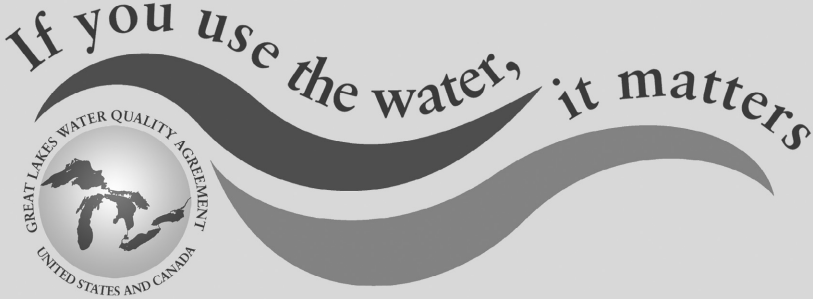

A Guide to the Great Lakes Water Quality Agreement

Background for the 2006 Governmental Review

In June 2005, the Canadian and U.S. governments asked the International Joint Commission to seek the views of the public on the operation and effectiveness of the Great Lakes Water Quality Agreement.

This publication is designed to support that initiative.

The governments will consider the views submitted to them by the IJC as they review the Agreement starting in 2006.

For more information about the Great Lakes Water Quality Agreement, the public meetings in the Great Lakes–St. Lawrence River basin in the fall of 2005 and associated online events, see www.ijc.org/glconsultations or call 1 866 813-0642.

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INTERNATIONAL JOINT COMMISSION
Canada and United States

COMMISSION MIXTE INTERNATIONALE
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A Guide to the Great Lakes Water Quality Agreement

Background for the 2006 Governmental Review

The Agreement defines the Great Lakes Basin Ecosystem as

"the interacting components of air, land, water and living organisms, including humans, within the drainage basin of the St. Lawrence River at or upstream from the point at which this river becomes the international boundary between Canada and the United States."

A Guide to the Great Lakes Water Quality Agreement

Background for the 2006 Governmental Review

An International Treasure Worth Protecting

For those of us who live in Canada and the United States, it's easy to forget that almost 20 percent of the world's fresh water lies within our boundaries, in five of the world's largest lakes — the Great Lakes. Consider some of the great reasons to restore and protect the Great Lakes basin ecosystem:

- The lakes cover 95,000 square miles or 245,759 square kilometers in area and have a shoreline of 10,210 miles or 17,017 kilometers.
- They hold 22,809 cubic kilometers or 5,500 cubic miles of water, but less than one percent of the water is renewed annually by precipitation, surface water runoff and inflow from groundwater surfaces.
- More than 350 species of fish call the lakes their home, as well as 3,500 species of plants and animals.
- The region is home for 37 million Canadians and Americans, and more than 40 million people get their drinking water each day from the Great Lakes drainage basin.
- Every day, 56 billion gallons of water are used from the Great Lakes for municipal, agricultural or industrial uses.
- More than 250 million tons of cargo is shipped on the Great Lakes annually, primarily iron ore, coal and grain. The shipping industry brings $3 billion to the region each year, provides jobs for 60,000 Americans and Canadians, and uses the primary transportation route in eastern North America.
- Approximately 40 million pounds of fish are harvested each year, through commercial and sport fishing, which contributes more than $3.5 billion to the region's economy.
- Thirty percent of all U.S. and more than 25 percent of Canadian agricultural production occurs in the Great Lakes region. One-third of the basin's land is used for agriculture, primarily for corn, soybeans, and livestock such as cattle and hogs. The lakes also provide climate niches where specialty crops can be produced, including cherries, blueberries, grapes, and nursery plants. And with much of the shoreline tree-covered, the forestry and pulp and paper industries are staples of the region's economy.
- Tourism revenue continues to increase annually from hunters ($2.6 billion), recreational boaters ($2 billion), anglers ($2.5 billion), and the more than 70 million people who visit the region's 10 national parks and hundreds of state and provincial parks.
- Only one percent of the Great Lakes' water actually flows out of the system each year. Because of this, water will stay in Lake Superior for up to 191 years, 99 years in Lake Michigan, 22 in Lake Huron, 6 in Lake Ontario, and 2.6 years in Lake Erie. This means that pollution can stay in the lakes' waters for many generations.

Summary

The Great Lakes Water Quality Agreement is a formal international agreement, first signed in 1972 by Prime Minister Pierre Trudeau and President Richard Nixon, that reflects the two countries' commitment to resolve a wide range of water quality issues facing the Great Lakes and the international section of the St. Lawrence River.

The governments recognized that for the Agreement to be successful, it needed to be adaptable to new challenges. Changes to the Agreement would be made as existing issues were more thoroughly understood and as new issues emerged. Consequently, the Agreement provides for consultation between the federal governments and periodic reviews of the operation and effectiveness of the Agreement as a whole.

The two governments will formally begin their next Agreement review in spring 2006.

In June 2005, the governments asked the Commission to hold a series of public meetings throughout the Great Lakes and St. Lawrence River basin with a view to their upcoming review of the Agreement. Through these meetings, the IJC will develop a comprehensive set of the issues, questions and suggestions raised by the public for the governments to take into account when they begin their work in the spring of 2006.

