LaMP UPDATE
LAKE ONTARIO • LAKEWIDE MANAGEMENT PLAN
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LAKE ONTARIO LAKEWIDE MANAGEMENT PLAN UPDATE 2000

CONTENTS

Lake Ontario Lakewide Management Plan-Making Progress

What you'll find in the Lake Ontario LaMP Update 2000 ... As we enter the new millennium, the Lake Ontario LaMP is "Making Progress". Feature articles highlight work by the LaMP lead agencies and their partners to track down and better understand the sources and loadings of critical pollutants; implement pollution prevention programs; document improvements in the health of waterbirds, mink and otter; and inform and involve the public in the LaMP process. Also included ... Remedial Action Plan updates and improvements to the Niagara River.

This Update is the second annual progress report on the Lake Ontario Lakewide Management Plan (LaMP). The previous issue, released in May 1999, provided an introduction to the LaMP and described cooperative binational efforts undertaken by the Four Parties (Environment Canada, U.S. Environmental Protection Agency, New York State Department of Environmental Conservation, and the Ontario Ministry of the Environment) to restore and protect Lake Ontario.

The Lake Ontario LaMP is now entering the final year of the 3 year binational workplan set out in the May 1998 Lakewide Management Plan for Lake Ontario Stage 1 Report. The workplan identified activities to further develop source reduction strategies and other actions to restore beneficial uses of Lake Ontario. Some of the workplan activities are reported on in this Update. Others will be reported on in detail in LaMP 2000, the Lake Ontario LaMP report targeted for the end of this year.

Here are some highlights of progress on the "Next Steps" we identified in the 1999 LaMP Update:

Reducing Inputs of Critical Pollutants & Other Pollutants

The Lake Ontario LaMP Stage 1 Report identified 6 Critical Pollutants — PCBs, DDT, Mirex, dioxins/furans, mercury and dieldrin. These pollutants are causing or are likely to cause impairments in the lake because they exist in the water, sediments or biota at levels that exceed U.S. or Canadian standards or criteria. The Four Parties are committed to reducing the inputs of these chemicals, as well as other, similar chemicals that are persistent (remaining in the water, sediment, and biota for long periods of time) and bioaccumulative (accumulating in aquatic organisms to levels that are harmful to human health).

Several articles in this Update discuss work by the Four Parties to improve our understanding of the sources and loadings of Lake Ontario Critical Pollutants, and to address identified sources. An overview of our approach begins on this page.

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Lake Ontario LaMP Approach for Assessment of Contaminant Sources and Loadings

Seth Ausubel, USEPA

The Concept of Sources and Loadings

LaMPs are intended to reduce loadings of critical pollutants in order to restore beneficial uses. To do this, the GLWQA requires that LaMPs develop the information necessary to determine a schedule of load reductions for the critical pollutants. An evaluation of the sources and loadings of the critical pollutants is a key step in determining load reductions. The Lake Ontario LaMP is now updating its information on sources and loadings of critical pollutants as part of a load reduction strategy to be included in LaMP 2000.

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Lake Ontario Lakewide Management Plan-Making Progress

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The Four Parties have continued to work toward reducing inputs of critical pollutants. U.S. source track-down programs continue, and the Canadian tributary monitoring study mentioned last year has been completed. See articles on pages 4 and 6. The findings of these programs have been used to locate specific sources and pathways of critical pollutants and to work with local facilities and communities to reduce inputs of contaminants from these sources.

The third in a series of workshops on improving Lake Ontario mass balance models was held in Toronto, Ontario in October 1999 as part of an effort to continue to refine the models that could help predict future responses of the Lake Ontario ecosystem. The workshop was sponsored by the Great Lakes Program of the University at Buffalo (UB), New York, Trent University in Peterborough, Ontario and the USEPA, and hosted by the University of Toronto. About 100 researchers, managers and students interested in Lake Ontario attended the workshop. The session generated opportunities for further research, monitoring and reporting. Progress on the modeling project is summarized in the article on page 8.

Updating Lakewide Beneficial Use Impairments

Efforts over the last year have focused on attaining a fuller assessment of the status of Lake Ontario wildlife (colonial waterbirds, bald eagles, mink and otter), phytoplankton and zooplankton populations, and benthos. As this information could not be fully assessed in time for publication of the Stage 1 Report, a commitment was made in the workplan to complete these descriptions and provide more details as soon as they became available. This Update reports on the population status of colonial waterbirds, bald eagles, mink and otter. Research indicates that populations of these species are increasing, which is an indication of improving health of the Lake Ontario ecosystem. Another article updates the status of lower trophic levels in the Lake Ontario food chain - phytoplankton and zooplankton, and points out how population dynamics reveal major changes in the functioning of the Lake Ontario ecosystem. Further details will be provided in the LaMP 2000 report.

Managing Biological/Physical Factors

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

The USEPA and the New York State Interagency Wetlands Task Force held a planning meeting in the summer of 1999 with federal, state, local and non-profit organizations dealing with habitat issues, to convey the goals of the LaMP and offer assistance in wetland restoration activities in New York State. The meeting resulted in agreement that a concerted effort should be made to protect and restore habitats in the Lake Ontario basin, based on an understanding of federal and state agency priorities. There are currently numerous habitat restoration and protection efforts underway in New York's Lake Ontario basin with support from NYSDEC, USEPA and other environmental partners.

In Canada, a habitat report has been prepared for the Lake Ontario LaMP. It compiles information on habitat status and trends from a variety of sources, and presents this in a manner that is readily accessible to all interested parties. The report also summarizes current habitat rehabilitation efforts in the Canadian portion of the Lake Ontario basin and provides an overview of recent and ongoing habitat conservation initiatives.

Recommendations on future actions to restore fish and wildlife habitat and to manage the factors affecting habitat will be included in the LaMP 2000 document.

Developing Ecosystem Objectives and Indicators

Preliminary Ecosystem Objectives were presented in the Lake Ontario LaMP Stage 1 Report. Indicators to measure progress towards ecosystem objectives are in various stages of development. See page 10 for an update on wildlife community indicators, proposed activities to finalize the binational Lake Ontario LaMP indicators and recommended monitoring strategies.

The Lake Ontario Committee of Fisheries Managers have finalized their Fish Community Objectives (available on their web site at: http://www.glfc.org/pubs/sp99-1.pdf.). The committee will continue to work with the LaMP Workgroup to refine ecosystem objectives, indicators and management actions for the Lake.

Facilitating Public Involvement

The Lake Ontario LaMP Public Involvement Committee continues to improve and expand our links with organizations already in the Lake Ontario basin.

The web site has seen many changes over the last year and new information will continue to be added as it is made available. Check out the website at the address listed on page 7. The Stage 1 Report in its entirety, the 1999 Update and this edition are also available on the site.

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Lake Ontario Lakewide Management Plan-Making Progress

(continued from page 2)

Reporting

The Lake Ontario LaMP reports on progress annually in a joint public meeting covering the LaMP and the Niagara River Toxics Management Plan. The session alternates each year between locations in New York State and Ontario. This year's meeting is scheduled for June 29 at the Days Inn, Riverview at the Falls, 401 Buffalo Avenue, Niagara Falls, New York. Further details will be posted on the Lake Ontario LaMP website, and notices sent to those on the LaMP mailing list.

Senior officials from federal and state agencies bordering all of the Great Lakes have made significant changes in reporting on commitments within the Great Lakes Water Quality Agreement (GLWQA) pertaining to Lakewide Management Plans. The "Next Steps" article at the end of this Update talks more about these changes and plans for future activities and reporting on the Lake Ontario LaMP.

Lake Ontario LaMP Approach for Assessment of Contaminant Sources and Loadings

(continued from page 1)

The terms "sources"and "loadings" reflect the two parts of the LaMP's load reduction strategy. A source is a specific pollutant input or category of input to the lake, for example, a sewage treatment facility. A loading (or "load") is the total amount of a pollutant that enters the lake from a source over a given period of time. The LaMP's efforts are focusing on:

- identifying the specific sources of critical pollutants that need to be remediated, for example, through a contaminant trackdown approach; and
- estimating the pollutant loadings from the various source categories, to help focus reduction programs on the most significant sources.

A brief overview of our efforts to assess sources and loadings for the LaMP load reduction strategy is provided below. Approaches being used in Canada and the U.S. are similar, and are proceeding in parallel, with the LaMP providing coordination. Technical meetings and workshops are helping to develop the information into a binational assessment for LaMP 2000.

Articles following, on Canadian tributary monitoring; contaminant trackdown efforts in U.S. metropolitan sewage systems; and load estimation for the Lake Ontario Toxics Modeling Project (LOTOX), provide additional information on our efforts to implement the LaMP strategy.

