

THIRD REPORT OF PROGRESS UNDER THE
CANADA-ONTARIO AGREEMENT RESPECTING THE
GREAT LAKES BASIN ECOSYSTEM
1997 - 1999



PARTNERSHIPS

for the Great Lakes



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Third Report of Progress Under the
Canada - Ontario Agreement respecting the
Great Lakes Basin Ecosystem, 1997 -

D03 ENVIRONMENT PLANNING

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OVERVIEW

The Great Lakes play a vital role in the health, culture and economic wellbeing of the 8.5 million Canadians who live within the basin and the additional 4.5 million who live along the shores of the St. Lawrence River. The lakes support a wide range of human activity, and consequently face significant pressures and stresses that must be considered to protect this precious resource.

The Canada-Ontario Agreement (COA) establishes a framework within which the two governments work with communities and partners to manage and improve the ecosystem of the Great Lakes basin. The COA sets environmental targets to restore degraded areas, reduce pollution, and conserve the health of the ecosystem and the people who live in the basin. Actions to meet COA targets are engaging the imagination and energy of thousands. People are giving their time and experience not only to restore polluted areas but also to promote approaches that will prevent the ecosystem from being degraded in the future.

During the five years that the current COA has been in effect, evidence of environmental improvements is visible on many fronts. Discharges of nutrients, contaminants and persistent toxic substances from municipal, industrial and agricultural sources have decreased. Levels of persistent toxic substances measured in the tissues of fish and wildlife have also declined. There are more sentinel species such as osprey, lake trout and the bald eagle living in the Great Lakes basin, pointing to measurable improvements in the quality of water and the overall health of the ecosystem.

Although much has been accomplished, challenges remain. The Great Lakes ecosystem is not static. It continues to evolve and react to human development impacts and interventions, and to natural processes. Over the next 25 years, economic growth within the Canadian portion of the basin is expected to remain strong, and the Canadian population living within this region is expected to increase by two million. This significant growth will increase the environmental stress in the basin. The partnerships, cooperation and effort started under the COA are essential for

dealing with these emerging challenges and achieving the goal of a healthy and sustainable Great Lakes ecosystem.

The governments of Canada and Ontario look forward to continuing their cooperative efforts to restore and protect one of Canada's great natural resources, the Great Lakes.

ABOUT THIS REPORT

This is the third progress report since the two governments signed the *Canada-Ontario Agreement (COA) Respecting the Great Lakes Basin Ecosystem* in 1994. It is through the COA that Canada meets its obligations under the Canada-U.S. Great Lakes Water Quality Agreement (GLWQA).

The purpose of this report is to present the achievements and to outline progress made by federal and provincial agencies and their partners in meeting the targets and objectives under the COA. The report provides a summary of the targets that have been met, and a description of the actions under way and proposed to meet the targets where work still remains.

This report also serves as the means by which Canada informs the International Joint Commission (IJC) of Canadian efforts to meet its obligations under the GLWQA. The IJC has indicated that its Biennial Reports will now include an assessment of the progress made by the Parties in relation to each of the annexes of the GLWQA. In an effort to assist the IJC in this endeavour, the Third COA Progress Report includes a summary chart that identifies the links between the COA targets and GLWQA annexes (Appendix I).

THE CANADIAN APPROACH

The 1994 COA set out a plan of action that established ambitious priorities, targets and schedules for addressing environmental issues of concern in the Great Lakes basin, and fulfills Canada's commitments under the GLWQA. COA established a results-oriented approach that identified more than 50 targets to be achieved during its term. These targets address three main objectives:

OBJECTIVE 1:

● Restore Degraded Areas

Canada and Ontario, in cooperation with other members of the Great Lakes community, will continue restoration activities which embody a systematic and comprehensive approach to restoring and protecting ecosystem health and beneficial uses in degraded areas.

OBJECTIVE 2:

● Prevent and Control Pollution

Canada and Ontario will work with the producers and sources of pollutants in the Great Lakes Basin Ecosystem to establish schedules and to achieve significant interim reductions (90 per cent by 2000) in the releases of persistent, bioaccumulative and toxic substances by adopting the philosophy of zero discharge. In addition, industries and others will be challenged to reduce the use, release or generation of other toxic substances which will contribute to the goal of virtual elimination.

OBJECTIVE 3:

● Conserve and Protect Human and Ecosystem Health

Canada and Ontario, in cooperation with other members of the Great Lakes community, will act to conserve and protect sustainable ecosystems, with their aquatic and terrestrial communities, including people. The governments will determine the impacts of contaminants on basin populations and use the information to provide advice and prompt action, in cooperation with basin stakeholders, on significant ecosystem health issues.

MEETING OUR COMMITMENTS

The Great Lakes constitute one of the largest systems of fresh surface water on earth. Rich in resources, the Great Lakes play a pivotal role in the health, culture and economic wellbeing of 8.5 million Canadians living in the Great Lakes basin and the 4.5 million Canadians living downstream along the shores of the St. Lawrence River.

Over the past 150 years, logging, farming and urban and industrial development have placed growing pressures on the Great Lakes ecosystem. Throughout the 1960s and 1970s, signs of an ecosystem under severe stress were clearly evident.

In 1994, Canada and Ontario signed the *Canada-Ontario Agreement Respecting the Great Lakes Basin Ecosystem* in support of a coordinated effort to clean up the Great Lakes. COA set out challenging environmental targets to be achieved by governments working in collaboration with all basin stakeholders. Over the past five years, Canada and Ontario have dedicated resources to restore degraded areas, to reduce the release of pollution to the Great Lakes and to conserve human and ecosystem health.

Many of the COA targets will be met on schedule and significant progress will be made on others. Under the COA there have been dramatic improvements in:

- water quality;
- the recovery of species at risk and habitat conservation; and,
- the environmental sustainability of Ontario's agricultural sector.

In addition, work under the COA has realized economic dividends and enlisted the active support of partners in all sectors.

Although the Great Lakes are cleaner today than they have been in 50 years, there are still many major concerns. Canada and Ontario remain committed to the rehabilitation, protection, and conservation of the Great Lakes Basin Ecosystem, and will continue to work cooperatively with basin stakeholders to the year 2000 and beyond.

Canada and Ontario wish to recognize the extensive actions taken by individuals and organizations which

contribute to the sustainability of the Great Lakes. These actions are resulting in important benefits for all residents of the basin.

Canada and Ontario are pleased to report the following achievements under the 1994 COA:

- The Great Lakes Binational Toxics Strategy was signed in April 1997 by Canada and the U.S. in an effort to virtually eliminate persistent toxic and bioaccumulative substances. The Strategy represents a significant step toward restoring and protecting the Great Lakes. Efforts are now focused on its implementation. (Target 2.3.1)
- A comprehensive audit of commercial pesticide use in Ontario confirms that there is no sale, commercial use or importation of five priority Tier I substances (aldrin/dieldrin, chlordane, DDT, toxaphene and mirex). (Target 2.5.1)
- In 1995, the Canadian Council of Ministers of the Environment formally approved the *Canadian Biodiversity Strategy: Canada's Response to the Convention on Biological Diversity*. The Strategy fulfills the COA target aimed at developing biodiversity policies to protect the function and structure of diverse, self-sustaining biological communities. (Target 3.3.1)
- The COA target regarding the development and implementation of Environmental Farm Plans has been met and exceeded. Nearly 16 000 farmers have attended more than 1 000 Environmental Farm Plan workshops, resulting in more than 8 300 peer-reviewed action plans. Farmers have implemented these action plans by investing out-of-pocket expenditures totalling \$21 million and government incentives worth \$7 million. (Target 3.6.4)

A number of other important and noteworthy accomplishments include:

- More than 60 per cent of the remedial actions needed to restore Canadian Areas of Concern (AOCs) have been implemented.
- All recommended remedial actions have been implemented in the Spanish Harbour AOC, which is being recognized by Canada and Ontario as an area of recovery. Monitoring continues to track

the full achievement of Remedial Action Plan (RAP) restoration targets.

- New technologies for improving the quality of municipal sewage treatment effluent and for controlling urban stormwater runoff have been developed and are being implemented in AOCs. These technologies enable municipalities to meet RAP effluent targets while saving millions of dollars in capital expenditures.
- Beaches are remaining open for longer periods of time in Toronto, Hamilton, and other lakefront communities because of improvements in treating combined sewer overflows (CSOs).
- Cost-effective technologies for removing and treating contaminated sediments are being applied to full-scale remediation projects in AOCs. Four successful full-scale cleanups have been completed in Collingwood Harbour, Severn Sound (Penetanguishene), and Toronto and Region (Scarborough Bluffers Park and Pickering) AOCs. Others are currently under way in the basin. Sediment management strategies have been developed in the majority of the AOCs.
- Ontario has cleaned up 12 contaminated sites that are under its jurisdiction within the Great Lakes basin. In addition, remediation at more than 50 sites is being funded by private proponents or responsible parties. Thirty-one of these sites have been cleaned up. The collection and treatment of contaminated groundwater continues at eight sites while remediation at a further 13 sites is scheduled for completion in the year 2000.
- Ontario established the Provincial Water Protection Fund program in August 1997, providing \$200 million to improve the operations of drinking water treatment plants and sewage treatment plants (STPs) across Ontario.
- Ontario established and provided seed money to the Ontario Great Lakes Renewal Foundation. It is a charitable organization dedicated to raising funds and providing grants to partnerships that aim to restore, protect and conserve the Great Lakes Basin Ecosystem.

- Overall, a 71 per cent reduction in the use, generation or release of Tier I substances has been achieved. The reduction target for alkyl-lead has been met. Reductions have been achieved for octachlorostyrene (86 per cent), PCDD [dioxins] (77 per cent), PCDF [furans] (77 per cent), mercury (74 per cent), hexachlorobenzene (61 per cent) and benzo(a)pyrene (20 per cent).
- More than 50 per cent of the high-level polychlorinated biphenyls (PCBs) previously in storage have been destroyed. This exceeds the year 2000 target.
- Regulations governing effluent limits for all nine industrial sectors under the Ontario Ministry of the Environment's (MOE) Municipal Industrial Strategy for Abatement (MISA) have been enforceable since 1998. These Clean Water Regulations provide for significant reductions in the discharges of 60 industrial toxic chemical substances from approximately 190 direct discharge facilities. For example, the federal and provincial pulp and paper regulations have resulted in an 82 per cent reduction in discharges of chlorinated toxic substances to the lakes, from 15 tonnes in 1990 to three tonnes in 1998, as well as the elimination of dioxin and furan emissions. In addition, significant reductions have occurred in the discharge of substances such as polycyclic aromatic hydrocarbons (PAHs), cyanide, zinc, lead, and chromium.
- Through the Great Lakes 2000 Cleanup Fund, more than 600 stakeholders representing all levels of government, Conservation Authorities, private businesses and industry, environmental and community groups and associations have provided \$123 million in financial and in-kind services toward rehabilitation projects.
- Recovery plans have been completed for five threatened species. A further 10 are in progress, and implementation is under way for 13 recovery plans. In Ontario, the goal of 10 pairs of peregrine falcons has been met, fledging a minimum of 15 young annually.

