LAKEWIDE MANAGEMENT PLAN FOR LAKE ONTARIO

Executive Summary
Stage 1: Problem Definition

May 1998

Introduction

In 1987, the governments of Canada and the United States made a commitment, as part of the Great Lakes Water Quality Agreement (GLWQA), to develop a Lakewide Management Plan (LaMP) for each of the five Great Lakes. According to the 1987 Agreement, "LaMPs shall embody a systematic and comprehensive ecosystem approach to restoring and protecting beneficial uses in ... open lake waters", including consultation with the public.

This Stage 1 LaMP (the "problem definition" document) for Lake Ontario has been developed by Region II of the U.S. Environmental Protection Agency (USEPA), Environment Canada (EC), the New York State Department of Environmental Conservation (NYSDEC), and the Ontario Ministry of the Environment (MOE) (the Four Parties), in consultation with the public. Stages 2 through 4 of the Lake Ontario LaMP (the schedule for load reduction activities, selection of remedial measures, and results as documented by monitoring) will be developed, with public input, over the next several years. Although this document serves as the Stage 1 document, it includes information from Stages 2-4 where available (i.e., some remedial measures have been or are being implemented and monitoring programs have indicated improvements).

Background

Lake Ontario Toxics Management Plan and Progression to the LaMP

In response to an identified toxics problem in the Niagara River and Lake Ontario, a Niagara River Declaration of Intent was signed on February 4, 1987, by the Four Parties. This document required that a Lake Ontario Toxics Management Plan (LOTMP) be developed. The main purpose of the LOTMP was to define the toxics problem in Lake Ontario and to develop and implement a plan to eliminate the problem through both individual and joint agency actions. The Four Parties developed a draft Toxics Management Plan which was presented for public review in 1988. The completed LOTMP was published in 1989. Updates of the LOTMP were completed in 1991 and in 1993.

Lake Ontario Toxics Management Plan Goals:

- ***Drinking water and fish that are safe for human consumption.***
- ***Natural reproduction, within the ecosystem, of the most sensitive native species, such as bald eagle, osprey, mink, and river otter.***

The LOTMP identified 11 priority toxic chemicals in the lake and provided information regarding ongoing load reduction efforts. The LOTMP has been the primary binational toxic substances reduction planning effort for Lake Ontario. As such, it serves as a foundation for the development of the Lake Ontario LaMP. In May of 1996, the Four Parties signed a Letter of Intent agreeing that the LaMP should provide the binational framework for environmental protection efforts in Lake Ontario.

The Four Parties have reviewed and incorporated all relevant LOTMP commitments into this Stage 1 Plan.

Scope of the LaMP

The Lake Ontario LaMP focuses on resolving:

- Lakewide beneficial use impairments as defined in the Great Lakes Water Quality Agreement (Annex 2) and described in Chapter 3 of this LaMP;

- Critical pollutants contributing to, or likely to contribute to, these impairments despite past application of regulatory controls, due to their toxicity, persistence in the environment, and/or their ability to accumulate in organisms; and

- Physical and biological problems caused by human activities.

The LaMP will address sources of lakewide critical pollutants, which are those substances responsible for beneficial use impairments in the open lake waters of both countries, as well as those substances that exceed criteria and are, therefore, likely to impair such uses, which require binational actions for resolution. The Plan will be coordinated with Remedial Action Plans within the Lake Ontario drainage basin and other localized efforts which are best suited to address issues of local concern. In addition, the Plan will utilize linkages to other natural resource management activities, such as the development of Lake Ontario fish community objectives by the Great Lakes Fishery Commission and the Lake Ontario Committee of fisheries managers. The LaMP will address impairments found in open waters of the lake and nearshore areas, without duplicating the efforts of localized remedial action plans. Tributaries, including the Niagara River, are treated as inputs to the lake. The St. Lawrence River is treated as an output from the lake.

***Remedial Action Plans* were also required by the GLWQA. These plans address localized environmental problems within an Area of Concern (AOC). AOCs are specific geographic areas where significant pollution problems have been identified as impairing beneficial uses such as swimming, eating fish, or drinking water.**

In addition to the Lake Ontario LaMP, there are a number of other environmental planning efforts upstream and downstream of the Lake Ontario basin. Plans are being implemented for the Niagara River, including Remedial Action Plans in both Canada and the U.S., and a binational Toxics Management Plan. The major sources of pollutants within the downstream St. Lawrence River are being addressed through three ongoing planning efforts: Canadian and U.S. Remedial Action Plans for the St. Lawrence River at Cornwall and Massena, respectively, and a St. Lawrence River Action Plan for the section of the river located in the Province of Quebec.