Overview of LaMP Efforts

The Canadian LaMP partners are compiling existing data for sources and loads of Lake Ontario critical pollutants. Source categories include the atmosphere (including particle deposition, gas exchange, and air emissions), tributaries, point sources (including sewage treatment plants, combined sewer overflows, and storm water), and sediments. While evaluating the existing information, a trackdown approach, similar to that being done by the U.S. partners, is being developed. The tributary monitoring study carried out by the Ministry of the Environment and Environment Canada in 1997 was a first step in identifying the critical pollutants found in Canadian Lake Ontario tributaries. This information, and additional ambient air monitoring studies proposed for 2000/01, are the basis for a trackdown approach being initiated in 2000/01 to assess potential existing or historical sources of specific chemicals.

In 1997, NYSDEC and USEPA conducted an assessment of potential pollutant sources in U.S. Lake Ontario watersheds using available information on ambient levels of critical pollutants, land use, and regulated facilities (e.g. inactive hazardous waste sites, point source discharges). This report is being used in conjunction with contaminant trackdown efforts, to help identify priority areas and specific contaminant sources. An update to the report will include an updated inventory of point source discharges in the basin, active hazardous waste facilities, and new contaminant trackdown results.

Trackdown efforts in U.S. Lake Ontario tributaries and municipal sewage systems have been conducted since 1996. Prior work has identified six priority areas in the Lake Ontario basin where follow-up work to pinpoint contaminant source locations is needed. This is scheduled for the spring and summer of 2000. Several metropolitan areas are among the priority areas, for example, Rochester, Lockport and Carthage. The work includes monitoring pollutant levels, and reviewing the information on land use and regulated facilities, to help pinpoint sources.

With USEPA support, a group of researchers led by Dr. Joseph V. DePinto of the University at Buffalo are conducting the Lake Ontario Toxics Modeling Project in coordination with the LaMP. One task is to compile information on critical pollutant loadings to the lake from the U.S. and Canada, and provide the information to update the load estimates presented in the Stage 1 LaMP. The researchers are focusing on reducing uncertainties in the estimates of critical pollutant loadings from major source categories, such as atmospheric and tributary loadings. A mass balance and bioaccumulation computer model called LOTOX2 is being used to help check the accuracy of the load estimates. The model is also being used to assess the effectiveness of various load reduction scenarios in reducing contamination in the lake water, sediments, and sportfish.

Lake Ontario Tributaries During 1997 and 1998

D. Boyd, MOE & Hans Biberhofer, EC

Background

The Lake Ontario Lakewide Management Plan requires the assessment of sources and loadings of identified critical pollutants as a means for the development of reduction plans to assist in restoring impaired beneficial uses. To assess the potential contributions from Lake Ontario tributaries on the Canadian side, a sampling program was designed that would provide information on critical pollutants using large volume sampling and low level detection technologies.

In the spring of 1997 a collaborative sampling program was established between Environment Canada and the Ontario Ministry of the Environment. The arrangement was designed to allow sampling under a range of flow conditions during the summer and fall of 1997, and the winter and spring of 1998.

Objectives

Two of the principal objectives of the 1997/98 study were to:

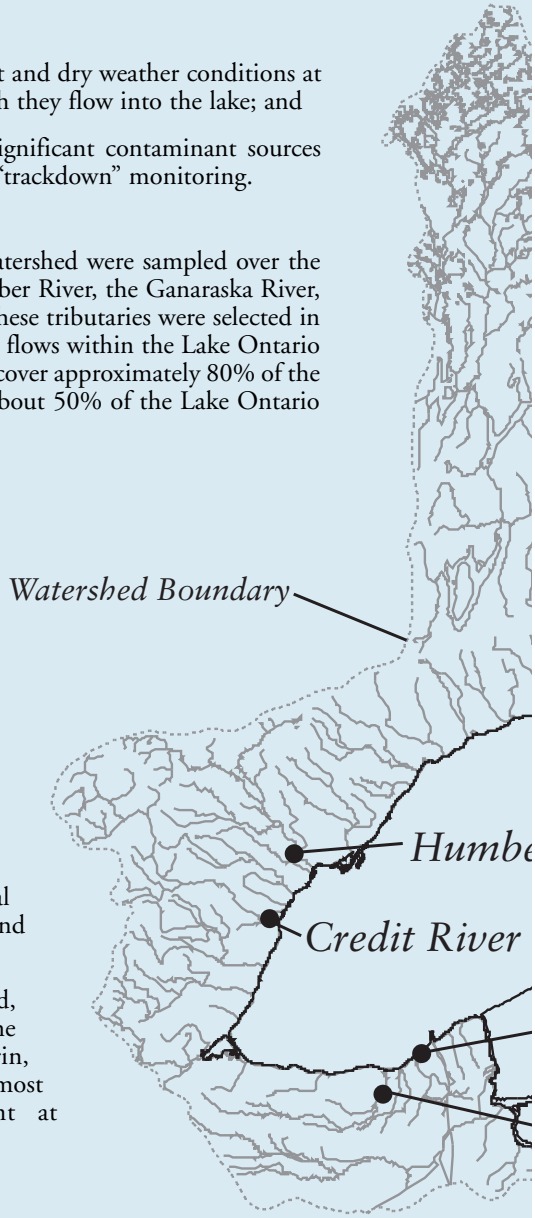
(a) measure the ranges of contaminant concentrations under wet and dry weather conditions at a variety of Lake Ontario watersheds near the point at which they flow into the lake; and

(b) use the results to screen these watersheds for potentially significant contaminant sources which could require further assessment or follow-up source "trackdown" monitoring.

Description of Sampling

Six tributaries in the Canadian portion of the Lake Ontario watershed were sampled over the period of July 1997 to March 1998: the Credit River, the Humber River, the Ganaraska River, the Trent River, Twenty Mile Creek, and Twelve Mile Creek. These tributaries were selected in order to cover the range of land use, watershed size, and average flows within the Lake Ontario drainage basin. The tributaries selected for sampling in 1997/98 cover approximately 80% of the tributary flows to the lake (excluding the Niagara River), and about 50% of the Lake Ontario watershed area.

Samples were analysed for a range of trace contaminants and "conventional" pollutants. These included organochlorine pesticides, total polychlorinated biphenyls (total PCBs as represented by a suite of 103 congeners or congener groupings), and polynuclear aromatic hydrocarbon compounds (PAHs). Trace metals (Al, Cr, Cd, Cu, Fe, Hg, Mn, Ni, Pb, Zn) and selected major ions and nutrients were also included. Bacteriological analyses were not carried out as part of this study.



Sampling Results

No samples had measurements above the Provincial Water Quality Objectives for chromium, mercury, Mirex, hexachlorobenzene, benzo(a)pyrene, or any of the organochlorine pesticides (lindane, aldrin/dieldrin, chlordane, DDT, endrin, endosulfan) in either dry or wet weather samples. Total PCBs were detected above the objective of 1.0 ng/L in all wet and dry weather samples.

Results for all other organochlorine compounds were varied, depending upon sample type and location. - BHC, lindane (- BHC), - endosulfan, - endosulfan, - chlordane, dieldrin, p,p'-DDT-(a DDT metabolite), and p,p'-DDT were the most frequently detected, although they were always present at concentrations well below their respective objectives.

The Credit River had dry and wet weather median concentrations of Mirex above the detection limit (0.01 ng/L) with values of 0.06 ng/L and 0.02ng/L respectively; well below the objective of 1.0 ng/L.