This Guide to the Great Lakes Water Quality Agreement is designed to assist the public throughout the review process.

The 1972 Agreeement set general and specific water quality objectives and mandated programs to meet them. It gave priority to point-source pollution from industrial sources and sewage plants. Point-source pollution was dramatically reduced and many visible and noxious pollution problems were alleviated.

A new Great Lakes Water Quality Agreement was signed in 1978. It undertook to seek the restoration and maintenance of the chemical, physical and biological integrity of the waters of the Great Lakes basin ecosystem. The new Agreement adopted an ecosystem approach (one which considers the interaction of air, land, water and living things, including humans) and called for a broad range of pollution-reduction programs. It called for the virtual elimination of the input of persistent toxic substances following a zero discharge philosophy. The levels of various persistent toxic substances in the fish and wildlife declined significantly.

The Agreement was amended in 1987 and called for programs to restore both the quality of open waters and beneficial water uses in 43 of the most contaminated local areas in the basin. Conditions have improved significantly in a number of these local "Areas of Concern", although only two have been delisted.

The Agreement has not been revised for nearly 20 years and now, despite considerable progress, new challenges are emerging while some old ones persist. What does this mean for the Agreement? Should it — or how should it — address issues like alien invasive species, population growth and urbanization, new chemical pollutants, climate change and human health?

The Agreement is a lengthy document, describing in great detail the programs and other activities the governments intend to carry out to restore and maintain the chemical, physical, and biological integrity of the waters of the Great Lakes Basin Ecosystem. Policy goals, major commitments, and organizational and procedural matters are contained in the body of the Agreement. Most detailed program descriptions, schedules and reporting arrangements are contained in Agreement annexes.

For more information about the Agreement and the review, visit www.ijc.org/glconsultations. To order printed copies of this or other IJC publications, call 1 866 813-0642.

The Great Lakes Water Quality Agreement between the United States of America and Canada

The United States and Canada share a long history of working together to address significant issues facing waters that cross the shared boundary. The Boundary Waters Treaty of 1909 started this formal process of cooperation, and created the International Joint Commission (IJC) to help them. The two governments extended this approach to issues facing the Great Lakes when they signed the Great Lakes Water Quality Agreement in 1972.

The Agreement is a formal international agreement that reflects the two countries' commitment to resolve a wide range of water quality issues facing the Great Lakes basin and international section of the St. Lawrence River. These issues were, and in many cases still are, critical to the economic and social health of not only the Great Lakes region, but to the entire United States and Canada.

The governments' approach in the Agreement was farsighted. While respecting the different ways each country deals with water quality issues and building on many existing programs, the two governments adopted shared goals and objectives and created joint activities and institutions to help them achieve their goals. The governments also recognized that for the Agreement to be successful, it needed to be adaptable to new challenges. Changes to the Agreement would be made as existing issues were more thoroughly understood and as new issues emerged. Thus, many detailed programs are included in Agreement annexes with relatively simple procedures for amendment. The Agreement also provides for consultation between the federal governments and periodic reviews of the operation and effectiveness of the Agreement as a whole.

The two governments will formally begin their next Agreement review in spring 2006. In keeping with the advisory role the governments gave to the IJC in the 1972 Agreement, they asked the Commission to hold a series of public meetings throughout the Great Lakes and St. Lawrence River basin. Through these meetings, the IJC will develop a comprehensive set of the issues, questions and suggestions raised by the public for the governments to take into account in their review.

This Guide to the Great Lakes Water Quality Agreement is provided to assist the public throughout the review process. It includes a brief history of the Agreement, a summary of its current provisions, a discussion of accomplishments and remaining work, and a short

section on some issues the governments may consider during their review. Readers are encouraged to use this as a basis for organizing their comments and advice to the Commission and the governments on their vision for the future of the Great Lakes–St. Lawrence River basin and the Great Lakes Water Quality Agreement.

The Agreement Over Time

The Great Lakes Water Quality Agreement has been the cornerstone of U.S.–Canadian cooperative efforts on Great Lakes water quality issues since it was first signed in 1972. Over the years, several significant amendments to the Agreement and shifts in its implementation have reflected an evolving understanding of the many complex issues involved.

The 1972 Agreement

In the early 1960s, as conditions in the Great Lakes deteriorated and concerns grew for both ecosystem and human health, the governments of Canada and the U.S. asked the IJC to determine whether Lakes Erie and Ontario and the international section of the St. Lawrence River were being polluted on either side of the boundary to the injury of health and property on the other, contrary to the 1909 Boundary Waters Treaty. If so, the IJC was to identify the causes and recommend remedial or other measures to address the problem.

The Commission's advisory boards reported excessive levels of phosphorus at several locations in the Great Lakes, and the Commission's final report in 1970 concluded that municipal and industrial pollution was indeed occurring on both sides of the boundary to the injury of health and property on the other side. The report recommended several actions to the governments to improve water quality in the basin including programs that would control phosphorus inputs into the lakes, new water quality objectives, and the establishment of new institutions to coordinate the overall cleanup effort.

The Commission's findings and recommendations were used by the governments as the basis of the negotiations that resulted in the 1972 Great Lakes Water Quality Agreement, which was signed on April 15, 1972 by Prime Minister Pierre Trudeau and President Richard Nixon.