- Over 9 000 hectares of wetlands have been protected, 4 000 through acquisitions and 5 150 through other methods such as easements. A further 2 500 hectares of wetlands have been rehabilitated.
- Approximately 1.72 million hectares of aquatic and terrestrial areas have been protected.
- Nearly 540 kilometres of riparian habitat have been rehabilitated and 700 kilometres have been protected.
- Research into endocrine-disrupting substances and their effects on wildlife continues. New techniques have been developed to assess effects and are now being incorporated into field and laboratory studies.
- Since the outset of the COA, the scientific understanding of the relationships between environmental contaminants and human health has increased significantly. Assessments of exposure in the general population and in more susceptible populations have also improved.
- Health Canada (HC) research has demonstrated strong associations between cardiorespiratory admissions to hospital and air pollution in the Great Lakes basin. These research results are being integrated into the development of government policies on air pollution.
- Canada continues to conduct critical research on the fate and effects of toxic substances and the identification of atmospheric inputs of toxic chemicals and their impacts.
- As part of the State of the Lakes Ecosystem Conference (SOLEC), Canada and the U.S. are developing indicators that reflect conditions of the entire Great Lakes basin and its major components. These indicators will draw on and complement indicators used for more specific purposes, such as Lakewide Management Plans (LaMPs) and RAPs, and will also be used to assess and report on progress.

SUMMARY OF PROGRESS 1997-1999

OBJECTIVE 1: RESTORE DEGRADED AREAS

The focus of Objective 1 is to restore degraded ecosystems throughout the Great Lakes basin, with an emphasis placed on AOCs.

Targets within this objective fall under seven general program areas: development and implementation of RAPs, capital works, species and habitat rehabilitation, contaminated sites, contaminated sediments, groundwater, and human health. The combined actions within these targets are essential for meeting Canada's commitments to restore AOCs.

Substantial progress is being made on a number of fronts. More than 60 per cent of the actions necessary to restore AOCs have been implemented. One AOC, Collingwood Harbour, was delisted in 1994 – the first and only one in the Great Lakes basin. There is also an AOC, Spanish Harbour, where the recommended actions have been implemented, and now the environment must respond and adapt to these actions.

The accomplishments within this objective are due in large measure to local action and partnership efforts. Innovative multi-stakeholder processes are engaging local communities in determining the extent and causes of environmental impairments, as well as in identifying and reaching agreement on complex decisions relating to remedial options and implementation strategies. More than 600 stakeholders representing municipal governments, Conservation Authorities, private businesses and industry, associations, and environmental and community groups have provided \$123 million in financial and in-kind services toward rehabilitation projects supported by Canada and Ontario. These efforts not only help to meet local goals and objectives within the RAP program, but also assist in meeting basin-wide commitments. For example, innovative technologies demonstrated in AOCs are being applied to other priority sites within the Great Lakes basin, as well as elsewhere in North America and abroad.

Canada and Ontario are committed to working with communities in restoring and cleaning up AOCs.

These areas are the result of years of degradation and will require substantial time to remediate. A number of factors affect the rate of progress including:

- the complexity of the environmental degradation;
- the time required by the environment to respond to implementation actions; and,
- the respective efforts of all partners.

1.1 REMEDIAL ACTION PLANS

COA Target 1.1.1: Restore 60 per cent of impaired beneficial uses across all 17 Areas of Concern (AOCs), leading to the delisting of nine AOCs by the year 2000.

Approximately 13 per cent of beneficial uses impaired by local sources have been fully restored. One AOC, Collingwood Harbour, has been declared fully restored and delisted.

More than 60 per cent of the actions necessary to restore AOCs have been implemented. Spanish Harbour is one site where it is recognized that all RAP recommended actions have been implemented, and where monitoring continues to measure progress towards achieving the restoration targets. Although not fully restored and delisted, Spanish Harbour is an area well on the way to full recovery.

COA Target 1.1.2: Complete and submit all RAP Stage 2 reports to governments by the end of 1996. The governments will respond to all completed Stage 2 reports and submit them to the IJC by the end of 1997.

Stage 2 recommended plans have been completed for 13 AOCs and all reports have been transmitted to the IJC. Government responses, however, are still pending for the Detroit River and Wheatley Harbour AOCs.

Work is continuing toward the completion of Stage 2 reports for the Peninsula Harbour, St. Marys River and Thunder Bay AOCs. The Port Hope Harbour RAP is "on hold" pending the establishment of a low-level radioactive waste facility.

COA Target 1.1.3: Establish organizational frameworks for individual AOCs to coordinate and facilitate implementation of local RAPs upon completion of Stage 2 reports.

Sustain public involvement and advisory programs for the implementation phase of RAPs.

Organizational frameworks to coordinate and facilitate RAP implementation have been established for the Severn Sound, Detroit River (Canadian side), Niagara River (Canadian side), Hamilton Harbour, Toronto and Region, Bay of Quinte and St. Lawrence River (Canadian side) AOCs. The frameworks are locally-based and relevant to existing needs. Discussions which will lead to the establishment of organizational frameworks at other AOCs are continuing.

In April 1998, the governments of Canada, the United States, Ontario and Michigan signed a "Letter of Commitment" to re-energize the restoration and remediation efforts of the Detroit River, St. Clair River and St. Marys River AOCs. This letter specifies the roles and responsibilities of the Four Parties in implementing activities in the shared AOCs.

Public involvement in the implementation phase of RAPs is being sustained, albeit at a reduced level. Activities focus on building local capacity and broadening partnerships which will ensure continued environmental improvement.

COA Target 1.1.4: By 1995, establish cooperative mechanisms, including environmental surveillance and monitoring, to track progress toward delisting all 17 AOCs.

Canada and Ontario have established an ad hoc Surveillance and Monitoring Committee to coordinate the annual planning and operations of Great Lakes water quality monitoring activities. The Committee provides monitoring support to RAPs and LaMPs to track progress toward the delisting of AOCs, as well as the reductions in critical pollutants causing lakewide impairments. A broader framework for coordination of all federal and provincial Great Lakes surveillance and monitoring activities is currently under development by the COA Review Committee.

1.2 CAPITAL WORKS

COA Target 1.2.1: Upgrade eight RAP primary sewage treatment plants (STPs) to secondary treatment and optimize effluent quality and sludge generation at a further 12 plants in AOCs.

The Espanola STP in the Spanish Harbour AOC is fully upgraded to secondary treatment. Construction of the Thunder Bay and Sarnia secondary treatment plants will begin in 1999. Construction to upgrade the STP in Tay Township in the Severn Sound AOC began in 1999. This latter work will also extend sewer services to two subdivisions which are being served by failing septic tank and tile field systems. Pilot and planning studies to determine the most cost-effective methods for upgrading are being undertaken at five other plants.

Effluent quality and sludge generation have been optimized at 11 STPs within the Severn Sound (Midland, Elmvale, Penetanguishene Mental Health Centre, Victoria Harbour and Coldwater); Bay of Quinte (Napanee, Batawa, Warkworth Penitentiary, Belleville and 8 Wing Trenton); and, Detroit River (Windsor Little River) AOCs. Projects at an additional three plants in the Hamilton Harbour (Skyway and Woodward) and Toronto and Region (City of Toronto) AOCs are ongoing. To date, the total savings to municipalities from these optimization activities are estimated at \$41 million.

COA Target 1.2.2: Enhance phosphorus removal at 15 STPs in AOCs by modifying or adding to existing phosphorus controls.

This COA target is nearing completion. Fourteen STPs in the Severn Sound (Midland, Elmvale, Penetanguishene Main, Penetanguishene Fox, Penetanguishene Mental Health Care Centre and Coldwater); Collingwood Harbour (Collingwood); Hamilton Harbour (Skyway); and, the Bay of Quinte (Trenton, Belleville, Picton, Batawa, Napanee and 8 Wing Trenton) AOCs have achieved RAP phosphorus objectives through optimization and/or capital works. A project

is also under way to enhance phosphorus removal at the Woodward STP in the Hamilton Harbour AOC.

At the Collingwood Harbour AOC, phosphorus discharged from the municipal STP was reduced by 67 per cent. This achievement contributed substantially towards the delisting of the AOC and resulted in a savings of \$10 million in capital costs.

COA Target 1.2.3: Undertake 25 stormwater quality pilot projects in AOCs.

This COA target is nearing completion. Sixteen stormwater quality projects in the Toronto and Region, Niagara River and Severn Sound AOCs have been completed. A further nine projects are under way in the Toronto and Region and St. Lawrence River AOCs. Among the technologies demonstrated are the Dunker's flow and exfiltration systems, which have been applied in the City of Toronto. It is the first time that these innovative technologies have been applied in Canada.

New stormwater pond designs have also been evaluated under this target. Monitoring results indicate higher than expected effectiveness in removing pollutants.

COA Target 1.2.4: Abate 40 per cent of combined sewer overflows in AOCs by implementing municipal Pollution Control Plans.

To date, 19 per cent of CSOs have been abated. Pollution Prevention Control Plans have been developed for specific areas within seven AOCs (City of Thunder Bay, Sarnia, City of Windsor, City of Niagara Falls, City of Hamilton, City of Toronto, and Cornwall) and work is ongoing at Sault Ste Marie.

Under the former MOE Beaches Improvement Program (BIP), numerous municipalities were able to implement recommendations for CSO abatement suggested in their Pollution Prevention Control Plan studies. The BIP and other avenues of funding have been used to assist municipalities. For example, federal and

provincial programs have financially assisted the construction of three CSO retention tanks in the Hamilton-Wentworth Region and the construction of the City of Toronto's Western Beaches Tank.

COA Target 1.2.5: Demonstrate and implement new and innovative technologies directly contributing to the restoration of beneficial uses through green industry strategies and other programs of both governments.

Projects are under way at a number of AOCs which demonstrate the implementation of innovative technologies that will support achievement of the COA targets relating to habitat rehabilitation, capital works, contaminated sediment and groundwater.

For example, STP optimization techniques are helping to achieve RAP phosphorus discharge objectives. In addition, stormwater and wastewater treatment technologies being implemented in AOCs are reducing energy, operating and maintenance costs.

A project at the Waterdown STP in the Hamilton Harbour AOC demonstrates the use of various innovative, low-cost ammonia reduction technologies, resulting in a 30 per cent savings over traditional methods.

At the Windsor West STP in the Detroit River AOC, biological aerated filters have shown to be an effective, low-cost alternative to conventional processes, with a potential cost savings of over \$33 million. This technique has been tested in a pilot project and is being considered for use in the City of Thunder Bay.

High-rate satellite CSO treatment technologies, a low-cost alternative to conventional storage tanks, are being demonstrated in Toronto and are being considered for use in other AOCs.

Biological nutrient removal technologies, which reduce the amount of chemicals used in removing phosphorus, are being demonstrated in Sudbury and are showing substantial savings in chemical and energy costs.

A simple technology known as "on-off aeration" has been demonstrated at five STPs in Ontario. This technology has resulted in a 30 per cent reduction in energy requirements and substantial savings in operating costs.