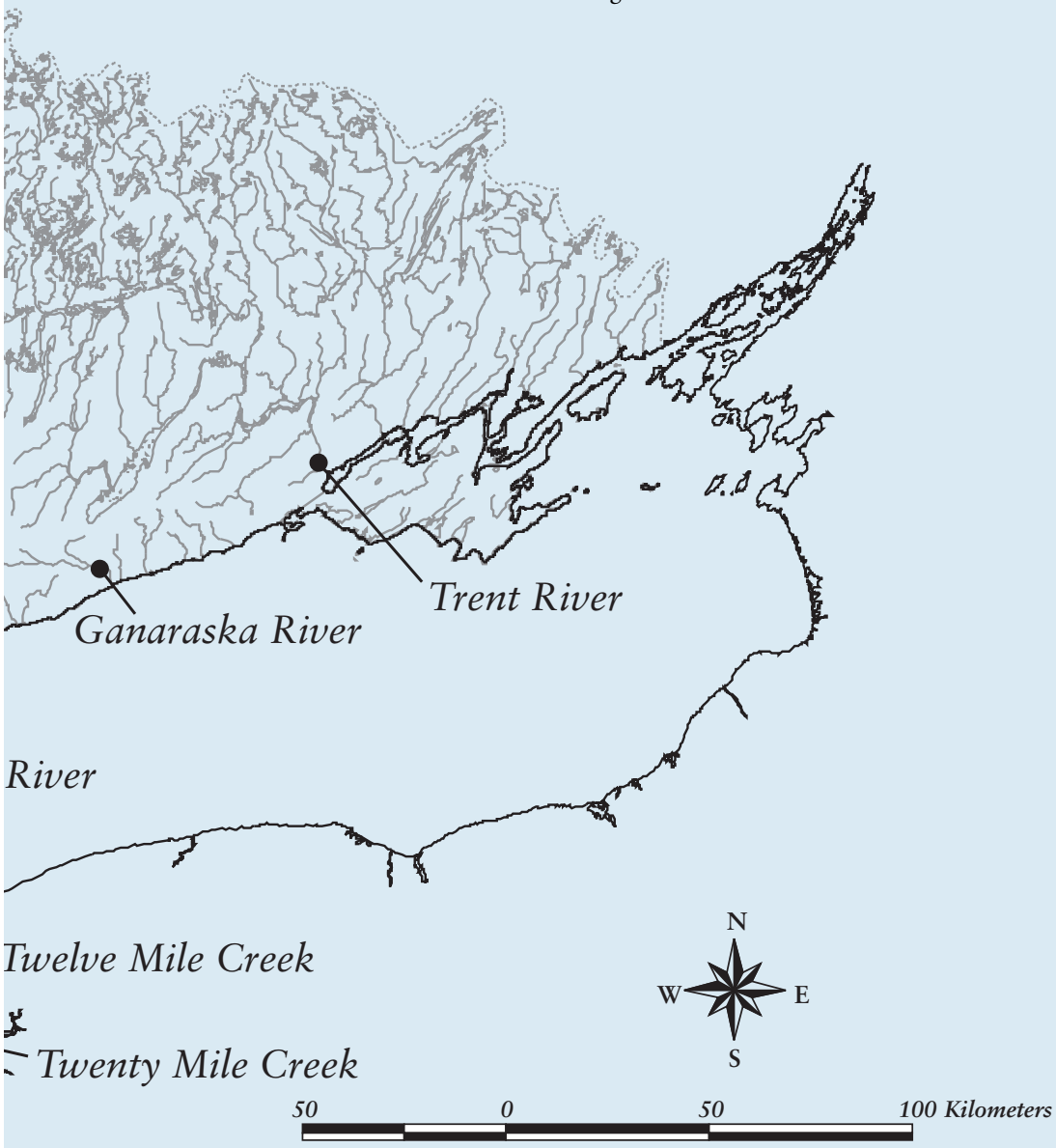
Future Work

Results of the 1997-98 Ontario tributary sampling program for PCBs indicate a relatively uniform background concentration in tributaries with a range of different land uses; this background is potentially attributable to atmospheric deposition of PCBs and their apparent ubiquitous presence at sites throughout the drainage basin.

Further analysis of available PCB data, additional sampling and examination of sediment, biological tissue and atmospheric data will be undertaken in 2000 as part of the tributary contaminant trackdown work.

A report summarizing the sampling and results can be accessed via the Lake Ontario LaMP website at www.cciw.ca/glimr/lakes/ontario/.

• Lake Ontario Tributaries During 1997 and 1998



Strategic sampling in sewage collection systems:

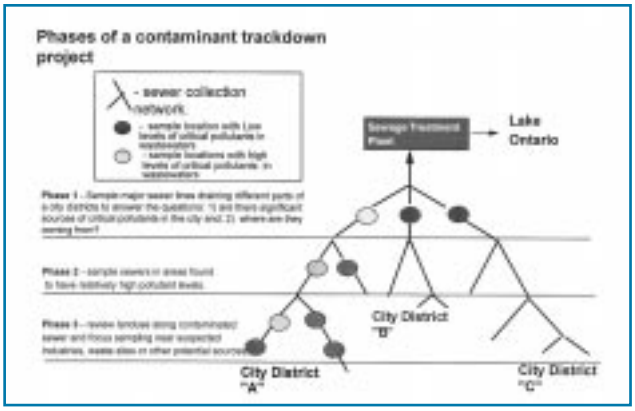
A simple approach to locate critical pollutant sources

Fred Luckey, USEPA

The development of partnerships at all levels of government is an important component of contaminant trackdown projects. Here, EPA and Monroe County field staff take a break after collecting a sample from a sewer pipe more than 30 feet below street level.

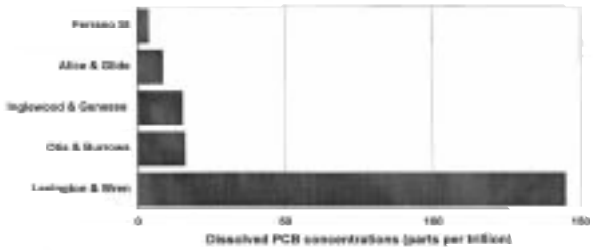
Elimination of critical pollutants is a major goal of Great Lakes Lakewide Management Plans. Tremendous strides have been made in reducing inputs of these pollutants but further reductions are necessary. U.S. and Canadian monitoring of fish, sediment and tributary waters show us where critical pollutants occur at higher than average concentrations in the Lake Ontario basin. "Contaminant trackdown" projects can then be designed to identify sources of these pollutants using a variety of sampling techniques.

Metropolitan areas warrant special attention given their higher concentrations of industry, manufacturing and waste sites. Sewage systems in urban areas collect wastewater from many industries that used or produced critical pollutants in the years before they were controlled and some may still be sources of these pollutants. Storm water runoff from waste sites can also enter sewer systems. As standard monitoring of sewage treatment plant wastewaters provides little information on critical pollutants, the true magnitude of loadings entering the Great Lakes from these plants is not well understood. Strategic sampling of wastewater at key points in sewage collection systems can help identify previously unidentified sources.



A systematic evaluation of a sewage collection system begins at the sewage treatment plant where wastewaters from each major sewage intake line are sampled and signs of critical pollutant sources are tracked upstream into the sewer network through the process of elimination. A review of land use information and focused sampling can then concentrate on those areas contributing high levels of contaminated wastewaters.

Ideally critical pollutants should be stopped at their sources as, trapped in sewage sludge, they create other environmental problems once disposed of on land or incinerated.



Phase 2 sampling of west Rochester sewers at various street intersections identified one sewer in particular that had much higher levels of PCBs suggesting the presence of a relatively significant PCB source.

A cooperative federal, state and county wastewater sampling project conducted in Rochester's municipal wastewater collection system illustrates how this simple approach is being used to locate unrecognized, potentially significant PCB sources. Phase one measured dissolved PCB levels in major sewer lines delivering wastewaters from different parts of the city to the sewage treatment plant. Wastewaters from west Rochester were found to have higher PCB levels (330 parts per trillion (ppt)) compared to those from other parts of the city (<40 ppt). Phase two sampling focused on west Rochester sewers and found one sewer line to have high PCBs (140 ppt) compared to other west Rochester sewers (<20 ppt). Analysis of land use information along this sewer identified manufacturing and waste sites that may be PCB sources. Phase three collected sewer wastewater samples near each potential source in the Fall of 1999 with the hope of identifying the specific source. Similar studies are underway in Carthage and Lockport to help the Lake Ontario LaMP and related RAPs to identify and control sources of critical pollutants entering Lake Ontario.

Sampling in sewer systems requires special equipment and training to be prepared for health and safety problems. In addition to the dangers of falling or the hazards involved with working in the middle of a busy intersection, the potential for explosive gases or the lack of oxygen can pose very real dangers to the samplers who must enter sewer pipes at difficult locations.

- Strategic sampling in sewage collection systems: A simple approach to locate critical pollutant sources

Check It Out!

The Lake Ontario LaMP has a website.

Read about the Lake and LaMP activities; find reports and fact sheets; and learn about upcoming meetings and opportunities to participate!

Find it at either:

www.cciw.ca/glimr/lakes/ontario/

or

www.epa.gov/glnpo/lakeont/

Lake Ontario Toxics Modeling Project (LOTOX) in Support of the Lake Ontario LaMP: April 2000 Update

Joseph V. DePinto, UB, Thomas C. Young, Clarkson U., & William G. Booty, EC

One of the benefits of the Lake Ontario mass balance modeling effort is an improved ability to quantify the relationship between the mass loading of contaminants of concern to the lake and their concentration in water, sediments and biota. This information can be used by the LaMP to help determine the most effective source reduction strategies.

Because contaminant loads are required inputs to the model, substantial effort has been expended to develop a database of load estimates. The first year results of the LOTOX project, summarized in the 1999 LaMP Update, provided preliminary estimates of contaminant loads from all major source categories. When possible, these were calculated from primary data (i.e., monitoring data such as the Niagara River Upstream-Downstream Program); but usually it was necessary to use published literature sources. Recognizing the uncertainty of many of the estimates, work on Lake Ontario contaminant load estimation has continued into the second year of the project, aiming at reducing the uncertainty of the load estimates.