Russell Train, then Chairman of the U.S. Council of Environmental Quality, stated that the Agreement was "unprecedented in scope" and should serve as an international model. Mitchell Sharp, then Canada's Minister of External Affairs, noted that the Agreement was the most far reaching of its kind "ever signed by two governments in the environmental field."

The 1972 Agreement set basinwide water quality objectives and included a binational commitment to design, implement and monitor municipal and industrial pollution control programs. The governments also included a requirement to comprehensively review the Agreement's operation and effectiveness after five years.

The accord made the Commission responsible for collecting, analyzing, and disseminating water quality data, monitoring water quality and related programs, and providing advice and recommendations to attain water quality objectives. To advise the Commission on this work, the Agreement established the Great Lakes Water Quality Board (composed of senior representatives of the federal, state and provincial governments) and the Research Advisory Board (composed of research managers). The governments also gave the Commission two new assignments: to examine the water quality impacts of land use activities and to examine water quality specifically in Lakes Superior and Huron. Finally, through the Agreement, the governments required the establishment of a regional office in the Great Lakes basin, which the IJC would administer, to assist the IJC with its new responsibilities.

The International Joint Commission

The IJC was established under the Canada–U.S. Boundary Waters Treaty of 1909. From its beginning, the IJC's fundamental role has been to help prevent and resolve transboundary water resource and environmental disputes between the U.S. and Canada through processes that seek the common interest of both countries. When requested by the two governments, it provides non-binding recommendations on transboundary issues. The IJC also, on application, issues Orders, generally with conditions, allowing projects that affect the levels and flows of boundary waters, such as the hydroelectric power plants at the outlets of Lakes Superior and Ontario. Finally, the Commission alerts the governments to emerging issues along the boundary that may have the potential to cause disputes.

Under the Great Lakes Water Quality Agreement, the IJC analyzes information provided by the governments, assesses the effectiveness of programs in both countries and reports on progress toward meeting the Agreement's objectives. The IJC makes recommendations at least every two years based on the work of its scientific, engineering and policy experts.

The IJC's Advisory Boards: Monitoring Progress and Recommending Action

The Agreement created two primary advisory boards to the Commission. **The Great Lakes Water Quality Board** (WQB), comprised of U.S. and Canadian federal, state, provincial and regional governmental officials, is the IJC's principal advisor for all Agreement programs and provides advice to the IJC on a broad spectrum of Great Lakes environmental and water quality issues. The second, the **Great Lakes Science Advisory Board**, is the principal scientific advisor to the IJC and the WQB and has members from the academic, governmental and industrial research community. It provides advice on scientific research and development to identify, evaluate and resolve current and emerging issues related to Great Lakes water quality.

The Commission also established the **Council of Great Lakes Research Managers**, which brings the top research program managers together to discuss research findings, coordinate research and monitoring, and determine research needs to achieve the Agreement's goals. In addition, the **International Air Quality Advisory Board**, comprised of academic and governmental researchers and managers, advises the Commission on transboundary air quality issues between the two countries, including those that affect Great Lakes water quality.

The Agreement also created the **Great Lakes Regional Office** (GLRO) in Windsor, Ontario, to assist the Commission and its Agreement boards. The Canadian and U.S. staff in this office provides administrative support and technical assistance to the various Great Lakes advisory boards. Additionally, the GLRO provides a public information service for the programs and public hearings undertaken by the Commission.

The 1978 Agreement

In 1978, the two governments replaced the 1972 Agreement with a new agreement. The 1978 Agreement built upon the foundation established in the earlier Agreement, as well as new information from scientists both in and out of government. It shifted the focus from conventional pollutants, such as phosphorus and bacteria, to toxic and hazardous polluting substances. Persistent toxic substances remain in the environment for very long periods, can accumulate in living organisms, and can have serious impacts on the health of wildlife and humans. Through the 1978 Agreement, the two countries adopted a policy that the discharge of any or all persistent toxic substances be

virtually eliminated in the Great Lakes and international section of the St. Lawrence River. Timelines were then established for municipal and industrial pollution abatement and control programs.

Perhaps the most significant change in the 1978 Agreement was the inclusion of a more holistic view through the use of the term "Great Lakes Basin Ecosystem" which it defined as the interacting components of air, land, water and living organisms, including humans, within the drainage basin of the Great Lakes and the international section of the St. Lawrence River. Thus the entire ecosystem was incorporated into the Agreement's goal "to restore and maintain the chemical, physical, and biological integrity of the waters of the Great Lakes Basin Ecosystem."

The 1978 Agreement continued the practice of assigning certain advisory responsibilities to the Commission. Terms of reference were included for the Great Lakes Water Quality Board, a new Science Advisory Board, and the Great Lakes Regional Office. It also provided for the amendment of specific annexes as needed, and specified a review of the Agreement following every third Commission biennial report on Great Lakes water quality.

Amendments in 1983

The 1978 Agreement was amended in 1983 to enhance efforts to reduce phosphorus inputs into the lakes. Scientists from both countries worked together to set the target loads for each lake that would need to be met to achieve the water quality objectives in the Agreement. On October 16, 1983, a Phosphorus Load Reduction Supplement to Annex 3 of the 1978 Agreement was signed that outlined measures to reduce phosphorus loading throughout the basin. As a result, detailed plans to reduce phosphorus loading to receiving waters were developed and adopted by each jurisdiction in the basin.