LaMP Ecosystem Goals and Objectives

Ecosystem Goals for Lake Ontario:

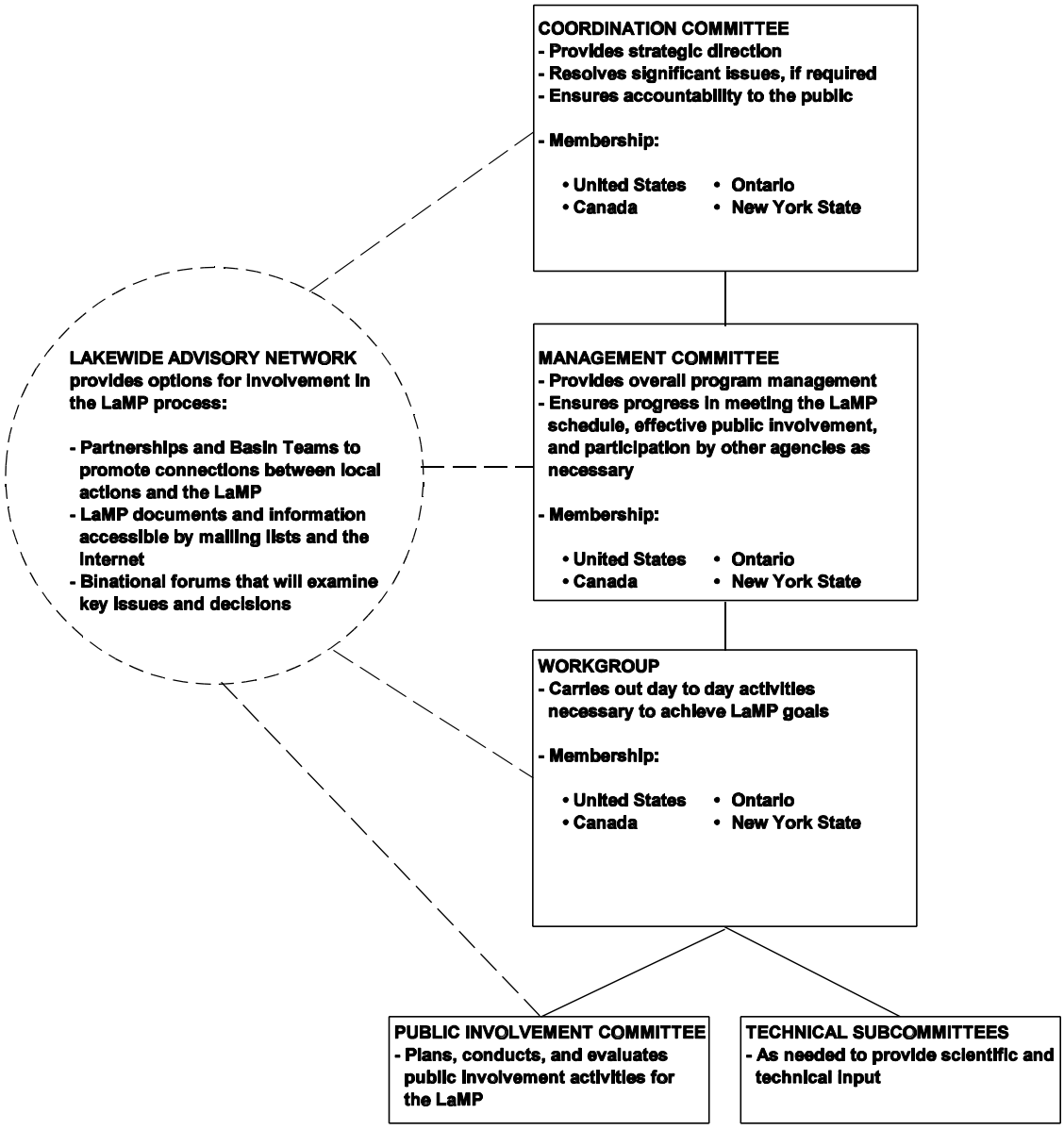
- *The Lake Ontario Ecosystem should be maintained and as necessary restored or enhanced to support self-reproducing diverse biological communities.*
- *The presence of contaminants shall not limit the uses of fish, wildlife, and waters of the Lake Ontario basin by humans and shall not cause adverse health effects in plants and animals.*
- *We as a society shall recognize our capacity to cause great changes in the ecosystem and we shall conduct our activities with responsible stewardship for the Lake Ontario basin.*

The earlier LOTMP developed broad ecosystem goals for Lake Ontario which have been incorporated in the LaMP process. The LaMP will expand on these goals by developing more detailed ecosystem objectives and ecosystem health indicators to be used to measure progress in restoring Lake Ontario. A preliminary effort resulted in the following five objectives which will serve as a starting point for a more comprehensive effort to include broader public, private, and governmental input.

Aquatic Communities (benthic and pelagic): the waters of Lake Ontario shall support diverse and healthy reproducing and self-sustaining communities in dynamic equilibrium, with an emphasis on native species.
Wildlife: the perpetuation of a healthy, diverse, and self-sustaining wildlife community that utilizes the lake for habitat and/or food shall be ensured by attaining and sustaining the waters, coastal wetlands, and upland habitats of the Lake Ontario basin in sufficient quality and quantity.
Human Health: the waters, plants, and animals of Lake Ontario shall be free from contaminants and organisms resulting from human activities at levels that affect human health or aesthetic factors such as tainting, odor, and turbidity.
Habitat: Lake Ontario offshore and nearshore zones and surrounding tributary, wetland, and upland habitats shall be of sufficient quality and quantity to support ecosystem objectives for the health, productivity, and distribution of plants and animals in and adjacent to Lake Ontario.
Stewardship: Human activities and decisions shall embrace environmental ethics and a commitment to responsible stewardship.

