
Great Lakes Training Program

Reference Manual



**The Delta Institute
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Chicago, IL 60604**



Table of Contents

Program Notes

- **Agenda**
- **Attendees**

Presentation

References

Internet Resources

Key Documents

- **Great Lakes Water Quality Agreement**
- **Great Lakes Charter**
- **Great Lakes Charter Annex**
- **Great Lakes – St. Lawrence River Basin Water Resources Compact**
- **Great Lakes Regional Collaboration Strategy**

Great Lakes Glossary



Great Lakes Basic Training Agenda

8:30 AM – 8:45 AM **Introduction**

A quick welcome and overview of the day with breakfast snacks and beverages provided to energize.

8:45 AM – 9:30 AM **Great Lakes Facts**

The section provides an overview of the history of the Great Lakes. Topics range from geology, hydrology, water levels, ecology, biology, population, and economics. And yes, there will be a quiz.

9:30 AM – 10:45 AM **Environmental & Natural Resources Issues**

The Great Lakes have been impacted by a variety of different stressors. This portion covers the many problems that are affecting the environmental health of the lakes including historical and emerging chemical contamination, land use, disease, invasive species, climate change and other hot topics.

10:45 AM – 11:00 AM **Morning Break**

11:00 AM – 12:00 PM **Treaties, Compacts & Agreements**

Many different types of agreements have been created to set up systems to improve the Great Lakes from the Boundary Waters Treaty of 1909 to NAFTA. This section showcases key agreements and discusses why they were enacted and their purposes.

12:00 PM – 1:00 PM **Lunch**

After discussing state, federal and international legislation, it is necessary to reenergize with lunch, which is provided.

1:00 PM – 2:15 PM **Institution, Programs & Authorities**

Who does what? Why? How? With whom? The Great Lakes area has a variety of organizations covering the gamut of environmental issues from AoCs to LaMPs and working at local, regional, state, federal and international levels.

2:15 PM – 2:30 PM **Afternoon Break**

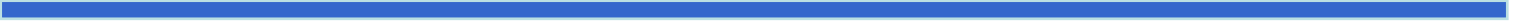
2:30 PM – 3:45 PM **Emerging Policy Opportunities**

Activity in the Great Lakes region has never been higher. This presentation covers what is going on and the importance of upcoming issues including Annex 2001, the Collaboration, and review of the Great Lakes Water Quality Agreement.

3:45 PM – 4:00 PM **Conclusion, Evaluation & Wrap-Up**



Presentation



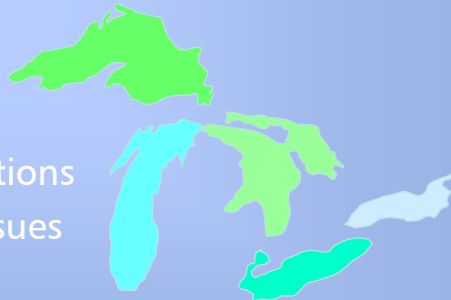
Great Lakes Basic Training



Delta Institute

Introduction

- An understanding of the Importance of the Great Lakes Watershed
- Historic Perspective of Environmental Stressors
- Programs, Agreements, Commissions and Institutions
- Current and Emerging Issues



Objectives

Delta Institute

Great Lakes Basic Training 2

Introduction



- Introduction and Objectives
- Great Lakes Facts
- Environmental & Natural Resource Issues
- Morning Break
- Treaties, Compacts & Agreements
- Lunch
- Institutions, Programs & Authorities
- Afternoon Break
- Emerging Policy Opportunities
- Conclusion

Agenda

Great Lakes Facts

- Obtain a brief history of the region
- Understand the scale of the Great Lakes
- Gain insight on the basic dynamics
- Explore the effects of the lakes on the region



Objectives

Great Lakes Facts



1. The Great Lakes represent what percentage of the world's freshwater supply?
2. How many people reside within the Great Lakes basin?
3. How deep is Lake Superior?
a. 483 feet b. 653 feet c. 1,248 feet d. 1,332 feet e. 1,684 feet
4. How many miles of coastline are there on the Great Lakes?
a. 5,208 b. 10,210 c. 8,690 d. 16,784 e. 21,347
5. How many years is water retained in Lake Michigan? Lake Erie?
a. 1.5 b. 2.6 c. 5.8 d. 13.4 e. 21 f. 35 g. 50 h. 99

Great Lakes Facts



6. The region represents what percentage of the US manufacturing output?
7. The Great Lakes states represent what percent of the US agriculture sales?
8. What is the largest economic sector?
9. How many tons of cargo is shipped through the St. Lawrence Seaway in 2003?
a. 21,000,000 tons b. 34,000,000 tons c. 73,000,000 tons
d. 66,000,000 tons e. 43,000,000 tons f. 177,000,000 tons
10. How many electoral college votes do the Great Lakes states have?
How does that compare to the number of electoral votes in 1950?
11. What was the last war fought in the Great Lakes?

Great Lakes Facts



1. The Great Lakes represent what percentage of the world's freshwater supply?

18%

2. How many people reside within the Great Lakes basin?

35,000,000 (25 million in the US, 10 million in Canada)

3. How deep is Lake Superior?

a. 483 feet

b. 653 feet

c. 1,248 feet

d. 1,332 feet

e. 1,684 feet

4. How many miles of coastline are there on the Great Lakes?

a. 5,208

b. 10,210

c. 8,690

d. 16,784

e. 21,347

5. How many years is water retained in Lake Michigan? Lake Erie?

a. 1.5

b. 2.6

c. 5.8

d. 13.4

e. 21

f. 35

g. 50

h. 99

Discussion

Great Lakes Facts



6. The region represents what percentage of the US manufacturing output?

60%

7. The Great Lakes states represent what percent of the US agriculture sales?

30%

8. What is the largest economic sector?

Manufacturing

9. How many tons of cargo was shipped through the St. Lawrence Seaway in 2003?

a. 21,000,000 tons

b. 34,000,000 tons

c. 73,000,000 tons

d. 66,000,000 tons

e. 43,000,000 tons

f. 177,000,000 tons

10. How many electoral college votes do the Great Lakes states have?

How does that compare to the number of electoral votes in 1950?

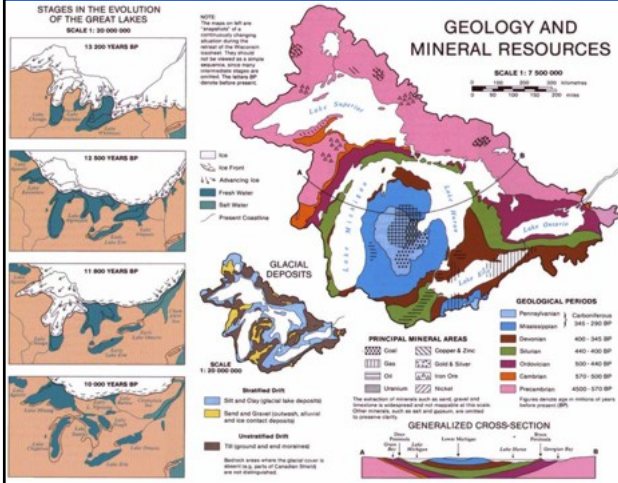
141 (out of 538, 26%), 169 in 1950.

11. What was the last war fought in the Great Lakes?

The War of 1812

Quiz

Great Lakes Facts



- The Great Lakes were formed around 10,000 years ago from glacial meltwater.
- Parts of the glaciers were over a mile thick.
- The glaciers did not retreat all at once, there were several warming/cooling cycles that occurred.
- After the retreat, the land underneath started decompressing, it is still occurring in northern regions of the basin.
- Sand, silt, clay and boulders were deposited in various mixtures, known as glacial drift.

Great Lakes Facts



The approximate percentage of land area in the basin by state ranks:

1. Michigan	100%
2. New York	32%
3. Wisconsin	32%
4. Ohio	29%
5. Minnesota	7%
6. Indiana	3%
7. Pennsylvania	1.3%
8. Illinois	0.2%
Ontario	21%

Great Lakes Facts



Lake	Superior	Michigan	Huron	Erie	Ontario
Elevation	600 ft	577	577	569	243
Length	350 mi	307	206	241	193
Breadth	160 mi	118	183	57	53
Ave. Depth	483 ft	279	195	62	283
Max. Depth	1,332 ft	925	750	210	802
Volume	2,900 mi ³	1,180	850	116	393
Surface Area	31,700 mi ²	22,300	23,000	9,910	7,340
Drainage Area	49,300 mi ²	45,600	51,700	30,140	24,720
Shoreline	2,726 mi	1,638	3,827	871	712
Retention	191 yrs	99	22	2.6	6

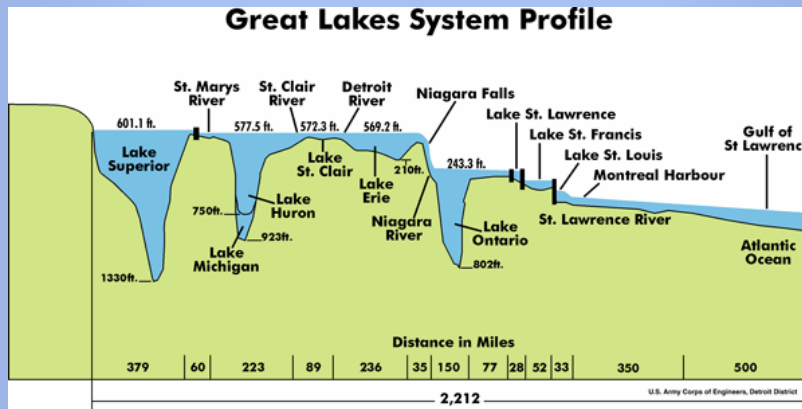
Hydrologic

1 mi³ = 1.1 trillion gallons, GL Total = 5439 mi³ = 5.9 quadrillion gallons.

Great Lakes Facts



Great Lakes System Profile



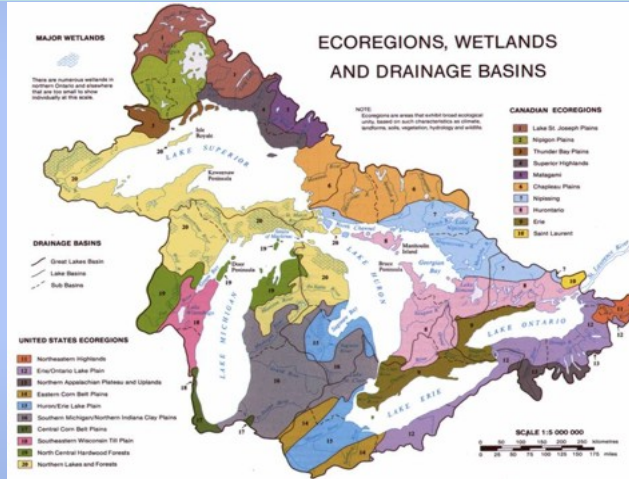
Hydrologic

Great Lakes Facts



The basin includes many types of ecosystems including:

- Coniferous forests
- Deciduous forests
- Tallgrass prairies
- Bogs, wetlands
- Freshwater dunes
- Aquatic



Ecologic

Great Lakes Facts



- 3,500+ species inhabit the basin.
- 130 are globally endangered or rare.



birds

- Bald eagle*
- Kirtland's warbler**
- Piping plover**

plants

- Dwarf lake iris*
- Eastern prairie fringed orchid*
- Houghton's goldenrod*
- Lakeside daisy*

insects

- Karner Blue butterfly**
- Mitchell's satyr butterfly**
- Hine's emerald dragonfly**

mammals

- Canada Lynx*
- Gray wolf*
- Indiana Bat**

reptiles

- Copperbelly water snake*
- Lake Erie water snake*

invertebrates

- White cat's paw pearly mussel**

* = Federally-listed threatened species
 ** = Federally-listed endangered species

Biologic

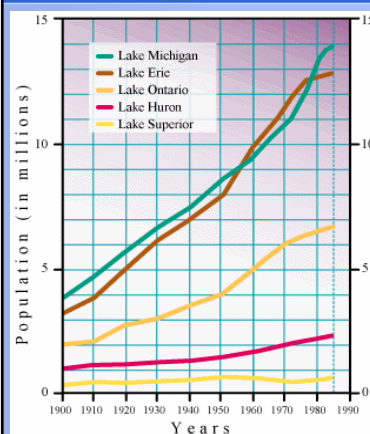
Great Lakes Facts



Distribution of Eastern Woodlands Indians.
Courtesy Britannica

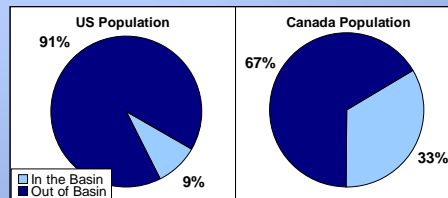
- Human settlement began around 8,000-9,000 years ago.
- Approximately 120 bands of Native Americans have occupied the Great Lakes basin comprising the many tribes in the area.
- In 1615, French explorers first encountered Native Americans by Lake Huron.
- Europeans traded their iron tools (needles, hatchets, traps, guns, etc.) for the furs and skins of the Native peoples.
- Relations deteriorated after the American revolution as settlers spread westward.

Great Lakes Facts

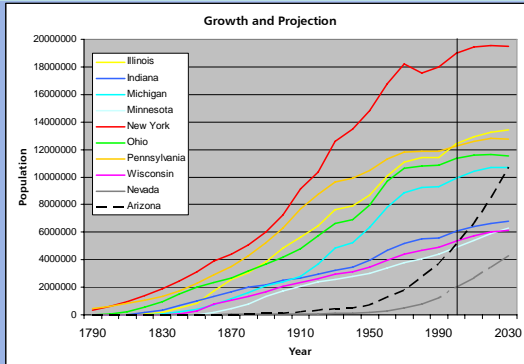


Population

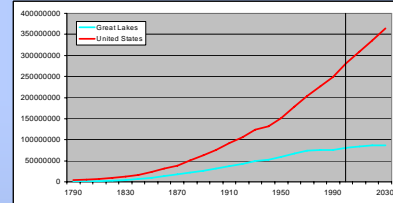
- Prior to the 1600s, the Native American population ranged between 60,000 and 117,000.
- Population reached 300,000 in 1800 and 11.5 million in 1900.
- The population jumps to 23 million in 1930.
- Today the population is at approximately 35 million.
- 10% of US Population is in the basin, while over 30% of the Canadian Population is in the basin.



Great Lakes Facts



The Great Lakes states are projected to grow at a rate of 7%, over the next 25 years, while the US is expected to grow at 29%. Some states are expected to double their populations.

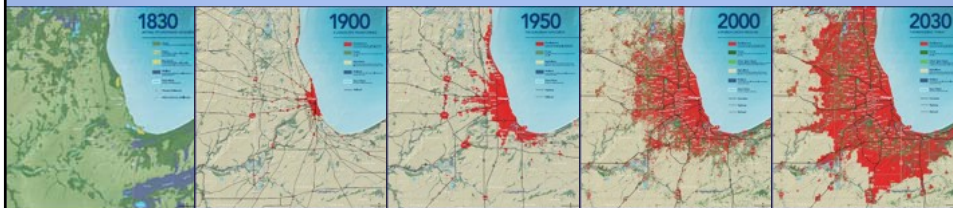


Population increase 2000 - 2030

	Illinois	Indiana	Michigan	Minnesota	New York	Ohio	Pennsylvania	Wisconsin	Great Lakes	United States	Nevada	Arizona
%	8.2%	12.0%	7.6%	28.2%	2.6%	1.7%	4.0%	14.7%	7.20%	28.87%	114.29%	108.79%
Rank	39	31	40	20	46	47	45	28			1	2

Population

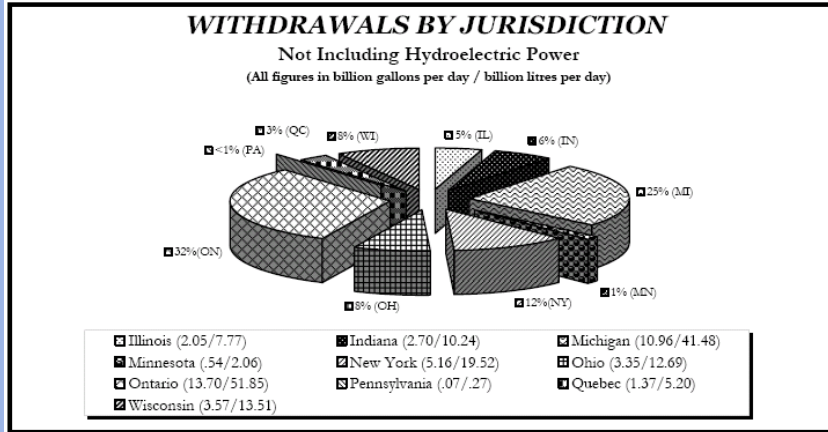
Great Lakes Facts



- Even with slower than average growth rates projected for the Great Lakes states, continued urbanization of metropolitan areas will continue to change the natural landscape.
- The five maps show the increased development in the Chicago region from 1900 through 2030.
- This pattern is projected for many of the 17 metropolitan areas in the Great Lakes region.