The 1987 Protocol Amending the 1978 Great Lakes Water Quality Agreement

After an extensive review of the Agreement, which included considerable public input and involvement, the governments signed the 1987 Protocol. The Protocol added several new programs and initiatives through comprehensive new annexes. For example, a new annex identified specific Areas of Concern (AOCs), or the most seriously polluted areas in the basin, and procedures for cleanup through the development and implementation of Remedial Action Plans (RAPs). This annex also prescribed principles and procedures to address critical pollutants in the open waters of the lakes by developing and implementing Lakewide Management Plans.

Annex 2: Great Lakes Areas of Concern and Remedial Action Plans

Great Lakes Areas of Concern (AOCs) are severely degraded geographic areas within the Great Lakes basin. They are defined by Annex 2 of the 1987 Protocol to the U.S. – Canada Great Lakes Water Quality Agreement as "geographic areas that fail to meet the general or specific objectives of the Agreement where such failure has caused or is likely to cause impairment of beneficial use of the area's ability to support aquatic life." The U.S. and Canadian governments identified 43 such areas including 26 in U.S. waters, 12 in Canadian waters, and five binational sites shared between the U.S. and Canada on connecting river systems (the Niagara River and St. Lawrence River AOCs each have a U.S. and Canadian Remedial Action Plan).

Two AOCs, both in Ontario, Canada, have been formally delisted: Collingwood Harbour and Severn Sound. The governments have also designated Spanish Harbour and Presque Isle Bay as "areas of recovery" where remaining beneficial uses will be restored through natural recovery rather than further remedial actions.

The Agreement directs the two federal governments to cooperate with state and provincial governments to develop and implement Remedial Action Plans (RAPs) for each Area of Concern. The RAPs identify specific problems and describe methods to correct them. They are typically compiled by a state or provincial department in charge of natural resources, signed by the secretary or minister of that department, and submitted to the International Joint Commission for comment. Advisory committees, comprised of local stakeholders, are involved in the development of the RAPs.

The Agreement requires each RAP take an ecosystem approach to restoring and protecting beneficial uses in each AOC. A RAP also must include problem identification, steps to solve these problems that include determination of responsible parties, a timetable for action, and documentation that problems are resolved.

Because each AOC is faced with different environmental problems, each RAP is unique in its approaches to restore impaired beneficial uses and to identify the options for remediation. The goal of the RAPs is to accurately reflect the environmental conditions, encompass the concerns of all stakeholders, and secure a clear commitment for full implementation.

Other new or revised annexes addressed pollution from land runoff, contaminated sediments, surveillance and monitoring programs, specific objectives for persistent toxic substances, contaminated groundwater, airborne toxic substances, and research coordination.

The 1987 Protocol also transferred major data collection and reporting responsibilities from the Water Quality Board to the governments. Most of the new or revised annexes required the governments to make biennial progress reports to the Commission so that it could evaluate Agreement progress. The Protocol also included enhanced requirements for bilateral consultation, and specifically called upon the governments — in cooperation with the states and provinces — to meet twice a year to coordinate their respective Agreement work plans and to evaluate progress. The governments established the Binational Executive Committee to implement this Agreement provision.

The 1978 Agreement's provision for formal review after every third biennial report by the IJC, or approximately every six years, remained in the Protocol. The Agreement has been reviewed twice since the 1987 Protocol, but it has not been modified since then; it will be reviewed again by the governments in 2006.

The Binational Executive Committee

The Binational Executive Committee (BEC) is composed of senior-level representatives of Canadian and U.S. federal, state, provincial, and tribal and First Nations agencies who are accountable for delivering major programs and activities that respond to the terms of the Great Lakes Water Quality Agreement. Several NGOs have been given observer status as well.

BEC aims to meet twice a year or as required to:

- set priorities and strategic direction for binational programming in the basin;
- coordinate binational programs and activities;
- respond to new and emerging issues on the Great Lakes including tasking existing or creating new working groups to undertake designated activities;
- evaluate progress under the Great Lakes Water Quality Agreement; and,
- provide advice, comment or other input for the preparation of various binational reports and presentations.

Summary of the Agreement

The current Great Lakes Water Quality Agreement is a lengthy document, describing in great detail the programs and other activities the governments intend to carry out to restore and maintain the chemical, physical, and biological integrity of the waters of the Great Lakes Basin Ecosystem. Policy goals, major commitments, and organizational and procedural matters are contained in the body of the Agreement. Most detailed program descriptions, schedules and reporting arrangements are contained in Agreement annexes, which are integral parts of the Agreement. A brief summary of the articles and annexes follows; the full text of the Agreement can be found on the Commission's website: www.ijc.org/rel/agree/quality.html

Summary of Agreement Articles

Article I provides definitions of the terms used in the Agreement. It is in this article that it defines the Great Lakes Basin Ecosystem as "the interacting components of air, land, water and living organisms, including humans, within the drainage basin of the St. Lawrence River at or upstream from the point at which this river becomes the international boundary between Canada and the United States."