Management Structure

The Four Parties have the responsibility for developing the Lake Ontario LaMP and have approved a LaMP management structure that consists of a Coordination Committee, a Management Committee, a Lake Ontario Workgroup, and a Lakewide Advisory Network (see figure below). There are other agencies that have an interest in the LaMP, such as natural resource and human health agencies, and their involvement on specific issues is an important component of LaMP decision-making. Responsibility for ensuring this participation lies with the Management Committee.



Lake Ontario LaMP Management Structure

Public Involvement in the Development of the LaMP

The public involvement program for the LaMP aims to fully support efforts to create and strengthen partnerships with citizens and organizations taking restoration and protection actions in the Lake Ontario basin. Historically, the public involvement process has included the following elements:

- # Holding open Coordination Committee meetings
- # Conducting public workshops
- # Improving connections with the Remedial Action Plans
- # Collecting information and conducting evaluations
- # Developing information and education materials

As the Lake Ontario process evolved, the Four Parties asked Lake Ontario stakeholders for guidance on enhancing the public involvement program. As a result, the agencies have adopted a strategy for a Lakewide Advisory Network.

Lakewide Advisory Network:

- *Establish partnerships to promote an understanding of the connections between local watershed activities and their impacts on Lake Ontario, to encourage action to conserve and protect the lake, and to provide input to the LaMP process.*
- *Maintain a mailing connection to keep people informed and solicit interest in the LaMP.*
- *Provide opportunities for binational discussions between representatives from the partnerships and other stakeholders on key issues or other major decisions.*

Public Involvement Goals:

- ***# Increase public understanding and awareness of Lake Ontario planning efforts.***
- ***# Provide various opportunities for meaningful public consultation in developing and implementing Lake Ontario management plans.***
- ***# Promote individual and corporate, governmental and non-governmental environmental stewardship actions.***
- ***# Build partnerships across the various programs and initiatives that are working to preserve and protect Lake Ontario.***

Problem Definition

Significant changes have occurred in the Lake Ontario ecosystem over the last century due to the effects of toxic pollution and habitat loss resulting from the rapid development of the Lake Ontario basin. The extent of these changes was fully realized in the 1960s and 1970s, when Lake Ontario colonial waterbirds experienced nearly total reproductive failures due to high levels of toxic contaminants in the food chain. In 1972, Canada and the United States took actions to ban and control contaminants entering the Great Lakes, and, in 1987, renewed the Great Lakes Water Quality Agreement with the goal to restore the overall health of the Great Lakes ecosystem. Today, as a result of these actions, levels of toxic contaminants in the Lake Ontario ecosystem have decreased significantly, and colonial waterbird populations have overcome most of the recognized contaminant-induced impacts of 25 years ago (i.e., their eggshells show normal thickness, they are reproducing normally, and most population levels are stable or increasing). However, bioaccumulative toxics persist in sediment, water, and biota at levels of concern for some fish species, such as lake trout and salmon, and for higher order predators, such as bald eagles, snapping turtles, mink and otters, and humans. Also, the more subtle chemically-induced effects are being investigated. Studies on Lake Ontario and the Great Lakes are being undertaken to identify the effects of persistent toxic chemicals on wildlife. These will be reported on in future LaMP documents.

The GLWQA provides fourteen indicators of beneficial use impairments (identified in the text box below) to help assess the impact of toxic chemicals and other factors on the Great Lakes ecosystem. These indicators provide a systematic way to identify pollutant impacts on the entire ecosystem, ranging from phytoplankton to birds of prey and mammals, including humans.

As defined by the Great Lakes Water Quality Agreement, "impairment of beneficial use(s)" is a change in the chemical, physical, or biological integrity of the Great Lakes System sufficient to cause any of the following:

1. *Restrictions on fish and wildlife consumption*
2. *Tainting of fish and wildlife flavor*
3. *Degradation of fish and wildlife populations*
4. *Fish tumors or other deformities*
5. *Bird or animal deformities or reproductive problems*
6. *Degradation of benthos*
7. *Restrictions on dredging activities*
8. *Eutrophication or undesirable algae*
9. *Restrictions on drinking water consumption, or taste and odor problems*
10. *Closing of beaches*
11. *Degradation of aesthetics*
12. *Added costs to agriculture or industry*
13. *Degradation of phytoplankton and zooplankton populations*
14. *Loss of fish and wildlife habitat*

The GLWQA defines critical pollutants as "substances that persist at levels that, singly or in synergistic or additive combination, are causing, or are likely to cause, impairment of beneficial uses despite past application of regulatory controls due to their:

1. presence in open lake waters;
2. ability to cause or contribute to a failure to meet Agreement objectives through their recognized threat to human health and aquatic life; or
3. ability to bioaccumulate".