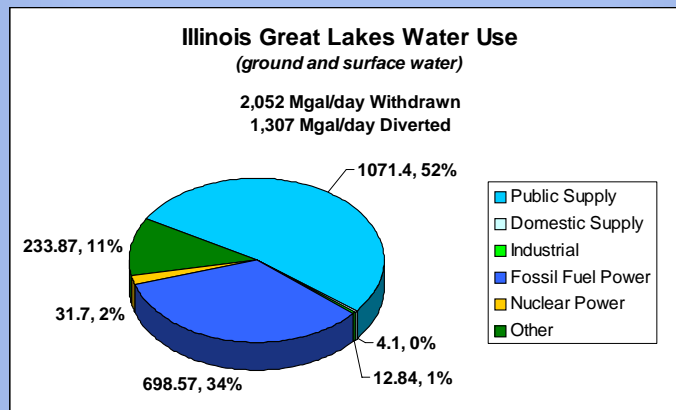
Population

Great Lakes Facts



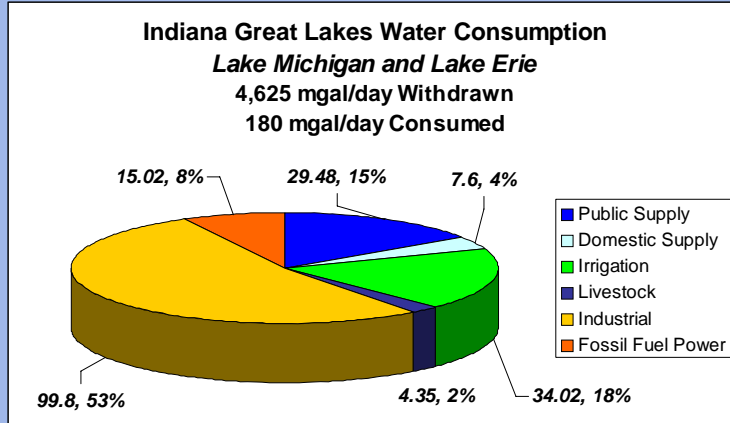
Water Use

Great Lakes Facts



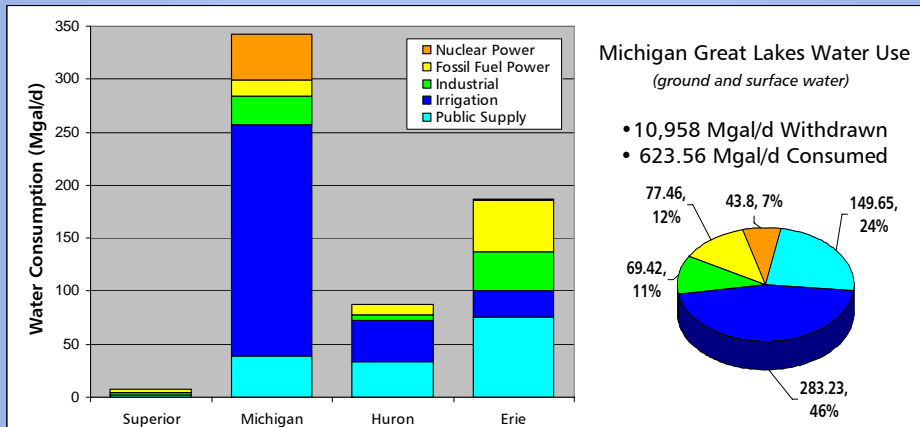
Water Use

Great Lakes Facts

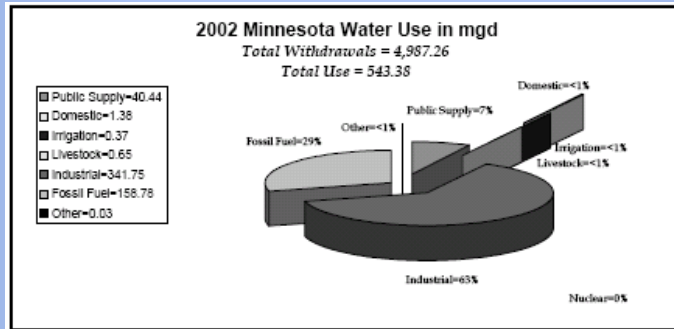


Water Use

Great Lakes Facts

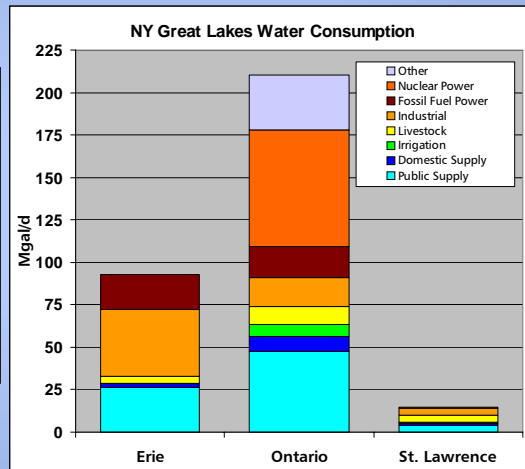
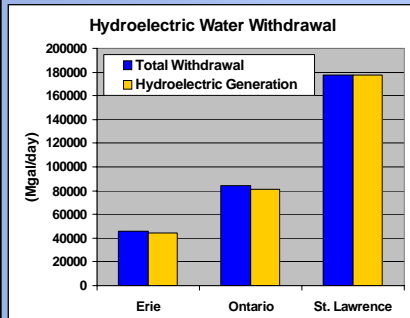


Great Lakes Facts



Water Use

Great Lakes Facts



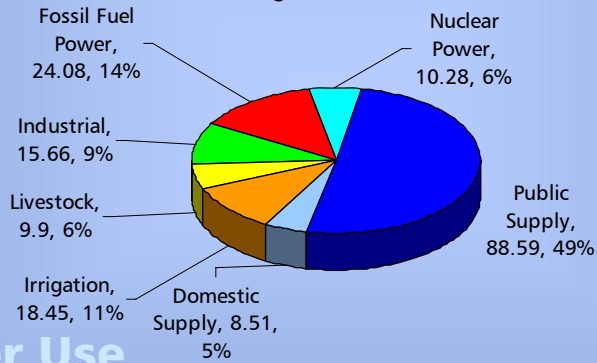
Water Use

Great Lakes Facts



Ohio Great Lakes Water Use

175.5 Mgal/d Consumed
3352.7 Mgal/d Withdrawn



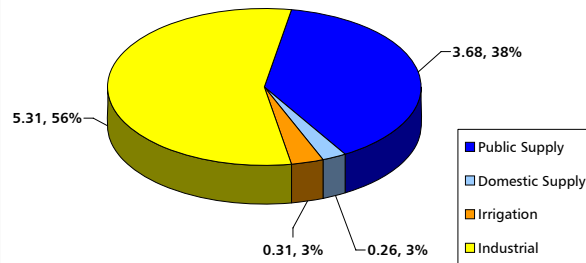
Water Use

Great Lakes Facts



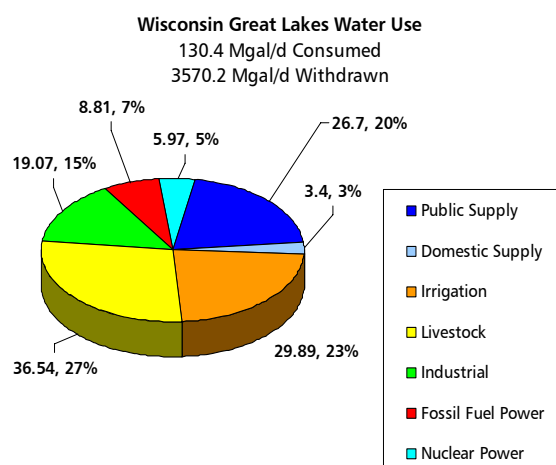
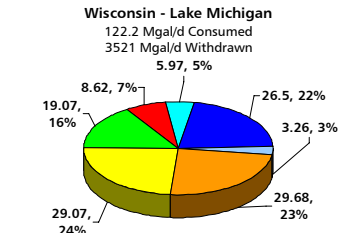
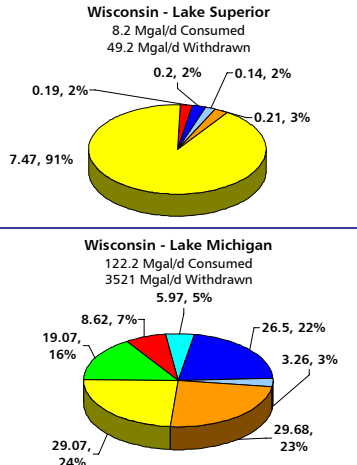
Pennsylvania Great Lakes Water Use

9.56 Mgal/d Consumed
70.44 Mgal/d Withdrawn



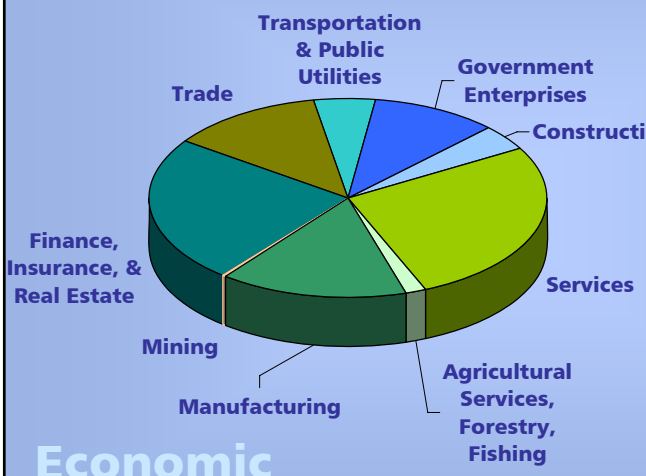
Water Use

Great Lakes Facts



- Public Supply
- Domestic Supply
- Irrigation
- Livestock
- Industrial
- Fossil Fuel Power
- Nuclear Power

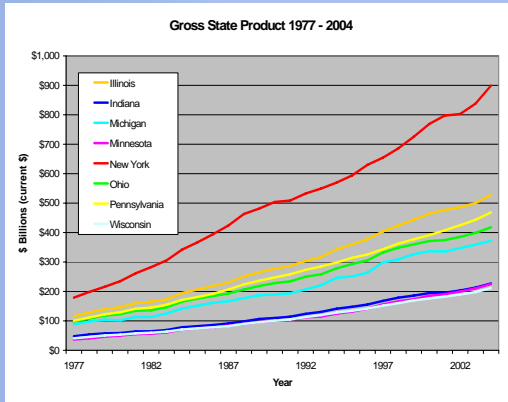
Great Lakes Facts



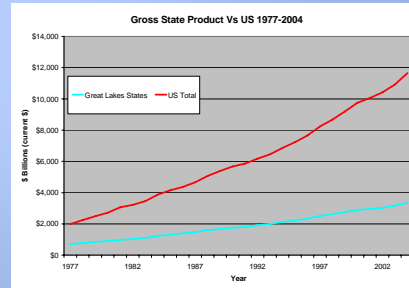
- The regional economy produced roughly \$3.3 trillion in 2004 accounting for about 29% of the U.S. GDP.
- The Great Lakes economy is diversified and manufacturing is the top single sector.
- The GDP of the region is the third-largest in the world, led only by the US itself and Japan.

Economic

Great Lakes Facts

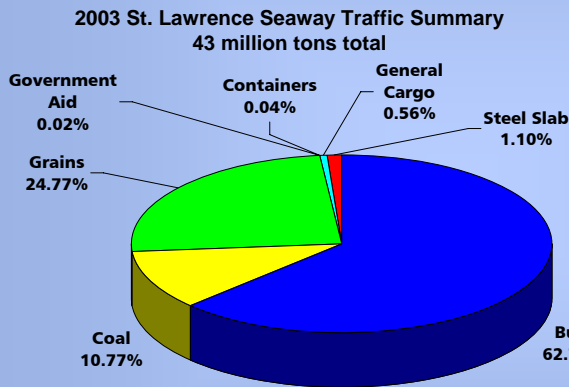


The Great Lakes states have reduced their economic growth compared to the US as a whole, decreasing from 36% of GDP in 1977 to 29% in 2004, adjusted for inflation.



Gross State Product

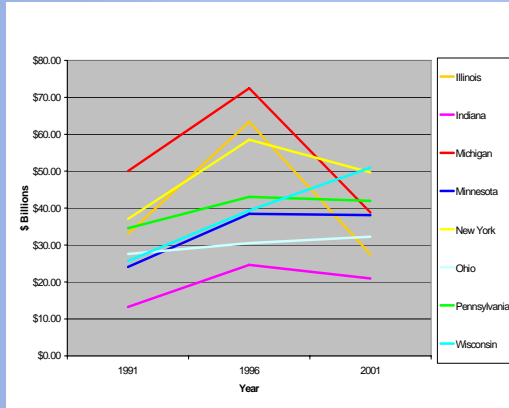
Great Lakes Facts



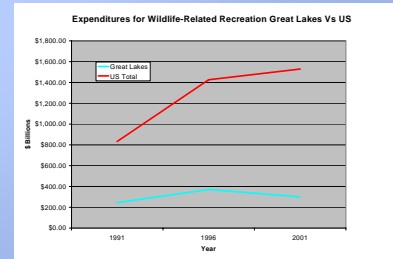
- 15 Major International Ports and 50 smaller regional ports
- Since 1959, more than 2 billion metric tons of cargo estimated at \$300 billion have moved to and from Canada, the United States and more than 50 other nations.
- More than 60 percent of seaway traffic travels to and from overseas ports, especially in Europe, the Middle East, and Africa.
- Iron ore, coal, grain, and steel make up about 80 percent of all cargoes shipped each year.

Shipping

Great Lakes Facts

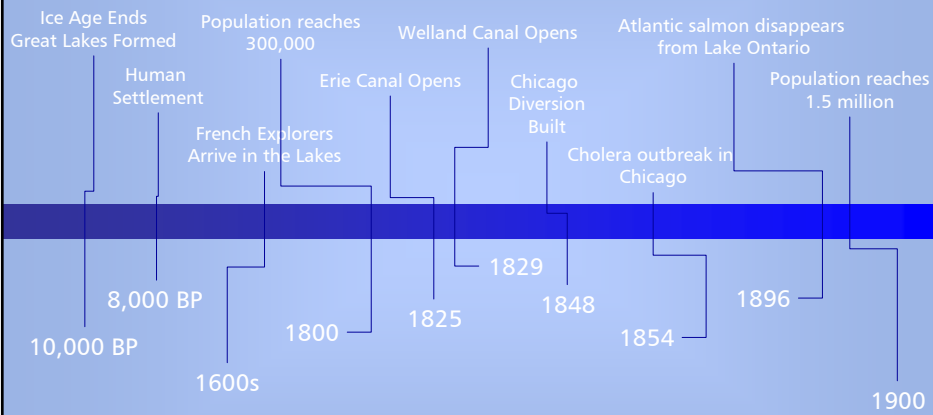


Wildlife recreation expenditures in the Great Lakes decreased overall from 1991 to 2001, even as the expenditures of the U.S. increased overall in the same period, from 29.5% of the U.S. total to 19.5% (data adjusted for inflation in 2005 dollars).



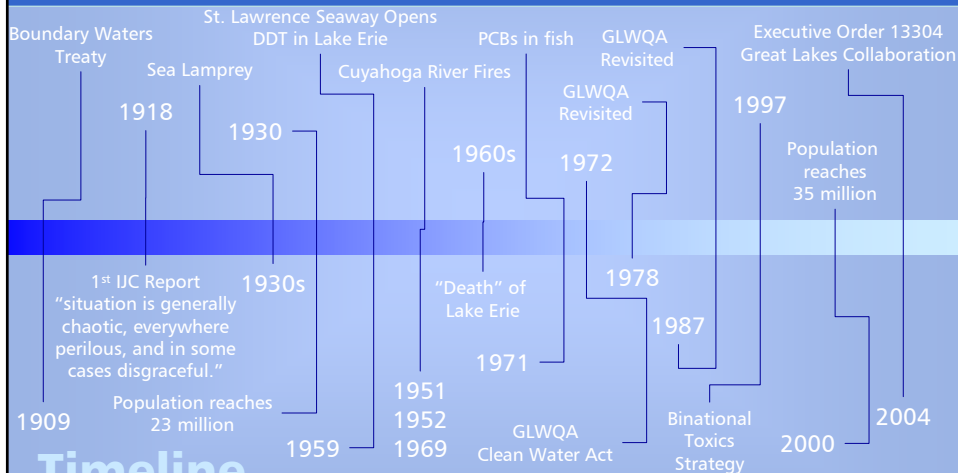
Wildlife Recreation

Great Lakes Facts



Timeline

Great Lakes Facts



Timeline

Environmental & Natural Resources Issues

- Obtain an overview of the history of Great Lakes ecosystem issues.
- Identify the stressors in the Great Lakes basin.
- Understand the impacts of environmental degradation and resource depletion.



Objectives

Environmental & Natural Resources Issues



Date: Today
To: Knowledgeable Team
From: New Agency Director
Re: Memo Request

Team,

I am happy to be joining this agency and it gives me great pleasure to work with such talented individuals as yourselves. I do need your assistance to become more acquainted with the important aspects of our work. Please develop a briefing on the top three to five items regarding environmental and natural resource management issues around the Great Lakes.

Sincerely,

Director

Brief

Environmental & Natural Resources Issues



- Small Group Reports
- Discussion

Discussion

Environmental & Natural Resources Issues



Invasive Species
Lake Levels
Sedimentation
Nonpoint Source Pollution
Bioaccumulation
Endangered Species
Dioxins
Wetland Destruction
Air Deposition
E. Coli
Water Pollution
Toxins
Pesticides
Endocrine Disruptors
Mercury Contamination
Climate Change
Cryptosporidium
Biodiversity
Fishery Depletion
PCBs

Discussion

Environmental & Natural Resources Issues



- The Great Lakes basin have been impacted by many different stressors over the history of the region.
- Dramatic improvement has occurred with time and effort: cholera outbreaks are no longer occurring and fires no longer break out on the water.



- New problems are being discovered and some persistent issues still remain.



Sources

Environmental & Natural Resources Issues



- Non-Point Source pollution effects the Great Lakes through the following categories:
 - Agriculture and Farming
 - Fertilizers, pesticides and animal waste from the various farming activities around the region can find their way into the lakes via runoff from fields.
 - Storm water
 - In addition to agricultural runoff, storm water from cities and industrial sites enter the lakes. Any pollution on the ground can be swept into storm water drains including sewer overflows.
 - Hydromodification in forested areas and agricultural lands can change storm water flow in non urban areas.
 - Air Deposition
 - Pollution emitted into the atmosphere from industrial activities and mobile sources is deposited into the lakes from local, regional, national and international origins.

Non-Point Source



Environmental & Natural Resources Issues



- Point Sources are those that have direct inputs into the Great Lakes system.
 - Municipal sources mainly consist of wastewater treatment facilities.
 - Industrial facilities either send their wastewater to municipal treatment plants or treat their water onsite and directly discharge into waterways.



Point Source

Environmental & Natural Resources Issues



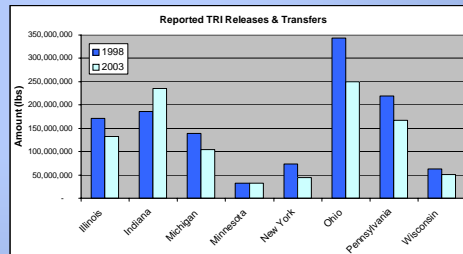
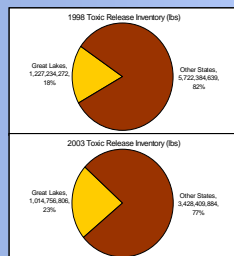
- Sewage
 - From combined sewer overflows and leaking septic systems.
 - Causes spread of disease, bacterial blooms, and adds nutrients to the water.
- Nutrients
 - From sewage and agricultural runoff.
 - Phosphorus and nitrogen cause algal blooms and creates eutrophication in the lakes and ultimately results in “dead zones.”
- Toxics
 - From a variety of sources around the Great Lakes and cause a multitude of different problems. Pesticides, heavy metals, organochemicals, and endocrine disruptors are regarded as having serious impacts on the Great Lakes.