Article II defines the purpose of the Agreement, which is to restore and maintain the chemical, physical, and biological integrity of the waters of the Great Lakes Basin Ecosystem.

Article III outlines the general objectives for the Great Lakes system. The Great Lakes system is defined as all streams, rivers, lakes and other water bodies within the drainage basin up to the St. Lawrence River, at or upstream from the point at which this river becomes the international boundary between Canada and the United States. The general objectives state that these waters should be free from, as a result of human activity,

- substances that settle to form objectionable sludge deposits or adversely affect aquatic life or waterfowl;
- floating materials such as debris, oil, or scum in amounts that are unsightly or deleterious;
- heat material that produces color, odor, or taste that interferes with beneficial uses;
- materials and heat that produce harmful or toxic conditions to human, animal, or aquatic life; and
- nutrients in amounts that create growths of aquatic life, which interfere with beneficial uses.

Article IV outlines the adoption of specific objectives for the boundary waters of the Great Lakes system, and notes that these objectives are detailed in Annex 1 of the Agreement.

Article V requires that the governments' water quality standards and other regulatory requirements be consistent with the achievement of the general and specific objectives of the Agreement, and commits the governments to use their best efforts to ensure that state and provincial requirements also meet these objectives.

Article VI details how the federal governments, in cooperation with state and provincial governments, will develop programs to address pollution from the following sources: municipal; industrial; agriculture, forestry and other land use activities; shipping; dredging; onshore and offshore facilities; airborne; contaminated sediment; and contaminated groundwater.

Article VII details how the International Joint Commission will assist in the Agreement's implementation and explains its responsibilities. The Commission is required to fully report to the federal, state and provincial governments at least every two years concerning progress toward the achievement of the Agreement's general and specific objectives, and of its annexes. The Commission also may submit a summary report in alternate years, and may at any time make special reports. All of the Commission's reports are to be distributed to the governments and to the public.

Article VIII outlines the makeup and responsibilities of the two boards that will advise the Commission. A Great Lakes Water Quality Board serves as the Commission's principal advisor, and a Great Lakes Science Advisory Board provides advice on research and all science matters to the Commission and the Water Quality Board. The Agreement creates a Great Lakes Regional Office, to be administered by the Commission, to provide administrative support and technical assistance to the two Boards, and to provide an information service for the programs undertaken by the Commission and the Boards. Terms of reference outlining the duties and functions of the two Boards and the Regional Office are appended to the Agreement.

Article IX details how the governments and the Commission should cooperate to exchange water quality information.

Article X explains the Agreement consultation and review process to be carried out between the governments, including consultations following the governments' receipt of Commission reports. The governments must meet twice a year to coordinate their respective work plans and to evaluate progress, and they must conduct a comprehensive review of the operations and effectiveness of the Agreement following every third Commission biennial report.

Article XI commits the governments to seek appropriate funds to implement the Agreement, enact additional necessary legislation, and cooperate with the Great Lakes state and provincial governments in all matters relating to the Agreement.

Article XII emphasizes that nothing in the Agreement diminishes the rights and obligations of the governments as set forth in the Boundary Waters Treaty.

Article XIII details how the Agreement, its annexes and terms of reference may be amended by the governments.

Article XIV notes that the Agreement shall enter into force upon signature by the duly authorized governmental representatives and remain in force for five years, and thereafter until terminated with twelve months' written notice by one government to the other.

Article XV explains how the 1978 Agreement supersedes the 1972 Agreement.

Summary of Agreement Annexes

Annex 1: Specific Objectives, includes the specific goals and objectives for persistent and non-persistent toxic substances, including pesticides, nutrients, metals and other organic and inorganic substances as well as pathogens and radionuclides.

Annex 2: Remedial Action Plans and Lakewide Management Plans, provides principles and procedures for the governments to use to restore beneficial uses in Areas of Concern and the open waters of the Great Lakes. This includes the development and implementation of Remedial Action Plans and Lakewide Management Plans, and the review of these plans at different stages by the International Joint Commission.

Annex 3: Control of Phosphorus, sets target loadings for phosphorus in each of the Great Lakes and describes the programs to be developed that will reduce the phosphorus inputs to the Great Lakes.

Annex 4: Discharge of Oil and Hazardous Polluting Substances from Vessels, requires the adoption of compatible regulations and programs to reduce discharges of oil and hazardous polluting substances. These include vessel design, construction and operation, and the training of personnel.

Annex 5: Discharge of Vessel Wastes, calls for the development of compatible regulations dealing with the discharge of garbage, sewage and wastewater from vessels.

Annex 6: Review of Pollution from Shipping Sources, requires ongoing review, consultation and analysis of a wide range of issues related to marine sources of pollution.

Annex 7: Dredging, establishes a committee under the Great Lakes Water Quality Board to review dredging practices and activities, with particular attention to wetlands threatened by dredged materials disposal activities.

Annex 8: Discharges from Onshore and Offshore Facilities, addresses discharges from onshore and offshore facilities, particularly those related to oil exploration, exploitation and transportation.

Annex 9: Joint Contingency Plan, directs the U.S. and Canadian Coast Guards to develop, amend and maintain a joint Canada – USA marine contingency plan to respond to pollution incidents in the Great Lakes.