In preparing this binational problem assessment (see summary table on the next page), Canada and the United States first independently evaluated 13 of the Lake Ontario beneficial use impairments for those geographic areas within their jurisdictions (Rang *et al.*, 1992; USEPA and NYSDEC, 1994). The agencies proceeded to integrate their separate evaluations into this binational assessment of the status of beneficial use impairments in Lake Ontario. The fourteenth beneficial use impairment, loss of fish and wildlife habitat, was evaluated using Lake Ontario habitat reports compiled by the United States Fish & Wildlife Service (USF&WS) as part of the LaMP evaluation process (Busch *et al.*, 1993) and others (Whillans *et al*., 1992). The LaMP recognizes the importance of appropriate linkages to other natural resource management initiatives such as fishery management plans, lake-level management, wetlands protection, watershed management plans, and control strategies for exotic species.

This report does not provide a complete analysis of the biological and physical problems facing the lake because the ecosystem objectives and indicators needed to evaluate these problems are still being developed and will be reported on as part of the Stage 2 reporting for the LaMP (see Binational LaMP Workplan). The LaMP will provide an assessment of the physical and biological problems after these objectives and indicators have been completed. Recognizing that the development of ecosystem objectives may require a considerable amount of time, the LaMP will move forward with the development of a critical pollutants reduction strategy rather than wait until all physical and biological problems have been defined.

The Four Parties have identified the lakewide beneficial use impairments of Lake Ontario:

- Restrictions on fish and wildlife consumption
- Degradation of wildlife populations
- Bird or animal deformities or reproductive problems
- Loss of fish and wildlife habitat

There is direct and indirect evidence that PCBs, DDT and its metabolites, mirex, and dioxins/furans are impairing beneficial uses in Lake Ontario.

Summary of Lake Ontario Lakewide Beneficial Use Impairments and Related Critical Pollutants and Other Factors.

Lakewide Impairments	*Impacted Species*	*Lakewide Critical Pollutants & Other Factors*
Restrictions on Fish and Wildlife Consumption	Trout, Salmon, Channel catfish, American eel, Carp, White sucker	PCBs, Dioxins, Mirex
	Walleye, Smallmouth Bass[a]	Mercury[a]
	All waterfowl[b]	PCBs, DDT, Mirex[b]
	Snapping Turtles[b]	PCBs[b]
Degradation of Wildlife Populations	Bald Eagle[c]	PCBs, Dioxin, DDT
	Mink & Otter[c]	PCBs
Bird or Animal Deformities or Reproductive Problems	Bald Eagle[c]	PCBs, Dioxin, DDT
	Mink & Otter[c]	PCBs
Loss of Fish and Wildlife Habitat	A wide range of native fish and wildlife species	Lake Level Management
		Exotic Species
		Physical Loss, Modification, and Destruction of Habitat

[a] Canadian advisories only.
[b] U.S. Advisories only.
[c] Indirect evidence only (based on fish tissue levels).
Notes: Dieldrin, although listed as a LaMP critical pollutant, is not associated with an impairment of beneficial use.
"DDT" includes all DDT metabolites; "Dioxin" refers to all dioxins/furans.

It is also important that the Lake Ontario LaMP consider toxic substances that are **likely** to impair beneficial uses. In this case, there may be no direct evidence that a substance contributes to use impairments, but there is indirect evidence if a chemical exceeds U.S. or Canadian standards, criteria, or guidelines. A review of recent fish tissue contaminant concentrations identified mercury as a lakewide contaminant of concern because mercury concentrations in larger smallmouth bass and walleye are likely to exceed Ontario's 0.5 parts per million (ppm) guideline for fish consumption throughout the lake. Although there are no U.S. or Canadian consumption advisories for smallmouth bass and walleye on a lakewide basis, the data are sufficient to identify mercury as a critical pollutant as part of the LaMP pollutant reduction strategy. Additional sampling may be required to fully characterize contaminant concentrations in some species that are not regularly sampled throughout the lake. As with mercury, dieldrin is not linked to a lakewide impairment but dieldrin concentrations exceed the most stringent criteria for both water and fish tissue. Given the lakewide nature of these exceedences of the most stringent criteria, dieldrin is also included in the list of LaMP critical pollutants.

The Lakewide Critical Pollutants that will be the focus of LaMP source reduction activities are:

- PCBs
- DDT and its metabolites
- mirex
- dioxins/furans
- mercury
- dieldrin

These critical pollutants are of concern because they are persistent (remaining in the water, sediment, and biota for long periods of time) and bioaccumulative (accumulate in aquatic organisms to levels that are harmful to human health). It is the intent of the Four Parties to prevent the development of additional lakewide use impairments that may be caused by other persistent, bioaccumulative toxics entering the lake. Therefore, the LaMP will include actions that will address these critical pollutants and the broader class of chemicals known as persistent, bioaccumulative toxics.

The Four Parties agree that loss of fish and wildlife habitat is a lakewide impairment caused by artificial lake level management; the introduction of exotic species; and the physical loss, modification, and destruction of habitat, such as deforestation and the damming of tributaries.