Impacts

Environmental & Natural Resources Issues



- The Toxics Release Inventory (TRI) reports annual data on the release and transfer of over 600 toxic chemicals used by industry.
- The Great Lakes states have reduced their use and release of toxic chemicals by over 20% between 1998 and 2003, but still account for 23% of the national total.



State	Rank
Illinois	16
Indiana	9
Michigan	20
Minnesota	33
New York	26
Ohio	5
Pennsylvania	14
Wisconsin	30

Toxics

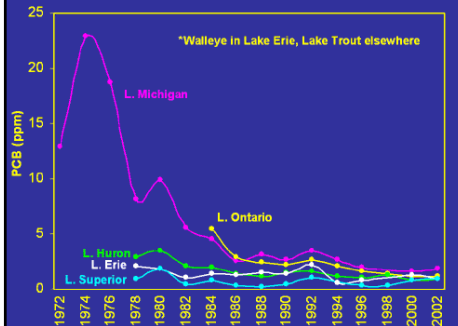
Environmental & Natural Resources Issues



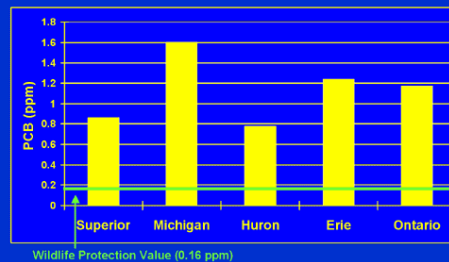
Environmental & Natural Resources Issues



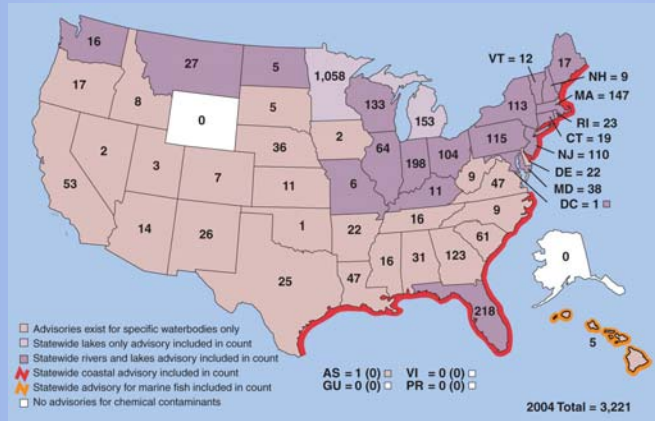
PCBs in Great Lakes Top Predator Whole Fish*, Even Year Sites



PCBs in Great Lakes Top Predator Whole Fish in 2000 (Walleye in Erie, Lake Trout elsewhere)



Environmental & Natural Resources Issues



Fish Consumption Advisories

Environmental & Natural Resources Issues



Great Lakes Fish Monitoring Program Analyte List

- | | |
|-----------------------|---------------------|
| •PCB congeners | •s-nonachlor |
| •PCB co-planars | •Trans-nonachlor |
| •hexachlorobenzene | •pp, op-DDT |
| •Pentachlorobenzene | •pp, op-DDE |
| •Octachlorostyrene | •pp, op-DDD |
| •d-HCH (Lindane) | •Endrin |
| •a-HCH | •Mirex |
| •Aldrin | •Toxaphene&homologs |
| •Dieldrin | •PCDD/Fs ** |
| •Heptachlor epoxide a | •PBDEs ** |
| •Heptachlor epoxide b | •PBB-153 ** |
| •Cis-chlordane | •PCNs ** |
| •Trans-chlordane | •Hg ** |
| •Oxychlordane | •Fraction lipid |

Current Monitoring

Environmental & Natural Resources Issues



- The table shows a list of emerging chemicals of concern.
- Additionally, each LaMP has developed a list of chemicals that are impacting each Great Lake specifically.

Great Lakes Monitoring Workshop List (3/6/2001)

- | | |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"> • Polybrominated Diphenyl Ethers (PBDEs) • Polybrominated Biphenyls (PBBs) • Tetrabromobisphenol A (TBBPA) • Short-chain Chlorinated Paraffins (SCCP) • Perfluorooctane Sulfonate (PFOS) | <ul style="list-style-type: none"> • Polychlorinated Naphthalenes (PCNs) • Alkylphenol Ethoxylates (APEs) • Current Use Pesticides – Dacthal & Chlorothalonil • Pharmaceuticals & Personal Care Products (PPCPs) |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

Chemicals of Concern

Environmental & Natural Resources Issues



- Decades of industrial activity have resulted in sediment contaminated with PCBs, PAHs, heavy metals and other toxic chemicals.
- 31 Areas of Concern have been established around in the Great Lakes to target remediation efforts.
- As of 2003, over 3 million cubic yards of sediment has been remediated.

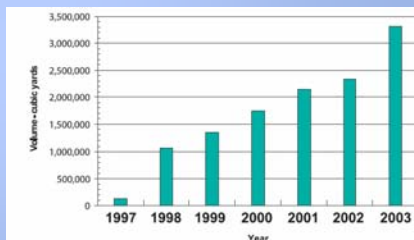
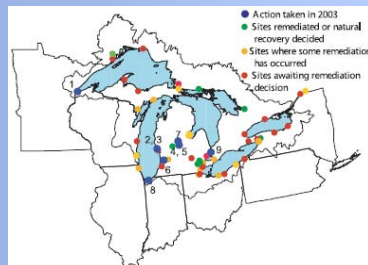


Figure 6-1. Cumulative Volume of Sediment Remediated in the U.S. Since 1997.™ Source: US EPA – Great Lakes National Program Office

Contaminated Sediments

Environmental & Natural Resources Issues



- The Legacy Act of 2002 calls for \$270 million to be used for sediment remediation in AoCs.
 - \$10 million was appropriated for FY04 and \$45 million for FY05.
- While 3 million cubic yards has been remediated, it is estimated that over 76 million cubic yards of sediment needs to be cleaned up around the Great Lakes.

	Volume	Low End Est.	High End Est.
Illinois	200,000	\$ 10,000,000	\$ 25,000,000
Indiana	4,389,000	\$ 219,425,000	\$ 1,231,700,000
Michigan	25,427,210	\$ 475,926,000	\$ 1,054,230,670
Minnesota	687,500	\$ 58,400,000	\$ 79,000,000
New York	1,525,000	\$ 76,250,000	\$ 305,000,000
Ohio	4,697,729	\$ 170,336,461	\$ 415,903,525
Pennsylvania	-	\$ -	\$ -
Wisconsin	39,409,000	\$ 635,400,000	\$ 974,900,000
Great Lakes	76,335,439	\$ 1,645,737,461	\$ 4,085,734,195

Contaminated Sediments

Environmental & Natural Resources Issues



- Beach closures continue to increase in the Great Lakes region. The more that beaches are monitored, the more they are being closed.
- The main cause of closure is due to high bacterial levels, followed by storm water and sewerage contamination.
- Some areas around the Great Lakes are still not accessible to recreation due to contamination by PCBs, PAHs, and heavy metals.



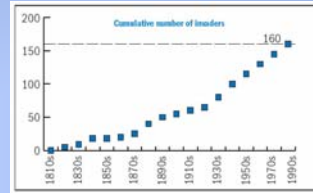
	2004		2003	
	Monitored	Closing Days	Monitored	Closing Days
Illinois	53	790	53	391
Indiana	24	61	24	88
Michigan	200	255	186	93
Minnesota	38	143	35	33
New York	37	473	30	256
Ohio	47	271	47	255
Pennsylvania	11	3	3	0
Wisconsin	113	984	112	738
Great Lakes	523	2980	490	1854
Total Monitored Days	47593			
Closed %	6.3%			

Beach Closures

Environmental & Natural Resources Issues



- 160 species have been introduced into the Great Lakes region since the 1800s.
- The alien species have had dramatic effects on the structure of the Great Lakes ecosystem.



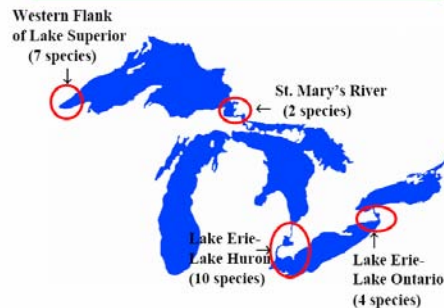
Invasive Species

Environmental & Natural Resources Issues



Ship traffic flow pattern and percent total discharge from BOB and NOBOB vessels in the Great Lakes 1981-2000.

Invasion hotspots represent 5.6% of Great Lakes water surface area but 54% of the NIS recorded in the Great Lakes since 1959.

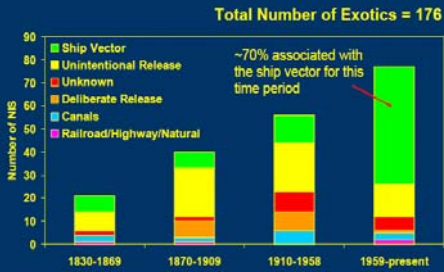


Invasive Species

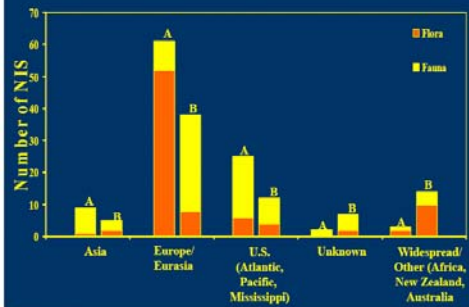
Environmental & Natural Resources Issues



Invasion Mechanisms for the Great Lakes



Donor regions for floral and faunal non-indigenous species (NIS) introduced to the Great Lakes from 1810-1958 (A) and 1959-2000 (B).



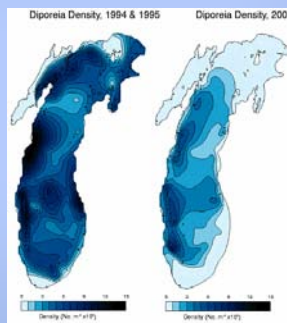
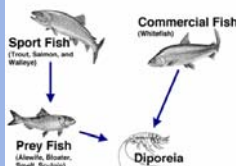
Invasive Species

Environmental & Natural Resources Issues



- Invasive species impact both the ecosystem health, but also the economic health of the Great Lakes region. Including:
 - Food Web Alteration
 - Sport Fishing Industry
 - Water Intake

Great Lakes Food Web



Invasive Species

Environmental & Natural Resources Issues



- Dredging is overseen by the U.S. Army Corps of Engineers.
- Corps maintains 139 channels and harbors around the basin.
- Great Lakes dredging is performed for:
 - navigation channels,
 - flood protection,
 - waterfront construction,
 - clearing water supply intakes,
 - placing or repairing utilities that cross under rivers, and
 - environmental remediation.
- Approximately 5 million cubic yards dredged in the Great Lakes. Disposal of per year dredged material:
 - 32% disposed of in open water off shore;
 - 12% disposed of near shore for beach restoration.
 - Remainder in Confined Disposal Facilities (CDFs).
- Dredging can resuspend contaminants from sediments and alter natural shoreline systems.

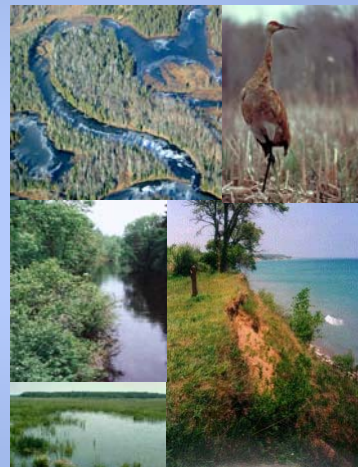


Dredging

Environmental & Natural Resources Issues



- 530,000 acres of coastal wetlands in the Great Lakes consisting of marshes, swamps, and peatlands (bogs & fens)
- Often connected to waterways, but sometimes isolated (i.e., kettle hole wetlands).
- Wetlands provide flood control, nutrient runoff mitigation, and critical habitat.
- Two thirds of the natural Great Lakes wetlands have already been filled or drained for agriculture, urban uses, shoreline development, recreation and resource extraction (such as peat mining).

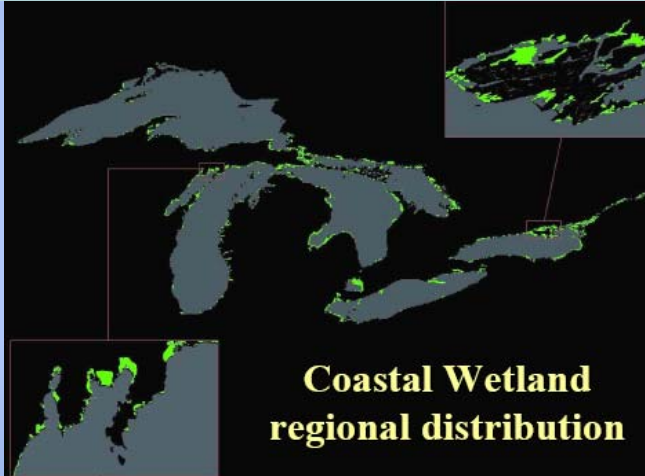


Wetlands

Environmental & Natural Resources Issues



Coastal Wetlands	Acres
Lake Superior	65,766
St. Marys River	26,651
Lake Huron	151,809
Lake Michigan	109,955
Lake St. Clair	40,636
Lake Erie	62,064
Niagara River	484
Lake Ontario	56,625
Upper St. Lawrence	20,881
Total	534,866



Coastal Wetland regional distribution

Wetlands

Environmental & Natural Resources Issues

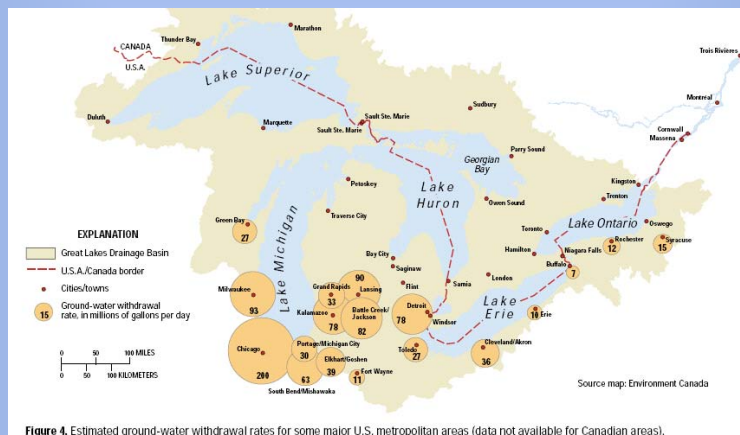


Figure 4. Estimated ground-water withdrawal rates for some major U.S. metropolitan areas (data not available for Canadian areas).

Groundwater

Environmental & Natural Resources Issues



- Lakes

- Declining lake levels
- Changes in fish species distribution
- Decline in coldwater fish species
- Increase in summer stratification/oxygen depletion (dead zones)

- Streams/Wetlands

- Early ice break up altering stream flow and breeding
- Reduced summer water levels impacting groundwater recharge and wetlands
- Increase uV radiation damage to aquatic organisms

- Forests

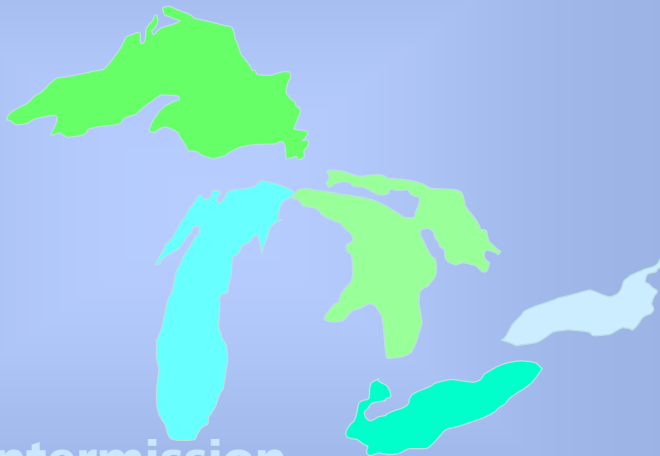
- Change in forest distribution
- Boreal forests shrink
- Northward movement of species

- Agriculture

- Increased growing season
- Crop losses may increase to increase of pests and disease
- Drier climate will reduce livestock grazing capacity

Climate Change

Great Lakes Basic Training



Morning Intermission

Treaties, Agreements, & Compacts

- Understand the governance of the Great Lakes.
- Recognize the different agreements and their objectives.
- Identify the important aspects of the Great Lakes agreements.



Objectives

Treaties, Agreements, & Compacts



Exercise

Treaties, Agreements, & Compacts



Boundary Waters Treaty of 1909
Great Water Quality Agreement
Great Lakes Binational Toxics Strategy
Great Lakes Fishery Convention
Air Quality Agreement
Great Lakes Basin Compact
Great Lakes Charter
Canadian Ontario Agreement

Discussion

Treaties, Agreements, & Compacts



Boundary Waters Treaty of 1909

- Agreement between the U.S. and Great Britain.
- Enacted to protect water quality and quantity for both US and Canada.
- Provides mechanisms for prevention and resolution of water disputes.
- Established the International Joint Commission (IJC) to oversee the treaty, manage water use, and regulate lake levels.



Boundary Waters

Treaties, Agreements, & Compacts



Great Lakes Water Quality Agreement

- Executive Agreement between U.S. and Canada first signed in 1972 spurred by conditions in Lake Erie due to phosphorus enrichment.
- Committed both countries to control pollution and clean up wastewater from industry and communities.
- A new agreement was signed in 1978 to restore and maintain the chemical, physical and biological integrity of the Great Lakes ecosystem.
- Focused on the reduction of persistent toxic substances.

GLWQA

Treaties, Agreements, & Compacts



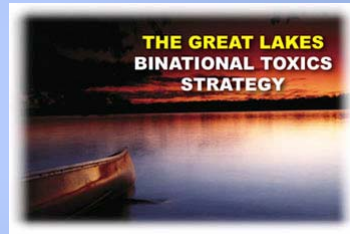
- The 1987 Protocol emphasized human and aquatic ecosystem health.
 - Directed to develop and implement Lakewide Management Plans (LaMPs) to reduce/eliminate loadings of critical pollutants.
 - Directed to develop and implement Remedial Action Plans (RAPs) to eliminate beneficial use impairments at Areas of Concern (AoCs).
 - New annexes on non-point contamination, contaminated sediments, airborne toxic substances, contaminated groundwater, and research & development.

