developed.

A significant but subtle success for the Toronto and Region RAP has been the operation of the Regional Watershed Monitoring Network (RWMN) – which provides critical assessments of the beneficial use impairments. In conjunction with the leveraged RAP support, the RWMN relies on all of the Regional Partners to supports its operation.

Sustainable Technologies Evaluation Program (STEP) has been one of this RAP's key deliverables. Determining new and innovative means of dealing with stormwater is necessary in this Region, as traditional stormwater pond management will not be enough to protect water quality, much less to bring about the restoration of the beneficial use impairments. For more information regarding STEP, visit www.sustainabletechnologies.ca.

Under its Wet Weather Flow Management Master Plan (WWFMMP), the City of Toronto is working on significant projects that will ultimately bring about major improvements to the waterfront. A substantial amount of work is required prior to projects being put in-the-ground (i.e. Environmental Assessment). The City of Toronto currently has six major projects underway or being prepared for the EA process – including the Don and Waterfront Interceptor Trunk Capacity and CSO Control project (a project anticipated to cost CDN\$500M). Other municipalities in the RAP jurisdiction have completed assessments of how best to retrofit their stormwater facilities and they are now in the process of implementation.

Another significant achievement for the Toronto and Region RAP was the completion of the Terrestrial Natural Heritage System Strategy (TNHSS). The TNHSS provides the framework to identify priority areas of habitat that will go beyond isolated patches of green space and will provide a functioning system that meet the requirements for species survival and aims to improve natural cover in the Region. The RAP will continue to support the adoption of the TNHSS into municipal Official Plans.

An essential component of the Toronto and Region RAP is the development of integrated watershed plans. These plans are necessary to ensure the systemic, long-term changes which are necessary to improve and protect environmental conditions. Watershed modeling forecasts the dismal state of water quality and ecosystem function if current planning techniques and designs are continued. The RAP has supported the development of integrated watershed plans; plans for the Rouge and Humber Rivers are now being finalized, the plan for the Don River is under development and background work for the Etobicoke-Mimico plan is being completed. Without comprehensive planning and systemic changes to development practices and design, the RAP will not be able to improve the status of beneficial use impairments.

Other promising signs of progress include: removal of stream barriers connecting Lake Ontario to the middle portions of Rouge and Humber Rivers for native species of fish that are able to jump, over 680,000 shrubs, plants and trees have been planted in the Region in the last five years, MNR has supported the creation of over 72 ha (178 acres) of wetlands in the last five years, and Toronto now has six beaches with the international Blue Flag accreditation.

Fisheries and Oceans Canada is undertaking research in cooperation with Toronto and Region CA and the University of Toronto to assess the effectiveness of habitat restoration and compensation measures that are planned. A combination of field work and modeling is being used to assess their effectiveness at reaching BUI goals and targets identified for the system. Both fish and fish habitat have been identified as impaired BUIs in the Toronto Region.

RAP Outlook: Implementation of the Toronto and Region RAP will be a decades-long undertaking. The RAP Team is working on a proposed path forward that will ensure all priority actions are taken and required plans for implementation are in place within the next 10 – 12 years. Many of the projects necessary for this RAP are large-scale and require substantial planning and financial investments in order to move forward; as a result they take a number of years before the work can be actualized. For example, a project such as the Revitalization of the Mouth of the Don River, which will naturalize the shoreline for fish and wildlife habitat, provide flood protection, reclaim land for wildlife habitats and recreational uses and enhance pedestrian and bicycle paths linking the Don River valley and the waterfront, are complex, significant and make up critical pieces of this RAP.

Similarly, the City of Toronto's WWFMMP has a 100-year timeframe for implementation and is anticipated to cost CDN\$1 billion over the first 25 year period of the plan. The implementation of WWFMMP is key to protecting water quality along Toronto's waterfront.

A lot of progress has been made in the largest urban AOC, also one of the fast growing areas in North America, but the scale of the issues needs to be recognized when considering delisting. Urban development and population growth will continue to impact Toronto and Region for many years and the RAP and its partners are focused on preventing further degradation to environmental conditions.

11.5.3 Port Hope Harbour

Background: Port Hope Harbour is located at the mouth of the Ganaraska River on the north shore of Lake Ontario, and 100 kilometres east of Toronto. The Town of Port Hope is located north of the Harbour. The AOC includes the harbour area and extends 300 metres (328 yards) from the lower Ganaraska River to the confluence area bounded by breakwalls.

Radioactive wastes were generated at a refinery (Eldorado Nuclear Limited) in Port Hope beginning in 1933. Low level radioactive wastes were initially stockpiled or disposed of in ravines and vacant lots in Port Hope during the 1930s. During the 1940s and 50s low level radioactive wastes were also placed in waste management facilities in two municipalities just outside of Port Hope. There is an estimated total of 1 to 1.5 million cubic metres (1.3 to 2 million cubic yards) of low-level radioactive waste and contaminated soils in the Port Hope area. The immediate health and safety risks have been assessed as minimal.