Local use impairments are also identified in this document. However, these impairments are best addressed on a local level through the development and implementation of Remedial Action Plans and other local management efforts.

Through the LaMP, the Four Parties seek to restore the lakewide beneficial uses of the lake by reducing the input of critical pollutants and persistent, bioaccumulative toxics to the lake, and by addressing the biological and physical factors discussed above. The Four Parties will also improve the database on sources and loadings of critical pollutants and other factors causing these impairments. The critical pollutants identified above are familiar to most citizens involved in Lake Ontario protection efforts, as they have been the subject of ongoing management, reduction, and prevention activities for many years. Despite these activities, levels of these critical pollutants remain a concern due to historic releases and practices contaminating sediments and soils, that are now being leached into Lake Ontario waters slowly; long-range atmospheric transport from distant sources; and inputs from other Great Lakes. Hence, restoring these impairments is an ongoing challenge.

The Four Parties plan to prioritize source reduction efforts to address the most significant contributors of critical pollutants. Based on the limited loadings data available, it appears that a significant load of critical pollutants to the lake originates outside the Lake Ontario basin. The upstream Great Lakes basin contributes the majority of the estimated loadings of PCBs (440 kg/yr), DDT and its metabolites (96 kg/yr), and dieldrin (43 kg/yr). Attention must also be focused on the Niagara River, since most of the mirex entering Lake Ontario originates in the Niagara River basin (1.8 kg/yr), and it also contributes to the load of other critical pollutants to the lake. Atmospheric deposition is a source of critical pollutants and appears to be the largest known source of dioxins/furans, contributing approximately 5 grams per year. The LaMP will also seek to address the inputs of critical pollutants from water discharges within the Lake Ontario basin, including point source discharges directly to the lake and point and non-point source discharges to the tributaries to the lake.

Progress to Date

The Four Parties have implemented programs and undertaken activities, both regulatory and voluntary, that have resulted in measurable improvements lakewide. Other actions have led to small incremental gains in localized areas. Remedial Action Plan projects are reducing pollutants, cleaning up the environment, and restoring habitat in Areas of Concern (AOC). Activities are also ongoing to protect and promote human health in the basin. Joint federal/state and federal/provincial programs to reduce sources of pollutants to the lake have been ongoing under the LOTMP and other initiatives. Environmental progress is evident in the reduced levels of contamination in lake biota and other ecological improvements. Highlights of this progress follow.

Binational Activities

The Niagara River Toxics Management Plan (NRTMP): Significant progress has been made towards achieving the 50 percent reduction of 10 priority toxics in the Niagara River. The 1996 NRTMP Progress Report outlines actions and results achieved by the Four Parties, including the following:

- As of 1995, the number of Ontario point sources directly discharging to the Niagara River had been reduced to 16. The data show that the daily loadings of 18 priority toxics had been reduced by 99 percent.

- In New York State, an 80 percent reduction in 121 organic and inorganic priority pollutants from significant point sources was realized between 1981 and 1986. Between 1986 and 1994, another 25 percent reduction was reported.

- In the U.S., 26 hazardous waste sites were identified as having the greatest potential for toxic pollutant loadings to the Niagara River. Accelerated remediation schedules were established for these sites. To date, remedial construction has been completed at 8 of these sites, and remedial activities are underway at 10 sites.

- Under Canadian and U.S. programs, contaminated sediments in several tributaries to the Niagara River have been cleaned up.

Development of Mass Balance Models: Mass balance models were developed that relate loadings of toxic contaminants to the lake to levels in water, sediment, and fish. These models provide an initial technical basis for determining load reduction targets, estimating how long it will take to meet these targets, and planning for additional measures necessary to achieve load reduction goals.

Development of Draft Ecosystem Objectives: The development of draft ecosystem objectives for wildlife, habitat, aquatic communities, human health, and environmental stewardship has provided direction and a basis for establishing targets, or ecosystem indicators, as a means to check on the effectiveness of remedial activities.

Activities in the United States

- New York State has banned the use of DDT, mirex, and dieldrin. Allowable uses of mercury have also been severely restricted. Production of PCBs and their use in the manufacture of new equipment is no longer allowed. Older equipment and transformers containing PCBs are being systematically removed from service and properly disposed.

- In 1993, USEPA conducted pollution prevention inspections at seven industrial facilities in the Lake Ontario basin. As a result of these inspections, pollution prevention measures were implemented that eliminated about 43 percent (213,000 lbs.) of toxic chemical pollutants.

- The LOTMP identified seven inactive hazardous waste sites in the Lake Ontario basin where remedial actions had not been completed. Remedial actions at four of these seven sites have now been completed. Two of the remaining sites are under remedial construction and the other site is in design.

- USEPA, in partnership with Erie County, New York, has established a “Clean Sweep” program to help farmers in the Lake Ontario basin dispose of unwanted and/or banned pesticides in an environmentally safe manner. To date, the program has been implemented in 15 counties, and over 120,000 pounds (gross) of agricultural hazardous or

toxic products have been collected and properly disposed, including DDTs, dioxin-contaminated pesticides, chlordane, arsenic, lead, and mercury.