Efforts to reduce uncertainty in load estimates has proceeded along three tracks. Our initial work focused on developing a history of tributary contaminant loading based on sediment cores collected by New York State Department of Environmental Conservation near the mouths of Lake Ontario tributary streams. Dated sediment cores provide a time history of contaminant accumulation at the location of the core. Using such cores, we developed a method to interpret the sediment accumulation data in a way that yields an estimate of the history of contaminant loading from the associated tributary. Additional information on current loadings from Canadian tributaries has recently become available through the Ministry of the Environment/Environment Canada tributary monitoring program. This will be used to update our tributary loading estimates.

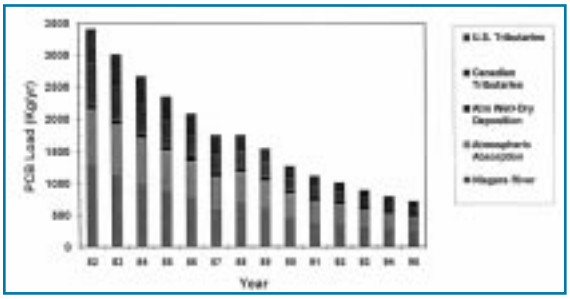


Figure 1

Recognizing the importance of atmospheric deposition as a source of critical pollutants to Lake Ontario, we also initiated an air monitoring program over the lake to supplement the ongoing monitoring supported by Environment Canada at Point Petre, Ontario (one of the Great Lakes International Atmospheric Deposition Network (IADN) sites). In September 1998, Dr. Keri Hornbuckle, with support from USEPA as part of the LOTOX project, used the USEPA research vessel Lake Guardian to sample air and water at seven locations around the lake. This survey detected generally higher air and water PCB concentrations in the western end of the lake than in the east. This suggests the presence of PCB sources in the urbanized areas on the western end of the lake. We intend to follow up on this finding, and to analyze other critical pollutants, in future work under the LOTOX project.

The third track of load estimation work has focused on data from New York point sources that report their discharges pursuant to New York State Pollutant Discharge Elimination System (SPDES) requirements. This analysis will help us to assess the contribution of point sources v. non-point sources to the contaminant loadings entering Lake Ontario from its watersheds. In other words, we will estimate the fraction of a given tributary's loading that originates from point sources within its watershed.

The progress in improving our estimates of loading of critical pollutants has allowed us to use our LOTOX models to make more accurate assessments of the lake's response to historical load reductions, and thus make more informed forecasts of the response of water, sediment and fish concentrations to further load reductions. An example is our estimate of the loading history of PCBs to Lake Ontario by source category (Figure 1). We can see that PCB loading to Lake Ontario decreased by about 75% between 1982 and 1995. Currently the major source categories of loading are the Niagara River and atmospheric deposition.

Using these load estimates in our LOTOX2 model, we can simulate the historical declines in lake trout PCB concentrations in response to the reduced loading. Having done that, we can use the model to forecast the future levels of PCBs in lake trout under a variety of load reduction scenarios. A base forecast was developed to predict future levels of PCBs in Lake Trout, assuming no future load reductions occur after 1995.This "base" forecast, which shows the average adult lake trout PCB concentration dropping below 1 part per million in the late 1990s, can then be compared to various load reduction alternatives being considered through the LaMP process. Thus managers can assess the most effective strategies to reduce contamination in the fish. Results will be available in time to assist load reduction strategies for LaMP 2000.

One other important aspect of the LOTOX project is the compilation, documentation and archiving of data. The database of contaminant loadings and ambient data supporting LOTOX, and the information obtained from the application of LOTOX to the data (e.g. as in the examples above), is being compiled into a "Lake Ontario Decision Support System". The system runs within the RAISON computer software package developed by scientists at the National Water Research Institute at the Canada Centre for Inland Waters. The LOTOX models themselves will also be accessible through RAISON.

Mercury

Bob Krauel, EC, & Carole Beale, Monroe County Dept. of Health

Mercury is a naturally occurring metal, which is found in small amounts in most soils and rocks. Although mercury is best known for its use in thermometers and medical and dental products, it is also used in batteries, switches and thermostats, fluorescent and high intensity discharge (HID) mercury lamps and in the production of various synthetic materials such as urethane foam. Historically, mercury was added to paints as an anti-mildew agent. Some uses of mercury have now been banned such as batteries, paints and vinyl chlorides.

Mercury was identified as a critical pollutant late in the Lake Ontario LaMP Stage 1 development process. More information will be available in the LaMP 2000 report. This article provides examples of pollution prevention activities currently underway. Some of these are mercury reduction efforts under the Canada-U.S. Great Lakes Binational Toxics Strategy (BTS).

Green Venture - Home Audits

Green Venture is a non profit community organization in the Hamilton area which conducts home energy audits. In January, 2000 Green Venture initiated a program in cooperation with the Region of Hamilton Wentworth, Honeywell and Environment Canada to conduct home mercury audits at the same time. Non-mercury, energy saving, programmable thermostats will be promoted to the householder and mercury thermostats and other mercury containing devices will be collected by Green Venture and recycled through the regional household hazardous waste program. If this program is successful, it will be encouraged in other green communities which offer the energy audit program. Communities which have household hazardous waste facilities would be best suited for this program. In 1999, the Association of Municipal Recycling Coordinators completed a survey which indicated that 50% of the household hazardous waste programs in Ontario are currently set up to accept mercury containing devices such as thermometers and thermostats. Some municipalities are also collecting fluorescent lamps and switches.

Medical and Dental Projects

Mercury pollution prevention activities in hospitals and dental offices are underway in both Canada and the U.S. In the Rochester Embayment watershed, the Monroe County, New York, Department of Health implemented a mercury pollution prevention program for hospitals and dental offices. The project, made possible by a grant from the U.S. Environmental Protection Agency, was undertaken in cooperation with the University of Rochester's Strong Memorial Hospital, Department of Dentistry and Eastman Dental Center. The project was a response to concerns about the health impacts of mercury and new federal regulations that greatly reduce the amount of mercury that can be discharged from a municipal wastewater system or an incinerator.

The U.S. Environmental Protection Agency Region 2 presented one of its 1999 Environmental Quality Awards to the Monroe County Health Department and the University of Rochester for their mercury pollution prevention project.

Health Care

In Ontario, Pollution Probe, the Ontario Hospital Association, Environment Canada and the Ontario Ministry of the Environment have encouraged hospitals to reduce or eliminate the use and release of mercury. Information and programs which have been developed include: a Memorandum of Understanding that individual hospitals can sign, a healthcare pollution prevention training program, a guide to sources of mercury and alternatives, a cost of alternatives report prepared by Pollution Probe, and a website (www.healthcare-environet.com) to provide ongoing, current environmental information.

Approximately 80 health care facilities in Ontario have completed the pollution prevention training course and a 1999 survey indicated that 80% of Ontario hospitals had initiated some form of mercury reduction program. The pollution prevention training program is currently being updated and it is expected that additional courses will be offered in the year 2000.

In New York State, Strong Memorial Hospital replaced mercury thermometers with electronic thermometers, mercury-filled sphygmomanometers with aneroid devices, and mercury-filled GI tubes with tungsten-filled tubes. Strong also discontinued using mercury-containing laboratory reagents unless there is no adequate substitute. Non-medical products that contain mercury are being phased out. A specialized training program for hospital staff was developed. The experiences at Strong and extensive research led to the preparation of a how-to manual that was distributed to other hospitals in the Rochester Embayment watershed and, by request, to other parts of the U.S. and Canada. The manual is entitled Reducing Mercury Use in Health Care: Promoting a Healthier Environment (1998). It is available on the web at www.epa.gov/glnpo/bns-docs/merchealth/.

Dentistry

A Best Management Practices manual for dental offices is being developed by the Ontario Dental Association with input from Environment Canada, the Ontario Ministry of the Environment and the Region of Hamilton Wentworth. In the spring of 2000, the City of Toronto and Environment Canada will conduct a pilot project to test this manual and will be installing and evaluating dental amalgam collection technologies at a dental facility in Toronto.

In New York State, techniques for handling and recycling dental amalgam were developed by the Health Department and University of Rochester dental facilities. A booklet and poster, Prevent Mercury Pollution: Use Best Management Practices for Amalgam Handling and Recycling, were distributed to dental offices in the Rochester Embayment watershed. The booklet contents are also included in the hospital manual.

Mercury Awareness in Schools

The Toronto District School Board is developing a curriculum resource that addresses BTS toxic substances. It will include a module on mercury. This educational resource will be tested at selected Toronto schools this fall.

Under a similar program funded by Environment Canada's ECOACTION 2000, EASE, a London, Ontario based non-profit organization is developing a curriculum for educating the young grade students in public schools about mercury health and environmental impacts and how to handle and safely dispose collected mercury, and reduce /eliminate mercury use.