GLWQA

Treaties, Agreements, & Compacts



- Signed by U.S. and Canada in 1997 in response to a 1994 IJC report calling for the parties to virtually eliminate toxic substances from the Great Lakes environment.
- Strategy follows four step process:
 - Information gathering
 - Analyze current regulations and programs that manage or control substances
 - Identify cost-effective options to achieve further reductions
 - Implement actions to work toward the goal of virtual elimination



Binational Toxics Strategy

Treaties, Agreements, & Compacts



1

Aldrin/dieldrin
 Benzo(a)pyrene {B(a)P}
 Chlordane
 DDT (+DDD+DDE)
 Hexachlorobenzene (HCB)
 Alkyl-lead
 Mercury and mercury compounds
 Mirex
 Octachlorostyrene
 PCBs , PCDD (Dioxins) and PCDF (Furans)
 Toxaphene

2

Cadmium and cadmium compounds
 1,4-dichlorobenzene ,3,3'-dichlorobenzidine
 Dinitropyrene, Endrin
 Heptachlor (+Heptachlor epoxide)
 Hexachlorobutadiene
 Hexachlorocyclohexane
 4,4'-methylenebis(2-chloroaniline)
 Pentachlorobenzene
 Pentachlorophenol
 Tetrachlorobenzene
 Tributyl tin

Plus PAHs as a group, including but not limited to:
 Anthracene
 Benzo(a)anthracene
 Benzo(g,h,i)perylene
 Perylene
 Phenanthrene

- U.S. and Canadian Challenges for Level 1 chemicals
- Promote pollution prevention and sound management of chemicals for Level 2 chemicals.
- Assess atmospheric inputs of Level 1 and 2 chemicals to the Great Lakes.
- Complete or be well advanced in remediation of contaminated sediment sites.

Binational Toxics Strategy

Treaties, Agreements, & Compacts



Great Lakes Fisheries Convention

- Signed in 1955 between the U.S. and Canada.
- Created the Great Lakes Fishery Commission (GLFC):
 - To develop coordinated programs of research on the Great Lakes, and, on the basis of the findings, to recommend measures which will permit the maximum sustained productivity of stocks of fish of common concern; and
 - To formulate and implement a program to eradicate or minimize sea lamprey populations in the Great Lakes.



Fisheries

Treaties, Agreements, & Compacts



Joint Strategic Plan for Management of Great Lakes Fisheries

- Adopted in 1981 as a commitment to interjurisdictional coordinated fishery management based on the ecosystem approach.
- Revised in 1997 to strengthen the Plan and to better coordinate and integrate fisheries and environmental ecosystem management systems initiatives (GLWQA, RAPs, and LaMPs).
- Common Goal Statement for all agencies involved in the Great Lakes fisheries.
- Established common Fishery Issues, Strategies for Management, and Strategic Procedures to achieve the common goal and implement the strategies.



Fisheries

Treaties, Agreements, & Compacts



- Established in 1991 to address transboundary issues between the U.S. and Canada.
- Agreement calls for U.S. and Canada to set specific objectives for a range of air pollutants.
- Parties agree to exchange information on monitoring, emissions data, control technologies, atmospheric science, and effects of air pollutants.
- Agreement references the International Joint Commission as the coordinating body for the agreement.
- Annex 1 of agreement establishes specific objectives for each party regarding:
 - Sulphur Dioxide
 - Nitrogen Oxides
 - Compliance and monitoring
 - Prevention of air quality deterioration and visibility protection.
- Annex 2 of agreement establishes scientific and technical activities and economic research.

Air Quality Agreement

Treaties, Agreements, & Compacts



- Established among the eight Great Lakes States and approved by the U.S. Congress in 1968.
- Purposes of the compact are to:
 - Promote orderly, integrated, and comprehensive development, use, and conservation of the water resources of the Great Lakes Basin.
 - To plan for the welfare and development of the water resources as a whole or those areas of special concern.
 - Make it possible for the region to benefit from public works projects such as navigation.
 - To advise in securing the proper balance among industrial, commercial, agricultural, water supply, residential, recreational, and other legitimate uses of water in the region.
 - To maintain an intergovernmental agency to implement the Compact.
- The Great Lakes Commission was formed in 1955.

Great Lakes Basin Compact

Treaties, Agreements, & Compacts



Great Lakes Charter

- A non-binding agreement signed in 1985 by the eight Great Lake State Governors and the two Provincial Premiers.
- Intended to conserve the levels and flow of the Great Lakes, focusing on the control of water use and supply.
- States were required to notify and solicit consultation of all states on any new or increased diversions or consumptive uses over 5 million gallons/day.
- Established the Water Resources Management Committee to collect water use data and a system to exchange information.

Charter

Treaties, Agreements, & Compacts



Great Lakes Charter – Annex 2001

- Resolved to move the Charter to a binding agreement covering:
 - All new or increased water diversions.
 - All new or increased water withdrawals in or out of the basin.
 - All new or increased consumptive uses in or out of the basin.
- Covers any diversion or withdrawal, no longer a 5mgd threshold.
- Existing uses are grandfathered.
- Straddling communities and counties.

Annex

Treaties, Agreements, & Compacts



- COA establishes priorities, goals, and results for the enhancement and conservation of the Great Lakes Basin Ecosystem.
- Management strategies required to achieve the goals.
- The roles and responsibilities of each party in relationship to the strategies.
- A commitment to report regularly and publicly on the state of the Basin as it relates to the agreement.
- Annexes
 - Areas of Concern
 - Harmful pollutants
 - Lakewide Management
 - Monitoring and Information Management

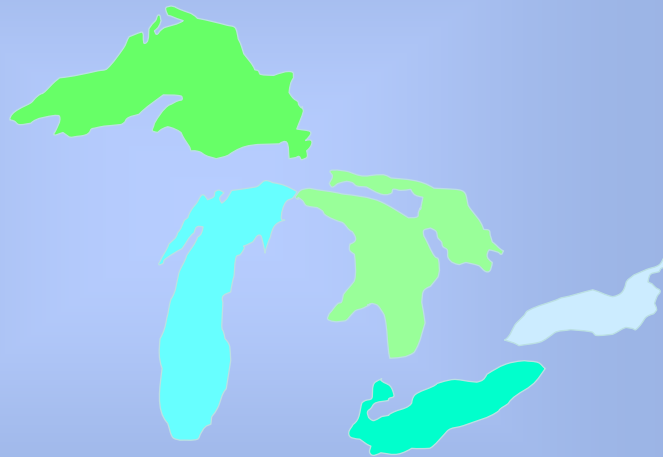
Canadian Ontario Agreement

Treaties, Agreements, & Compacts



	Water Quality	Criteria Pollutants	Toxics	Phosphorus/Nutrients	Fishery	Invasive Species	Ecosystem Mgmt	Diversions	Infra-structure	Monitor/Info/Research	Habitat
Boundary Waters Treaty	X							X			
GLWQA	X		X	X			X			X	
Binational Toxics Strategy			X							X	
GL Fishery Convention					X	X	X			X	X
Air Quality Agreement	X	X								X	
GL Charter								X		X	
GL Compact					X			X	X	X	
Canada Ontario Agreement			X				X			X	

Great Lakes Basic Training



Lunch

72

Institutions, Programs & Authorities

- Understand the Institutions and Programs Operating in the Great Lakes Region

Objectives





Develop a list of the Great Lakes organizations that your state is a member of and the principal value of your participation.

Organize



- Small Group Reports
- Discussion

Discussion

Institutions, Programs & Authorities



- Federal
 - Boundary Waters Treaty of 1909
 - International Joint Commission
 - Great Lakes Fishery Convention
 - Great Lakes Fishery Commission
 - Water Quality Agreement
 - International Joint Commission
 - Air Quality Agreement
 - International Joint Commission
- State
 - Great Lakes Basin Compact
 - Great Lakes Commission
 - Great Lakes Charter
 - Council of Great Lakes Governors
- Local
 - Great Lakes and St. Lawrence Cities Initiative



Governance Framework

Institutions, Programs & Authorities



Mandate:

- Boundary Waters Treaty of 1909
- Great Lakes Water Quality Agreement

Mission:

- Jurisdiction over use, obstruction, or diversion of Boundary waters
- Biennial Report to the parties (GLWQA requirement)

Organization:

- 3 Commissioners per country
- Staff in Washington, Ottawa and Windsor
- Several boards, council and working groups



International Joint Commission

Institutions, Programs & Authorities



Mandate:

US-Canada Convention on Great Lakes Fisheries (1955)

Mission:

- Research on fishery management
- Set lake objectives for fisheries
- Eradication of sea lamprey

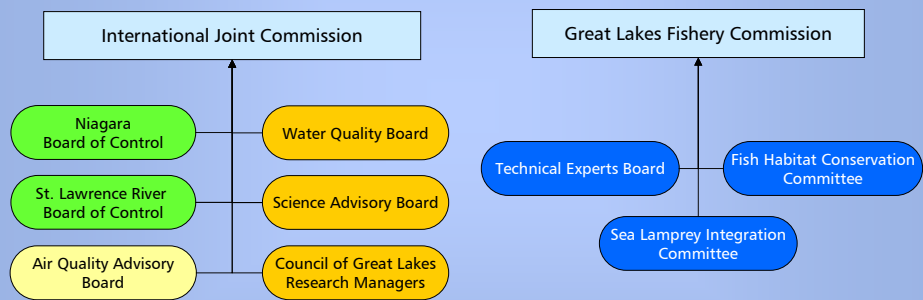
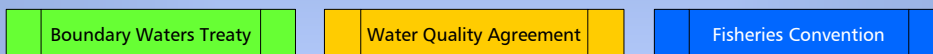


Organization:

- 4 Commissioners per country
- Staff in Ann Arbor, Michigan
- Lake Committees and councils

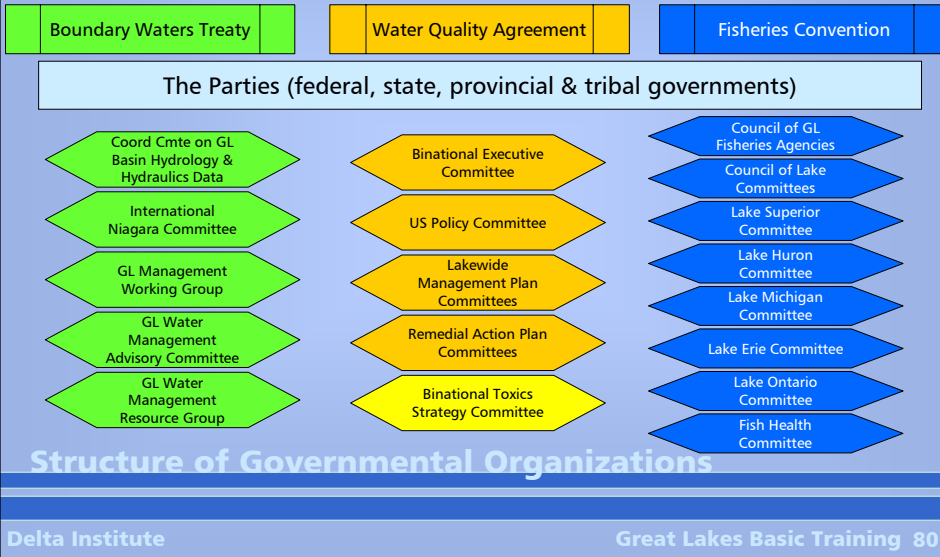
Great Lakes Fishery Commission

Institutions, Programs & Authorities



Structure of International Organizations

Institutions, Programs & Authorities



Institutions, Programs & Authorities



U.S. Federal Authorities for Implementation:

- Clean Water Act
- Great Lakes Critical Programs Act
- Clean Air Act
- Water Resources Development Act
- Coastal Zone Management Act
- Nonindigenous Aquatic Nuisance Prevention & Control Act
- Great Lakes Legacy Act

Federal Role

Institutions, Programs & Authorities



Federal Agencies:

- Agency for Toxic Substances and Disease Registry
- National Oceanic and Atmospheric Administration
- U.S. Army Corps of Engineers
- U.S. Coast Guard
- U.S. Department of Agriculture
- U.S. Environmental Protection Agency
- Great Lakes National Program Office
- U.S. Fish and Wildlife Service
- U.S. Forest Service
- National Park Service
- U.S. Geological Survey

Federal Role

Institutions, Programs & Authorities



- **The Congressional Research Service identified 84 specific programs with various types of funding authorities to address Great Lakes issues involving 13 federal agencies including:**

- Army Corps of Engineers (18)
- Department of Agriculture
 - Farm Services Administration (3)
 - Natural Resources Conservation Service (12)
 - Other Agencies (4)
- National Oceanographic and Atmospheric Administration (12)
- Department of Interior
 - Fish and Wildlife Service (13)
 - National Park Service (1)
 - United States Geologic Survey (3)
- Department of Transportation (1)
- Environmental Protection Agency (14)
- Department of Health and Human Services (1)
- Department of State (3)

Program Areas Include:

Sediments
Remediation
Restoration
Conservation
Research
Education
Pollution Control
Invasive Species
Erosion
Wetlands
Fisheries
Water Quality

Federal Authorizations

Institutions, Programs & Authorities



- Great Lakes Indian Fish & Wildlife Commission
 - Composed of Ojibwe Tribes in Michigan, Minnesota and Wisconsin
 - Retained hunting, fishing, and gathering rights through a series of treaties with the United States.
- Chippewa Ottawa Resource Authority
 - Comprised of 5 tribes in Michigan
 - Established the Great Lakes Resource Committee to serve as intertribal management body for the treaty fishery in 1836 Treaty waters.
- U.S. EPA Region 5, Indian Environmental Office
 - Assists the 35 Federally recognized Indian Tribes through grants assistance and management, training and technical assistance, and coordination services with other programs. The mission for Region 5 is to provide leadership for protecting public health and the environment in Indian Country, respecting the sovereignty of each tribe and recognizing our Federal trust responsibility
- Individual Tribes

Native American & First Nations Role

Institutions, Programs & Authorities



- A five year strategy created in 2002 by the US Policy Committee to focus on US Federal, State and Tribal government environmental protection and natural resources management.
- Establishes common goals among high-priority, multi-lake, and basin-wide environmental issues.
- Set 4 collective goals:
 - Chemical Integrity
 - Toxic Pollution, Excess Nutrients
 - Physical Integrity
 - Habitat Protection, Water Quantity Management, Land Use
 - Biological Integrity
 - Human Health, Species Protection
 - Working Together
 - Coordination, Program Implementation, Priorities Establishment

Great Lakes Strategy

Institutions, Programs & Authorities



- Founded in 1983.
- Mission: To encourage and facilitate environmentally responsible economic growth.
- Establish a cooperative effort between the public and private sectors among the 8 Great Lake states and the provinces of Ontario and Quebec.
- Governors work collectively to ensure that the entire Great Lakes region is both economically sound and environmentally conscious in addressing today's problems and tomorrow's challenges.

Current Projects

Great Lakes Water Management Initiative Great Lakes Priorities
Great Lakes International Trade Initiative Aquatic Invasive Species Task Force
Great Lakes Biomass State Regional Partnership

CGLG

Institutions, Programs & Authorities



The nine priorities established by the Council are:

- Ensure the sustainable use of our water resources while confirming that the States retain authority over water use and diversions of Great Lakes waters.
- Promote programs to protect human health against adverse effects of pollution in the Great Lakes ecosystem.
- Control pollution from diffuse sources into water, land and air.
- Continue to reduce the introduction of persistent bioaccumulative toxics into the Great Lakes ecosystem.
- Stop the introduction and spread of non-native aquatic invasive species.
- Enhance fish and wildlife by restoring and protecting coastal wetlands, fish and wildlife habitats.
- Restore to environmental health the Areas of Concern identified by the International Joint Commission as needing remediation.
- Standardize and enhance the methods by which information is collected, recorded and shared within the region.
- Adopt sustainable use practices that protect environmental resources and may enhance the recreational and commercial value of our Great Lakes.

CGLG

Institutions, Programs & Authorities



Great Lakes Protection Fund

- Formed in 1989 by the Great Lakes Governors with a permanent endowment.
- Supports collaborative actions to improve the health of the Great Lakes Ecosystem.
- Board of Directors comprised of two governor appointed representatives from each state.
- Seeks projects that:
 - Lead to tangible improvements in the health of the GL ecosystem,
 - Promote the interdependence of ecological and economic systems, and
 - Are innovative, creative and venturesome.
- The fund has made 204 grants or investments representing more than \$45 million.

Current Interests

Preventing Biological Pollution
Leadership for Ecological Restoration
Using Market Mechanisms for Environmental Improvement
Restoring Natural Flow Regimes

GLPF

Institutions, Programs & Authorities



- Formed in 1955 by the Great Lakes Basin Compact.
- Board of Directors consists of one delegate from each Great Lakes state.
- Additional delegates from each state serve as Commissioners. Ontario and Quebec have associate member status.
- The Great Lakes Commission is charged with:
 - Collecting and providing information
 - Making recommendation on water resource management and uses
 - Considering the need and viability of public works projects
 - Considering means of improving navigation and port facilities
 - Considering means of improving fisheries
 - Making recommendations on public policies related to water resource management
 - Recommend agreements between the US and Canada, and help negotiations

GLC



Institutions, Programs & Authorities



- Under agreement, States agree to act on Commission recommendations on:
 - Stabilization of lake levels
 - Measures for combating pollution, beach erosion, floods, and shore inundation
 - Uniformity of navigation regulations
 - Uniformity of fishing laws and cooperative action to eradicate parasitical forces
 - Suitable hydroelectric power developments
 - Cooperative controls for soil and bank erosion
 - Diversion of water to and from the basin
 - Other

GLC



Institutions, Programs & Authorities



- Formed in 2003 as the Great Lakes Cities Initiative by the Northeast-Midwest Institute with a grant from the Joyce Foundation.
- Recently joined with the International Association of Great Lakes and St. Lawrence Mayors Association to combine efforts.
- The Great Lakes and St. Lawrence Cities support:
 - The nine priorities established by the CGLG;
 - Recreational, commercial, tourism, and cultural activities for citizens and visitors;
 - Drive economic value and improve the economic value of shoreline communities;
 - Provide fresh drinking water for millions of people; and
 - Support agricultural and industrial activities.
- The initiative was founded to give Mayors an active voice in the development and implementation of policies and programs.
- It also assists Mayors in concentrating efforts and focusing on long-term protection and restoration.