1.3 SPECIES AND HABITAT REHABILITATION

COA Target 1.3.1: Rehabilitate ecosystem function and structure of diverse self-sustaining native biological communities in 12 AOCs and other priority degraded areas.

COA partners, along with other agencies and the private sector, are continuing to add to the number of habitat-related projects in 12 AOCs and other priority areas, such as Oshawa Second Marsh, on Lake Ontario, as well as Dunnville Marsh and Rondeau Bay, on Lake Erie. Projects are designed to rehabilitate ecosystem function, and the structure of diverse self-sustaining native biological communities. Efforts are also under way to facilitate rehabilitation activities throughout the Great Lakes basin. A variety of tools and techniques have been developed and disseminated to guide and support activities at the community level. For example, habitat rehabilitation guidelines have been produced to guide local action within AOCs.

COA Target 1.3.2: Develop and implement recovery plans for six threatened species.

Recovery plans have been completed for five species: Henslow's sparrow; loggerhead shrike; peregrine falcon; Blanchard's cricket frog; and, eastern spiny softshell turtle. A further 10 are in progress. In Ontario, the goal of 10 pairs of peregrine falcons has been met, fledging a minimum of 15 young annually.

COA Target 1.3.3: Develop fish and wildlife goals and objectives for each of the Great Lakes and implement plans to rehabilitate degraded native populations.

Fish community goals and objectives have been developed for lakes Erie, Superior, Huron and

Ontario as required by the Strategic Great Lakes Fisheries Management Plan. *The Joint Strategic Plan for Management for Great Lakes Fisheries* was updated in June 1997 to address the need to better coordinate and integrate fisheries and environmental ecosystem management initiatives, particularly those related to the implementation of the GLWQA. Various plans have been implemented to rehabilitate species on a lake-by-lake basis, including: lake trout in lakes Superior, Huron and Ontario; coaster brook trout in Lake Superior; and, Atlantic salmon in Lake Ontario.

As part of the LaMP process, wildlife and habitat goals and objectives have been developed for Lake Superior. Wildlife and habitat goals for Lake Erie are expected by autumn 1999.

Lake Ontario's LaMP goals have been established and preliminary ecosystem objectives were presented in the Stage 1 report which was finalized and released to the public in May 1998. LaMP fish objectives and indicators will be established jointly with the Lake Committee of Fishery Managers over the next several years. Wildlife indicators have been developed and will be the subject of consultations in the fall of 1999.

COA Target 1.3.4: Increase the extent of productive aquatic habitats by rehabilitating and protecting 6 000 hectares of wetland habitat and 600 kilometres of riparian habitats.

The rehabilitation of more than 2 500 hectares of wetlands has been completed, with a further 1 340 hectares in progress.

Nearly 540 kilometres of riparian habitat have been rehabilitated and projects involving an additional 175 kilometres are in progress. As well, 700 kilometres of riparian habitat have been protected, and a further 159 kilometres have been proposed for protection.

In Hamilton Harbour, the construction of a fishway and carp barrier, in conjunction with numerous other rehabilitation efforts, has resulted in the recovery of 200 hectares of

wetland. Wild celery is growing in Cootes Paradise for the first time in 50 years, and the submerged plant community has increased from 10 to 17 species.

In Severn Sound, nearly 70 kilometres of riparian habitat have been rehabilitated through a highly successful tributary restoration program which included native stream bank plantings and the restriction of livestock access to streams.

1.4 CONTAMINATED SITES

COA Target 1.4.1: Remediate contamination at ten priority federally-owned sites, at five orphan sites under the National Contaminated Sites Remediation Program, and an expected 20 sites under provincial jurisdiction.

FEDERAL SITES

Canada has taken action to remediate 10 federally-owned sites within the Great Lakes basin. These sites have been remediated to a state that meets federal and provincial environmental remediation criteria. Sources of contamination included fuel oil, heavy metals, phenolic compounds, herbicides, pesticides, fertilizers, oils and greases, and household wastes.

PROVINCIAL SITES

Orphan Sites

Cleanup at the Shamrock Chemicals site in Port Stanley, formerly an oil gasification site, took place from March 1994 to March 1996. The property has now been fully decommissioned.

Site remediation work continues at four other orphan sites: Chemical Waste Management Ltd., Smithville; Tyre King Fire Site, Hagersville; National Hard Chrome Site, North York; and, Deloro Mine Site, Deloro. Since the termination of the National Contaminated Sites Remediation Program on March 31, 1995, MOE has assumed full responsibility for the remediation of these sites.

In 1998, MOE re-evaluated the surface water runoff and groundwater quality at the Hagersville Tyre King Fire Site. Based on the results of the study, the stormwater runoff collection and treatment system is being decommissioned. The Ministry continues to monitor the domestic wells in the vicinity. To date, no contamination from the fire site has been detected. MOE continues to operate a pump and treat system at the Smithville site, and an interception and treatment system at the National Hard Chrome Site. Final remediation of the abandoned Deloro Mine Site will take an additional two to three years at an estimated total cost of \$18 million. This remediation will eliminate the threat of contamination to downstream communities and to the Bay of Quinte.

Other Provincial Sites

Since the last reporting period, additional contaminated sites under provincial jurisdiction have been identified for remediation. Remediation activities include the cleanup of PCB wastes and contaminated soil, and the cleanup and removal of illegally buried or abandoned hazardous wastes.

Provincial funding is being used to remediate 16 sites. Remediation is complete at 12 sites, and continues at four others.

In addition, remediation of more than 50 sites is being funded by private proponents or responsible parties. To date, 31 of these sites have been remediated, with cleanup at a further 13 sites scheduled for completion by the year 2000.

COA Target 1.4.2: Assess and prioritize closed landfill sites under provincial jurisdiction for potential problems.

Ontario has a comprehensive inventory of the more than 2 000 closed disposal sites in the province. The 377 closed sites which were considered to have the greatest potential for adverse environmental effects were assessed and no significant impacts were identified.

1.5 CONTAMINATED SEDIMENTS

COA Target 1.5.1: Describe effects, demonstrate and implement the clean up of severely contaminated sediments, with emphasis on contamination at priority sites in AOCs.

Contaminated sediment assessments have been undertaken at 11 priority sites in AOCs. The following progress has been made: the demonstration of a range of removal and treatment technologies; the successful full-scale remediation in the Welland River at Atlas Steels in the Niagara River AOC; the initiation of full-scale cleanup at the Northern Wood Preservers site in the Thunder Bay AOC; the development of a sediment strategy for the Hamilton Harbour AOC; and, the completion of physical, chemical and biological assessments for the St. Clair River AOC. In addition, negotiations are currently under way to deal with the most contaminated zone, adjacent to Randle Reef, in the Hamilton Harbour AOC. Contaminated sediment strategies are also being developed for the St. Lawrence River (Cornwall) and St. Marys River AOCs.

COA Target 1.5.2: Develop long-term strategies for remediation of areas of intermediate sediment contamination at ten locations by the year 2000.

Long-term strategies have been developed, and the source control and monitoring of the recovery of sediment quality have been implemented for Nipigon Bay, Spanish Harbour, Severn Sound, Collingwood Harbour, Wheatley Harbour and Bay of Quinte AOCs.

Full-scale cleanup has been completed in Collingwood Harbour, Severn Sound (Penetanguishene), and Toronto and Region (Scarborough Bluffers Park and Pickering) AOCs. To date, more than 51 000 cubic metres of material have been removed from sites of intermediate sediment contamination.

Further study and investigation of options is being carried out in Peninsula Harbour, St. Marys River and St. Lawrence River AOCs

to determine preferred remedial strategies. Source control is the strategy that will be applied in the Jackfish Bay AOC.

1.6 GROUNDWATER

COA Target 1.6.1: Undertake hydrogeological investigations and demonstrations of new approaches to remediate groundwater contamination at priority locations in the Great Lakes Basin Ecosystem.

The remediation of groundwater contamination is costly and often unsuccessful. However, a number of studies and demonstrations are under way to develop new and more efficient techniques for the cleanup of contaminated groundwater. Activities include: investigating the use of vitamin B12 for the remediation of groundwater contaminated with chlorinated compounds; testing the effect of humic acids for the remediation of petroleum hydrocarbons in groundwater; determining the potential impact of groundwater pollution by septic system effluent on the marsh at Point Pelee National Park; assessing the impact of climate change and variability, as well as consumptive groundwater use on groundwater levels and discharge to surface waters in the Grand River watershed; and, conducting a groundwater study at the Smithville PCB site in the Niagara Peninsula.

1.7 HUMAN HEALTH

COA Target 1.7.1: By 2000, reduce the risk of exposure to specific environmental contaminants in six known risk populations by 50 per cent.

Steady declines in many key pollutants have occurred under the COA. These have led to declines in contaminant levels in human tissues, such as lead in blood and organochlorine contaminants in breast milk. Composite levels of seven persistent organochlorine pesticides in human breast milk in Canada have declined 80 per cent since 1975.

Data collection has been completed for the *Fish and Wildlife Consumption Survey in Five Great Lakes Areas of Concern*, a shoreline survey of fish consumers in the Detroit River, St. Clair River, Hamilton Harbour, Toronto and Region, and Niagara River AOCs, and for a related study, *The Great Lakes Fish Eaters Study*, on high consumers of fish. The results of these studies will be integrated into risk/benefit assessments and summaries of this work will be available to the public.

Reducing the risk of exposure to specific environmental contaminants continues. In 1998, Canada revised its assessment for mercury intake by women of child-bearing age and children under 15 years of age, and strengthened its guideline by lowering the tolerable daily intake for these groups. These changes were reflected in the *1999/2000 Guide to Eating Ontario Sport Fish*.

Health risk assessments have been provided and published on PAHs and recreational water use for the St. Marys River, Hamilton Harbour and Toronto and Region AOCs. Ongoing research has demonstrated strong associations between cardiorespiratory admissions to hospital and air pollution in the Great Lakes basin. The results of this research are being integrated into the development of government policies on air pollution.

OBJECTIVE 2: PREVENT AND CONTROL POLLUTION

Objective 2 is the prevention and control of pollution with a focus on persistent, bioaccumulative and toxic substances. The Objective is organized into a number of specific targets, and it uses a systematic and strategic approach to achieve reductions.

Considerable progress has been made in reducing toxics within the Great Lakes. One area where significant strides have been made is in the development of better release inventories for Tier I and Tier II substances. Prior to 1994, information on quantities released within the Great Lakes basin was very limited. Improved release inventories are providing a stronger basis for assessing progress towards virtual elimination of toxics, and are assisting in identifying sources where reduction efforts must be focused. Efforts to prevent and control pollution have used a combination of voluntary and regulatory approaches, and have drawn on national and provincial efforts that are outside the umbrella of the COA. For example, the Accelerated Reduction/Elimination of Toxics (ARET) program is a national initiative that seeks to virtually eliminate some 14 persistent bioaccumulative toxics and to reduce emission levels for 87 other hazardous toxic substances. Other national initiatives such as the Toxic Substances Management Policy (TSMP), Strategic Options Process (SOP) and Canada-Wide Standards (CWSs) are also helping to meet COA targets by addressing some of the same substances and sectors. At the provincial level, regulations governing effluent limits for nine industrial sectors under MISA are now enforceable. These regulations provide for significant reductions in the discharges of 60 toxic industrial substances from approximately 190 direct discharge facilities.