Within the harbour, most of the contaminant input occurred between 1933 and 1953 resulting from operations and waste management practices of the Eldorado refinery. Process wastes were stored at the site and it is likely that surface runoff was the route of contamination for the harbour. An estimated

85,000-90,000 cubic metres (111,175 to 117,715 cubic yards) of sediment containing low-level radioactive material is located within the turning basin and west slip of the harbour. Contaminants include uranium and thorium series radionuclides, heavy metals and PCBs.

In recent years, leaching of radioactive wastes and overflows at drainage ponds has occurred during heavy rains and has resulted in contamination entering the groundwater and Lake Ontario.

Impairments: Port Hope was initially designated as an AOC due to restrictions placed on dredging activities. There have been no other BUIs identified.

RAP Structure: Previously, Environment Canada was responsible for coordination of the Port Hope RAP. However, remediation of Port Hope Harbour is now following a different process, with progress dependant upon the selection and approval of an appropriate waste facility. Natural Resources Canada is working in cooperation with Environment Canada to develop the remediation of the Port Hope AOC for the larger low-level radioactive waste clean up in the Port Hope area.

In 1982, the federal government created the Low-Level Radioactive Waste Management Office (LLRWMO) to assume the responsibility of managing historic wastes in Port Hope and elsewhere in Canada. The office in Port Hope has assisted the RAP in developing costs estimates for cleanup, handling public information requests and offers assistance to residents to assess and remediate their properties. The LLRWMO has been designated by Natural Resources Canada as the proponent of the Port Hope Area Initiative.

RAP Status and Progress: In March 2001, the Government of Canada (represented by Natural Resources Canada) and the three communities of the Town of Port Hope, the Township of Port Hope and the Municipality of Clarington, entered into a legal agreement for the clean up and long term management of local historic low-level radioactive wastes, including wastes found within Port Hope Harbour. The legal agreement is based on community-developed concepts for the local, long-term management of the wastes.

With the signing of the legal agreement, the Government of Canada began a 10 year, CDN\$260 million dollar plan called The Port Hope Area Initiative, to develop and implement a long-term solution. Since that time, the Town of Port Hope and the Township of Port Hope have been amalgamated into one community, the Municipality of Port Hope.

Implementation of the legal agreement for the Port Hope clean-up is now underway. The Low-Level Radioactive Waste Management Office (LLRWMO) is seeking the necessary approvals for development of management facilities for the long-term management of the wastes from the Port Hope area, including those found within Port Hope Harbour.

RAP Outlook: Natural Resources Canada is the lead for the clean-up of all historic radioactive wastes found within the local municipalities, including those within Port Hope Harbour, and will work with Environment Canada to ensure that the requirements of the RAP are met. The development of low-level radioactive waste facilities require licenses from the Canadian Nuclear Safety Commission and are subject to the Canadian Environmental Assessment Act.

In March 2007, the Government of Canada approved the Port Hope Project Environmental Assessment. The approval immediately set in motion the licensing process – the next step leading to the cleanup and long-term management of the historic low-level radioactive waste in Port Hope. The Low-Level Radioactive Waste Management Office is preparing licensing documents for submission to the Canadian Nuclear Safety Commission. The Commission will then hold hearings on the Project, expected to take place in mid 2008. The final decision on the project is expected later that year. An additional five years will be required for the physical clean up and emplacement of wastes in newly constructed long-term management facilities.

11.5.4 Bay of Quinte

Background: The Bay of Quinte is a narrow z-shaped inlet of Lake Ontario which is about 100 kilometres (62 miles) in length. It is located on the north shore of Lake Ontario's eastern basin, 135 kilometres (84 miles) east of Toronto and 40 kilometres (25 miles) west of Kingston. The Trent, Moira, Salmon and Napanee Rivers are the major tributaries to the Bay. The drainage area to the Bay of Quinte covers 17,250 square kilometers (6660 square miles), which is the largest drainage basin in Southern Ontario. Parks Canada manages the Trent-Severn Waterway, of which the Trent River is a part. Four First Nations are also located within the drainage basin.

The Bay of Quinte is a unique ecosystem within the Lake Ontario basin. Shallow, and flushed up to 10 times per year, in some respects the Bay behaves like a riverine estuary. The Bay has historically supported a large sports fishery based primarily on walleye. The majority of anglers participating in this fishery come from outside of the Quinte area and the fishery makes a substantial contribution to the local economy. In recent years the ecosystem of the Bay has been greatly influenced by invasive species, such as the zebra mussel, which, by ingesting plankton, have diverted this food source from fish species. Further, the aquatic environment has been altered by decreased nutrient loadings, all of which have reduced the area's capacity to produce walleye. The shoreline of the Bay contains 22 coastal, some of which are under pressure from urban development in the cities of Belleville, Trenton and the Towns of Napanee, Picton and Deseronto.