Great Lakes and St. Lawrence Cities Initiative

Institutions, Programs & Authorities



IL

Chicago, IL -- Mayor Richard M. Daley
Evanston, IL -- Mayor Lorraine H. Morton
Highland Park, IL -- Mayor Michael D. Belsky
Wilmette, IL -- Village Manager Michael Earl
Zion, IL -- Mayor Lane Harrison

IN

East Chicago, IN -- Mayor George Pabey
Hammond, IN -- Mayor Thomas McDermott, Jr
Gary, IN -- Mayor Scott L. King
Michigan City, IN -- Mayor Charles Oberlie
Portage, IN -- Mayor Douglas W. Olson
Whiting, IN -- Mayor Joseph M. Stahura



MI

Bay City, MI -- Mayor Robert J. Katt
Brownstown, MI -- Supervisor Art Wright
Detroit, MI -- Mayor Kwame M. Kilpatrick
Ferndale, MI -- Mayor Robert G. Porter
Grand Rapids, MI -- Mayor George K. Heartwell
Hancock, MI -- Mayor Barry Givens
Mackinaw City, MI -- Village President Robert R. Heilman
Manistee, MI -- Mayor Richard Mack
Marquette, MI --
Monroe, MI -- Mayor John R. Iacoangeli
Potoskey, MI -- Mayor Herbert Carlson
Rochester Hills, MI -- Mayor Pat Somerville
Royal Oak, MI -- Mayor Jim Ellison
Springfield Township, MI -- Supervisor Collin Walls
Traverse City, MI -- Mayor Linda Smyka
West Bloomfield Township, MI -- Supervisor David Flaisher
MN
Duluth, MN -- Mayor Herb Bergson
Grand Marais, MN -- Mayor Mark Sandbo

NY

Buffalo, NY -- Mayor Anthony M. Masiello
Niagara Falls, NY -- Mayor Vincenzo V. Anello
Rochester, NY -- Mayor William A. Johnson, Jr.
OH
Cleveland, OH -- Mayor Jane Campbell
Sheffield Lake, OH -- Mayor John Piskura
Toledo, OH -- Mayor Jack Ford
Vermilion, OH -- Mayor Jimmy L. Davis
PA
Erie, PA -- Mayor Richard E. Filippi
WI
Ashland, WI -- Mayor Fred P. Schnook
Green Bay, WI -- Mayor James J. Schmitt
Manitowoc, WI -- Mayor Kevin M. Crawford
Milwaukee, WI -- Mayor Tom Barrett
Racine, WI -- County Executive Bill McReynolds
Racine, WI -- Mayor Gary Becker
Sturgeon Bay, WI -- Mayor Dennis McIntosh
Superior, WI -- Mayor Dave Ross
Wind Point, WI -- Board President John Kruteson

Great Lakes and St. Lawrence Cities Initiative

Delta Institute

Great Lakes Basic Training 92

Institutions, Programs & Authorities



• Laboratories

- Great Lakes Environmental Research Laboratory (NOAA)
- Great Lakes Science Center (USGS)

• Research Vessels

- The Great Lakes Associate of Science Ships reports that 81 boats are active in research programs in the US and Canada for Great Lakes studies.

• International Association of Great Lakes Research (IAGLR)

- Formed in the 1950s
- Large network for communicating research
- Publishes the Journal of Great Lakes Science
- Provides awards and scholarships



Research, Planning & Information Sharing

Delta Institute

Great Lakes Basic Training 93

Institutions, Programs & Authorities



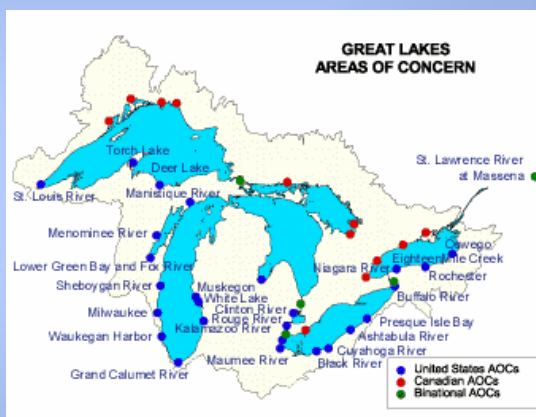
- **Monitoring Programs**
 - Fish
 - Water quality
 - Air
- **Sea Grant**
- **State of the Lakes Ecosystem Conference**
 - Since 1994, SOLEC has been held on even-numbered years.
 - Sponsored by US EPA and Environment Canada to foster the exchange of information between the government, corporate and non-profit sectors.
 - Has created a framework for assessing the overall health of each lake through a variety indicators and a ranking system.

Research, Planning & Information Sharing

Institutions, Programs & Authorities



- Remedial Action Plans (RAPs) were mandated in the Great Lakes Water Quality Agreement 1987 Protocol.
- The RAPs were created for 43 Areas of Concern (AoCs) around the Great Lakes.
- The RAP is used to address any of the 14 beneficial uses that are being impaired (ranging from fish and wildlife consumption to dredging activities to drinking water).



RAPs/AoCs

Institutions, Programs & Authorities



Great Lakes Beneficial Use Impairments

1. Restrictions on Fish and Wildlife Consumption
2. Tainting of Fish and Wildlife Flavor
3. Degradation of Fish and Wildlife Populations
4. Fish Tumors or Other Deformities
5. Bird of Animal Deformities or Reproductive Problems
6. Degradation of Benthos
7. Restrictions on Dredging Activities
8. Eutrophication or Undesirable
9. Restrictions on Drinking Water Consumption or Taste & Odor Problems
10. Beach Closings
11. Degradation of Aesthetics
12. Added Costs to Agriculture or Industry
13. Degradation of Phytoplankton and Zooplankton Populations
14. Loss of Fish and Wildlife Habitat

RAPs/AoCs

Institutions, Programs & Authorities



- Lakewide Management Plans (LaMPs) for each of the Great Lakes were mandated in the Great Lakes Water Quality Agreement 1987 Protocol.
- LaMPs provide a comprehensive ecosystem management approach to problems facing Great Lakes watersheds, a structure for implementing change, and a continuing dialogue between the federal government(s) and stakeholders.
- Work on the LaMPs began in 1995, with publication in 2000. The LaMP for each of the Great Lakes is updated every two years.
- Each LaMP has a public stakeholder outreach program called the Forum associated with it. The Forums, comprised of volunteer stakeholders, meet three to four times per year around the basin to address emerging issues, consider solutions, and manage and implement pilot projects in Areas of Concern (AoC).

LaMPs



Institutions, Programs & Authorities



- Lake Superior Binational Program
 - Zero Discharge Demonstration Program
 - The Broader Program
 - Public Involvement
- Organization
 - Lake Superior Task Force
 - Superior Work Group
 - Lake Superior Binational Forum
- Ecosystem Principles and Objectives
 - General Objective
 - Chemical Contaminants Objective
 - Aquatic Communities Objective
 - Terrestrial Wildlife Objective
 - Habitat Objective
 - Human Health Objective
 - Developing Sustainability



Lake Superior LaMP

Institutions, Programs & Authorities



- Goal: To Restore and protect the integrity of the Lake Michigan ecosystem through collaborative place-based partnerships
- 11 Subgoals are used to measure the health of the lake:
 - We can all eat fish.
 - We can drink the water.
 - We can swim in the water.
 - All habitats are healthy, naturally diverse, and sufficient to sustain viable biological communities.
 - Public access to open space, shoreline, and natural areas is abundant and provides enhanced opportunities for human interaction with the Lake Michigan ecosystem.
 - Land use, recreation, and economic activities are sustainable and support a healthy ecosystem.
 - Sediments, air, land and water are not source or pathways of contamination that affect the integrity of the ecosystem.
 - Exotic species are controlled and managed.
 - Ecosystem stewardship activities are common and undertaken by public and private organizations in communities around the basin.
 - Collaborative ecosystem management is the basis for decision-making in the basin.
 - We have enough information/data/understanding/indicators to inform the decision-making process.



Lake Michigan LaMP

Institutions, Programs & Authorities



- The Lake Huron Binational Partnership was formed in 2002.

- Focus on three initial binational issues:

- Contaminants in fish and wildlife;
- Biodiversity and ecosystem change; and
- Fish and wildlife habitat.



- Additional Lake Huron Issues:

- AoCs
- Low Water Levels
- Botulism
- Cormorants
- Blue-green Algae Blooms in Georgian Bay
- Tributary Access for Spawning Fish
- Aquaculture
- Global Climate Change
- Low-Level Contaminants

Lake Huron LaMP

Institutions, Programs & Authorities



- Created a vision statement in 2004 that stresses the importance and urgency of:

- Improving land use activities;
- Continued diligence in nutrient management; and
- The vulnerability of fish and wildlife species to human activities.

- The LaMP addresses:

- Objectives and indicators
- Beneficial Use Impairment
- Sources and Loads
- Habitat
- Public Involvement
- Human Health
- RAPS and Watershed Implementation
- Assessment and Tracking
- Significant Ongoing and Emerging Issues
- Pathways to Achievement



Lake Erie LaMP

Institutions, Programs & Authorities



Ecosystem Goals for Lake Ontario:

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



Objectives

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

Lake Ontario LaMP

Institutions, Programs & Authorities



There are hundreds of organizations centered around the Great Lakes focusing on issues regarding a single creek to the entire basin, or a single species to the entire ecosystem of the lakes.

NGOs

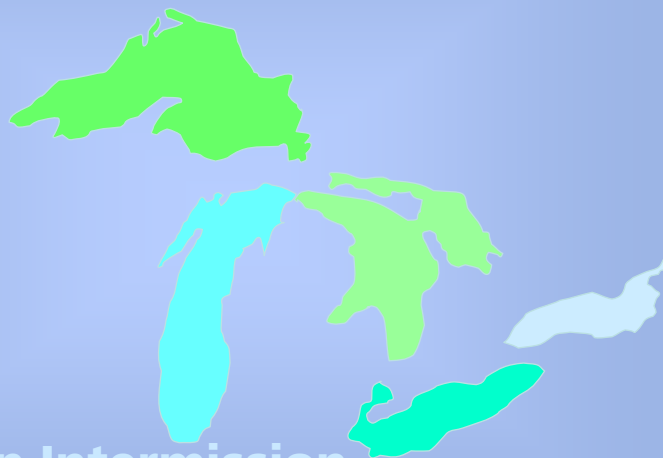
Institutions, Programs & Authorities



- The role of states.
- Current and future interests of the state.

States

Great Lakes Basic Training



Afternoon Intermission

Emerging Policy Opportunities

- Understand the status of current policy opportunities.
- Identify unique opportunities for your state.



Objectives

Emerging Policy Opportunities



- Major Issues:
 - Update is Long Overdue
 - Scope
- Policy Opportunities:
 - Could drive binational agenda
 - Should address issues of the day
 - New commitments for actions and governance



GLWQA

Emerging Policy Opportunities



- Importance/Stake:
 - Revitalization of historically important tool
 - Canadian commitment and involvement
- Current Status:
 - IJC Review and Recommendations Report
 - Expected to be released in early 2006
 - Governments decision on path expected shortly after
 - IJC public meetings to hear ideas and concerns
 - Last meeting held 11/10 in NY
 - Meetings were well attended
 - 11/30 Online Comment Deadline



GLWQA

Emerging Policy Opportunities



Exercise

Emerging Policy Opportunities



- Major Issues:
 - Culmination of years of work by States and Provinces
 - Common Standard
 - Joint Decision Making
 - Management/Prohibition of consumptive major new diversions
- Policy Opportunities:
 - Common resource management commitment
 - State water management program
 - Water conservation and resource protection



Annex 2001

Emerging Policy Opportunities



- Importance/Stake:
 - Great Lakes regional control of water resources
 - Equal State commitment and program
 - Strong opportunity for resource protection and program
- Current Status:
 - Governors and Premiers signature, December 13th in Milwaukee
 - Final version bans diversions except for straddling communities and counties.
 - Strong commitment to develop and implement water conservation programs.



Annex 2001

Emerging Policy Opportunities



- Next Steps
 - Regional body to convene
 - Compact to Legislatures and then Congress
 - State Programs to be established



Annex 2001

Emerging Policy Opportunities



- Major Issues:
 - Key administrative initiative (Presidential Executive Order 13304) to address the Great Lakes resources
 - Eight Key Areas identified
 - Aquatic Invasive Species
 - Habitat Conservation and Species Management
 - Nearshore Waters and Coastal Areas
 - Areas of Concern Restoration and Sediments
 - Nonpoint Source Pollutants
 - Toxic Pollutants
 - Sound Information Base & Representative Indicators
 - Sustainability



Collaboration

Emerging Policy Opportunities



- Policy Opportunities:
 - Strategize next steps
 - Prioritize funding
 - US/State legislative development
- Importance/Stake:
 - Very rare opportunity/need to take full advantage
 - New State and Great Lakes programs
 - Major resources
- Current Status:
 - Final version was released December 12, 2005.



Collaboration

Emerging Policy Opportunities



- Next Steps
 - Federal Response
 - Congressional Budget Process
 - Continued Coordination



Collaboration

Emerging Policy Opportunities



- Key Problem Solving Level
- Assessments and Strategies
 - Lakewide Forums
 - Training
- Issues
 - Governance
 - Partnerships and Management
 - Funding



Watershed Management

Emerging Policy Opportunities



Concluding Exercise

Conclusion



Evaluation

Thank You for Participating

Acknowledgements

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- Kim Walz
- Lisa Wojnarowski
- Don Zelazny





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<u>Slide #</u>	<u>Source</u>
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8	North America's High Performance Heartland, Council of Great Lakes Governors http://www.cglg.org/pub/heartlan/intro.html Great Lakes Strategy 2002, U.S. EPA GLNPO http://www.epa.gov/glnpo/gls/ "Confronting Climate Change in the Great Lakes Region" Union of Concerned Scientist and Ecology Society of America http://www.ucsusa.org/greatlakes/ The St. Lawrence Seaway 2003 Traffic Report Great Lakes St. Lawrence Seaway System http://www.greatlakes-seaway.com/en/pdf/traffic_report_en_2003.pdf United States Electoral College
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10	Picture: http://www.glc.org/basin/images/basinstates.jpg Source: Basin Area—Great Lakes Information Network, State Area—Wikipedia.
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13-14	United States Fish & Wildlife Service, Great Lakes Ecosystem Team http://www.fws.gov/midwest/greatlakes/ecosystem.htm The Great Lakes Atlas (page 38)
14	Pictures: http://www.sdgifp.info/Wildlife/Diversity/bead/images/bald_eagle_landing.jpg http://www.michigan-sportsman.com/non-game/images/kirkla1.jpg http://www.nativeecosystems.org/lynx/images/lynx_eyewire.jpg http://environment.fhwa.dot.gov/strmlng/newsletters/sep03nl.jpg http://www.mott.org/programs/images/env-iris.jpg http://www.chicagobotanic.org/research/conservation/images/gt/fringed_orchid2.jpg http://www.carolinian.org/images/LakeErieWaterSnak.gif http://www.nativeorchid.org/BT61-LakesideDaisy-Solitary_2003_jn520.jpg

<u>Slide #</u>	<u>Source</u>
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16	The Great Lakes Atlas (page 18)
17	U.S. Census, July 2004
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31	Images: EPA GLNPO Image Library http://epa.gov/glnpo/image
35	Data: U.S. EPA TRI Explorer State Ranking: http://www.scorecard.org
36-37, 39	Chart: U.S EPA, GLNPO http://www.epa.gov/glnpo/glindicators/fishtoxics/gamefishhb.html
38	Chart: http://www.epa.gov/waterscience/fish/advisories/
40	EPA GLNPO Great Lakes Monitoring Workshop (3/6/2001)
41	Map: U.S. EPA GLNPO Binational Toxics Strategy Chart: Great Lakes Binational Toxics Strategy 2004

<u>Slide #</u>	<u>Source</u>
42	Data: U.S. EPA, GLNPO, Contaminated Sediments Remaining Estimates Memo from Dave Cowgill
43	Data: Testing The Waters 2005, National Resources Defense Council
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62-63	U.S. EPA, GLNPO, http://www.epa.gov/glnpo/bns
64-65	Great Lakes Fishery Commission, http://www.glfc.org
66	International Joint Commission, http://www.ijc.org
67	Great Lakes Commission, http://www.glc.org
68-69	Council of Great Lakes Governors, http://www.cglg.org

<u>Slide #</u>	<u>Source</u>
70	Canadian Ontario agreement (http://www.on.ec.gc.ca/laws/coa/coa94-e.html)
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89-90	Great Lakes Commission, http://www.glc.org
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Section: Emerging Policy Issues	
107-108	International Joint Commission, http://www.ijc.org
110-112	Council of Great Lakes Governors, http://www.cglg.org
113-115	Regional Collaboration, http://www.glrc.us



Internet Resources

Great Lakes Information Network

www.great-lakes.net

Alliance for the Great Lakes

www.greatlakes.org

Council of Great Lakes Governors

www.cqlg.org

Council of Great Lakes Industries

www.cgli.org

The Delta Institute

www.delta-institute.org

Environment Canada, Great Lakes Program

www.on.ec.gc.ca/water/greatlakes

Great Lakes Atlas

www.epa.gov/glnpo/atlas

Great Lakes Commission

www.glc.org

Great Lakes Directory

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Great Lakes Environmental Research Laboratory

www.glerl.noaa.gov

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www.glfc.org

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www.glpf.org

Great Lakes Regional Collaboration

www.glrc.us

Great Lakes and St. Lawrence Cities Initiative
www.greatlakescities.org

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International Joint Commission
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www.nwf.org

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www.nemw.org

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www.seaway.dot.gov

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www.sierraclub.org/greatlakes

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www.lrd.usace.army.mil

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www.binational.net

U.S. EPA, Great Lakes National Program Office
www.epa.gov/glnpo

United States Fish & Wildlife Service
www.fws.gov/midwest/greatlakes



Great Lakes Regional Collaboration Strategy



Great Lakes Regional Collaboration Strategy



To Restore and Protect the Great Lakes



December 2005

GLRC 

TABLE OF CONTENTS

Executive Summary	1
Introduction.....	7
Strategy Team Recommendations	15
Aquatic Invasive Species.....	17
Habitat/Species.....	23
Coastal Health.....	29
AOC/Sediments	36
Nonpoint Source.....	41
Toxic Pollutants.....	47
Indicators and Information	53
Sustainable Development.....	59
Appendices	65



Executive Summary





EXECUTIVE SUMMARY

The Resource

The Great Lakes are a unique and extraordinary resource that have provided vast amounts of fresh water to nourish the history, culture, economy, and well-being of the people in this part of the United States. They have done so for millennia for the region's Native Americans whose life ways and communities have been and remain intertwined with the natural resources found in their ancestral homelands. And, for the past few hundred years since the earliest journeys of European explorers, the Great Lakes natural bounty has provided for the needs of a growing nation.