The Environmental Management Agreement (EMA) between industry and government is an innovative approach to promote environmental protection and enhancement that goes beyond existing legislation. These facility-based agreements are proactive in nature, and hold promise for further toxic reductions. For example, in 1997 the Dofasco Inc. mill in Hamilton signed an EMA with Canada and Ontario

that consolidates the objectives of the company's environmental programs, and sets aggressive targets in the areas of air, water and waste management.

The negotiation of the *Great Lakes Binational Toxics Strategy* has been one of the achievements under the COA. This Strategy targets the same toxic substances identified under the COA, and aims to virtually eliminate these persistent and bioaccumulative substances. The Strategy provides a basis for coordinating binational action by promoting information sharing, identifying cost-effective options to achieve further reductions, and assessing and reporting on cross-cutting issues such as the long-range transport of atmospheric pollutants from worldwide sources.

Substantial progress in reducing the levels of toxic substances is being made as a result of these initiatives. Future success will involve innovative partnership arrangements and additional reduction commitments by major sources beyond the year 2000.

2.1 PRIORITY TOXIC SUBSTANCES

COA Target 2.1.1: For Tier I substances Canada and Ontario agree to seek a 90 per cent reduction in the use, generation or release of the remaining seven substances (benzo[a]pyrene, hexachlorobenzene, alkyl-lead, mercury, octachlorostyrene, PCDD [dioxins] and PCDF [furans]) by the year 2000.

Overall, a 71 per cent reduction has been achieved in the use, generation or release of the seven Tier I priority toxic substances. Total releases of these substances are estimated to be 21 tonnes per year. The target for alkyl-lead has been met. Reductions have been achieved for octachlorostyrene (86 per cent), PCDD [dioxins] (77 per cent), PCDF [furans] (77 per cent), mercury (74 per cent), hexachlorobenzene (61 per cent), and benzo(a)pyrene (20 per cent).

COA Target 2.1.2: For Tier II substances and other pollutants, Canada and Ontario agree to collaborate with, and provide support for, voluntary programs by industry and others to reduce the use, release or generation of Tier II

substances (cadmium, hexachlorocyclohexane, 1,4-dichlorobenzene, 3,3'-dichlorobenzidine, 4,4'-methylene bis(2-chloroaniline), pentachlorophenol, tributyl tin, and a group of PAHs including anthracene and dinitropyrene), and establish specific timelines and targets for achieving their virtual elimination.

Significant reductions have occurred in the use, release or generation of five of the eight Tier II substances, primarily as a result of stakeholder actions. Reductions have been made for pentachlorophenol (50 per cent), tributyl tin (an estimated 50 per cent, given the regulation in place to restrict its use), 1,4-dichlorobenzene (40 per cent), cadmium (25 per cent) and PAHs (20 per cent).

COA Target 2.1.3: Provide essential knowledge on the fate and effects of Tier II substances from industrial, municipal and other sources.

Twenty-five research projects have been undertaken to develop knowledge on the occurrence, fate and effects of Tier II substances in the waters of the Great Lakes basin. For example, 3,3'-dichlorobenzidine has been monitored over the past three years at an industrial site in Toronto. Results of tests indicate effluent concentrations range from 0.2 to 650 micrograms per litre, whereas effluent from the municipal sewage treatment plant shows no sign of the substance. Research continues on the biological degradation of this Tier II substance. Another study conducted at marinas around Lake Ontario indicates tributyl tin, a banned substance, does not originate from suspended sediment but is being released from boat paint.

Other studies and research projects include: assessment of the levels of heavy metals and PAHs in stormwater runoff; potential impacts of highway runoff; toxicity of stormwater, CSO and ultraviolet disinfected effluents; stormwater pond performance; endocrine-disrupting potential of municipal effluents in the Great Lakes basin; and, development and application of approaches to evaluate chemical toxicity in effluents.

The federal government announced the Toxic Substances Research Initiative (TSRI) in December 1998. Through the TSRI the government will invest \$40 million over four years to enhance the knowledge base needed to define and reduce the risk of adverse effects of toxic substances on Canadians and their environment. The TSRI complements other federal activities on toxic substances by supporting multi-disciplinary research, within and outside government, into priority areas and emerging issues not adequately addressed by other programs.

Efforts by the Canadian Chlorine Coordinating Committee (C4), an alliance of associations and companies devoted to the responsible use of chlorine chemistry, are contributing in part to meeting this COA target. The Committee has funded 22 projects, at a cost of approximately \$1 million over two years, in the following research areas: environmental effects; endocrine effects; neurobehavioural effects; reproductive toxicology; dose response for dioxin-like compounds; breast, bladder, and endometrial cancer; and, probabilistic risk assessment.

COA Target 2.1.4: For Tier I, Tier II and other polluting substances:

- a) Work with industry to attain commitments to achieve the targets stated herein through such formal arrangements as Memoranda of Understanding (MOU), and through informal arrangements as appropriate.
- b) Implementation by 1998 of pollution prevention programs will be promoted and encouraged at targeted industrial facilities discharging to the Great Lakes, through a variety of instruments, including the Ontario Pollution Prevention Pledge Program (P4) and the national ARET initiative.

MOUs with five industrial sectors have resulted in toxic and hazardous waste reductions of 390 000 tonnes per year. The five sectors are Automotive Manufacturing, Metal Finishing, Automotive Parts, Printing and Graphics, and Dry Cleaning.

ARET initiatives have resulted in toxic reductions of 24 090 tonnes nationally per year. The MOE's Pollution Prevention Pledge Program has documented toxic reductions of 52 000 tonnes per year, as well as a 43 000 tonne reduction in greenhouse gases.

In November 1997, the first facility-based EMA was signed by Dofasco Inc., Ontario and Canada. This Agreement consolidates the objectives of the partners' major environmental programs, including the COA, ARET and SOP, and sets targets and timelines for key parameters of air and water quality, waste management, community activities and energy usage. With respect to PAH (including benzo(a)pyrene) emissions, Dofasco has committed to a 30 per cent reduction from its coke-making operations by the end of year 2000, and a 50 per cent reduction by the end of 2005. The company also committed to an 80 per cent reduction in benzene emissions by year 2000.

The Canadian Chemical Producers Association (CCPA) is a trade association representing member companies which produce over 90 per cent of the industrial chemicals in Canada. Approximately half the member companies are located in Ontario. Through its Responsible Care® initiative, CCPA has reported a significant decline in the emission of toxic substances, including a reduction of 1 875 tonnes of ARET toxics between 1992 and 1997.

2.2 PCBs, HAZARDOUS WASTE AND SPILL REDUCTIONS

COA Target 2.2.1: Seek to decommission 90 per cent of high-level PCBs in Ontario, to destroy 50 per cent of the high-level PCBs now in storage, and accelerate the destruction of stored low-level PCB waste by the year 2000.

Through a concerted effort by Ontario PCB owners from 1994 to 1999, more than 50 per cent of the 10 650 tonnes of high-level PCBs which were in storage are now destroyed. This exceeds the year 2000 destruction target.

The destruction of Ontario's 115 000 tonne stockpile of low-level PCBs has been accelerated with an estimated 30 per cent destroyed.

Fifty per cent of high-level PCBs have been decommissioned. The decommissioning of high-level PCB electrical equipment in many cases involves multi-year planning and must include operational and financial considerations. Consequently, the 90 per cent decommissioning target will be met after the year 2000.

The federally and provincially-sponsored PCB Owner Outreach Program for small quantity owners in Ontario has contributed to the success achieved in moving these decommissioning and destruction targets forward.

COA Target 2.2.2: Actions to address both Tier I and Tier II pollutants will include significant, measurable reductions in the generation and release of hazardous wastes from all sources, and will focus on cooperative activities with waste generators.

Ontario's hazardous waste tracking and management system documents more than 160 000 shipments of hazardous wastes annually. Comprehensive regulations cover the storage, transport and handling of the 1.75 million tonnes of acids, dirty oils and other hazardous materials that are shipped off-site for treatment, recycling and disposal.

Data compiled by the National Pollutant Release Inventory (NPRI) indicate that off-site waste transfers by Ontario generators of Canadian Environmental Protection Act (CEPA) toxic and carcinogenic pollutants increased from 1995 to 1996. This increase is the result of a one-time, non-routine transfer of hazardous waste associated with one facility. Aside from this one-time transfer, CEPA pollutants generated from Ontario sources decreased 14 per cent.

In 1997, approximately 290 000 tonnes of hazardous and liquid wastes were imported into Ontario, and 200 000 tonnes were exported. Although export quantities show little change since 1994, import quantities from the U.S. have

increased. The reduced value of the Canadian dollar is contributing in part to this higher waste import trend.

One example of cooperative activities with waste generators is the Ontario PCB Owner Outreach Program. This program provides information on management options for private sector owners of PCBs and certified PCB contractors.

COA Target 2.2.3: Actions to address the prevention and control of spills by improving federal, provincial and industrial spill prevention, preparedness and response programs in priority areas such as the St. Clair River, will further reduce pollutant loadings.

Emergency spill reporting has been harmonized under MOE's Spills Action Centre.

Canada and Ontario developed a Spill Prevention Workshop for Industrial Facilities. The workshop stressed pollution prevention as the most effective means of ensuring long-term protection from spill incidents, and was held in five regional centres - Toronto, Sarnia, Cornwall, Sudbury and Thunder Bay. Canada also developed a brochure entitled *A Guide to Spills Prevention for Industrial Facilities* to assist in raising awareness of spill prevention, preparedness and response programs.

2.3 BINATIONAL INITIATIVES

COA Target 2.3.1: Establish with U.S. Federal and State governments, a common strategy by 1996 to eliminate the discharge of persistent, bioaccumulative and toxic substances to the entire Great Lakes Basin Ecosystem.

This target was achieved through the signing of the *Great Lakes Binational Toxics Strategy* in April 1997. Efforts are now focusing on its implementation. For instance, work groups composed of interested stakeholders have been formed around a specific challenge or substance. These groups are formulating ideas, suggestions and options for reductions, and are presenting

their findings to the stakeholder community at-large. An Integration Work Group has been formed to work on organizational, administrative, process and other cross-cutting issues.

COA Target 2.3.2: Reduction targets will be pursued under the Niagara River Toxics Management Plan (NRTMP) and Lakewide Management Plans (LaMPs).

Toxic reduction plans for major industrial sectors will be incorporated into LaMPs for Lakes Ontario and Superior by 2000.