USEPA and NYSDEC are conducting a "Source Trackdown" project in order to facilitate the identification and remediation of contaminant sources to the lake. This information will be used to confirm unknown sources, determine the effectiveness of remediation activities, and plan follow-up sampling activities.

Activities in Canada

Ongoing and new activities to reduce critical pollutant loadings to Lake Ontario from Ontario sources are undertaken within the framework of the Canada-Ontario Agreement respecting the Great Lakes Basin Ecosystem (COA). The list of critical pollutants identified in this document has been deliberately included in the COA to support further reductions in releases of the critical pollutants, along with reductions in the releases of these and other chemicals under the Niagara River Toxics Management Plan. The COA Tier I substances, which include the LaMP critical pollutants, are targeted for zero discharge to Ontario waters.

Since 1993, Ontario has promulgated Clean Water Regulations under its MISA (Municipal and Industrial Strategy for Abatement) program for nine industrial sectors: organic chemicals, iron and steel, pulp and paper, petroleum refineries, metal casting, metal mining, inorganic chemicals, industrial minerals, and electric power generation. The goal for the 34 regulated plants located within the basin is the use of best available treatment technologies to substantially reduce pollutant loadings. Compliance with the MISA regulations will achieve more than a 70 percent reduction in the release of toxic pollutants to the waters of Lake Ontario by 1998. The virtual elimination of releases of persistent toxic substances, such as dioxins, is one benefit of this activity.

Ontario has banned the use of several of the Lake Ontario critical pollutants (DDT, dieldrin, and mirex) and, in cooperation with Environment Canada, recently confirmed that no legal use is taking place in Ontario. Long-standing restrictions on the use of PCBs to closed systems has prevented any deliberate releases to the ecosystem; accidental releases are a possibility, which is why the decommissioning and destruction of PCBs are being accelerated in Ontario.

The national program, Accelerate Reduction/Elimination of Toxics (ARET) calls for the voluntary reduction of 101 substances from either direct or indirect industrial discharges to air, land, and water. The goal is a 90 percent reduction of persistent bioaccumulative toxic emissions

and a 50 percent reduction of other toxic substance emissions by the year 2000. Under the ARET challenge, a total of 287 organizations across Canada have responded, over 100 of which are located in Ontario. Together, these facilities have committed to voluntary reductions in emissions of toxic substances of nearly 17,500 metric tonnes nationally (as of year-end 1995).

- The Ontario Environmental Coalition, in cooperation with Ontario Farmers, is developing Environmental Farm Plans (EFPs) to assess environmental concerns. EFPs will continue to receive $5.6 million through the year 2000 from the Agricultural Adaptation Council, with technical support provided by the Ontario Ministry of Agriculture, Food and Rural Affairs (OMAFRA). Approximately 10,000 farmers have voluntarily attended farm plan workshops, and 5,186 approved integrated action plans and implementation strategies are in place to improve pest management and control erosion and agricultural runoff from farms.

- Over the past five years, the partnership of OMAFRA and the Crop Protection Institute, MOE, and AgCare has instituted an Agricultural Pesticides Container Collection Program. One million containers have been collected over the last two years.

Areas of Concern

Remedial Action Plan (RAP) development and implementation continues in the Niagara River, Hamilton Harbour, Toronto Harbour, Port Hope, Bay of Quinte, Oswego, Rochester Embayment, and Eighteenmile Creek Areas of Concern. In addition to RAPs, other local environmental planning efforts are underway that will contribute to a reduction in Lake Ontario critical pollutants.

Improving Fish and Wildlife Populations

Many habitat restoration and protection projects are underway in the Lake Ontario basin. For example:

- In the U.S., the New York State Open Space Conservation plan provides a statewide process to identify and acquire undeveloped habitats. The Ecological Protection and Restoration Program of USEPA's Great Lakes National Program Office provides funding for a variety of habitat restoration projects in Lake Ontario, including: barrier beach and wetlands habitat restoration on the lake's shoreline; creation of wildlife nesting habitat and exotic vegetation control at Deer Creek Marsh Wildlife Management Area; and protection and restoration of Sandy Pond Peninsula. In 1995, the non-profit New York River Otter Project began the process of introducing nearly 300 river otters to the Lake Ontario basin.

- In Canada, EC's Cleanup Fund is currently supporting, in conjunction with its many partners, more than 30 habitat rehabilitation projects in the Lake Ontario watershed. By March of 1996, 45 km of riparian and 40 hectares of wetland habitats had been rehabilitated as a result of project activities supported by the Fund and its partnerships. Rehabilitation of an additional 18 km of riparian habitat and 409 hectares of wetlands is in progress. Canada's Great Lakes Wetlands Conservation Action Plan is a five year plan that focuses on the conservation of coastal wetlands along the lower Great Lakes. Priority areas for protection and rehabilitation have been identified along the Lake Ontario shoreline.