Today, more than 35 million Americans receive the benefits of drinking water, food, a place to work and live, and transportation from the Great Lakes. Millions of people enjoy fishing, hunting, swimming, boating, and the sheer beauty of the Lakes in remote parks and on the stunning shorelines of some of our largest cities, and agricultural fields yield abundant harvests of a large variety of crops. The region's many Native American communities rely upon the Great Lakes' natural resources to meet their subsistence, economic, cultural, medicinal, and spiritual needs. We have thrived on the richness the Lakes have brought us, but have not protected them adequately to ensure that future generations will be able to enjoy them as we have.

Challenges

The challenges we face on the Great Lakes are many in number and serious in nature. Aquatic invasive species continue to arrive at the rate of one every eight months, adding to the more than 160 already causing serious ecological and economic damage. At the same time, past and ongoing development has compromised Great Lakes habitats, and threatens the plants and animals that need them to survive. Many of our coastal areas, in particular, also suffer from massive sewer overflows that contaminate the water and close the beaches. The thirty-one areas identified more than 15 years ago where the most significant harm to the resources has occurred continue to be of great concern; none of them has been fully restored to date. Continued pollution from non point sources in these areas and many others contribute to impaired water quality and related problems. Although releases of toxic pollutants have been reduced significantly over the years, there is a legacy of contamination in sediments and fish throughout the system, and mercury and other pollutants continue to enter the Great Lakes from nearby and distant sources. While large amounts of data and information on the Great Lakes have been collected over the years, not enough of that has been transformed into knowledge about the key indicators of the health of the ecosystem. In addition, many of the practices of industry, agriculture, communities, and private citizens simply have not been sustainable.

Collectively, these problems and others have seriously compromised the environmental health of the Great Lakes. Because the stressors to the Great Lakes have developed over time and there has usually been a delay in the Lakes' response to the stressors, many believe that we have time to counter these stresses and restore the Lakes. However, in many areas of the Lakes, historic stressors have combined with new ones to reach a point where ecosystem-level changes occur rapidly and unexpectedly. As a result, there is a new sense of urgency for action on the highest priorities for restoring and protecting the Great Lakes.



Since 1970, governments, citizens, industry, and agriculture have worked together extensively to restore and protect the Great Lakes. Although much progress has been made, some of the problems have become more serious, many have not been solved, and new ones continue to develop. Despite good intentions and hard work, the strategies and efforts to date simply have not been effective enough to do the job of cleaning up the Great Lakes or preventing further degradation. A much more concerted effort over a longer period of time is essential for the restoration and protection of the resource and the prevention of future problems.

The Great Lakes Regional Collaboration

In December 2004, the Great Lakes Regional Collaboration of National Significance (GLRC) was launched, creating a unique partnership of key members from federal, state, and local governments, tribes, and other stakeholders for the purpose of developing a strategic plan. This Strategy is intended to build upon the extensive regional efforts to date, working together toward a common goal of restoring and protecting the Great Lakes ecosystem for this and future generations.

An Executive Committee made up of senior elected and appointed officials from different levels of government has helped guide the GLRC over the past year as the Strategy has been developed. Eight Strategy Teams, each focusing on a different issue affecting the Great Lakes basin, began work in January 2005 to develop recommendations for action. More than 1,500 people from diverse backgrounds have participated on these Teams. A Draft Strategy was released on July 7, 2005 for public comment. Comments were solicited and received through a series of public meetings, the Internet, and in writing. This Strategy is the result of that collaborative process but it should not be construed as an endorsement or approval by the GLRC members of each and every Strategy Team recommendation. Implementation will proceed promptly after the Strategy is released. Because we share the Great Lakes with Canada, we must do everything possible to make sure that our plans and actions are compatible and synchronized with their efforts.

Strategy Team Recommendations

The work of the Strategy Teams includes many recommendations for action focused on the steps that should be taken over the next five years to proceed with restoration to achieve the greatest results. The actions identified by the Strategy Teams highlight the highest priorities recommended by the Teams for early implementation. Much more will need to be done to fully restore and protect the Lakes. Those additional actions, as well as much more supplemental information, are included in the Appendices to the Strategy. The Strategy Teams considered the overarching issues of human health, tribal interests and perspectives, and research, and factored them in to the extent possible. The Strategy Teams worked to characterize the problems faced in the Great Lakes, and to establish goals and milestones. The key recommendations crafted by each Strategy Team are set forth below.

Immediate action to stop the introduction of more **aquatic invasive species** (AIS) can prevent significant future ecological and economic damage to the Great Lakes. The steps needed include:

- prevention of AIS introductions by ships through ballast water and other means;
- stopping invasions of species through canals and waterways;
- restricting trade in live organisms;
- passage of comprehensive federal AIS legislation;
- establishing a program for rapid response and management; and
- education and outreach on AIS introduction and prevention.

The plants and animals of the Great Lakes need habitat in order to survive in the future, and there is a need for significantly more **habitat conservation and species management**. The recommendations focus on:

- native fish communities in open waters and near shore habitats;
- wetlands;
- riparian (streams) habitats in tributaries to the Great Lakes; and
- coastal shore and upland habitats.

The **near shore waters and the coastal areas** are the region's largest source of drinking water and experience a variety of recreational activities. To minimize the risk to human health resulting from contact with near shore waters, actions needed include:

- major improvements in wet weather discharge controls from combined and sanitary sewers;
- identify and control releases from indirect sources of contamination;
- implement a “risk-based approach” to manage recreational water;
- protect sources of drinking water; and
- improve the drinking water infrastructure and support source water protection.

The United States identified the 31 most contaminated locations on the Great Lakes under the Great Lakes Water Quality Agreement with Canada more than 15 years ago. None of them have been restored to date. To remedy this situation, a dramatic acceleration of the cleanup process at these **areas of concern** (AOC) is needed. The actions recommended are:

- amend the Great Lakes Legacy Act to increase funding and streamline the process;
- improve federal, state, and local capacity to manage the AOC cleanups;
- create a federal-state AOC coordinating committee to work with local and tribal interests to speed cleanups; and
- promote clean treatment and disposal technologies as well as better beneficial use and disposal options.

Non point sources of pollution contribute significantly to problems in the Areas of Concern, as well as to other locations in the Great Lakes, including the open waters. Actions to address these problems include:

- wetland restoration;
- restoration of buffer strips;
- improvement of cropland soil management;
- implementation of comprehensive nutrient and manure management plans for livestock operations; and
- improvements to the hydrology in watersheds.

Toxic pollutants continue to stress the Great Lakes ecosystem, posing threats to human and wildlife health. Persistent toxic substances such as mercury and PCBs remain present in fish at levels that warrant advisories and restrict consumption throughout the Basin. To address this ongoing problem, actions are needed to:

- reduce and virtually eliminate the discharge of mercury, PCBs, dioxins, pesticides and other toxic substances to the Great Lakes;
- prevent new toxic substances from entering the Great Lakes;
- institute a comprehensive research, surveillance and forecasting capability;

- create consistent, accessible basin-wide messages on fish consumption and toxic reduction methods and choices; and
- support efforts to reduce continental and global sources of toxics to the Great Lakes.

With a resource as large and complex as the Great Lakes ecosystem, it is essential to have a **sound information base and representative indicators** to understand what is happening in the system. This information must then be communicated to the public, to decision makers, and all others involved. To improve over the current situation, the following actions are needed:

- better coordinate the collection of critical information regarding the Great Lakes ecosystem and support the U.S. Integrated Earth Observation System (IEOS) and the Integrated Ocean Observing System (IOOS) as key components of the Global Earth Observation System of Systems (GEOSS);
- promote the continued development of science-based indicators, including those developed through the SOLEC process;
- double funding for Great Lakes research over the next five years;
- establish a regional information management infrastructure; and
- create a Great Lakes communications workgroup to manage scientific and technical information.

Ensuring the long term **sustainability** of the Great Lakes resource will require a number of significant changes in the way we approach such things as land use, agriculture and forestry, transportation, industrial activity, and many others. To start this process, we need to:

- adapt and maintain programs that promote sustainability across all sectors;
- align governance to enhance sustainable planning and management of resources;
- build outreach that brands the Great Lakes as an exceptional and competitive place to live, work, invest, and play; and
- provide leadership for sustainable development through implementation of the Strategy recommendations.

This document provides the full range of recommendations, options, and ideas generated by the Strategy Teams. While better coordinated use of existing resources will allow for some recommendations to move forward early in the implementation process, others will require modest additional funding, and some will be impossible to implement absent substantial new expenditures on the part of the various Collaboration partners. While the release of this Strategy does not constitute a commitment of additional resources on the part of any member of the Collaboration, the members are committed to continuing to work together in partnership toward the goals identified in the Strategy.

The Collaboration partners have rallied around a shared vision of a restored, sustainable Great Lakes ecosystem that has generated optimism and engendered a spirit of cooperation. What is needed now is the will to act and the leadership to proceed if we are to realize our vision and reach our goals. The time to begin is now.

Introduction





A National Treasure

When the United States is photographed by satellite cameras, the Great Lakes stand out as one of the few recognizable features. In the west, Lake Superior, the Ojibwas' "Gichigami" and Longfellow's "shining big sea water," is the largest freshwater lake in the world. Some 750 miles to the east, in the land of James Fenimore Cooper's Hawkeye and Chingachgook, Lake Ontario's average outflow of two million gallons per second gives birth to the St. Lawrence River—the connection to the Atlantic Ocean. In between, more than 35 million U.S. residents live, work, and play supported by the waters of the Great Lakes basin.

The Great Lakes are the largest single source of fresh surface water in the Western Hemisphere. The Lakes support thriving fisheries, a strong agricultural sector, and vibrant tourism. A draft study for the Army Corps of Engineers shows that one-third of all registered recreational boats in the United States are located in the eight Great Lakes States, where boating results in \$35.6 billion of annual economic activity and supports 246,117 jobs. In addition, U.S. Fish and Wildlife survey data indicate that fishing, hunting and wildlife watching generate almost \$18 billion in annual revenues in the Great Lakes region.

The Great Lakes Region is the ancestral homeland of thirty-five federally-recognized Indian Tribal Nations whose reservations are located in the Basin or which retain treaty-guaranteed rights to hunt, fish or gather in the Basin. Although each Tribal Nation is unique and distinct in its own right, all Great Lakes Tribal Nations share much in terms of historic, cultural and social underpinnings of their respective communities, particularly regarding their interdependence with and reliance upon natural resources to meet subsistence, economic, cultural, spiritual, and medicinal needs. Tribal governments play a vital role in Great Lakes protection and restoration efforts. They provide a range of governmental services to promote the health, welfare and security of their peoples and their physical/biological communities.¹

A Time of Growth

The first European explorers encountered the Tribal Nations as they used the Great Lakes travel routes to open the interior of what would become the United States of America. As the young country began to grow, the Great Lakes region's natural resources sparked its development. Iron ore from Michigan, Wisconsin, and Minnesota was shipped to mills in Indiana and Ohio to meet the expanding demand for steel forged in furnaces fueled by Pennsylvania coal. Millions of board feet of timber were cut and shipped to build growing cities. New European immigrants came to the region to farm the land and open businesses. The boundless fisheries of the Great Lakes helped feed a rapidly growing population.

As the cities grew, commerce expanded, and the Lakes became the major transportation route to move goods back and forth through the region and, with construction of canals, to cities on the Atlantic coast. Henry Ford launched the automobile industry in Michigan. Other manufacturing followed—paper, chemical, heavy manufacturing and steel—all supported by Great Lakes shipping



¹ A more detailed discussion of Great Lakes Tribal Nations and the perspectives that they bring to the Collaboration is provided in Great Lakes Regional Collaboration, Tribal Nations Issues and Perspectives, Version 1.0 (April 26, 2005) that is contained in the Appendices to this Plan.

By the 1900s, the Great Lakes region, with its manufacturing might and economic strength, was the industrial backbone of America.

Completion of the St. Lawrence Seaway in 1959 removed the last obstacle to international shipping and world commerce. The promise for long-term economic vitality seemed to be fulfilled.

The Price of Prosperity

But these advances had a price. Physical changes to the Great Lakes ecosystem wrought by heavy industry, agriculture, and rampant development endangered the future of the Lakes.

For example, the St. Lawrence Seaway, in opening the Lakes to the world, also became a doorway for destructive exotic species. Within just a few years of the arrival of the sea lamprey, the once ubiquitous lake trout were nearly gone. Other species soon followed the lamprey, many arriving in ballast holds of international ships. The Pandora's Box had been opened. More than 160 exotic species now exist in the Lakes.

In the meantime, some of the region's largest cities were regularly dumping raw sewage into the Lakes. Most industries had no treatment systems beyond those needed to support their industrial processes, and their discharges poisoned rivers throughout the basin. By the 1970s, the Great Lakes' image as a symbol for the nation's strength was tarnished. While many areas, such as the Kakagon River Sloughs in Lake Superior, remained pristine, other areas became a national embarrassment. The image of the Cuyahoga River aflame in 1969 epitomized the decades of abuse and its sorry consequences.

Looking for Solutions

Fortunately, America was waking up to its environmental problems. Strong environmental laws, including the Clean Air Act and Clean Water Act, began to address the lax pollution controls of the time. Recognizing the need for shared action to protect the Great Lakes, the U.S. and Canada developed the Great Lakes Water Quality Agreement of 1972, and amended it in 1978. A new philosophy, the ecosystem approach was embraced as the way to restore the Great Lakes' ecological integrity.

In 1987, thirty-one locations in the U.S. were designated Areas of Concern and energized groups of stakeholders developed plans to clean up these polluted hot spots. In addition, States, Tribes, local governments, federal agencies, advocacy groups and many individual citizens came together to create consensus recommendations for the actions necessary to restore each of the five Great Lakes. Because these consensus plans identified gaps in existing programs and critical funding needs, there was a growing expectation that the planning process would lead to the technical and fiscal resources essential to implement the recommendations. This expectation was never realized.

As a result, the problems remained and in some instances have become more serious.

- The number of exotic species has exploded in the Great Lakes region. As a result, millions of dollars are directed annually to protect water intakes at industries, water utilities, and power plants.
- Although phosphorus reductions at wastewater treatment plants led to successful algae reduction, cladophora again fouls some beaches and near-shore habitats.
- There is no appreciable natural reproduction of lake trout in the lower four lakes. Other desirable fish population levels remain severely depressed.

- Municipal wastewater treatment infrastructure is old and deteriorating, and sewage overflows during storm events allow inadequately treated wastes to enter the Lakes.
- Contaminated sediments continue to leach toxic pollutants into the food chain, causing elevated levels of PCBs and mercury in fish, wildlife, and humans.
- Once a cleanup success story, Lake Erie has become the scene of dissolved oxygen depletions and resultant avian botulism outbreaks, killing thousands of migrating birds.
- Aging and obsolete factories that once fueled the country's growth were abandoned, leaving behind brownfields that challenge municipal governments' redevelopment efforts.
- Drinking water supply contamination risks remain, threatening the health of Great Lakes residents.
- Tributary flows and habitats, essential to the fish of the Lakes, have been negatively altered by local watershed activities that change hydrology.
- Wetlands that provide habitat and serve as pollution filters have been lost.
- Growth patterns have diminished public access to much of the Lakes' shoreline.

These problems have catalyzed actions by dedicated constituencies who have continued the call for help. But it has been a challenge to effectuate a national action plan to restore and protect the Great Lakes. A Government Accountability Office (GAO) review of Great Lakes restoration programs concluded that leadership and interagency coordination were lacking. The GAO also found that improved coordination was essential to increase the effectiveness of existing and future programs.

Re-energizing Restoration Efforts

In 2003, at the request of a Great Lakes Congressional delegation, the Great Lakes Governors identified nine priorities for Great Lakes restoration and protection as a first step in providing the leadership and coordination all agree was needed. Since their release, these priorities have been adopted by the Great Lakes Mayors, the Great Lakes Commission, and other Great Lakes leaders. These priorities form the organizing principle for this plan. The first of the priorities—ensuring the sustainable use of our water resources—is being advanced through the Governors' efforts, in partnership with the Premiers of Ontario and Québec, to implement the Great Lakes Charter Annex of 2001. This plan describes the actions needed to achieve the objectives that relate to the other eight priorities.

A key piece of the puzzle was put into place when President Bush issued an Executive Order in May 2004. This Order recognized the Great Lakes as a “national treasure” and created a Federal Great Lakes Interagency Task Force to improve federal coordination on the Great Lakes. The Order also directed the U.S. EPA Administrator to convene a “regional collaboration of national significance for the Great Lakes.” This collaboration process was needed to develop, by consensus, the national restoration and protection action plan for the Great Lakes.

The Collaborative Process

In December 2004, the region's leaders kicked off the Great Lakes Regional Collaboration. Since then, the Collaboration has developed a Strategy that provides a set of recommendations to restore and protect this national treasure. More than 1,500 people representing the federal, state, local and tribal governments; non-governmental entities; and private citizens have participated on eight issue-specific Strategy Teams to develop the plan. The Strategy is a reflection of this partnership and recognizes that we must all work in concert in order to be successful.

The GLRC Strategy is based on “Recommendations from the Strategy Teams” which represent each Team’s highest priority recommendations for actions that can be taken over a period of time to effectuate improvements in the Great Lakes basin. They do not represent all that needs to be done to completely restore the Great Lakes. Other recommendations the Teams developed during the collaborative process, as well as much supporting information, appear in the appendices.

The overarching issues of human health, research and information, and tribal perspectives were considered by each of the Strategy Teams as they pursued their work. Human health issues are discussed by a number of recommendations made by the Strategy Teams, particularly the Coastal Health Team, the Persistent Toxics Team, and the Areas of Concern/Sediment Team. Research and information issues are included chiefly in recommendations from the Indicators and Information Team.