One of the original targets of the NRTMP was a 50 percent reduction by 1996 in the Canadian and U.S. point and non-point source loads of chemicals of concern to the Niagara River. Canada has essentially met this obligation. Loads to the river from Canadian landfills are negligible. As of 1995, Ontario has reported a 99 per cent reduction in the point source loads of the 18 "priority toxics" identified in the NRTMP from those reported in 1986. End-of-pipe concentrations for these chemicals at Canadian point sources now meet open water quality objectives. The focus will shift to reducing the remaining releases from U.S. sources, which are considerable. The Four Parties (EC, MOE, United States Environmental Protection Agency and New York State Department of Environment) to the NRTMP reconfirmed their commitment by signing a letter of support in 1996. As a result, reductions in releases from American sources are anticipated to continue, as is upstream/downstream tracking of pollutant levels.

On Lake Superior, the Stage 2 LaMP (Reduction Schedules) has been discussed with major point sources and other stakeholders. Stage 2 identifies basin-wide load reduction schedules for the nine zero discharge demonstration chemicals, and environmental objectives for the remaining critical pollutants. The Stage 3 LaMP is currently under way and successful implementation will depend on cooperative activities among governments, industries and local communities.

On Lake Ontario, the Stage 1 LaMP document identifying six lakewide critical pollutants (PCBs, DDT, mirex, dioxins/furans, mercury and dieldrin) was released for public review in May 1998. The three-year workplan in the Stage 1 LaMP outlines the Four Party activities to be undertaken to produce a Stage 2 LaMP for public review by fall 2000. These activities include: updating estimates of sources and relative loadings from the various sources; implementing a tributary monitoring and source trackdown approach to identify significant sources within the Lake Ontario watershed; establishing action plans to address specific sources; and, the continuation of a 10-year U.S.-led modelling effort with workshops planned for fall 1999.

COA Target 2.3.3: The role of zero discharge in achieving the virtual elimination of persistent bioaccumulative and toxic substances will be demonstrated, bearing in mind social and economic factors, primarily through the Lake Superior Binational Program.

Pollution prevention initiatives under the zero discharge demonstration program have strategically targeted the small business and municipal sectors of the economy.

A button battery recovery demonstration project was undertaken in Thunder Bay as part of the effort to keep mercury out of the Lake Superior basin and to increase public awareness. The program has since been extended to Sault Ste Marie and Marathon. A new partnership with the City of Thunder Bay will target mercury in fluorescent lights and household thermostats. The potential for including institutions and industrial facilities is being examined.

COA Target 2.3.4: Jointly declare the waters of Lakes Superior and Nipigon under a designation such as the Canada Water Act (CWA) Part I, and investigate this mechanism for other exceptional waters.

The U.S. is currently applying two designations under the Great Lakes Water Quality Initiative

that would prevent or control point source discharges of bioaccumulative substances throughout the U.S. portion of the basin, or to selected geographic areas.

In Canada, special designations of lakes Superior and Nipigon are feasible under the *Canada Water Act* (Part I) and would require a joint federal-provincial agreement.

Progress has been made on a proposal to designate an area of Lake Superior as a National Marine Conservation Area. A detailed physical, chemical and biological evaluation of the area between Thunder Cape in Sibley Peninsula and Bottle Point, east of Jackfish Bay and from the lake's north shore to the Canada-U.S. border has been undertaken. These data have been collected and analyzed. Boundary options for a National Marine Conservation Area have been developed and feedback on these options is being solicited from the public and stakeholders in the area. The next steps include selection and refinement of the preferred option and preparation and submission of the final report to the federal Heritage Minister.

2.4 ATMOSPHERIC DEPOSITION

COA Target 2.4.1: The identification of atmospheric inputs of toxic chemicals, and their impacts, derived from worldwide sources, will provide a basis for supporting international negotiations to reduce loadings in the Great Lakes Basin Ecosystem.

A number of programs are being proposed and developed at the regional, national and international levels, because many pollutants are not restricted to a geographic area and so are of concern outside the place of origin. Canada's involvement in these endeavours is, in part, aimed at reducing loadings and assessing their impacts in the Great Lakes.

Canada has signed two international agreements to reduce atmospheric emissions of 16 persistent organic pollutants (POPs) and three heavy metals (lead, mercury and cadmium). The agreements

were negotiated under the auspices of the United Nations Economic Commission for Europe (UN ECE), which includes Canada, the United States, European countries, and countries of the former Soviet Union. The POPs and Heavy Metals Protocols are the first major multinational, legally-binding agreements to place controls on emissions of these hazardous air pollutants. COA agencies have contributed significant advice in preparation for these negotiations for controlling POPs and heavy metals.

In addition, Canada and the U.S. have initiated an assessment of atmospheric depositions to the Great Lakes basin under the *Great Lakes Binational Toxics Strategy*.

COA Target 2.4.2: Improvements in and integration of existing air toxics data networks and management systems to track the deposition of contaminants within the Great Lakes Basin Ecosystem will support these international negotiations.

International monitoring of air pollutants in the basin is conducted through the Integrated Atmospheric Deposition Network (IADN), a program developed under the Great Lakes Water Quality Agreement. The IADN program is continuing in both the United States and Canada. The two countries have extended the monitoring program for another five years. Minor changes will be made to the network operation as the result of an agreed to binational implementation plan.

Through IADN, scientists are able to determine the loading estimates of the amounts of chemicals coming from the air and volatilizing from the Great Lakes. Current estimates indicate that there is a downward trend in air and precipitation concentrations for most semi-volatile organic and trace metals. Using analyses and statistical tests, the sources of these chemicals can be determined and estimates of the time to virtual elimination in the atmosphere can be calculated. Given current analytical capabilities, the estimates for virtual

elimination of some contaminants, such as DDT, are in the range of the year 2020 to 2040. Results of studies indicate that some of the semi-volatile organic compounds and trace metals are coming from sources outside the basin, while some of the trace metals have in-basin sources. This information provides further scientific basis for continuing to seek global control of the release of toxic substances.

In an effort to integrate health considerations into guidelines and criteria for reducing air pollution transported over long distances, a study was conducted using large administrative health and environmental monitoring databases. The study assessed the impact of air pollution on respiratory and cardiac illnesses resulting in hospitalization and premature death. Results indicate a clear relationship between increasing ozone and sulphate levels and increasing hospitalization in the Ontario Great Lakes basin area. An additional study, now in progress, is examining the costs related to health problems caused by ground level ozone and airborne particles.

2.5 PESTICIDES

COA Target 2.5.1: For Tier I substances, Canada and Ontario agree to confirm by 1996 that zero discharge has been achieved for five priority substances.

This target has been achieved. Based on a comprehensive review, evidence suggests zero use and stock availability within Ontario's commercial sectors of the five banned pesticides (aldrin/dieldrin, chlordane, DDT, toxaphene and mirex).

COA Target 2.5.2: For Tier II substances and other pollutants, Canada and Ontario agree to a coordinated review and evaluation of registered and scheduled pesticides.

A cooperative process for reviewing and evaluating registered and scheduled pesticides is being made possible through the recent establishment of a Federal/Provincial/Territorial Committee on Pest Management and Pesticides. The primary role of the Committee is to strengthen federal/provincial/territorial relationships, to promote information exchange, and to provide advice and direction to the respective governments in the area of pest management and pesticides. The mandate given to this Committee provides an efficient and effective mechanism for providing information to Health Canada's Pest Management Regulatory Agency (PMRA), which has the overall responsibility for pesticide registration in Canada.

In addition, agricultural pesticide use is monitored through a comprehensive survey conducted every five years by Ontario. The survey tracks pesticide usage, both by crop and by individual pesticide product. Results indicate a steady decline in pesticide use since the early 1980s.

OBJECTIVE 3: CONSERVE AND PROTECT HUMAN AND ECOSYSTEM HEALTH

This Objective focuses on both the conservation and protection of human and ecosystem health, since they are interrelated. Emphasis is placed on protecting those aspects of the ecosystem that have been rehabilitated and improved, as well as conserving those that may be threatened.

Considerable advances have been made toward achieving targets related to the conservation of habitat, the protection of ecologically valuable lands, and the management of land and water. For other targets, however, the time needed for the ecosystem to respond to implemented actions was underestimated or the problems themselves have proved to be more complex. In some cases this will necessitate the development of new policies and science.

Monitoring, assessment and research of environmental processes are important elements for the delivery of the Great Lakes program. Through lakewide ecosystem-based planning, the development and monitoring of indicators provide information on the overall state of the lakes. By identifying the impacts of climate change, essential knowledge is provided to improve predictability and response strategies for the future. Scientific studies monitoring the levels and effects of toxic chemicals in fish and wildlife are being used to focus protection and conservation activities, and to provide the basis to assess progress in other areas of the COA.

Assessing the impacts of Great Lakes environmental pollutants on human health continues to be challenging. However, increased research and the development of human health indicators are contributing to the overall knowledge and awareness of environment and health-related issues. Health indicators have been developed for the Great Lakes basin population and reports on effects, exposure, tissue levels, and disease trends have been produced.

Through land and water use management initiatives, sustainable use of natural resources within the Great Lakes basin is being encouraged. These initiatives range from water efficiency programs to planning

processes that engage municipalities, to incentive programs that encourage land owners to conserve ecologically valuable land.

Future efforts will focus on integrating the various conservation and protection efforts within the Great Lakes basin. The coordination of monitoring and surveillance programs to determine how well the environment is responding to actions within the various targets under the COA is a critical component of this integration.

3.1 LAKEWIDE PLANNING

COA Target 3.1.1: Develop ecosystem-based principles, objectives and indicators for Lake Ontario by 1995, Lake Superior by 1996, Lake Erie by 1996, and Lake Huron by 2000 to provide direction for management plans.

Develop Stage 1 LaMPs for critical pollutants for Lake Superior by 1995, Lake Ontario by 1995, and for Lake Erie by 1998 for consideration by the IJC.

Develop Stage 2 LaMPs for critical pollutants for Lake Superior by 1996, Lake Ontario by 1997, and for Lake Erie by 2000 for consideration by the IJC.

The Stage 1 problem definition has been completed for Lake Ontario. The Stage 1 report was released in May 1998. Work is under way to implement the actions identified in the binational action plan contained in the Stage 1 document with a goal to begin public consultations on Stage 2 source reduction schedules by fall 2000. Ecosystem goals have been developed and preliminary ecosystem objectives for aquatic communities, wildlife, human health, habitat and stewardship were presented in the Stage 1 report. Indicators for wildlife have been developed and will be the subject of consultations in fall 1999. Benthic community indicator development is also under way and fish community objectives and indicators will be addressed jointly with the Lake Committee of Fishery Managers over the next several years.

A progress report of Lake Erie LaMP work completed to date has been released. Assessments have been completed for eight of the 15 beneficial uses, with the remainder to be completed by April 2000. Work continues on developing ecosystem objectives through the use of an ecological model. Finalized ecosystem objectives which have been endorsed by the public are anticipated by April 2000. Mercury and PCBs have been identified as critical pollutants and action plans to reduce inputs are being developed. A draft report documenting progress on source trackdown work will be available for comment by September 1999.

All three targets for the Lake Superior LaMP have been met. The ecosystem objectives and indicators report of 1996 is currently being reviewed and updated.

At this time, there are no plans to develop a LaMP for Lake Huron. There are, however, preliminary discussions under way regarding a Lake Huron initiative.