Environmental Trends in the Lake Ontario Ecosystem

Due in part to the programs and initiatives described above, environmental progress has been documented in Lake Ontario, both in the reduction of levels of contaminants found in the organisms, water quality, and sediments within the lake, as well as in the population numbers and reproductive success of various species found in the Lake Ontario basin.

- The input of toxic chemicals associated with suspended sediment from the Niagara River has declined, most significantly between 1960 and 1990.

- Numbers of fish-eating gulls and cormorants have increased dramatically in the last 20 years. PCB levels in herring gull eggs decreased by an order of magnitude from the mid-1970s to the late 1980s; dieldrin levels decreased by 80 to 90 percent.

- New York's bald eagle population is estimated to be growing at an annual rate of between 15 to 30 percent since 1988.

- Overall, the fish community has experienced a dramatic reduction in contaminant levels for PCBs and mirex since the mid-1970s, and a slower rate of decline since the mid-1980s. Levels of mercury in fish from eastern Lake Ontario do not show a statistically significant trend.

LaMP Agenda

Based on the impaired beneficial uses of Lake Ontario and the critical pollutants and biological/physical factors contributing to these impairments, the Four Parties have proposed an agenda of ongoing and future activities that will continue efforts to move towards the restoration of beneficial uses of the lake and achieve virtual elimination of critical pollutants. The Four Parties recognize that there are many groups, organizations, and agencies implementing activities to improve and protect the Lake Ontario basin. The LaMP process provides an opportunity to

develop better connections with these various activities and build on the successes already achieved.

Examples of proposed future binational activities include:

- The U.S. and Canada will continue to work with their Great Lakes stakeholders to implement the "Canada-United States Strategy for the Virtual Elimination of Persistent Toxic Substances in the Great Lakes Basin" to pursue the goal of virtual elimination of persistent toxic substances in the basin.

- The U.S. and Canada will continue to support the Integrated Atmospheric Deposition Network (IADN), a binational network of 19 stations in the U.S. and Canada established and operated for the purpose of monitoring the atmospheric deposition of toxic substances to the Great Lakes.

Examples of proposed future activities in the U.S. include:

- Implementation of the USEPA/NYSDEC Performance Partnership Agreement, which sets out mutual understandings of New York State and USEPA regarding environmental projects to be pursued. The two principles upon which the Agreement is based are maintaining the efficiency and effectiveness of existing programs in the state and taking additional action, as necessary, to solve particular problems in particular places through "Community-Based Environmental Protection." The Lake Ontario basin has been identified as one of the priority community-based environmental initiatives for USEPA and NYSDEC.

- In February 1998, NYSDEC completed the adoption process and began to implement the regulations, policies, and procedures contained within the Great Lakes Water Quality Guidance (GLWQG) (further described in Chapter 4). The implementation of the GLWQG will result in consistent state water pollution control programs throughout the U.S. Great Lake States and will lead to substantial reductions in the loading of LaMP critical pollutants and other pollutants.

- USEPA and NYSDEC will conduct additional trackdown studies in order to pinpoint significant sources of critical pollutants in tributaries to the lake, and will form a trackdown workgroup to identify immediate remedial activities.

- In 1996, the citizens of New York passed a $1.75 billion Clean Water/Clean Air Bond Act. Approximately $125 million has been targeted for Clean Water projects in the Great Lakes basin. Funding will support point source, non-point source, and pollution prevention initiatives, as well as activities to restore aquatic habitat and preserve open space.

Examples of proposed ongoing and future activities in Canada include:

- EC and MOE will continue to implement COA. The ultimate goal of COA is to achieve the virtual elimination of persistent, bioaccumulative substances from the Great Lakes basin ecosystem by implementing strategies consistent with zero discharge.

- Under MOE's Clean Water Regulations, developed under MISA, effluent limits for 10 sectors will be in force by 1998. These include 34 industrial plants in the Lake Ontario basin.

- EC's Cleanup Fund will continue to provide funding and technical support to a wide range of contaminated sediment, urban stormwater, and agricultural projects aimed at controlling sources of pollution to Lake Ontario, as well as habitat restoration and enhancement projects.

- Canada and Ontario initiated a Lake Ontario Tributary Priority Pollutant Monitoring Study beginning in the spring of 1997, in order to provide recommendations for targeted actions within watersheds identified as significant sources of priority pollutants.

Binational LaMP Workplan

The 1987 GLWQA specifies that, when the problems in the lake have been identified and the Stage 1 LaMP has been completed, a Stage 2 LaMP be prepared which sets out a schedule for load reduction activities. The Four Parties propose to develop the technical information necessary to focus the actions undertaken through the LaMP and provide the foundation for the Stage 2 LaMP.

The Stage 2 LaMP will identify the additional actions that will be necessary to restore the beneficial uses of Lake Ontario. The Four Parties will, however, initiate additional LaMP actions prior to the completion of the Stage 2 document if these actions are identified as necessary to achieve LaMP goals.