Making the Final Plan

As set forth in the Framework that established the parameters of this collaborative effort, the members of the Great Lakes Regional Collaboration are issuing the final Great Lakes Regional Collaboration Strategy to Restore and Protect the Great Lakes. These members, who each have representation on the Executive Committee, are Federal Government Cabinet Officials, Great Lakes Governors, Mayors, and Tribal leaders. Representatives of Congress and of the Canadian government serve as observers. In developing the final Strategy, the Executive Committee and Strategy Team leadership addressed the following:

- The implementation process will emphasize some new actions to be taken as well as stressing the importance of making more effective use of the authorities, programs and funding already available at all levels of government, and will demonstrate opportunities for doing so. The President’s Executive Order charges the Federal Interagency Task Force with improving coordination among the approximately 140 different federal programs operating in the Great Lakes basin. An untold number of state, municipal, and tribal programs—as well as the efforts of non-governmental entities—must also be coordinated and managed as efficiently and effectively as possible as a necessary first step in restoring and protecting the Great Lakes;
- Part of this coordination is the recognition that no one Collaboration partner can be the sole source of support for implementing the Strategy. The Collaboration partners expect that, to the extent the Strategy’s goals cannot be accomplished under current resources or programs, responsibility will continue to be shared among those who value and currently invest in the preservation and restoration of the Great Lakes; and
- The Executive Committee acknowledges the funding climate in which implementation is likely to occur. While better coordinated use of existing resources will allow for some recommendations to move forward, others will require modest additional funding, and some will be impossible to implement absent substantial new expenditures on the part of the various Collaboration partners. While, the release of this Strategy does not constitute a commitment of additional resources on the part of any member of the Collaboration, the members commit to continuing to work together toward the goals identified in this document.

The Role of Tribal Nations

The Collaboration recognizes Tribal Nations as valuable partners under this Plan. It also acknowledges the United States’ unique treaty obligations and trust responsibilities toward Tribal Nations and their communities. Accordingly, the Framework Agreement establishes the need for

this Plan to address Tribal interests and perspectives as an overarching issue. The Collaboration recognizes the efforts of each Strategy Team to consider and address Tribal perspectives. These general comments are offered to complement and help integrate the Teams' efforts.

Tribal Nations count upon the United States government to adequately fund their natural resource and environmental management programs pursuant to various laws² and long-standing federal policies.³ Consequently, Tribal programs are particularly vulnerable to federal budgetary reductions. The loss of what might be considered a small amount of funding to others usually constitutes a large percentage of a Tribal program's funding, resulting in a correspondingly large reduction in services to Tribal communities, if not a de facto elimination of that program.

The Collaboration recognizes the need to maintain base funding levels for Tribal programs to ensure that the Tribal Nations are able to provide for the health and welfare of their communities. A secure, on-going funding base ensures the capacity to carry out the primary purposes of basic natural resource and environmental management programs. It further assures essential, culturally-appropriate research and monitoring of consumption patterns and risk exposures of Tribal members who engage in subsistence life ways, who use natural resources for medicine and in ceremonies, and whose livelihood is based upon natural resources. And, only with this funding can Tribal Nations remain effective partners in Great Lakes protection and restoration efforts.

The Collaboration acknowledges that most environmental problems, and particularly habitat degradation, disproportionately impact the culture, religious practices and other life ways of Tribal communities. Accordingly, it acknowledges and supports particular priorities that Collaboration member Tribal Nations have identified, including the prevention and control of invasive species, the reduction and prevention of toxic pollutants, and habitat protection and restoration. With this Plan, the Collaboration pledges its commitment to address these priorities to help sustain the overall health and well-being of Tribal communities and of the natural resources upon which they rely.

Creating a Shared Vision

The collaborative process that has produced this Strategy has engendered a new spirit of shared responsibility and optimism. Most importantly, the Collaboration has rallied around a shared vision of a restored, sustainable Great Lakes ecosystem. The Collaboration has reaffirmed a number of important underlying principles to guide not only decision makers as they move forward in implementing key actions, but also every Great Lakes citizen as they carry out everyday activities.

While the Strategy is a best effort to identify some means of moving closer to that shared vision, the Collaboration recognizes that it can not possibly identify every action or funding avenue that will help achieve the desired end. The members of the Collaboration hope that those whose activities impact the Great Lakes basin will use the Strategy as a benchmark to guide their decisions in a way that supports the ultimate shared vision. From thinking about the practices of the everyday household consumer, to the processes of Great Lakes industries, the Strategy can and should be used to identify how everyone in the Great Lakes basin might contribute to a cleaner, healthier environment.

² Such laws include dozens of treaties between the United States and Great Lakes Tribal Nations and a number of federal statutes such as the Indian Self-Determination and Educational Assistance Act, the Clean Water Act, and the Clean Air Act.

³ These policies are stated in a number of Executive Branch documents such as President Bush's Memorandum to the Head of Executive Departments and Agencies (September 23, 2004), President Clinton's Executive Order 13175 (November 6, 2000), EPA's Policy for Administration of Indian Programs on Reservations (November 8, 1984) and the USFWS Native American Policy (June 28, 1994). Most federal agencies have now adopted similar policies.

Similarly, the Collaboration expects that the Strategy will be used by decision makers and funding sources as an important benchmark in judging funding requests and project proposals by the various Collaboration partners that are consistent with the Strategy. The Strategy will succeed only if it is fully utilized in a dynamic, adaptive fashion to leverage even more and greater opportunities to protect and restore this national treasure.

Continued Role of the Regional Collaboration

With the release of the Great Lakes Regional Collaboration Strategy, the Collaboration partners will continue to fulfill the role that was articulated in the Framework Document, released in December 2004, which is to serve as a broad forum to address regional issues that relate to Great Lakes ecosystem protection and restoration. The Executive Committee will develop a formal addendum to the Framework document outlining plans for the continuation of the GLRC, including the Executive Committee and the Executive Subcommittee's function and operation by March 30, 2006.

Strategy Team Recommendations



Acknowledgement of Recommendations from the Strategy Teams

The GLRC Executive Committee acknowledges the valuable recommendations provided by the eight Strategy Teams. The Strategy Team reports provide information on actions that will help guide restoration activities at all levels of government and by the private sector over the coming years, and will serve as an important tool to use in selecting and weighing competing priorities with respect to Great Lakes restoration activities.



STRATEGY TEAM RECOMMENDATIONS

AQUATIC INVASIVE SPECIES

I. Problem Statement

Significant progress over the previous three decades to restore the Great Lakes has been interrupted and undermined by the present crisis of Aquatic Invasive Species (AIS). Invasive species come from outside an ecosystem, degrade habitat, kill native and naturalized species, and short-circuit food webs needed to maintain and rehabilitate biological resources. The Great Lakes region continues to face wave after wave of aquatic invasion. Sadly, even after decades of high-profile invasions like the sea lamprey and zebra mussel, the rate of new introductions has not slowed.⁴ Our Great Lakes, which are the world's greatest freshwater lakes, are succumbing to an irreversible "invasional meltdown"⁵ that may be more severe than chemical pollution, as AIS often make the Great Lakes home, they reproduce and spread, rendering eradication impossible. Existing measures to prevent the introduction of new species and to control species that are already established are woefully inadequate. The Great Lakes cannot afford even one new invader, and as invasions are irreversible, prevention is paramount.

An "invasive species" is defined as a species: 1) that is not native, and 2) whose introduction causes, or is likely to cause, economic or environmental harm or harm to human health.⁶ AIS have entered or may enter the lakes through vectors such as maritime commerce (e.g., ship ballast), aquaculture, canals and waterways, recreational activities, and the trade and use of live organisms. The AIS Strategy Team's plan addresses species invasion through these vectors. More than 160 non-native aquatic species are established in the Great Lakes, and during the last several decades established populations have been discovered at an average rate of one every 8 months.⁷ Not all of those species are invasive, but economic losses in the Great Lakes Basin from those that are were estimated in 2005 at \$5.0 billion per year.⁸ Moreover, 42 percent of threatened and endangered species in the U.S. are at risk, mainly because of invasive species.

Recommendations below apply only to the U.S. While a heightened U.S. response to AIS is welcomed and overdue, the U.S. should work closely with Canada to ensure commensurate action on both sides of the border, especially with regards to ballast water controls for ships



⁴ □
Great Lakes. [online] URL http://www.iaglr.org/scipolicy/ais/ais_iaglr02.pdf.

⁵ Ri □
Can. J. Fish. Aquat. Sci. 58: 2513-2525.

⁶ Executive Order 13112. <http://www.invasivespecies.gov/laws/eo13112.pdf>.

⁷ Mills, □
ductio □
invasive species in the North American Great Lakes accelerate? *BioScience* 55:4; Holeck KT, EL Mills, HJ MacIsaac, MR Dochoda, RI □
Lakes. *BioScience* 54:919-929; Holeck KT, EL Mills, HJ MacIsaac, MR Dochoda, and A Ricciardi. 2005. [Letter] Response from Holeck and colleagues. *BioScience* 55:4-5.

⁸ □
economic and environmental assessment. *Environ. Manage.* 35(1): 1-11.

transiting the St. Lawrence either in ballast or declaring no ballast on board. Bi-national cooperation is required to prevent introductions of AIS into the Great Lakes via maritime commerce, canals and waterways (including Long Lac and Ogoki diversions, St. Lawrence Seaway, and Welland Canal), trade of live organisms, and recreational activities.

II. Goals and Milestones

Goal: Prevent all new introductions of AIS into the Great Lakes.

Goal: Stop the spread of AIS within the basin, extirpate harmful AIS, or if impossible, then control to levels that ensure sustainable ecosystems and the social, economic and cultural uses they support.

Interim Milestones: A complete list of all milestones developed to measure progress through 2010 toward reaching the goals is included in AIS appendix A. The most important interim milestones supporting the recommendations are to:

- Enact comprehensive federal legislation (*specifically* legislation that would incorporate all of the terms contained in S. 770, H.R. 1591 and 1592 as introduced in the 109th Congress; collectively the *National Aquatic Invasive Species Act*—NAISA; with modifications as outlined in recommendation #3) to authorize and fund AIS programs;
- Provide expanded federal support for AIS research and outreach programs; and
- Develop a binational plan of action to prevent additional species invasions, and control established populations of the most damaging AIS.

III. Recommendations

The AIS Strategy Team offers the following five recommendations. A complete list of recommendations is included as Appendix A. Dollar figures have been included in the recommendations, where available. The dollar amounts provided are often incomplete estimates; more realistic figures should be developed.

1) Ship and barge-mediated introductions and spread of AIS in the Great Lakes should be eliminated, through the immediate promulgation of environmentally protective standards for ballast water, and the implementation of effective ship-board treatments and management measures. Specifically:

- Immediately require, verify, and enforce (in the current shipping season under existing authorities) that ocean-going vessels in the no ballast on board condition (NOBOB) implement practices that are an improvement over current practices⁹;
- Immediately require, verify, and enforce best performing ship-board ballast water treatment and hull management methods for ocean-going vessels (with a set approval period), with continued upward ratcheting of the treatment floor as treatment performance improves. Approved treatment must be to an environmentally protective standard by 2011;
- Immediately require monitoring, reporting, and public dissemination of all ballasting activities, prevention practices, and outcomes such that progress toward the goal is measurable and enforcement practical;
- Review and apply best-performing ballast water management practices to non-ocean-going vessels operating exclusively within the Great Lakes (including application of ballast water treatment for new ships) to eliminate the spread of AIS already introduced into the system; and

⁹ The Steering Committee of the Collaboration has requested the Strategy Teams put forward recommendations that can be implemented even before the process is finalized in December, 2005. The AIS Strategy Team recommends this action on NOBOBs as one for immediate implementation.

- Immediately and significantly expand research, testing, and evaluation of policies and technologies as alternatives to on-board treatment. Alternatives to be investigated should include (but not be limited to) cargo transfer, shore-based treatment, use of Clean Water Act discharge permits, and state/regional actions. Programs under which these investigations can be conducted include the Ballast Water Technology Demonstration Program and the Environmental Technology Verification Program. These investigations will hasten development of effective shipboard treatment systems. If ship-board treatments are shown to be inadequate, the team recommends implementation by 2011 of effective alternatives that prohibit ballast water from ocean-going ships from being discharged into the Great Lakes.

Rationale: The failure to install meaningful and enforceable regulations for treatment of ballast water from ballasted and NOBOB ocean-going ships remains a major inhibitor for achieving the protection and restoration of the Great Lakes. Moreover, some AIS have limited means to disperse throughout the Lakes without the help of ships. Clearly, the status quo is unacceptable and does not protect the Great Lakes. Ocean-going ships are the prime vector for AIS introductions into the waters of the Great Lakes, so stopping those introductions is a top priority. Also, preventing the spread of AIS by the Great Lakes shipping industry is also a priority, so ballast water management practices for ships that operate within the Great Lakes should be reviewed and modified. Quick passage and immediate implementation of comprehensive federal legislation is required to prevent ship-mediated introductions of AIS into the Great Lakes. The government has significant authority under existing law to take immediate action, particularly in the management of NOBOB ships. Ship-board treatment actions must be fully implemented now, and evaluated well in advance of 2011. This will require immediate action by the Coast Guard to promulgate ballast water regulations. In addition, research and planning on alternatives is needed immediately so that methods may be applied by 2011, in the event best-performing ship-board treatment fails to fully protect the Great Lakes and the nation.

Cost: \$13.2 million annually for five years.

2) Federal, state, and/or local governments must enact measures that ensure the region's canals and waterways are not a vector for AIS, including full federal funding of the Chicago San-Ship Canal barrier and the sea lamprey control program. Specific recommendations are to:

- Complete construction of barrier II, make barrier I permanent, provide federal funds to operate both dispersal barriers in the Chicago Waterway system, and complete a study of options for permanent hydrological and/or biological separation of the Great Lakes and Mississippi River systems;
- Fully examine options and their economic benefits and costs to prevent the spread of AIS via the Lake Champlain Canal and other canal systems linking the Great Lakes with other basins;
- Close or modify, through the use of physical barriers or control structures, canals that have fallen into disuse or disrepair—if rebuilt, prevent passage of aquatic invasive species;
- Prohibit development of new cross-drainage basin connections;
- Address intermittent flood-related connections;
- Initiate measures to prevent or reduce the movement of AIS into stream segments opened up by dam/impediment removal or culvert construction, and fully consider benefits to native species and impacts from AIS when evaluating cost-benefits of proposed fish passage projects;
- Develop and implement AIS monitoring plans to provide comprehensive monitoring and reporting of AIS through the canal vector; and

- Fully fund the Great Lakes Fishery Commission’s sea lamprey control program.

Rationale: A unified (federal) approach is preferred, but some canals and waterways are under state or local jurisdiction that will require state or local legislation. Canals facilitate the conveyance of bulk goods and commodities and are used for recreational activities, but they also facilitate the spread of AIS by allowing cross-basin transfer between watersheds. Canal closure can re-establish the natural geographic separation of the Great Lakes from other drainage basins. Work to complete the barrier system on the Chicago Waterway is moving forward, and provisions supporting this project exist in the pending NAISA legislation and in the Senate version of the Water Resources Development Act of 2005 (S. 728). New legislation is needed to study options for hydrological separation and to address issues in other canals, particularly in un-used waterways. Existing canals and waterways should include dispersal barriers, flood control barriers, physical barriers, and other provisions to ensure hydrologic separation of historically disconnected watersheds. Wherever possible, canals that have fallen out of use should not be improved and, in fact, should contain physical barriers to prevent the free-flow of organisms. Dam removal, while often an important element of habitat rehabilitation, should be done carefully, with full coordination of federal, state, and local agencies, so as not to solve one problem by creating another, an AIS pathway. The sea lamprey control program, successfully carried out by the Great Lakes Fishery Commission, should be fully funded so that this species, which entered the system through canals, remains under suppression.

Cost: \$45 million annually for five years.

3) Federal and state governments must take immediate steps to prevent the introduction and spread of AIS through the trade and potential release of live organisms. Specifically:

- Develop a list of species of concern for the Great Lakes basin and an immediate moratorium by the States on the trade of species on that list, until the species are screened and approved for trade ;
- Implement provisions of the pending NAISA legislation, as introduced, that establish a federal screening process for organisms proposed for trade¹⁰;
- Modify the pending NAISA legislation mandating that the screening process should classify species proposed for trade into three lists—prohibited, permitted, and conditionally prohibited/permitted;
- Modify NAISA to clearly state that the screening process established must place the burden of proof of non-injuriousness on the importer;
- Allocate sufficient resources to heighten the number of species under the Lacey Act as “injurious,” to prevent the interstate transportation of harmful species; the Fish and Wildlife Service FWS should list black, bighead, and silver carps as injurious under the Lacey Act;
- Significantly increase resources for the enforcement of laws governing the trade of live organisms; and
- Develop and implement risk models for organisms in aquaculture.

Rationale: The trade of live organisms is vibrant. Hundreds of millions of fish and hundreds of thousands of invertebrates, plants, and other organisms are traded live each year. However, serious problems and many loopholes in the trade regime exist. In many cases, trade is unregulated, facilitating importation, interstate commerce, and trade among the pathways that pose the greatest risk for introduction of invasive species into the Great Lakes ecosystem. This recommendation is designed to close the loopholes in the trade regime. It calls for an immediate listing of species and

¹⁰ For predictions about which fish species from Eurasia would be most damaging to the Great Lakes, and thus for insights into an immediate candidate list for damaging species that should be listed in the Lacey Act, see: Kolar, C.S. and D.M. Lodge. 2002. Ecological predictions and risk assessments for alien species. *Science* 298:1233-1236.

a state moratorium on trade of those species. It supports the provisions of NAISA that establish a screening process and it proposes that the screening process be based on a three-list approach. The recommendation also improves the implementation of key federal laws that restrict the interstate transportation of injurious species and calls for increased law enforcement to ensure the laws are implemented properly. Underlying the recommendation is the requirement that the burden of proof demonstrating that an organism is not injurious be placed on person(s) who proposes to import it. When the screening process is developed pursuant to NAISA, it will be important to place the burden of proof on the importer. Placing the burden on the government to demonstrate injuriousness (which occurs usually after it is too late to address the problem, if at all) does little to contain the spread of AIS through trade, and does not protect the Great Lakes.

Cost: \$17 million annually for five years.