3.2 HABITAT CONSERVATION AND PROTECTED AREAS

COA Target 3.2.1: Implement the Great Lakes Wetlands Conservation Action Plan (GLWCAP) in 1994 to protect coastal and basin wetlands.

Implementation of the GLWCAP is well under way with much progress in protecting and communicating the value of wetlands. Nearly 4 000 hectares of wetlands have been acquired at 18 sites, with the Eastern Habitat Joint Venture of the North American Waterfowl Management Plan as a major partner.

One recent acquisition, the 225-hectare Hoasic Creek Wetland, represents a particularly significant conservation gain in eastern Ontario. This acquisition was augmented by a generous land donation under the Ecological Gifts Initiative. Eastern Ontario's largest Great Blue Heron colony is found here along with more than 365 plant taxa.

The area protected by Awenda Provincial Park northwest of Penetanguishene on Georgian Bay has been increased by 101 hectares through acquisition activities. The area includes a bog classified as a Provincial Life Science Area of Natural and Scientific Interest. This acquisition will ensure the long-term conservation of this valuable site and continue to provide habitat for the vulnerable spotted turtle.

COA Target 3.2.2: Apply the principles of the Federal Policy for the Management of Fish Habitat with a goal of net gain in productive capacity of fish habitat basin wide.

In 1997, the federal Department of Fisheries and Oceans (DFO) became the sole agency responsible for implementing the *Federal Policy for the Management of Fish Habitat*. To protect fish habitat within the basin, the Department has entered into delivery agreements with a number of Conservation Authorities and with Parks Canada in order to implement provisions of the *Fisheries Act*. The number of projects requiring review in a given year is closely tied to the economic performance of the region. Habitat continues to be threatened through the accumulated effects of many smaller projects and the cumulative demands of human development. In 1998, for example, 3 300 habitat referrals were processed. In an effort to meet this additional demand, DFO increased its habitat and enforcement staff by approximately 10-fold. The Department has also developed tools to quantify the cumulative effects of habitat alteration and developed new technologies to restore fish habitats.

COA Target 3.2.3: Secure a network of protected areas representative of terrestrial and aquatic natural areas in the Great Lakes basin by 1999.

A total network of 1.72 million hectares of terrestrial and aquatic areas have been protected in the Great Lakes basin, with 1.22 million hectares contributed through Ontario's *Living Legacy* strategy of 1999. In southern parts of the basin, there is continuing focus on securing sites as protected areas by encouraging private

land stewardship. This includes the establishment of the Conservation Land Tax Incentive Program, and the development of land trusts, on lands surrounding some protected areas, particularly national parks, in order to protect the greater park ecosystem. As well, progress has been made on the feasibility of a Lake Superior marine conservation area. Similar initiatives for lakes Erie and Ontario are at the formative stages.

3.3 FISH AND WILDLIFE CONSERVATION

COA Target 3.3.1: Have biodiversity policies in place by 1996 designed to protect the function and structure of diverse, self-sustaining biological communities.

This target was achieved in 1995 through the formal approval by the Canadian Council of Ministers of the Environment of the *Canadian Biodiversity Strategy: Canada's Response to the Convention on Biological Diversity*. Work now focuses on implementation and reporting. While biodiversity gains are being achieved through many of the COA targets, efforts to protect ecosystem function and structure will continue beyond the year 2000.

COA Target 3.3.2: Focus monitoring programs to measure success in achieving healthy diverse ecosystems.

There are a number of federal and provincial monitoring activities under way within the Great Lakes basin. Discussions are in progress to increase coordination and integration of these activities.

Since the initiation of large-scale monitoring programs in the 1970s, there has been a general decline in contaminant concentrations in Great Lakes fish and wildlife. Canada and Ontario continue annual monitoring of spatial and temporal trends in contaminant levels in eggs of herring gulls and other fish-eating birds at up to 15 locations in the lakes. More than 100 contaminants are analyzed and surplus tissues are archived for future retrospective

analyses. Reductions of up to 90 per cent in concentrations of some chemicals in wildlife tissues have occurred.

In 1998 new analytical techniques showed that the rates of decline in recent years were similar to those in the 1970s. Bioeffects of contaminants are also studied. The incidence of gross deformities such as crossed bills in cormorants has decreased to the point where monitoring is no longer necessary. Tools are being developed and applied to monitor more subtle reproductive and developmental effects such as those associated with endocrine disruption.

In the lower Great Lakes, the decline in chemical inputs and subsequent decreases in contamination in habitat areas has not always resulted in a continuing decrease in contaminant levels in fish, particularly in top-predators. Canada and Ontario monitor spatial and temporal trends in contaminant levels in top predator fish. In 1998, the Fish Contaminant Surveillance Program collected and analyzed approximately 400 samples of top predator fish, prey species and invertebrate diet items at 11 sites throughout the Great Lakes. After a decade or more of decline, the rate of decrease in the concentration of some contaminants has begun to level off. In some cases there have been periods of time when an increase in chemical concentrations has been observed for a few fish species.

Ontario continues to monitor the production, yield and harvest of important game and commercial fish species and conducts long-term monitoring of fish communities to assess the status of populations.

Monitoring efforts continue to benefit from the involvement of volunteers, particularly in assessing the health of wildlife populations. For example, the binational Marsh Monitoring Program reports on birds and amphibian populations throughout the basin.

COA Target 3.3.3: Develop and implement by 1997, joint federal and provincial action plans to control the introduction of undesirable species and mitigate the negative impacts of non-indigenous nuisance species such as zebra mussels and ruffe. The federal government will continue the control program on sea lamprey.

Canada and Ontario are collaborating on studies to measure the impacts of zebra and quagga mussels on the ecology of Lake Erie, and to identify fisheries and nutrient management strategies. The research measures the effects that invading mussels have on food web dynamics and energy flow, as well as the availability of food for zooplankton, benthos and fish.

Efforts are also continuing in the Bay of Quinte to determine the impact of zebra mussels on energy flow and trophic interaction. The Quinte study is unique because it builds on almost 30 years of ecological data describing water quality and food web dynamics. The research has resulted in a model explaining how zebra mussels have altered water quality and food availability and shifted habitat requirements for walleye, an important recreational fishery in the Bay. The results of this research were published in the Bay of Quinte Progress Report and this knowledge is being applied for the development of management options for the Lake Erie LaMP. Canada and Ontario are also collaborating on a number of educational programs to inform the public about aquatic nuisance species problems and control strategies in the Great Lakes.

A number of studies have been conducted to determine the role of ballast water as a possible source of exotic species introductions. Study results will form the basis for the Great Lakes Regional Ballast Water Management Plan, and a National Ballast Water Working Group has been established for its implementation. Canada and Ontario advise the National Working Group on Great Lakes priorities. Continuing research is required on many fronts including safety, possible type and efficiency of treatment options

and a risk assessment of the human health impacts of microorganisms in ballast water. While there are no proven techniques available to treat the water and sediment in ballast tanks, Canadian scientists are focusing on shore-based and on-board water treatment technologies.

Canada is continuing to control sea lamprey populations in the Great Lakes. A technique was recently developed for controlling larval sea lamprey in the St. Marys River, a major lamprey spawning and nursery area. Approximately 81 hectares of highly productive lamprey habitat was treated in 1998. This treatment effort will be expanded to 810 hectares in U.S. and Canadian waters of the River in 1999. This treatment, and the release of approximately 17 000 sterile male lamprey are expected to reduce the population of larval lamprey in the St. Marys River by 75 per cent, enabling lake trout restoration in Lake Huron.

3.4 HUMAN HEALTH

COA Target 3.4.1: Protect and promote human health through education, long-term monitoring and stewardship. By 2000, 70 per cent of the population will be knowledgeable about five key environmental health issues and how to reduce their risk.

By 2000, achieve for the general population a 30 per cent reduction in human health risks associated with exposure to environmental contaminants.

By 2000, 80 per cent of the population will have significantly increased their understanding and taken action in order to protect their health through involvement in environmental stewardship.

Through risk assessment research, Canada continues to monitor human exposure to contaminants and to investigate toxicology and health effects such as cancer, reproductive health, neurological development and respiratory health. Exposure assessments for the Great Lakes basin population have been completed for 11 COA Tier 1 substances (aldrin/dieldrin, benzo(a)pyrene, chlordane, DDT, dioxins and

furans, hexachlorobenzene, mercury, mirex, octachlostyrene, PCBs, and toxaphene).

Health-related indicators have been developed for the Great Lakes basin population and reports on health effects, exposure, tissue levels, and disease trends have been produced. Research investigating the relationship between environmental factors and human health has been completed or is ongoing. These include studies on: semen decline in men; prostate cancer; female fertility; endometriosis and breast cancer; PCBs and neurobehaviour; and, release of lead in the bones of the elderly.

A number of publications and handbooks have been developed to educate the public and promote informed decision-making on health and environment issues. A critical review of population knowledge, attitudes and behaviour regarding specific environmental health issues has been completed and will be used as a basis for future work. In addition, 21 community education projects have been supported as part of environmental stewardship around health issues.

3.5 CLIMATE CHANGE

COA Target 3.5.1: Identify the most likely impacts of climate variability and change on the Great Lakes Basin Ecosystem (for example, on human or ecosystem health or water and land use management) and develop and promote adaptive response strategies to reduce vulnerability.

To date, work on this target has centred on identifying potential impacts. Future efforts will focus on developing and promoting adaptive strategies, with work continuing beyond the year 2000.

Databases for the monitoring and detection of regional climate change are being developed. A groundwater supply study will be completed by 2000, and a satellite receiver has been installed to facilitate the collection of information to track ecosystem changes. A comprehensive climate change study, *Adapting to Climate Variability and*

Change in Ontario, was released in 1998 as part of the *Canada Country Study* series which examined the impacts of climate change. In addition, a significant number of outreach presentations on the climate change issue have been given at the community and stakeholder level.

A study of the Toronto-Niagara Region (TNR) is under way. It consists of a number of projects examining the impact of climate and other atmospheric changes, such as smog, air toxics, acidifying emissions, and ultraviolet radiation, on the built and natural environments of the south-central Great Lakes basin. This study will provide regional policy-makers with information for assessing the vulnerability of the TNR to the cumulative effects of atmospheric change and for identifying effective adaptation and mitigation response strategies.

3.6 LAND AND WATER USE MANAGEMENT

COA Target 3.6.1: Implement water efficiency initiatives to reduce per capita water use in the Great Lakes basin.

There are numerous water efficiency success stories and initiatives aimed at reducing per capita water use in the Great Lakes basin. A 1997 survey of Ontario municipalities indicates that considerable progress towards water conservation has been made since the first survey in 1987.

To encourage the exchange of information in this rapidly growing field, the federal government and the Canadian Water and Wastewater Association have developed Canada's first Water Efficiency Experiences Database. This online database is organized by sector and already includes more than 50 case studies related to municipal plumbing retrofits; rate structure modification; education; water process changes; water audits; and, other adopted water efficiency measures (see Appendix 3 for website information).

COA Target 3.6.2: Develop and adopt an ecosystem-based planning process to integrate land use and water management by 1997.