Annex 10: Hazardous Polluting Substances, commits the governments to maintain and continually update a list of substances known to have toxic effects on aquatic and animal life and that have a risk of being discharged to the Great Lakes basin, and to develop and implement discharge prevention programs.

Annex 11: Surveillance and Monitoring, describes the activities to be undertaken to assess compliance with Agreement requirements, achieve goals and objectives, evaluate water quality trends, and identify emerging problems. This includes development of ecosystem health indicators.

Annex 12: Persistent Toxic Substances, outlines the governments' agreement to develop and adopt programs and measures to eliminate discharges of persistent toxic substances to the Great Lakes.

Annex 13 : Pollution from Nonpoint Sources, specifies programs and measures to reduce nonpoint pollution from urban and rural land use activities, and commits the governments to develop and implement watershed management plans and to preserve and rehabilitate wetlands.

Annex 14: Contaminated Sediment, describes the governments' agreement to map, assess and manage contaminated sediments by establishing compatible criteria, evaluating methods to quantify transfer of contaminants from sediment to biota, and developing management procedures.

Annex 15: Airborne Toxic Substances, addresses research, surveillance and monitoring, modeling and pollution control measures related to atmospheric deposition of persistent toxic substances using data from sampling network stations.

Annex 16: Pollution from Contaminated Groundwater, commits the governments to mapping groundwater systems, assessing their quality, coordinating programs, controlling sources of contamination, and reporting progress on implementation.

Annex 17: Research and Development, delineates research needs to support the achievement of Agreement goals, and specifically details research related to cause/effect relationships; varying lake levels; sources, fate and effects of pollutants; non-native species introductions; and control of municipal and industrial wastes and effluents.

Successes and Challenges for the Great Lakes Water Quality Agreement

Both countries have made considerable progress in reversing the impacts of chemical, physical, and biological damage to the Great Lakes and St. Lawrence River ecosystem. Tremendous efforts have been made to clean up the lakes and protect them from further pollution, and governments at all levels have put billions of dollars to the task. Industries have made significant strides in changing production processes, the products produced, and cleaning up contaminated areas. Municipalities, often supported by other levels of government, upgraded sewage and water treatment facilities across the basin, particularly in the early phases of work under the Agreement. Community and environmental groups have worked tirelessly to monitor progress and improve the environmental condition of the Great Lakes and St. Lawrence River system.

A lot has been done, but much more is needed to fulfill the Agreement's mission to fully restore and maintain Great Lakes water quality. Governments identified specific objectives and developed water quality criteria and regulations to achieve them, but important developments in computing and computer modeling and advances in biological and environmental science have shown that what once was thought to be "enough" is not sufficient to protect vulnerable populations of humans, fish and wildlife. Two good examples of this dilemma are reductions in phosphorous loading and the input of persistent toxic substances such as PCBs and DDT.

Phosphorus

In the 1960s, excessive algal growth in the Great Lakes adversely impacted water quality. Canada and the United State s responded with aggressive programs to reduce phosphorus inputs through the use of phosphorus-free detergents, improvements to municipal and industrial sources, as well as using best management practices to improve the quality of runoff from agricultural lands and stormwater from urban areas. Recent open-lake total phosphorus concentrations for Lakes Michigan, Superior, Huron, and Ontario suggest that the Agreement's goals for phosphorus reductions have been met for these lakes. Concentrations in the three basins of Lake Erie fluctuate from year to year and frequently exceed target concentrations. In Lakes Ontario and Huron, some offshore and nearshore areas and embayments experience elevated levels that can promote nuisance algae growths. Comprehensive monitoring programs for loadings of phosphorus from nonpoint sources have been curtailed, limiting our ability to

track the sources of phosphorous: phosphorous loading to certain nearshore waters remains a persistent problem. Changing nutrient dynamics that result in phosphorous enrichment and subsequent seasonal low oxygen conditions because of aquatic invasive species (biological pollution) in Lake Erie are suspected but not yet verified. No clear solutions have been identified for these type of complex nutrient management challenges.

Persistent Toxic Substances

In this example, the governments established a policy to virtually eliminate the input of persistent toxic substances into the Great Lakes environment. Their Binational Toxics Strategy, adopted in 1997, has furthered this policy through a range of innovative partnerships within the health care, energy, manufacturing, governmental, non-governmental and other sectors. Through other national and Great Lakes–specific programs and initiatives, the two governments have made considerable progress toward achieving this goal. For example, the two countries have tracked total polychlorinated biphenyls (PCBs) and total DDT in lake trout tissue samples from Lakes Superior, Michigan, Huron, and Ontario and in walleye from Lake Erie over several years. Results from fish collected in 2000 show some impressive improvements. However, these lakes have and continue to receive inputs of persistent toxic substances from a variety of point and nonpoint sources, and all of the Great Lakes and their tributaries continue to have advisories to limit fish consumption.

Remedial Action Plans for Areas of Concern

Remedial activities in Areas of Concern (AOCs) are important steps to restoring and protecting water quality-related environmental conditions. Despite encouraging progress 41 of 43 AOCs still require action and monitoring. The Commission completed a special report on AOCs in 2003 that examined the status of restoration activities in these locations (see www.ijc.org/php/publications/html/aoc_rep/english/report/index.html). It identified wastewater infrastructure improvements and contaminated sediment remediation as the most significant remedial activities needed to restore the AOCs. The report details the dollars spent to date and the estimated costs of planned remediation actions, providing a measure of how far we have come and how far we still have to go.