Status of Colonial Waterbirds on Lake Ontario

Chip Weseloh, EC

Lake Ontario is home to hundreds of thousands of colonial nesting waterbirds - birds that nest in large groups (or colonies) as opposed to those that nest singly, like robins or sparrows. Biologists from the Canadian Wildlife Service, the Ontario Ministry of Natural Resources and the New York State Department of Environmental Conservation have just completed the third Lake Ontario-wide census of nesting colonial waterbirds - a survey that is conducted approximately once every 10 years. The information collected from these surveys, along with the results of other studies carried out over a number of years in the Lake Ontario basin is starting to give us a good indication of improvements to the ecosystem.

(continued on page 11)

Lake Ontario Wildlife Objectives and Indicators

Ralph Jessup, EC

One of the main goals of the Lake Ontario LaMP is to address beneficial use impairments relating to the health of wildlife communities. This goal will be met by insuring that the Lake Ontario Ecosystem is maintained and, as necessary, restored or enhanced to support self-reproducing diverse biological communities. The LaMP's ecosystem objective for wildlife is the perpetuation of a healthy, diverse, and self-sustaining wildlife community that utilizes the lake for habitat and/or food. This objective shall be ensured by attaining and sustaining the waters, coastal wetlands, and upland habitats of the Lake Ontario basin in sufficient quality and quantity.

It will be necessary, among other things, to have a set of measures which may be used as "yardsticks" to monitor progress toward the LaMP objectives. These yardsticks or indicators must be carefully chosen, and sufficient in number, to provide all of the essential information on which to base lake-wide management decisions and to provide a comprehensive picture of the health of the wildlife ecosystems. They must also be readily observable, quantifiable, non-redundant, and display the necessary degree of sensitivity to the underlying stresses on the wildlife systems and the corresponding responses.

The ecosystems being monitored consist of the wildlife assemblages in the open waters, the coastal wetlands, and the upland regions of the Lake Ontario basin. To represent the overall health of these systems, three sets of representative "indicator species" from the three habitat domains will need to be selected. Then, based on the criteria mentioned above, suitable quantifiable species characteristics must be selected as measures, or indicators, of wildlife health. Seven such indicators have thus far been identified: population size, reproductive potential, productivity, contaminant levels, species representation at trophic levels, abundance and saturation of niches, and native to exotic species ratios. To date, however, indicator species have been selected only for the open waters and the coastal wetlands. None have yet been selected for the upland regions.

Many of the existing wildlife indicators have been monitored for a number of years. In this way, progress has already been documented in the reduction of contaminant levels in organisms, in the population numbers, and in the reproductive success of various species found in the Lake Ontario basin. For example, PCB levels in herring gull eggs decreased by an order of magnitude from the mid-1970s to the late 1980s and continued to decline into the 1990s. The dieldrin levels also decreased by 80 to 90 percent. Numbers of fish-eating gulls and cormorants have increased dramatically in the last 20 years. Likewise, Bald Eagles in New York's Lake Ontario basin have been estimated to be growing in number at an annual rate of 15 to 30 percent since 1988, although they have not yet returned to breed along the Lake's shoreline nor on any of its islands.

Over the next year, the Lake Ontario LaMP Workgroup, in consultation with the Lake Ontario Committee of Fisheries Managers, the U.S. Fish and Wildlife Service, and the Canadian Wildlife Service, will further develop the draft wildlife indicators and propose them to public focus groups for review and comment. The development of ecosystem objectives and indicators in conjunction with the public will assure that a mechanism exists to measure the success of restoration efforts, and ensure that it is acceptable to all interested stakeholders in the Lake Ontario basin.

Status of Colonial Waterbirds on Lake Ontario

(continued from page 10)

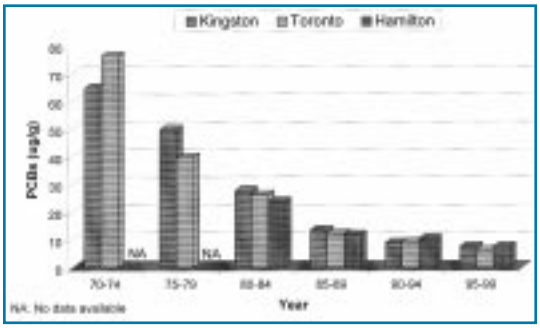
Contaminant Studies of Fish-eating Birds on Lake Ontario

Fish-eating birds, such as gulls, terns, cormorants, and night-herons, have been used as bio-indicators of contamination on Lake Ontario and throughout the Great Lakes for more than 30 years. The Canadian Wildlife Service monitors contaminant levels as well as their biological effects in both the overall population and the individual birds. In the 1970s, fish-eating birds in the Great Lakes, including Lake Ontario, were found to have very high levels of contaminants such as PCBs, DDE and Mirex in their eggs. They also had much thinner eggshells than normal, elevated rates of embryonic mortality and, in some cases, deformities. As well, they often suffered total reproductive failure and their population levels were declining.

Most of these conditions have improved greatly. Contaminant levels have declined dramatically in eggs of Herring Gulls (see Figure 1), Caspian Terns and Double-crested Cormorants; eggshell thickness has returned to normal or, at least, is not a problem for any of the species; and population levels of several colonial, fish-eating bird species have increased.

Although many of the obvious signs of toxic contaminant effects on water bird populations are no longer apparent, the Canadian Wildlife Service is continuing its research to better understand the potential for more subtle, less obvious effects of environmental contaminants on fish-eating birds and other wildlife on Lake Ontario.

Figure 1.
PCBs in Herring Gull Eggs from Lake Ontario Colonies (1970-99)



Note: From 1974 - 87 Sum PCB values were calculated by converting PCB 1254:1260 with the appropriate factor for Herring Gull Eggs from Lake Ontario (Turle et al., 1991). From 1988 -99, Sum PCB values are based on the sum of 40-59 congeners.

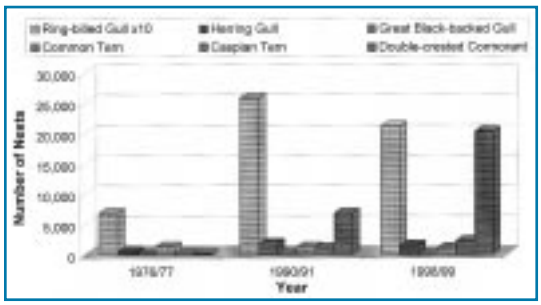
Populations in the Ontario Basin

Cormorants, Gulls and Terns

Surveys were conducted in 1976/77, 1990 and 1997-99 for six species of colonial waterbirds: Double-crested Cormorant, Ring-billed Gull, Herring and Great Black-backed Gulls and Common and Caspian Terns (see Figure 2).

Double-crested Cormorants have increased tremendously on Lake Ontario during the last quarter-century. In 1977, there was one cormorant colony on Lake Ontario, which contained 96 nests. In 1999, there were over 20,000 nests on 17 colonies. The two largest colonies, each with more than 4,500 cormorant nests, were located in the eastern half of the lake. One of these, Little Galloo Island, was the site of a large illegal shooting and a cormorant control program. In July 1998, approximately 1,000 cormorants were illegally shot. Ten people were apprehended, prosecuted and sentenced in U.S. Federal Court. In 1999, a large scale, sanctioned cormorant control program was initiated on Little Galloo Island. All cormorant eggs in ground nests were sprayed with non-toxic corn oil to prevent them from hatching and to eliminate any production of young. Reducing the number of cormorants is desired because of their potential impact on other species of colonial birds with which they nest, especially the Black-crowned Night-Heron.

Figure 2.
Number of Gull, Tern & Cormorant Nests on Lake Ontario, 1976-99



The Ring-billed Gull is the most numerous colonial waterbird on Lake Ontario and the Great Lakes. During 1998-99, over 200,000 nests were tallied on 18 colonies on Lake Ontario. Between the first two census periods, the population grew by 10% per year, but between 1990 and 1998/99 it declined by 2% per year. By 1999, Ring-billed Gulls had also completely abandoned seven colony sites that were active in 1990. Natural habitat change and gull control activities were responsible for some of this decline, but nesting cormorants and Great Black-backed Gulls also may be exerting an influence.

The Herring Gull is the most widespread colonial waterbird nesting on the Great Lakes. In 1998/99 it nested at 18 different locations on Lake Ontario, with a population of almost 1,500 nests. In 1990, 21 colonies were counted, with about 1,800 nests. In 1976/77 there were 448 nests on 13 colonies. After growing at an average annual rate of 11% from 1976/77 to 1990, this population also declined by 2% per year overall between 1990 and 1999. Since the 1990 census, the Canadian nesting sites have grown by about 30% while the U.S. sites have declined by over 60%.

Of the six species of colonial waterbirds discussed here, the Great Black-backed Gull is the least numerous. During the 1976/77 census, it was not found nesting on Lake Ontario. In 1990, there were 15 nests on three sites and in 1998/99, there were 33 nests at six sites. This large gull, which has only started nesting on Lake Ontario regularly since the early 1980s, may be a serious competitor and predator with some of the other species of colonially nesting birds (see above).