The following table identifies the activities that the Four Parties propose to undertake binationally (either jointly or in a complementary fashion) to move towards the completion of the draft Stage 2, and to continue to build partnerships and provide information about the LaMP process. It is the goal of the Four Parties to develop the technical information in draft form within two years. Preparation of the Stage 2 LaMP will then commence, incorporating public input on the draft technical information. It is the goal of the Four Parties to produce a draft Stage 2 document for public review by fall of the year 2000.

Binational Workplan for the Lake Ontario LaMP

Activity	3-year objectives	Priorities	Deliverables (Spring 2000, unless otherwise specified)
Reducing inputs of critical and other pollutants	Continue existing programs to reduce loadings of critical pollutants	Evaluate effectiveness of existing programs Support implementation of Binational Great Lakes Toxics Strategy	a) Table and map identifying likely point and non-point sources of critical pollutants; the data collection will focus on sources in the basin but will also include upstream sources entering via the Niagara river; major atmospheric sources from out of the basin may also be included b) Forecast reductions in loadings as a result of existing activities
	Update pollutant loadings and contaminant levels and instigate new control programs to address identified sources and loadings	Undertake source trackdown to identify sources Update tributary loading Update sewage treatment plant loading Enhance existing mass balance models Facilitate cooperative lakewide monitoring	a) Prioritized listing of point, non-point, and basin sources contributing loadings of critical pollutants to include significant sources on each side of the lake b) Updated table 3-3 and 3-4 for LaMP c) Updated tables 3-5 and 3-6 for LaMP d) First cut mass balance model to describe major fluxes of critical pollutants into and out of Lake Ontario (Spring 1999) e) Binational priorities listing for monitoring needs (Spring 1999) f) Workplan for cooperative monitoring
	Refine LaMP List of Critical Pollutants	Review new data as necessary	Determination of any additional critical pollutants (in consultation with health and resource agencies)

Activity	3-year objectives	Priorities	Deliverables (Spring 2000, unless otherwise specified)
Updating/reassessing beneficial use assessments in open lake waters	Refine beneficial use impairment assessment	Further assess lakewide beneficial uses: Priorities: 1) Chemical impacts on benthos 2) Chemical and other factors influencing phytoplankton and zooplankton populations 3) Updates on status of colonial waterbirds, bald eagles, mink, and otter 4) Updates of all beneficial use impairments as necessary, where data available on impacts of physical and biological factors impacting beneficial uses	a) Updated benthos impairment section for Stage 2 LaMP b) Binational beneficial use assessment of phytoplankton and zooplankton populations using information from the Canadian Department of Fisheries and Oceans Bioindex project, MOE's intake monitoring, USEPA's Lake Guardian research program, and the U.S. Bioindex project carried out by the NYSDEC, U.S. Fish & Wildlife Service, and Cornell University c) Binational update on status, using relevant, readily available data, addressing chemical and nonchemical factors d) A series of prioritized updates to be prepared using relevant data on beneficial use impairment indicators, with management recommendations; may not include update on all 14 indicators for the Stage 2 LaMP
Managing biological and physical factors	Continue habitat protection and restoration activities	Summarize underway/proposed actions for nearshore by fall 1998	Map and table identifying nearshore underway and proposed (to year 2000) actions to protect or restore physical habitat
Developing ecosystem objectives and indicators	Update ecosystem objectives and determine monitoring indicators	Review work completed to date by technical subcommittees; in conjunction with partners, determine next steps	Binational workplan for ecosystem objectives development including role of public consultation, priority objectives for pelagic, benthic, and wildlife communities (Spring 1999); begin implementation of Workplan
	Develop objectives for restoration of beneficial uses	Set restoration objectives, determine necessary loading reduction schedules, develop monitoring mechanisms	Delisting objectives for the LaMP for each of 3 beneficial uses impaired by chemicals as basis for loading reduction schedules, for public consultation in 1999

Activity	3-year objectives	Priorities	Deliverables (Spring 2000, unless otherwise specified)
Facilitating public involvement - three tiered Lakewide Advisory Network	Establish Basin Teams and partnerships	Identify and meet with partners	a) Agreements with Basin Teams and partners to cooperate in sharing information, encouraging actions to preserve and protect the lake and watershed, and providing public input to the LaMP process (Spring 1999) b) Meetings with groups on issues of concern as necessary
	Maintain information connection	Provide updated information via the Lake Ontario LaMP Web page and mailings	a) Up to date Lake Ontario LaMP homepage b) Occasional mailings for informational updates and gathering public input
	Hold binational Lake Ontario forums at significant stages in the LaMP process	Convene binational Lake Ontario forums, as necessary, with participants from Basin Teams, partners, and other interested stakeholders	Binational forum meeting likely in 1999
Reporting	Produce annual status reports	Produce Year 1 Annual Report	A short annual report highlighting progress to be released at joint Lake Ontario LaMP and NRTMP annual meeting
	Produce draft Stage 2 report	1) Assess existing programs 2) Update sources and loadings 3) Present revised objectives and indicators 4) Present draft load reduction schedules	Draft Stage 2 will be available for public review in the fall of 2000