Restoration efforts for the AOCs and the lakes as a whole are complicated by new chemical issues, such as inputs of polybrominated diphenyl ethers, and emerging biological challenges such as aquatic

Percent Change in DDT and PCB Concentrations

Lake	Contaminant	Species	Highest Recorded Concentration		Most Recently Measured Concentration		% of Highest Recorded Concentration
			Year	Value(ug/g)	Year	Value(ug/g)	
Superior	ΣDDT	Lake Trout	1977	1.2	2000	0.567	47%
	Total PCBs	Lake Trout	1980	1.89	2000	0.784	41%
Michigan	ΣDDT	Lake Trout	1970	19.19	2000	1.056	8%
	Total PCBs	Lake Trout	1974	22.91	2000	1.614	7%
Huron	ΣDDT	Lake Trout	1979	3	2000	0.557	19%
	Total PCBs	Lake Trout	1979	3.66	2000	0.779	21%
Erie	ΣDDT	Walleye	1977	0.51	2000	0.085	17%
	Total PCBs	Walleye	1977	2.64	2000	1.241	47%
Ontario	ΣDDT	Lake Trout	1977	1.93	2000	0.864	45%
	Total PCBs	Lake Trout	1977	8.33	2000	1.174	14%

Source: Elizabeth Murphy, MPH, U.S. Environmental Protection Agency Great Lakes National Program Office, in presentation to the Great Lakes Science Advisory Board, Chicago, March 2005.

invasive species. These and other issues limit our collective ability to define timelines to completely restore AOCs and the lakes. Further reductions in levels of persistent toxic substances will be difficult to achieve due to their usage in other countries and subsequent global airborne transport and deposition within the Great Lakes basin. Residual quantities will remain in contaminated sediment, and continued domestic use and transport from upland sites will continue their discharge into the lakes. In some areas, it will be necessary to rely on natural recovery to eliminate contaminated sediment, and recovery times could range from 10 to 80 years or longer.

The Cost of Restoring Great Lakes Areas of Concern

As of 2003, Canada had invested about $33 million (Cdn) on sediment remediation and approximately $270 million (Cdn) on wastewater infrastructure improvements in its AOCs. Identified future funding needs for those areas are about $1.9 billion (Cdn). The U. S. reported in 2003 that it had spent $160 million (US) for sediment remediation and more than $3 billion (US) for wastewater infrastructure improvements. Estimated future funding needs for U.S. AOCs is $7.4 billion (US). Based on these values, the first quarter of the journey toward remediation of Great Lakes AOCs has been completed. Detailed plans for many remedial actions have not been finalized and thus projected costs could change. For now, restoring all of the Great Lakes AOCs is estimated to cost an additional $9 billion (US). *Source: A Special IJC Report on The Status of Restoration Activities in the Great Lakes Areas of Concern. April 2003.*

Where Do We Go from Here?

Drafters of the original Great Lakes Water Quality Agreement anticipated that changes and adjustments would be needed in the Agreement based on experience, new science and a greater understanding of the Great Lakes Basin Ecosystem. They recognized that they didn't have all the answers, but knew that urgent, forceful action was needed. The governments responded with an extraordinary document, and in each revision to the Great Lakes Water Quality Agreement they continued to change and improve this historic model of international cooperation.

Consistent with Agreement provisions, the governments are required to initiate a comprehensive review of the Agreement early in 2006. This is an opportune time for such a review. Several collaborative initiatives are underway throughout the basin to protect and restore the Great Lakes Basin Ecosystem. While much good work has and is being done to achieve the Agreement's goals, some parts of the Agreement, such as some of the specific objectives for the concentrations of substances in water, are outdated and others have not worked as well as expected. One of the main purposes of the governments' review will be to consider which parts have worked well and which have not. They will also consider whether additional subjects should be addressed.

Experts have identified a number of serious challenges facing the Great Lakes now and into the future. A brief summary of some of these challenges follows.

Climate Change

Many experts believe that climate change, especially global warming, is already affecting the chemical, physical, and biological integrity of the Great Lakes Basin Ecosystem. The timing and significance of possible impacts are not well understood, but any alterations in water levels and water quality can affect to some degree the biological community including humans, wildlife, wetlands, and fish. Governments will need to consider whether climate change should be addressed in the Agreement.

Excess Nutrients

Inputs of nitrogen and phosphorous from point sources such as factories and sewage treatment plants have been largely controlled. Nonpoint sources such as stormwater runoff from farm fields or parking lots remain ongoing problems. Large-scale aquaculture can also lead to excess nutrients and other impacts. Combined sewer overflows and sanitary sewer bypasses also can result in increased concentrations of nutrients and other contaminants. Excess nutrients stimulate the growth of algae that can threaten the health of humans, fish, and wildlife and affect large areas such as the central basin of Lake Erie. They also cause taste and odor problems in drinking water, and foul beaches and swimming areas.