(continued on page 12)

Status of Colonial Waterbirds on Lake Ontario

(continued from page 11)

Since 1990, the lake-wide population of Common Terns has declined by 11%. It is encouraging, however, to see that in Canadian waters there was an increase in the number of nesting sites between 1990 and 1998 from 6 to 14. Most of these were on man-made islands, shoals or "tern rafts" and two were re-established colonies at sites that had been abandoned. Artificial nest sites of one type or another seem to be an attractive alternative for this species.

Average annual growth rates of Caspian Tern populations were 24% for 1976/77 to 1990 and 8% for 1990 to 1997/98. Substantial cormorant colonies do not seem to be having a negative impact on the growth of the Caspian Tern colonies with which they are located, for example, on Little Galloo Island, the number of tern nests went from 320 in 1990 to 1204 in 1997 while the number of cormorant nests went from 4072 to 7591 during the same period. However, the large black-backed gull may be preying on terns; in 1995, 21 fresh Caspian Tern carcasses were found within black-backed gull nesting territories.

The results of the recent population surveys are mixed but encouraging; contaminants do not appear to be limiting any of the colonial bird populations, Caspian Tern numbers are increasing, Common Terns, though declining, are adapting to man-made sites in the face of large Ring-billed Gull populations, both Herring and Ring-billed Gull populations appear to have leveled off during the last decade, cormorants have responded to a cleaner environment and black-backed gulls represent a new nesting species on Lake Ontario.

Bald Eagles *Peter Nye, NYSDEC*

The Bald Eagle is considered by many to be one of the premier ecological indicators of the Great Lakes. In the 1970s there were no active Bald Eagle nesting territories in the Lake Ontario basin. Two eagle nesting territories were artificially established in the basin during the 1980s through the introduction of adult eagles captured in Alaska. Since that time the number of nesting territories has increased at a rate of approximately 20% a year. There are now eight established nesting territories in the basin (New York tributaries of Lake Ontario). The combined long term average successful reproduction rates for these nests is 1.4 eaglets per nesting attempt. A reproduction rate of 1.0 eaglets per occupied nesting territory is generally believed to be necessary to maintain stable Bald Eagle populations.

Although good to excellent nesting habitat exists along the eastern shoreline of the lake, there are as yet no shoreline or island nests. The eagles are expected to occupy shoreline nesting sites as their numbers steadily increase. Human disturbance has already slowed the return of eagles to the shoreline. A few years ago a young hunter shot and killed the female of a Bald Eagle pair engaged in nest building behavior along the lake shore west of Oswego, New York. Restoration of shoreline nesting territories will depend in part on protection of eagle nesting habitats and preventing further human disturbance.

Mink and Otter Update

Dennis Money, New York River Otter Project

The Lake Ontario Lakewide Management Plan identified contaminants in fish as one factor that may slow the rate of natural recovery of mink and otter populations. Laboratory studies have suggested that reproduction of these animals may be impaired by the presence of toxic contaminants, such as PCBs and mercury in their diets. Both mink and otter are difficult to study in the wild which makes it difficult to obtain reliable population estimates or measures of their reproductive health. These potential health threats to mink and otter are diminishing as levels of PCBs and other contaminants continue to decrease in the environment. The Lake Ontario LaMP is working to further reduce levels of these contaminants in the environment.

Mink are present in most parts of the Lake Ontario basin and hundreds are legally harvested each year by trappers. Mink have a varied diet, preferring small mammals such as muskrats and rabbits, but they also consume fish and other small aquatic organisms.

The river otter's diet changes with the seasons. In the spring and summer, crayfish, frogs and tadpoles are

(continued on page 13)

Mink and Otter Update

(continued from page 12)

preferred. Otters feed almost entirely on fish during the rest of the year. River otter were found in all major U.S. and Canadian waterways until the 1800s when settlement, unregulated trapping and habitat loss led to their near disappearance in the western half of the Lake Ontario basin. Today, river otter are found along tributaries in the eastern Lake Ontario basin and along the St. Lawrence River. Until recently they have been largely absent from the central and western parts of the basin, but improved environmental conditions are again favoring the return of the otter. Old farm land is reverting to forest and water quality is much improved. Otters are slowly extending their range westward into the Lake Ontario basin from the Adirondacks and Catskills in eastern New York. With help from the New York River Otter Project, the natural recovery of river otter populations should also be accelerated by several decades.

The River Otter are back!

The New York River Otter Project, Inc. is a coalition of industries, nature and educational institutions, conservation and sportsmen's organizations, and individuals working to return river otters to central and western New York State. The ultimate goal is to reintroduce approximately 270 river otters at nine release points across the area. These otters would become the initial breeding stock for that area and eventually each release area's population would expand and occupy other currently vacant habitat. The first release efforts began in 1995.

Three public hearings were held with people and organizations that could be affected by the project. Support for reintroducing the otters was overwhelming.

River otter restoration efforts continue in central and western New York with the release of the 211 animals at seven sites. The year 2000 will be the sixth year of moving otters from eastern New York to sites near Lake Ontario and Lake Erie. Project success is being evaluated through surveys of otter tracks in the snow, individual sight observations and recoveries, and radio telemetry of all otters released at one site.

Associated studies include the evaluation of PCB levels in otters. Studies carried out in New York State compare tissue samples taken from otter before they are released into the area with those of any recovered animals located after their release. Across the lake, scientists from the Ontario Ministries of the Environment and Natural Resources have found that mercury levels in the hair of otters provide a good indicator of mercury in the brains of these animals. High mercury levels can stress otter nervous systems and cause early mortality. With ongoing research, the use of hair clippings from live trapped and released otters promises to provide an important tool to monitor otter health throughout the Lake Ontario basin.

The New York River Otter Project Inc.'s ultimate goal is to restore a lost part of the Great Lakes basin's natural heritage. This project has been made possible by several partners, each playing a key role. If you care to help, you will be rewarded by knowing that you have done something positive for yourself and for future generations. You will have become a true steward of our natural resources.

To contribute or to request further information, please call 716-771-2113 or write to: New York River Otter Project, Inc., P.O. Box 9512, Rochester, New York 14604, or visit their web site at www.nyotter.org.

Lake Ontario Phytoplankton and Zooplankton Communities

Ken Nicholls

Healthy and balanced communities of microscopic plants and animals (phytoplankton and zooplankton) are essential components of all normal aquatic ecosystems, without which there could be no fish in lakes. In Lake Ontario in recent decades these communities have been influenced by dramatic reductions in inputs of phosphorus from municipal waste treatment facilities, invasions by exotic species and changes in fish communities.

Lake Ontario phytoplankton and zooplankton data have been collected under four long-term monitoring programs during the past few decades. A class-level analysis of the plankton data has been done to provide preliminary information about possible imbalances and impairments in the Lake Ontario plankton community.

Phosphorus and Phytoplankton.

The Lake Ontario phytoplankton community is potentially controlled by both nutrient supply and grazing (many zooplankton species eat phytoplankton). Phosphorus removal at wastewater treatment plants in Canada and the U.S.A. resulted in a dramatic decline in total phosphorus levels in the lake beginning in the early 1970s. The 15-year decline in total phosphorus at off-shore stations was about 30%. The decline between 1976 and 1998 at near-shore water intake sampling locations was as high as 75%. Although significant, phytoplankton biomass declines were much less dramatic than the total phosphorus declines, especially in the off-shore waters.

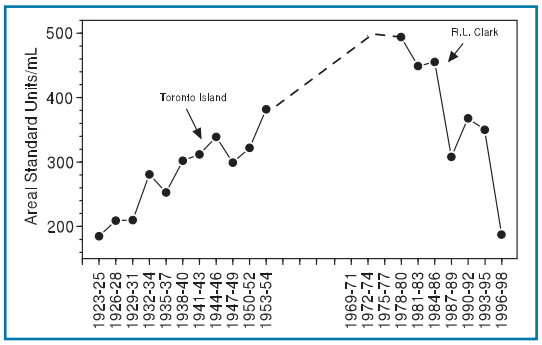


Figure 1. Three-year annual mean phytoplankton densities (Areal Standard Units/mL) in samples collected from two Toronto area water treatment plant intakes in Lake Ontario (the Toronto Island plant and the R.L. Clark plant) between 1923 and 1998. No data from these sites are available for the period 1955-1978. The dashed line represents an hypothesized trend line based on historical phosphorus loading to Lake Ontario and a best-fit extrapolation for the Toronto Island data.

Previously published data from samples collected in the intake of the Toronto Island Filtration Plant showed a doubling of phytoplankton densities between 1923 and 1954. More recent data from the nearby intake of the R.L.Clark Water Treatment Plant were combined with the earlier data to provide a picture of change spanning nearly 80 years. It is suggested that the increases in algal densities of the first half of the 20th century have been reversed in the last 20 years (Fig. 1).