Impairments: A high level of nutrient enrichment and destruction of fish and wildlife habitat are considered to be linked to the majority of the BUIs that exist in the Bay of Quinte. In particular, the upper reaches of the Bay of Quinte are shallow and susceptible to local nutrient inputs from sewage treatment plants and runoff from urban and agricultural lands.

The Remedial Action Plan for the Bay identifies 10 BUIs that result from 4 main issues: i) excessive nutrients, ii) habitat loss (particularly coastal wetlands), iii) contaminated sediment from historical mining and industrial activities, and iv) bacterial contamination from sewage treatment plants, stormwater discharge and agricultural runoff (which lead to beach closures).

In addition, the incidence of fish tumours and other deformities is an issue which requires further assessment. In 2005, a histopathological tissue analysis of brown bullhead specimens from the Bay of Quinte was initiated. It is anticipated that the results of this analysis will provide a determination of the status “fish tumours and other deformities” BUI.

RAP Structure: In 1997, a Restoration Council, with membership from Federal and Provincial Government agencies (EC, MOE, DFO, MNR, OMAFRA), the local conservation authorities (Lower Trent Region and Quinte), the Mohawks of the Tyendinaga Territory, Department of National Defense and the local environmental group, Quinte Watershed Cleanup was formed to oversee the implementation of the 80 recommendations from the Stage 2 Report.

The Quinte Watershed Cleanup is a local community based group that works to promote the restoration and protection of the Bay of Quinte. This organization originated from a public advisory committee that was set up in 1988 to advise the Provincial and Federal Government during the development of the RAP.

In 2000, a major public consultation was undertaken to establish restoration targets for the Bay of Quinte. The public was supportive of the proposed delisting targets which formed the basis for a Five Year Action Plan.

RAP Status and Progress: Substantial progress toward delisting the Bay of Quinte Area of Concern has been made. Key achievements in the implementation of the Bay of Quinte RAP include:

- a 50% reduction in phosphorus loads from sewage treatment plants since 1990;
- a reduction of 16,500 kilograms (36,376 lbs) of phosphorus annually into streams draining to the Bay of Quinte;
- over 50 kilometres (31 miles) of shoreline have been planted with native trees, shrubs and grasses to reduce erosion and improve habitats;
- the rehabilitation of 354 hectares (875 acres) and protection of a further 482 hectares (1191 acres) of wetland; and
- Over 27,000 hectares (66,718 acres) of farmland have been converted from conventional to conservation tillage.

Through sewage treatment optimization for four facilities bordering directly on the Bay of Quinte, phosphorous loads have been reduced from 50 kg/day in 1986 to less than 25 kg/day in 1997. Within the Bay of Quinte, phosphorous concentrations are approaching the RAP target of 30-40 µg/L. Furthermore, water clarity is improving and the algal blooms are less severe. Direct discharges of industrial wastes have been substantially lowered, and beach closings occur on a less frequent basis.

A phosphorus budget and simulation model were developed by Fisheries and oceans Canada as a tool to guide development of a phosphorus management plan, evaluate future loading scenarios, assess the consequences of reduced tributary flow due to climate change and evaluate the role zebra mussels play in phosphorus recycling.

An ECOPATH ecosystem model was developed by Fisheries and Oceans Canada, Ontario Ministry of natural Resources and Cornell University to evaluate the impact of invasive species and guide fisheries management decisions.

Fish habitat classification and modeling projects are currently underway to assess delisting status and guide further refinement of the fish habitat management plan.

Project Quinte, a long term cooperative research and monitoring project between fisheries and oceans, OMNR and OME has been in place for over 30 years. This program has served as the backbone for evaluating the impairment status of all the biological BUIs and is the key component to both determining whether this RAP can be delisted and ongoing assessment under Stage 3 of the RAP.

A draft Fisheries Management Plan for the Bay of Quinte has been developed and it is expected to be finalized early in 2008.

RAP Outlook: In September 2006, the Restoration Council adopted a 2006 - 2010 Workplan which is to address the remaining remedial actions identified in the Stage 2 RAP. Upon completion of all the remedial actions the Bay of Quinte will move from an Area of Concern to and Area in Recovery.

A component of the work plan is the development of a phosphorus loading model that will assist the Restoration Council in determining and implementing a phosphorus management strategy for the Bay. The phosphorus management strategy may include recommendations for changes to municipal phosphorus loading “caps”.

Detailed delisting criteria for fish and wildlife communities and habitats have been developed. Additional habitat conservation and protection measures may be required based on existing natural heritage strategies and the fish habitat management plan.

11.6 Actions and Progress

The information contained in this chapter has been compiled based on past documents and was updated as of December 2003. The RAP 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.

11.7 References

Environment Canada, Remedial Action Plan Web site: <http://www.on.ec.gc.ca/water/raps/>

Government of Canada, Canada’s RAP Progress Report 2003, Restoration Programs Division, Environmental Conservation Branch, Environment Canada-Ontario Region, 2003.

Great Lakes National Program Office (GLNPO) Web site: <http://www.epa.gov/glnpo/aoc/>