The *Watershed Action Guide*, released in 1998, is a practical guide for building partnerships, projects and processes for a sustainable watershed. The principles in this guide are being applied within the Great Lakes basin. The Grand River Conservation Authority was the first to use the guide in developing its watershed plan. In fact, there are currently between 250 and 300 watershed and sub-watershed plans in some stage of preparation or implementation, most of them being done under the leadership of Conservation Authorities.

COA Target 3.6.3: Focus demonstration projects for ecosystem-based practices to reduce stresses to land, water and biota.

The Wetlands/Woodlands/Wildlife (WWW) Program, of the Canada-Ontario Agriculture Green Plan, has resulted in the implementation of 205 “on-the-ground” demonstration projects in southern Ontario. These projects demonstrate and publicize management practices that conserve, enhance or create fish and wildlife habitat in a manner compatible with sustainable farming.

In addition, a number of agricultural projects have been implemented to improve water quality in AOCs. These activities include: restricting access of livestock to streams; improving manure storage facilities; reducing phosphorus loads; and, adopting conservation tillage practices.

COA Target 3.6.4: Support the development and implementation of Environmental Farm Plans.

This target has been met and exceeded. Nearly 16 000 farmers have attended more than 1 000 Environmental Farm Plan workshops, resulting in more than 8 300 peer-reviewed action plans. Farmers have implemented these action plans by investing out-of-pocket expenditures worth \$21 million and government incentives worth \$7 million. They have continued to invest time and money toward other on-farm environmental improvements outside of the Environmental Farm Plan incentive program.

APPENDIX I:

LINKAGES BETWEEN GLWQA ANNEXES & 1994 COA TARGETS

The COA represents Canada’s commitment to fulfilling its obligations under the GLWQA. The following chart provides a link between COA targets and the GLWQA Annexes. It is noted that some COA targets contribute to meeting objectives in multiple Annexes; only major linkages are indicated.

ANNEX	COA TARGET
1: SPECIFIC OBJECTIVES	OBJECTIVE 2
	2.1.1 (Canada and Ontario agree to seek a 90 per cent reduction in use, generation or release of mercury)
	2.1.2 (Canada and Ontario agree to collaborate with, and provide support for, voluntary programs by industry and others to reduce the use, generation or release of cadmium)
	2.1.4 (implement pollution prevention programs at industrial facilities discharging to the Great Lakes)
	2.2.1 (seek to decommission and destroy PCBs)
	2.2.2 (actions will include significant, measurable reductions in the generation and release of hazardous wastes from all sources, and will focus on cooperative activities with waste generators)
	2.5.1 (Canada and Ontario agree to confirm that zero discharge of five priority Tier I substances has been achieved)
	OBJECTIVE 3
	3.2.2 (apply the principles of the <i>Federal Policy for the Management of Fish Habitat</i> with the goal of net gain in productive capacity of fish habitat basin wide)
	3.2.3 (secure a network of protected areas representative of terrestrial and aquatic natural areas in the basin)
	3.6.2 (develop and adopt an ecosystem-based planning process to integrate land use and water management)
2: RAPs AND LAMPs	OBJECTIVE 1
	1.1.1 (restore impaired beneficial uses across all 17 AOCs)
	1.1.2 (complete and submit RAP Stage 2 reports to governments)
	1.1.3 (establish organizational frameworks for individual AOCs to coordinate and facilitate implementation of local RAPs)
	1.1.4 (establish cooperative mechanisms, including environmental surveillance and monitoring, to track progress toward delisting the 17 AOCs)
	1.2.1 (upgrade RAP primary STPs to secondary treatment and optimize effluent quality and sludge generation)
	1.2.2 (enhance phosphorus removal at STPs in AOCs)
	1.2.3 (undertake stormwater quality pilot projects in AOCs)
	1.2.4 (abate CSOs in AOCs by implementing municipal Pollution Control Plans)
	1.2.5 (demonstrate and implement new and innovative technologies to restore beneficial uses)
	1.3.1 (rehabilitate ecosystem function and structure of native biological communities in AOCs and other priority degraded areas)
	1.3.2 (develop and implement recovery plans for six threatened species)
	1.3.3 (develop fish and wildlife goals and objectives for each Great Lake and implement plans to rehabilitate degraded native populations)
	1.3.4 (increase the extent of productive aquatic habitats by rehabilitating and protecting wetland and riparian habitats)
	1.5.1 (demonstrate and implement the cleanup of severely contaminated sediments)
	1.7.1 (reduce the risk to human health of exposure to specific environmental contaminants)
	OBJECTIVE 2
	2.3.2 (incorporate toxic reduction plans for major industrial sectors into LAMPs for lakes Ontario and Superior)
	2.3.4 (jointly declare the waters of lakes Superior and Nipigon under a designation such as the <i>Canada Water Act Part I</i>)

ANNEX

COA TARGET

2: RAPs AND LAMPs (CONT'D) OBJECTIVE 3

- 3.1.1 (develop Stage 1 and Stage 2 LaMPs for lakes Superior, Ontario and Erie)
- 3.3.2 (focus monitoring programs to measure success in achieving healthy diverse ecosystems)
- 3.6.1 (implement water efficiency initiatives to reduce per capita water use in the Great Lakes basin)

3: CONTROL OF PHOSPHORUS

OBJECTIVE 1

- 1.1.1 (restore impaired beneficial uses across all 17 AOCs)
- 1.2.1 (upgrade RAP primary STPs to secondary treatment and optimize effluent quality and sludge generation)
- 1.2.2 (enhance phosphorus removal at STPs in AOCs)

OBJECTIVE 3

- 3.6.2 (develop and adopt an ecosystem-based planning process to integrate land use and water management)
- 3.6.3 (focus demonstration projects for ecosystem-based practices to reduce stresses to water)
- 3.6.4 (support the development/implementation of Environmental Farm Plans)

4: DISCHARGES OF OIL AND HAZARDOUS POLLUTING SUBSTANCES FROM VESSELS

* Coast Guard reports are available for this Annex

5: DISCHARGES OF VESSEL WASTES

* Coast Guard reports are available for this Annex

6: REVIEW OF POLLUTION FROM SHIPPING SOURCES

OBJECTIVE 3

- 3.3.3 (develop and implement joint federal/provincial action plans to control the introduction of undesirable species)
- * Coast Guard reports are available for this Annex

7: DREDGING

OBJECTIVE 1

- 1.1.1 (restore impaired beneficial uses across all 17 AOCs)
- 1.2.5 (demonstrate and implement new and innovative technologies to restore beneficial uses)
- 1.5.1 (demonstrate and implement the cleanup of severely contaminated sediments)
- 1.5.2 (develop long-term strategies for remediation of areas of intermediate sediment contamination)

OBJECTIVE 3

- 3.2.1 (implement the Great Lakes Wetland Conservation Action Plan to protect coastal and basin wetlands)

8: DISCHARGES FROM ONSHORE AND OFFSHORE FACILITIES

OBJECTIVE 2

- 2.2.2 (actions will include significant, measurable reductions in the generation and release of hazardous wastes from all sources, and will focus on cooperative activities with waste generators)

9: JOINT CONTINGENCY PLAN

OBJECTIVE 2

- 2.2.3 (improve federal, provincial and industrial spill prevention, preparedness and response programs to address the prevention and control of spills)

ANNEX

COA TARGET

10: HAZARDOUS POLLUTING SUBSTANCES

OBJECTIVE 2

- 2.1.1 (Canada and Ontario agree to seek a 90 per cent reduction in the use, generation or release of mercury)
- 2.1.2 (Canada and Ontario agree to collaborate with, and provide support for, voluntary programs by industry and others to reduce the use, generation or release of pentachlorophenol)

11: SURVEILLANCE AND MONITORING

OBJECTIVE 1

- 1.1.4 (establish cooperative mechanisms, including environmental surveillance and monitoring, to track progress toward delisting the 17 AOCs)

OBJECTIVE 3

- 3.1.1 (develop Stage 1 and Stage 2 LaMPs for lakes Superior, Ontario and Erie)
- 3.3.2 (focus monitoring programs to measure success in achieving healthy diverse ecosystems)
- 3.4.1 (protect and promote human health through education, long-term monitoring and stewardship)

12: PERSISTENT TOXIC SUBSTANCES

OBJECTIVE 1

- 1.1.1 (restore impaired beneficial uses across all 17 AOCs)
- 1.2.3 (undertake stormwater quality pilot projects in AOCs)
- 1.2.4 (abate CSOs in AOCs by implementing municipal Pollution Control Plans)
- 1.2.5 (demonstrate and implement new and innovative technologies to restore beneficial uses)
- 1.4.1 (remediate contamination at federally-owned sites, orphan sites, and sites under provincial jurisdiction)
- 1.7.1 (reduce the risk to human health of exposure to specific environmental contaminants)

OBJECTIVE 2

- 2.1.1 (Canada and Ontario agree to seek a 90 per cent reduction in use, generation or release of mercury)
- 2.1.4 (implement pollution prevention programs at industrial facilities discharging to the Great Lakes)
- 2.3.1 (establish a common strategy with U.S. federal and state governments to eliminate the discharge of persistent, bioaccumulative and toxic substances to the entire Great Lakes Basin Ecosystem)
- 2.3.2 (incorporate toxic reduction plans for major industrial sectors into LaMPs for lakes Ontario and Superior)
- 2.3.3 (demonstrate the role of zero discharge in achieving the virtual elimination of persistent bioaccumulative and toxic substances in Lake Superior)
- 2.5.2 (for Tier II substances and other pollutants, Canada and Ontario agree to a coordinated review and evaluation of registered and scheduled pesticides)

OBJECTIVE 3

- 3.3.2 (focus monitoring programs to measure success in achieving healthy diverse ecosystems)
- 3.4.1 (protect and promote human health through education, monitoring, stewardship)

13: POLLUTION FROM NON-POINT SOURCES

OBJECTIVE 1

- 1.1.1 (restore impaired beneficial uses across all 17 AOCs)
- 1.2.3 (undertake stormwater quality pilot projects in AOCs)
- 1.2.4 (abate CSOs in AOCs by implementing municipal Pollution Control Plans)
- 1.3.4 (increase the extent of productive aquatic habitats by rehabilitating and protecting wetland and riparian habitats)
- 1.6.1 (undertake hydrogeological investigations/demonstrations of new approaches to remediate groundwater contamination at priority locations in the Great Lakes Basin Ecosystem)

13: POLLUTION FROM NON-POINT SOURCES (CONT'D)

OBJECTIVE 3

- 3.2.1 (implement the Great Lakes Wetland Conservation Action Plan to protect coastal and basin wetlands)
- 3.3.2 (focus monitoring programs to measure success in achieving healthy diverse ecosystems)
- 3.6.3 (focus demonstration projects for ecosystem-based practices to reduce stresses to land, water, biota)
- 3.6.4 (support the development/implementation of Environmental Farm Plans)

14: CONTAMINATED SEDIMENT

OBJECTIVE 1

- 1.5.1 (demonstrate and implement the cleanup of severely contaminated sediments)
- 1.5.2 (develop long-term strategies for remediation of areas of intermediate sediment contamination)