Zooplankton

Spring densities of total crustacean zooplankton were low, typically in the 5,000-20,000/m3 range; summer densities were 10-20 times higher. Like the off-shore phytoplankton community, there were major differences in the composition of the spring and summer zooplankton communities. Shifts in abundance of cladocerans (water-fleas) were the most important reason for the clear distinction between the spring and summer zooplankton communities at both DFO-Bioindex stations, while at the U.S. EPA stations, rotifers and immature copepods assumed this role.

In contrast to the phytoplankton variables for which most showed decreasing trends in both spring and summer, there were several zooplankton components showing increasing trends. For example, for the spring periods there were 13 statistically significant increasing trends and no decreasing trends. For the summer period, there were 11 decreasing and only one significantly increasing trend.

Some of the trends were quite dramatic; total zooplankton densities in the eastern outlet basin of the lake during spring increased nearly 10-fold after the low recorded in 1985 (Fig. 2a). Also observed at this location was an increase in the representation by calanoid copepods (Fig. 2b), a group usually associated with deep, low-productivity lakes.

Embayment - Inshore - Offshore Differences

Studies in the mid 1990s found the difference between spring and summer was greater at the near-shore sites. Spring phytoplankton densities were 6-8 times higher than summer densities at the near-shore locations at the eastern end of the lake. Offshore stations showed much less difference between spring and summer phytoplankton biomass. Spring phytoplankton peaks were confined to April and May at eastern Lake Ontario near-shore sampling locations but often extended into June at western sampling sites, another indication that western Lake Ontario was more impacted by sustained year-round nutrient (phosphorus) loading. With continued declines in nutrients entering Lake Ontario via the Niagara River, studies now find little difference between eastern and western Lake Ontario nutrient levels.

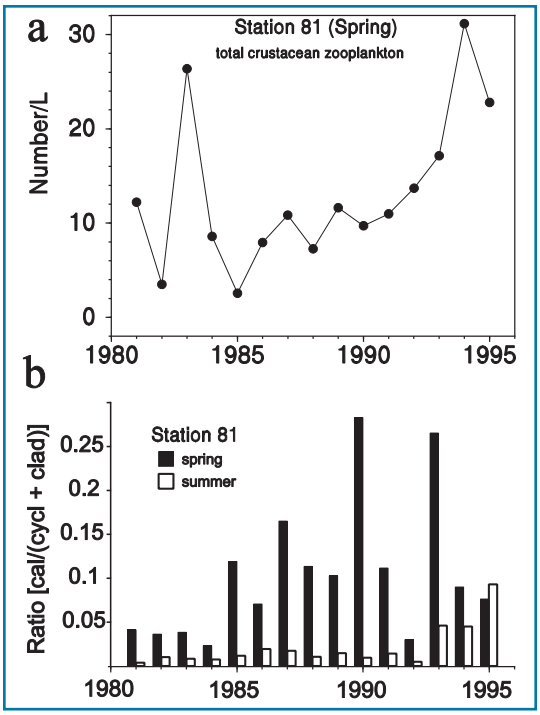


Figure 2(a) Increase in total crustacean zooplankton during the spring periods of 1985-1995, and (b) increasing ratios of total calanoids-to-(cyclopoids + cladocerans) at DFO Bioindex Station 81.

Results from 1998 surveys in U.S. waters of Lake Ontario indicate that embayments are very productive habitats compared to nearshore and offshore areas. In embayments, TP concentrations were nearly twice those in nearshore and three times those in offshore areas. In 1998, there were more bosminids (a type of small water flea) in the embayments, and more calanoid copepods in the offshore of Lake Ontario, especially during August. Some of the bigger water flea species (daphnids) became more prominent in July and August in both embayments and nearshore sites.

Exotic Species

The transport of exotic species by ocean-going freighters to the Great Lakes remains an on-going threat to Lake Ontario. The spiny water flea was discovered in Lake Ontario in 1985, followed by the zebra mussel in 1989 and the hooked water flea in 1998. The long term impact of these exotics on native species is not well understood. Spiny water fleas and hooked water fleas both feed on most smaller zooplankton species, and thus have the potential to change the balance between fish, zooplankton and phytoplankton.

To date, there is little evidence for an offshore effect by any of these exotic species on phytoplankton, but the near-shore effect of zebra mussels was seen as early as 1992. By 1998 zebra mussel feeding had apparently reduced phytoplankton densities by more than 90% in some inshore areas.

Human Health Issues in Lake Ontario: LaMP input

Dora Boersma, Health Canada

The Great Lakes Water Quality Agreement (GLWQA) states that Lakewide Management Plans shall include "a definition of the threat to human health or aquatic life posed by critical pollutants". Lake Ontario LaMP Stage 1 Report provided an overview of the human health issues for Lake Ontario, especially with respect to the health-related beneficial uses of the Lake (recreational/drinking water quality and restrictions on fish and wildlife consumption). At present the LaMP is in the process of gaining a better understanding of human health impacts by working to synthesize the available research studies and in close partnership with health agencies.

Sources of persistent toxic substances from Lake Ontario are known to contribute very little to the exposure of the general population. For the general population, a general market diet contributes to over 95% of their contaminant intake and drinking water, recreational water contact and air pollution constitute very minor exposure. Consequently, the approach taken by the responsible agencies has been to examine groups at higher risk of exposure to persistent toxic substances from Great Lakes sources, such as high consumers of sportfish: recreational anglers, certain ethnic groups, subsistence anglers and others.

It is well known that sport fishing has nutritional, social and cultural benefits. However, because of the detection of PCBs and other contaminants found in Lake Ontario sportfish, both the New York State Department of Health as well as the Ontario Ministry of the Environment issue fish advisories recommending restrictions for several fish species depending on their degree of contamination. The advisories also explain how to minimize exposure to contaminants in sportfish and reduce the health risks associated with those contaminants. It is critical that women of childbearing age, young children and the elderly pay close attention to these advisories, as there are concerns that they are more sensitive to potential developmental, reproductive, immunological and neurological health risks posed by these contaminants.

Further information on persistent toxic substances and human health, and other Great Lakes health and environment issues can be found on the following web sites:

Internet sites:

http://www.hc-sc.gc.ca/ehp.index.htm

http://www.atsdr.cdc.gov/grlakes.html

http://www.ene.gov.on.ca/water.htm

http://www.epa.gov/OGWDW/

http://www.health.state.ny.us/nysdoh/environ/fish.htm

Improvements in the Niagara River .... Good News for Lake Ontario!

Marna Gadoua, NYSDEC

The 1999 Annual Progress Report of the Niagara River Toxics Management Plan (NRTMP) indicates significant improvements in the Niagara River. This is good news for Lake Ontario since the Niagara River is the largest tributary to Lake Ontario, providing over 80% of all the water that flows into the lake. Along with the contribution of water, however, the Niagara River also transports contaminants from the waters of the upper Great Lakes and from sources along the river from Lake Erie to Lake Ontario.

Because of this critical link between Lake Ontario and the Niagara River, the Four Parties agreed, in 1987, to implement the NRTMP in an effort to "reduce toxic chemical concentrations in the Niagara River by reducing inputs from sources along the river with a goal of achieving ...water quality that will protect human health, aquatic life, and wildlife, and while doing so, improve and protect water quality in Lake Ontario as well." To do this, the Four Parties committed to: 1) reduce point and nonpoint sources of pollution to the river 2) monitor the water quality and health of the river and 3) report progress to the public.

Percent reduction in contaminant loads entering Lake Ontario from the Niagara River, 1986/1987 to 1996/1997	
PCBs	**82%**
Dieldrin	**70%**
Mirex	**62%**

(Loads on suspended sediment at Niagara-on-the Lake)

Since 1987, significant improvements in the river have been made by completing site specific clean-up activities, controlling point source discharges, encouraging pollution prevention techniques and restoring critical habitat areas along the river. These improvements are documented by the results of sampling and analyzing water quality, testing contaminant levels in the tissues of fish or mussels and collecting and analyzing sediments. Some specific examples include:

- Substantial reductions in the concentrations and loads for most of the NRTMP priority contaminants. Reductions, in most cases have been 50% or greater.
- USEPA and NYSDEC have completed remediation at 13 of 26 hazardous waste sites in New York that were identified as major contributors of contaminants to the Niagara River. This has resulted in an estimated reduction of inputs to the river by over 80%.
- Environment Canada, Ontario Ministry of Environment and others have jointly removed 10,500 cubic meters of sediments contaminated with heavy metals, oil and grease from the Welland River (a shipping canal between Lake Erie and Lake Ontario).

The cleaner Niagara River is a success story in the making and efforts by the Four Parties continue to reduce contaminants in the river. For more information about the NRTMP and details about the reductions in contaminants to the river, visit US EPA's website at:
http://www.epa.gov/glnpo/lakeont/nrtmp.