Aquatic Alien Invasive Species and Changes to the Biological Community

Approximately 170 aquatic alien invasive species, such as zebra mussels and sea lamprey, are not native to the Great Lakes ecosystem, and have dramatically impacted the ecology and economy of the lakes. These organisms were introduced from other continents or other parts of North America in a variety of ways, including the discharge of ballast water, from ships, canals, and hull and equipment fouling. Native species and ecosystems have not always been capable of resisting infection, infestation, predation or competition from these invaders. Despite more than a decade of attention and action such as the mandatory ballast water exchange requirements in some jurisdictions, the introduction and spread of alien invasive species continues, and at least two new species arrive every year. The lack of common regulations in the two countries has slowed progress.

Chemical Contaminants and Their Effects

While levels of some chemical pollutants have declined over the last 20 to 25 years, emerging chemical issues continue to raise concerns for human and ecosystem health. Critical pollutants are still detected in open waters at levels that sometimes exceed the most stringent criteria designed to protect wildlife and humans who consume fish. For example, levels of polychlorinated biphenyls (PCBs) and dieldrin in open waters of Lake Ontario are approximately 100 times higher than their respective standards. Fish consumption advisories are in effect in all lakes and their tributaries. PCBs, dioxins, mercury, chlordane and DDT account for most of the advisories. Some of the newer classes of persistent chemicals may impair or disrupt the endocrine system, potentially interfering with development, reproduction and growth in certain species.

Shoreline Development and Urban Sprawl

If current trends continue, the impact of future growth of urban areas within the Great Lakes and St. Lawrence River basin will lead to continued shoreline development and urban sprawl, with or without increases in population. Both further degrade water quality by increasing runoff, air pollution, groundwater contamination, and reducing fish and wildlife habitat and wetlands.

These emerging issues are not specifically addressed by the current Agreement. The governments likely will consider these and other emerging issues in their review of the Agreement; they may choose to address them within a revised Agreement, or by a variety of other mechanisms and programs.

Collaborative Initiatives

In the United States, a comprehensive **Great Lakes Regional Collaboration** is being carried out pursuant to an Executive Order signed by President George Bush in 2004. The collaboration brings together a broad range of stakeholders representing government and nongovernmental organizations at the local, regional, tribal, state and federal levels. Together, they are developing a consensus long-term strategy for Great Lakes restoration while at the same time providing a mechanism to address specific immediate threats, coordinate programs and maximize available resources. This collaboration complements the work of the United States' Great Lakes Interagency Task Force, a cabinet-level group tasked by the U.S. president to coordinate federal work in the Great Lakes, set priorities and target resources across agencies.

In Canada, federal–provincial collaboration on Great Lakes restoration and protection is achieved through the **Canada–Ontario Agreement Respecting the Great Lakes Basin Ecosystem** (COA). Since 1971, COAs have guided the federal and Ontario governments by outlining how they will cooperate and coordinate their efforts to restore, protect, and conserve the Great Lakes Basin Ecosystem. It builds on the actions taken through previous agreements, focuses priorities for future actions, and contributes to meeting Canada's obligations under the Great Lakes Water Quality Agreement. A new COA will be negotiated before the current COA expires in 2007.

The Great Lakes Governors and the Premiers of Ontario and Quebec are developing agreements to implement the **Great Lakes Charter Annex of 2001**. Once completed, these agreements, which address bulk removals and diversions of Great Lakes water, will update the regional water management system and help ensure the sustainable use of basin waters. Discussions related to Annex implementation over the past several years have provided an extraordinary opportunity for key officials and individuals, both in and out of government, to collectively explore the complexity of the Great Lakes basin ecosystem and various options to address challenges.

Your Role in the Great Lakes Water Quality Agreement Review Process

The U.S. and Canadian federal governments' intensive work to review the Great Lakes Water Quality Agreement will begin in 2006. We encourage you to follow this process and take advantage of opportunities to share your views with the governments about how their Agreement work is proceeding.

To help them prepare for their review, the governments asked the International Joint Commission to hold a series of public meetings as well as an online consultation to gather as much input from the public as possible on their concerns and expectations for the Agreement and the Great Lakes ecosystem. The governments want to know what the public's views are about how the Agreement has worked, what issues should be included in a revised Agreement, and how those issues should be addressed.

The Commission will hold 14 public meetings and a Web Dialogue in October and November, 2005. It will also accept comments online, by e-mail, fax, mail and telephone. For details and developments, see www.ijc.org/glconsultations or call 1 866 813-0642.

All information provided to the Commission will be collected and presented to the two governments, with a synthesis report, in early 2006.

We encourage you to consider how you can contribute to the governments' review, and what you would like the Great Lakes Water Quality Agreement to address.

The future of the Agreement and the Great Lakes rests in all of our hands. Through this review process, each of us can contribute to a process that ensures that the Great Lakes basin ecosystem is truly restored and protected.

Key Questions

Expectation:

What are the issues in your part of the basin and in the Great Lakes–St. Lawrence River ecosystem as a whole that you want to see addressed?

Effectiveness:

Is the Agreement effective in restoring and maintaining the waters of the Great Lakes–St. Lawrence River basin ecosystem?

Scope:

Does the Agreement deal with everything it should?

Public engagement:

How should the public be involved in the review and implementation?

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