15: AIRBORNE TOXIC SUBSTANCES

OBJECTIVE 1

- 1.7.1 (reduce the risk to human health of exposure to specific environmental contaminants)

OBJECTIVE 2

- 2.1.4 (for polluting substances, implement pollution prevention programs at industrial facilities)
- 2.4.1 (identify atmospheric inputs of toxic chemicals, and their impacts, derived from worldwide sources)
- 2.4.2 (track the deposition of air contaminants within the Great Lakes basin)

16: POLLUTION FROM CONTAMINATED GROUNDWATER

OBJECTIVE 1

- 1.6.1 (undertake hydrogeological investigations/demonstrations of new approaches to remediate groundwater contamination at priority locations in the Great Lakes Basin Ecosystem)

17: RESEARCH AND DEVELOPMENT

OBJECTIVE 1

- 1.1.1 (restore impaired beneficial uses across all 17 AOCs)
- 1.2.5 (demonstrate and implement new and innovative technologies to restore beneficial uses)
- 1.5.1 (demonstrate and implement the cleanup of severely contaminated sediments)
- 1.7.1 (reduce risk to human health of exposure to specific environmental contaminants)

OBJECTIVE 2

- 2.1.3 (provide essential knowledge on the fate and effects of Tier II substances from industrial, municipal and other sources)

OBJECTIVE 3

- 3.3.3 (develop and implement joint federal/provincial action plans to control the introduction of undesirable species)
- 3.5.1 (identify impacts of climate variability and change on the basin ecosystem, and develop and promote adaptive response strategies to reduce vulnerability)

APPENDIX II:

FURTHER READING ON GREAT LAKES ACTIVITIES

Agriculture in Harmony with Nature: Strategy for Environmentally Sustainable Agriculture and Agri-Food Development in Canada (Agriculture and Agri-Food Canada, 1997)

Available online at:

http://www.agr.ca/policy/envharmon/docs/strat_e.pdf

Atmospheric Change in the Toronto-Niagara Region: Towards an Integrated Understanding of Science, Impacts and Responses (Environment Canada, 1999)

Available online at:

http://www1.tor.ec.gc.ca/earg/pubs/tnrs_procmay98.htm

Canada Country Study: Adapting to Climate Variability and Change in Ontario (Environment Canada, 1998)

Canada-Ontario Agreement Objective 2.1: Priority Pesticides Confirmation of No Production Use, or Import in the Commercial Sector in Ontario (Environment Canada and Ontario Ministry of Environment and Energy, October 1996)

Available online at:

<http://www.cciw.ca/glimr/data/zero-discharge/intro.html>

Canada-Ontario Agreement Respecting the Great Lakes Basin Ecosystem (Governments of Canada and Ontario, July 1994)

Available online at:

<http://www.cciw.ca/glimr/data/canada-ontario-agreement/intro.html>

The Canada/Ontario Great Lakes Remedial Action Plan Program: An Analysis of Ten Years of Effort (Ontario Ministry of the Environment, 1997)

Available online at:

<http://www.cciw.ca/glimr/data/analysis-10-years/intro.html>

Canadian Biodiversity Strategy: Canada's Response to the Convention on Biological Diversity (Biodiversity Working Group, November 1994)

Available online at:

http://www.cciw.ca/eman-temp/reports/publications/rt_biostrat/intro.html

Environmental Progress Report (Mining Association of Canada, November 1997)

Available online at:

<http://www.mining.ca/english/publications/epre.pdf>

The Great Lakes Binational Toxics Strategy: Canada-United States Strategy for the Virtual Elimination of Persistent Toxic Substances in the Great Lakes (Environment Canada and

U.S. Environmental Protection Agency, 1997)

Available online at:

<http://www.epa.gov/glnpo/p2/bns.html>

The Great Lakes Binational Toxics Strategy: Canada-United States Strategy for the Virtual Elimination of Persistent Toxic Substances in the Great Lakes (Progress Report, November 16, 1998)

Great Lakes 2000 Cleanup Fund Project Summaries Report: New, Ongoing and Completed Projects as of March 1997 (Environment Canada, 1997)

Available online at:

<http://www.cciw.ca/glimr/data/cleanup-project-summaries/intro.html>

Great Lakes Wetlands Conservation Action Plan, 1994-2001: First Progress Report (Environment Canada - Canadian Wildlife Service, Ontario Ministry of Natural Resources, Federation of Ontario Naturalists, Nature Conservancy of Canada, October 1997)

Available online at:

<http://www.cciw.ca/green-lane/wildlife/glwcap/reports/intro.html>

Guideline to Eating Ontario Sport Fish 1999-2000 (Ministry of the Environment, 1999)

Available online at:

<http://www.ene.gov.on.ca/envision/guide/index.htm>

A Guide to Spills Prevention for Industrial Facilities (Environment Canada, 1999)

Health of Our Air: Toward Sustainable Agriculture in Canada (Research Planning and Coordination Directorate, Research Branch, Agriculture and Agri-Food Canada, 1999)

Available online at:

http://www.agr.ca/research/Healthy_Air/toc.html

Health Related Indicators for the Great Lakes Basin Population: Numbers 1 to 20 (Health Canada, 1998)

A Joint Strategic Plan for Management of Great Lakes Fisheries (Department of Fisheries and Oceans and Great Lakes Fishery Commission, 1997)

Available online at:

<http://www.glfc.org/fishmgmt/sglfmp97.htm>

Ontario's Progress in Pollution Prevention (Ministry of Environment and Energy, June 1997)

Available online at:

<http://www.ene.gov.on.ca/programs/3551e.pdf>

Persistent Environmental Contaminants and the Great Lakes Basin Population: An Exposure Assessment (Health Canada, Great Lakes Health Effects Program, 1998)

Reducing Emissions: 1997 Emissions Inventory and Five-Year Projections (Canadian Chemical Producers' Association, 1998)
Available online at:
http://www.ccpa.ca/Reports/1998/NERM97_Eng.pdf

Rehabilitating Great Lakes Habitats: A Resource Manual (Environment Canada, 1995)

Summary: State of Knowledge Report on Environmental Contaminants and Human Health in the Great Lakes Basin (Health Canada, 1998)

Technical Summary of Progress under the Integrated Atmospheric Deposition Program 1990-1996 (U.S./Canada IADN Scientific Steering Committee, January 1998)
Available online at:
ftp://airquality.tor.ec.gc.ca/pub/iadn/www/IADN_Technical_Report.zip

Watershed Action Guide: A Practical Guide for Building Partnerships, Projects and Processes for a Sustainable Watershed (Ontario Ministry of Natural Resources, May 1998)

APPENDIX III: WEBSITES OF INTEREST

Accelerated Reduction/Elimination of Toxics (ARET)
<http://www.ec.gc.ca/aret>

Agriculture and Agri-Food Canada
<http://www.agr.ca>

Canadian Chemical Producers' Association (CCPA)
<http://ccpa.ca>

Canadian Water and Wastewater Association and Environment Canada's Water Efficiency Experience Database
<http://www.cwwa.ca/wed.htm>

Council of the Great Lakes Industries
<http://www.cgli.org>

Environment Canada - Ontario Region, Canadian Wildlife Service
<http://www.cciw.ca/green-lane/wildlife/>

Environment Canada - Global Climate Change
<http://www.ec.gc.ca/climate/>

Environment Canada's Great Lakes 2000 Cleanup Fund
<http://www.cciw.ca/green-lane/cuf/>

Environment Canada's Great Lakes Wetlands Conservation Action Plan
<http://www.cciw.ca/green-lane/wildlife/glwcap/>

Environment Canada's Green Lane
<http://www.ec.gc.ca>

Department of Fisheries and Oceans
<http://www.dfo-mpo.gc.ca>

Health Canada
<http://www.hc-sc.gc.ca>

Health Canada's Great Lakes Health Effects Program
<http://www.hc-sc.gc.ca/ehp/ehd/bch/bioregional/glhep.htm>

Lakewide Management Plans (LaMPs)
<http://www.cciw.ca/glimr/program-LaMPs.html>

Ontario Environmental Farm Plan Program of the Canada-Ontario Agriculture Green Plan
<http://res.agr.ca/lond/gp/efp/efpmenu.html>

Ontario Ministry of Agriculture, Food and Rural Affairs
<http://www.gov.on.ca/OMAFRA>

Ontario Ministry of the Environment
<http://www.ene.gov.on.ca/>

Ontario Ministry of Natural Resources
<http://www.mnr.gov.on.ca/MNR/>

Ontario Living Legacy Strategy
<http://www.mnr.gov.on.ca/MNR/oll/>

Our Great Lakes
<http://www.cciw.ca/glimr/intro.html>

Remedial Action Plans (RAPs)
<http://www.cciw.ca/glimr/raps/>

State of the Lakes Ecosystem Conference (SOLEC)
<http://www.cciw.ca/solec/>

Toxic Substances Research Initiative (TSRI)
<http://www.hc-sc.gc.ca/ehp/ehd/tsri/>

Wetlands/Woodlands/Wildlife program of the Canada/Ontario Agriculture Green Plan
<http://res.agr.ca/lond/gp/3w/3wmenu.html>

Wildlife and Habitat Conservation of Environment Canada
<http://www.cciw.ca/green-lane/wildlife/conservation/conservation.html>

APPENDIX IV: ACRONYMS USED IN PROGRESS REPORT

AOC	Area of Concern
ARET	Accelerated Reduction/Elimination of Toxics program
BIP	Beaches Improvement Program
CCPA	Canadian Chemical Producers Association
CEPA	Canadian Environmental Protection Act
COA	Canada-Ontario Agreement Respecting the Great Lakes Basin Ecosystem
CSO	combined sewer overflow
CWA	Canada Water Act
CWS	Canada-Wide Standard
C4	Canadian Chlorine Coordinating Committee
DFO	Department of Fisheries and Oceans
EC	Environment Canada
EMA	Environmental Management Agreement
GLWCAP	Great Lakes Wetlands Conservation Action Plan
GLWQA	Great Lakes Water Quality Agreement
HC	Health Canada
IADN	Integrated Atmospheric Deposition Network
IJC	International Joint Commission
LaMP	Lakewide Management Plan
MISA	Municipal Industrial Strategy for Abatement
MOE	Ontario Ministry of the Environment
MOU	Memorandum of Understanding
NPRI	National Pollutant Release Inventory
NRTMP	Niagara River Toxics Management Plan
PAHs	polycyclic aromatic hydrocarbons
PCBs	polychlorinated biphenyls
PMRA	Pest Management Regulatory Agency
POP	persistent organic pollutant
P4	Pollution Prevention Pledge Program
RAP	Remedial Action Plan
SOLEC	State of the Lakes Ecosystem Conference
SOP	Strategic Options Process
STP	sewage treatment plant
TNR	Toronto-Niagara Region
TSMP	Toxic Substances Management Policy
TSRI	Toxic Substances Research Initiative
UN ECE	United Nations Economic Commission for Europe
WWW	Wetlands/Woodlands/Wildlife program

Canada

 Ontario

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