Remedial Action Plans

Remedial Action Plans (RAPs) were called for by the 1987 amendments to the Great Lakes Water Quality Agreement, signed by the federal governments of the United States and Canada. The federal governments, in cooperation with state and provincial governments, committed to develop and implement RAPs in 43 Area of Concern (AOCs). The RAP process strives to identify environmental problems (beneficial use impairments); identify pollutants causing the problems; identify the sources of the pollutants; recommend and implement remedial activities to restore the beneficial uses and document progress towards restoration. The ultimate goal, therefore, is to restore the area's beneficial uses and be able to delist the AOC. Read on to find out about what's happening with the Lake Ontario RAPs. You can also find information on the following websites: www.cciw.ca/glimr/program-RAPs.html or www.great-lakes.net/places/aoc/ontaoc.html.

Eighteenmile Creek (NY)

Currently, the RAP is continuing the investigation and assessment of creek sediments; evaluating possible sources of PCBs and other contaminants; remediating inactive hazardous waste sites in the area; monitoring the creek; improving combined sewer overflows (CSOs); and continuing surveillance activities. Three New York State Clean Air / Clean Water Bond Act grants have been awarded to the City of Lockport; two projects will reduce CSO's and one will expand wastewater treatment capacity in the City's sewage treatment plant. Additional implementation activities that continue include: core sampling and investigation of the hazardous waste site at Williams Street Island.

Rochester Embayment (NY)

Monroe County Department of Health takes the lead role in implementing the RAP. Currently four oversight committees are developing delisting criteria and monitoring needs. Implementation activities include lawn care education, pollution prevention for auto recyclers, phosphorus removal at small wastewater treatment facilities, creating a water quality education collaborative organization, establishing a phosphorus loading goal, and preparing small watershed plans.

Oswego River (NY)

Habitat restoration was identified as the key activity which needs to be addressed to move the RAP to implementation. The Remedial Advisory Committee will focus on the recommendations, next step remedial strategies, and restoration/protection criteria for the area of concern. Important elements of the RAP remedial strategies include upstream watershed activities involving power dam relicensing requirements regarding habitat and flow, inactive hazardous waste site remediation including the Onondaga Lake cleanup, continued fish flesh studies involving Lake Ontario and the Oswego River area, contaminated river sediment determinations, and identifying and conducting investigations to assist in use impairment assessments.

Toronto (Ontario)

RAP implementation continues with the Waterfront Regeneration Trust and the Toronto and Region Conservation Authority as the local coordinating agencies. The City of Toronto is developing a wet weather flow plan to address the CSO problem, and an interagency, coordinated watershed monitoring framework is being developed to track progress towards delisting. At the November 1999 Clean Water Summit, two hundred and thirty participants called for protection of the Oak Ridges Moraine - the headwaters of the Toronto AOC watershed. 1999 RAP Award winners were recognized for the 15 km Bartley Smith Greenway plantings and naturalization in the Don River Valley, the Etobicoke Stormwater Exfiltration System, a 2-km in-system retrofit stormwater management technology that allows stormwater to filtrate back into the soil, and the Peel Children's Groundwater Festival, educating some 5000 children a year about water resources and the environment.

Hamilton Harbour (Ontario)

The Regional Municipality of Hamilton-Wentworth is currently undertaking major improvements at the Woodward Avenue Wastewater Treatment Plant at an expected cost of $21 million. Shoreline habitat construction has resulted in an increase in the number of fish species and the area of aquatic plant vegetated cover. (Northeastern Shoreline, LaSalle Fact Sheets, 1998) Pending the results of an environmental assessment and public review, the Randle Reef contaminated sediment clean-up project is expected to begin in the summer 2000.

Port Hope Harbour (Ontario)

Contaminated sediment from the harbour is to be removed to a low level radioactive waste storage facility. A conceptual plan for the facility was developed and approved in 1999 with local endorsement. Natural Resources Canada is currently negotiating a draft agreement with the town of Port Hope. Cleanup of the contaminated sediments in the harbour would lead to the restoration of this area of concern.

Bay of Quinte (Ontario)

RAP implementation activities continue to be focused on restoring and protecting habitat, optimizing sewage treatment plant operations and reducing phosphorus loadings, and increasing farm acreage converted to conservation tillage. Habitat gains are being realized and there are now a greater diversity of top order predators in the fishery. Delisting criteria are being reviewed considering the gains made to date.

Lake Ontario LaMP Public Involvement

Marlene O'Brien, EC

The Four Parties responsible for the Lake Ontario Lakewide Management Plan are committed to involving the public in the LaMP. Public involvement includes a range of activities - from promoting awareness of the LaMP to encouraging partnerships between governments, the private sector and the general public.

• Lake Ontario LaMP Public Involvement

How it works

The public involvement strategy provides various opportunities for people to learn about the Lake Ontario LaMP, stay informed about progress and participate in LaMP activities. Activities are directed toward the public at three levels of interest or involvement.

The first level includes people who are already involved in groups working to conserve and restore Lake Ontario. We reach out to them by attending their meetings and mailing information to their members.

The second level of involvement is the mailing network which is made up of individuals who have attended public meetings or have requested information on the LaMP. They may also have responded to requests for input or have provided comments on one of our documents.

The third level of interest is that of the general public who receive information about the LaMP through the media or on our Web site.

What we've been doing

Since the last Update, the Public Involvement Committee has been updating the mailing list and looking at additional ways to reach the public. In order to strengthen ties between RAPs and LaMPs, we are targeting stakeholders who are already involved in activities to remediate problems in the Lake Ontario basin to receive information on the LaMPs.

At the same time, we are improving the Lake Ontario LaMP web site to better convey information on Lake Ontario and the LaMP. A "postcard" has been added to the site to help people request information packages. It can be completed electronically or downloaded and mailed to the agencies.

Each spring we hold a public meeting, which alternates between Niagara Falls, Ontario and Niagara Falls, New York, to report on LaMP activities. The 1999 meeting was held June 16 in Niagara Falls, Ontario. Besides offering an opportunity to meet with agency staff to discuss progress of the LaMP, the meeting included presentations on topics such as water quality, tributary monitoring and contaminant trackdown, fish and benthic communities and colonial water birds. This year, the meeting will be held at the Days Inn, Riverview at the Falls, 401 Buffalo Avenue, Niagara Falls, New York., on June 29 from 7-9 PM.

Upcoming Opportunity for Involvement

This fall, the Lake Ontario LaMP will be releasing a document, "Lake Ontario LaMP 2000", that will present an assessment of existing programs, updated sources and loadings information, revised objectives and indicators and draft load reduction strategy. We will be seeking public input on this report and it would be an excellent opportunity to get involved in the LaMP. If you would like to be included on our mailing lists, please contact - in the United States - Mike Basile, or - in Canada -Marlene O'Brien, at the addresses indicated at the end of this Update.

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Lake Ontario Lakewide Management Plan Next Steps

• Lake Ontario Lakewide Management Plan Next Steps

At its July 1999 meeting, the Great Lakes Binational Executive Committee (BEC), the senior government representatives to the Great Lakes Water Quality Agreement, adopted a consensus position on the role of LaMPs. The resolution called for an acceleration of schedules, an emphasis on action over planning, and a streamlined review and approval process for the LaMPs.

It was resolved that LaMPs, instead of reporting in stages, will report every two years on all elements of the LaMP stages described in the GLWQA, as information is available. The reports are to include commitments by the governments and other parties, and suggested and voluntary actions, to bring about actual improvements in the Great Lakes ecosystem.

The Lake Ontario Stage 1 LaMP, released in 1998, already included elements of the BEC decision, in that it addressed elements of Stage 2 and 3 LaMPs, and included a three-year binational work plan. The BEC's resolution recognized the Four-Party Agreement for Lake Ontario and the uniqueness of the binational work plan.

The Lake Ontario LaMP has been working to meet the binational work plan commitments, as we have reported here. As the current binational work plan expires in Fall 2000, the principal focus of the Lake Ontario LaMP will be the preparation and completion of a Fall 2000 LaMP ("LaMP 2000"). LaMP 2000 will present the progress of the LaMP under the current three-year work plan and set out commitments of the agencies in a revised work plan. The principal elements of LaMP 2000, as described in the current work plan, include:

- Assessment of existing programs
- Revised ecosystem objectives and indicators
- Updated sources and loadings
- Draft load reduction strategy

The revised binational work plan will include actions by the Four Parties which will be reported on in the LaMP document to be released in 2002.

The BEC decision anticipated that the LaMPs would be reporting on similar issues, and therefore, while not specifying formats, it included requirements for the content of the biennial LaMP reports. LaMP 2000 will report on all aspects of Lake Ontario LaMP progress since the LaMP Stage 1 Report consistent with the BEC decision. Similarly, the next binational work plan will include actions to continue our work on all the elements of the Stage 1 Report, leading to the 2002 report.

Should you wish to receive further information on the Lake Ontario LaMP, please contact one of the following:

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For more information on the LaMP program (Making Progress, Next Steps and Public Involvement) please contact: Marlene O'Brien or Mike Basile at the numbers listed above.


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