4) Establish a Great Lakes Aquatic Invasive Species Integrated Management Program to implement rapid response, control, and management programs and assess the effectiveness of those programs. This program, which will require authorization, must:

- Allocate funds for development and implementation of State and Interstate Aquatic Nuisance Species Management Plans through the Aquatic Nuisance Species Task Force, with a particular emphasis on the immediate use of techniques to control or slow the spread of AIS;
- Develop voluntary agreements and codes of best practices for industrial trade groups;
- Encourage investigation of economic requirements and incentives (e.g., bonds or insurance) to prevent new introductions;
- Establish a revolving fund for rapid response actions;
- Establish an interagency, Great Lakes Federal Rapid Response Team, that will conduct activities on federal lands, and in other locations with State, Tribal, and local cooperation; and
- Allocate funds to implement a system of enhanced monitoring and ecological surveys in the Great Lakes;
- Support additional research to develop and implement new control methods for uncontrolled species of concern;
- Establish a coordinated data management system, through the Smithsonian Institution, the Great Lakes Environmental Research Laboratory, or other suitable entity, to develop an accessible, integrated, and centralized database that allows for the reporting and tracking of AIS infestations; and
- Ensure overall coordination and accountability through the Invasive Species Council, including developing regular and comprehensive reports summarizing the status of AIS activities (including those of the Aquatic Nuisance Species Task Force and the Great Lakes Panel on ANS in implementing the National Invasive Species Management Plan), formulating a complete AIS federal budget request, overseeing progress in addressing AIS, evaluating the collective response to AIS, and communicating AIS needs and problems to Congress and the public. The National Invasive Species Management Plan should include specific focus on AIS in the Great Lakes.

Rationale: The Government Accountability Office (formerly the General Accounting Office) observed that more than 20 federal agencies in ten departments are involved in AIS management and that States also play a significant role¹¹, and much better coordination of federal, state, and local actions is needed. One entity should be empowered to coordinate the AIS actions in the Great Lakes. For example, fifty years ago the governments of the U.S. and Canada mandated and funded

¹¹ Government Accountability Office (formerly General Accounting Office). 2002. Invasive Species: Clearer Focus and Greater Commitment Needed to Effectively Manage the Problem. Report GAO-03-1.

the development of successful control techniques for sea lampreys. A similar mandate is required for other AIS. Part of improved coordination is the systematic collection and free dissemination of AIS information. There must be a central place for the public, researchers, managers, and others to report AIS infestations. This information, in turn, should be available to anyone and should be used in implementing AIS programs. To achieve better detection and management of AIS, States and the federal government must cooperate in the development of AIS management plans, including plans allowing for monitoring, rapid response, and control. Moreover, codes of best practices for industry and the use of economic incentives (for example insurance and posting of bonds prior to engaging in practices where there is a risk of unintentional release) would significantly help industry participate in AIS management. When an AIS is first detected in the Great Lakes, States and the federal government must be prepared with pre-approved plans and funds to mount a rapid response action. Implementing an integrated pest management program in the Great Lakes will result in immediate cost-effective benefits.¹²

Cost: \$44 million annually for five years.

5) Federal, state and tribal agencies, academic institutions and other organizations should receive adequate support to conduct and evaluate cost-effective AIS vector-specific outreach and education programs. These programs should focus on behavior change and responsibility of resource users. Specifically, the following actions should be taken:

- Support programs that educate Great Lakes boaters and anglers on how to take preventive actions against AIS;
- Continue AIS-focused Hazard Analysis and Critical Control Point (HACCP) training and plan implementation for research and management agencies within and outside of the Great Lakes basin;
- Support a program that educates all facets of the Great Lakes maritime commerce industry including ports, carriers, shippers, mariners, resource users and users of goods produced from cargoes transported to and from the Great Lakes by ships, about the urgency and cost-effectiveness of preventing/containing AIS, the status of prevention, and what is needed to advance prevention; and
- Support a new comprehensive AIS Organisms-in-Trade educational campaign including the bait industry, modeled on the Sea Grant AIS-HACCP and Pet Industry Joint Advisory Council/Sea Grant/USFWS Habitattitude™ campaigns. Measurable objectives and timetables for these programs are included in Appendix F.

Rationale: People of all walks of life play a role in preventing the introduction and spread of AIS and, therefore, must be involved. Education and outreach are critical in an effective program to address AIS. Several entities have developed and implemented extremely successful educational campaigns (e.g., Sea Grant's HACCP program, U.S. Fish and Wildlife Service/Aquatic Nuisance Species Task Force's Stop Aquatic Hitchhikers™ campaign, and Pet Industry Joint Advisory Council/Sea Grant/U.S. Fish and Wildlife Service Habitattitude™ campaign). These programs should be expanded, emulated, and applied to all aspects of AIS, and particularly applied to reach people who pose the greatest risks of AIS introductions. The proposed educational campaign targeting maritime commerce, for instance, would involve shippers, ports, consumers, and others touched by the marine shipping industry, thus involving all people who work in and benefit from shipping. Effective educational campaigns rely on repetition and sustained messages from multiple sources.

Cost: \$19.5 million annually for five years.

¹² For background on the cost-effectiveness of slowing the spread of AIS, see: Leung, B., D.M. Lodge, D. Finnoff, J.F. Shogren, M. Lewis, and G. Lamberti. 2002. An ounce of prevention or a pound of cure: bioeconomic risk analysis of invasive species. *Proc Royal Soc London B* 269: 2407-2413.

GLRC HABITAT/SPECIES ISSUE AREA STRATEGY TEAM REPORT

I. Problem Statement

The landscape and aquatic ecosystems in the Great Lakes basin have been altered due to human settlement and activities, resulting in the loss or degradation of many habitats, and threatening the species they support. Invasive species, non-point source runoff, and aquatic food web disruption are some of the key threats to the health and sustainability of Great Lakes habitats and species they support; additional key threats are loss of fish spawning substrate and nursery areas, disruption of sediment transport, contaminants, altered lake levels, loss of floodplains and riparian buffers, hydrological changes, and landscape fragmentation and alterations. Great Lakes habitat loss and degradation is a pressing concern. The Great Lakes have lost more than half of the region's original wetlands and 60 percent of forest lands, and the region only has small remnants of other habitat types such as savannah or prairies. These changes in habitat type and extent have contributed to numerous plant and animal extirpations throughout the Great Lakes basin.

These impacts are of concern, as human health and prosperity, as well as the sustainability and biodiversity of Great Lakes wildlife, fish, and plant species and their habitats, are dependent on the health of the entire ecosystem. Natural habitats and native fish and wildlife communities play a critical role in maintaining ecosystem health and function, and contribute to the social and economic vitality of both the region and the nation. Nearshore and open waters provide drinking water for municipalities and habitat for numerous species of fish, aquatic life, and birds. The 10,000 miles of coastline consist of over 530,000 acres of coastal wetlands, sand and cobble beaches, and the largest system of freshwater dunes in the world buffer upland areas from storms. More than 30,000 islands scattered throughout the Lakes are refuges for rare and sensitive species. Thousands of tributaries and streams transport sediments, nutrients, and organic material throughout the watershed. Inland, thousands of lakes and wetlands support a diversity of fish and wildlife and are important reservoirs for water. Forest lands and rare savanna and prairie remnant ecosystems contribute to clean air, filtered water, and stabilized soil. The full array of these habitat types are vital for sustaining the many important Great Lakes species, particularly species targeted for restoration programs like trumpeter swans and lake trout in the lower four lakes. Appendix 2 contains a complete list of representative biodiversity in the Great Lakes.

In addition to supporting sustainability and biodiversity, Great Lakes resources have substantial economic value. Current estimates indicate that boating, fishing, hunting and wildlife watching generate over 50 billion dollars of economic activity annually and generate hundreds of thousands of jobs (additional economic statistics are included in Appendix 1). Healthy and diverse Great Lakes ecosystems are also of great value to the Tribal Nations who rely on these resources to meet their subsistence, economic, cultural, spiritual, and medicinal needs. Habitat and species restoration and protection efforts are vital to the maintenance and recovery of these valuable Great Lakes resources. The following systems are identified as the initial priorities for which protection and restoration efforts should be focused: 1) Fish and wildlife populations in the Open and Nearshore Waters; 2) Wetlands; 3) Riverine Habitats; 4) Coastal Shore and Upland Habitats.



The causes and impacts of habitat degradation and species loss are many and transcend state boundaries. Likewise, the benefits of Great Lakes protection and restoration efforts extend far beyond the Great Lakes states. Successful campaigns for the protection and restoration of the Great Lakes ecosystem require substantial financial resources, the talents of a broad range of stakeholders, and coordination among local, state, tribal, federal, and international agencies. There are currently numerous policies, regulations, and ongoing management efforts to address these issues (see Appendices 3 and 5). Many of these ongoing activities have demonstrated that smaller successes can be achieved, increasing the feasibility of system-wide success. A coordinated concentrated effort, with a focus on the initial priorities for protection and restoration efforts, as well as a broader viewpoint that puts individual projects into a broader region-wide Framework, will help to address impacts to Great Lakes ecosystem health.

II. Goals and Milestones

Goals and milestones are guided by population and habitat objectives from plans which were developed through the cooperative efforts of teams of qualified scientists and other experts (Appendix 5 includes a complete discussion of ongoing efforts). An overarching long-term goal that applies to all habitat types is to continue progress on recovering state and federally listed species and communities as well as taking proactive steps to prevent future listings. In addition, a process should be created or adopted to prioritize conservation actions, and the actions recommended should consider the full range of habitat and species biodiversity and be scientifically justified with measurable outcomes. These actions must also be considered from a basin wide perspective and therefore must include coordination with Canadian conservation efforts.

Open/Nearshore Waters

Long-term goals:

- Open and nearshore waters possess a full array of safe and healthy natural habitats required to meet the growth and reproductive needs of fish and wildlife, in accordance with the Joint Strategic Plan for the Management of Great Lakes Fisheries.
- Open and nearshore waters harbor self-sustaining fish and wildlife communities that include
- reproducing native fish species, especially lake herring, deepwater ciscos, lake trout, yellow perch, walleye, lake whitefish, coaster brook trout, lake sturgeon, American eel, and Atlantic salmon as a significant component.
- Self-sustaining populations of non-native game fish contribute to stabilize fish communities.
- Competition for habitat, predation, and disruptions to the food webs from invasive species are
- eliminated or neutralized by preventing new introductions and managing existing invasive populations.
- Food webs are free of toxic contaminants.
- Healthy fish communities support sustainable commercial, subsistence, and recreational fisheries.

Short-term actions:

- Develop and evaluate lake trout restoration efforts through strategies such as a 40 percent increase in the number of lake trout stocked, using guidance from existing fishery management plans (Appendix 5).
- Develop an initiative to re-establish native lake sturgeon and coregonines in five areas of the Great Lakes from which they have been extirpated.

- Refine or develop techniques or models to improve assessment and exploitation strategies and management protocols for important fish species such as yellow perch, lake whitefish, lake trout, and walleye stocks.
- Develop an understanding of factors involved in recruitment of lake trout and other important native species, and remove or mitigate major impediments to recruitment.

Wetlands

Long-term goals:

- Wetland conditions should be sufficient to provide a full range of ecosystem services including hydrologic retention, nutrient and sediment trapping, spawning, nesting, and nursery habitats, and other habitat needs of fish and wildlife.
- Fish, wildlife, and plant communities and their habitats are protected and conserved.
- Wetlands in hydrologically modified environments are maintained and improved.
- Non-native plant and animal species are managed or prevented.
- One million acres of high quality wetlands in the basin are protected or restored.
- Self-sustaining non-endangered population levels for all currently listed wetland wildlife species, as determined by the state Departments of Natural Resources.

Short-term actions:

- Restore or protect 550,000 acres of wetlands and associated uplands (1.1M acres).
- Achieve at least 1.54 million breeding pairs of waterfowl (annual breeding population under average environmental conditions).
- Update inventory and mapping of wetland habitat types in the Great Lakes basin.
- Acknowledge, develop and enhance federal and state regulations and enforcement for coastal and inland wetland protection that also facilitate and accelerate wetland restoration.

Riverine Habitats and Related Riparian Areas

Long-term goals:

- Lakes, streams, rivers, wetlands, and connecting channels are conserved or restored to ensure their connectivity to floodplains.
- Intact stream corridors sustain native and migratory fishes, other aquatic biota, and wildlife.
- Barrier-free access to cold and warm water tributary spawning and nursery habitats is sufficient to sustain migratory fishes.
- Rivers and streams are adequately buffered to reduce sedimentation and nutrient inflow.
- Natural flow regimes (including groundwater infiltration) are restored or emulated.

Short-term actions:

- Restore ten Great Lakes tributaries (five tributary barrier projects and five riparian habitat projects).
- Restore coaster brook trout and lake sturgeon in Great Lakes tributaries.
- Adopt a method to characterize or classify watersheds based on degree of altered hydrology.

Coastal and Upland Habitats

Long-term goals:

- Coastal shore habitats and natural processes that sustain them—such as sediment transport, lake-level fluctuation, and wetland migration—are protected, restored and/or managed.
- Coastal and upland habitats sustain long-term diverse and abundant populations of native resident and migratory fish and wildlife species, especially those that are threatened and endangered.
- Sufficiently large and connected inland habitats are protected and restored, contributing to ecosystem health and biodiversity, and providing migration corridors for species.
- Highly altered environments are managed to emulate natural ecosystems.
- New invasions of non-native species are prevented and existing non-native populations are eliminated or controlled.
- Erosion is controlled and groundwater is recharged.
- The vitality of these habitats provides a broad range of social, cultural, and economic benefits.

Short-term actions:

- Inventory and assess all Great Lakes coastal habitats and prioritize them for protection and restoration.
- Protect or restore 10,000 acres of high priority coastal and upland habitats per year across the basin.
- Conduct detailed monitoring of Areas of Concern in coastal shore areas.
- Protect and restore 1,100,000 acres of upland associated with wetlands.

III. Overall Recommendation

Habitat Conservation and Species Management Funding Should Be Increased by \$288.7M/year.

While there are currently a variety of targeted authorization levels, appropriations have failed to match the authorized funding levels. As appropriations shrink, there is a growing expectations gap between those who supported legislative actions to achieve results and those entities implementing protection and restoration programs. As funding is diminished, program effectiveness is diminished. As an example, under the Farm Bill Wetland Reserve Program there is a program to restore wetlands, but there is not enough funding to meet the demand and it is oversubscribed for private landowner enrollment. Similar appropriation shortfalls are evident in budgets related to other federal legislation designed to protect and restore the critical habitats and promote important species management needs of the United States. Therefore, the recommended actions are premised on a tiered approach to reflect different options for the implementation approaches which include:

- Increasing appropriations to match previously authorized levels;
- Increasing the authorized funding level where existing levels are inadequate to achieve specified results; and
- Creating new authorizations and appropriations where program gaps currently exist.

These recommended actions are a significant step towards meeting habitat/species goals, but reaching full restoration and protection objectives for the entire basin will require more resources and more time. Federal, state, tribal, and local government involvement along with private or

industrial landowner implementation is crucial for all of the recommendations including funding. The outcomes resulting from these recommended actions should be measurable. The immediate measure of project success may be, for example, the amount of area impacted by the project. After a few years, the assessment may shift to species numbers and/or population diversity in response to the habitat changes.

The Overall Recommendation for habitat conservation and species management funded at \$288.7 million annually should be allocated as listed below.

1. Native Fish Communities in Open water/Nearshore Habitats - \$20 million annually

Provide 20 million additional dollars annually for efforts to promote the restoration and protection of native fish communities in the near shore and open lake waters. Fishery resources and associated uses are among the most sensitive of all uses made of the Great Lakes and are an integral part and indication of ecosystem quality. This funding would support implementation of the fishery goals and objectives developed via the Joint Strategic Plan for Management of Great Lakes Fisheries, adopted in 1981 and updated in 1985 and 1997 by all state, provincial, tribal, and federal agencies with fisheries management authority in the Great Lakes. This funding would be used for research, population assessments, restorative stocking efforts, predictive fisheries modeling, development of regulations, and enforcement surveillance to protect stocks and promote sustainable harvests.

2. Wetlands – \$188.7 million annually

To achieve the goals of the Great Lakes regions specified in the North American Waterfowl Plan and related Joint Ventures, target 57 million new dollars annually for acquisition, restoration, and other protection tools for wetlands. Wetland restoration costs are estimated between \$1,000 and \$1,700 per restored acre, based upon average costs of wetland restorations undertaken by Ducks Unlimited and USDA's Wetland Reserve Program. An estimated sixty-six percent of historic Great Lakes wetlands have already been lost. Therefore, primary emphasis would be on wetland protection and restoration directed at achieving a net increase of wetlands in the basin, and would include a monitoring component. Currently, authorizations exist in several federal agencies (see Appendix 5, Ongoing Efforts). Improved coordination and joint targeting efforts could lead to project designs and locations that provide both non-point source pollutant controls (for water quality benefits) as well as increased amounts of critical wetland habitat. See Appendix 6 for more information on this recommendation.

3. Riparian Habitats – Great Lakes River Restoration - \$40 million annually

There is currently no national program to specifically support restoration of the physical integrity of our nation's rivers. Rivers are critically important to the establishment of self-sustaining Great Lakes fish communities and estuarine fish and wildlife populations. Congress should therefore develop legislation to restore Great Lakes rivers. It should provide \$40 million annually to implement watershed projects that restore the hydrology, protect and restore the riparian habitats for wildlife, restore in-stream habitats needed for fish spawning or nursery sites, and promote access for anadromous fish migrations while restricting exotic species expansions. The program could work jointly with USDA programs like the CREP riparian buffer programs to achieve systemic results through improved inter-governmental coordination and watershed targeting. Funding should be allocated to states and tribes on a formula basis based on watershed size, tributary miles, populations in the basin, and miles of Great Lake shoreline.

4. Coastal Shore and Upland Habitats - \$40 million annually

We recommend creating a coastal shore and upland habitat conservation program to coordinate funding to ensure Great Lakes native species and communities of greatest conservation need are protected, restored, and appropriately managed. We further recommend an increase in funding for existing landowner incentive programs to encourage private and corporate landowners to conserve habitat and help to protect important native species. With recommended funding levels of \$40 million per year for five years, we expect the results to be the prevention of habitat and species loss and the conservation of coastal shore and upland habitats supporting healthy populations of numerous species. This funding should be directed to existing state, tribal, and federal natural resource management programs. Funding would also provide grants for cost share projects, acquisitions, easements or other incentives for private and corporate landowners and municipal governments to provide long term habitat and species protection and restoration efforts.

There are common priority themes which would drive protection and restoration of coastal and upland areas across the basin and include:

- Habitats specified in endangered species recovery plans;
- Habitats that represent rare, threatened or endangered species;
- Rare or unique habitats like islands or dunes or rocky coastlines; and
- Habitats critical to species restoration programs.

While these themes are categorized as common priorities, monitoring, indicators, and measurable objectives, they would differ across the basin in recognition of the natural variations. It may therefore be necessary to suggest a temporal approach to monitoring which evolves as the projects develop and the biological systems subsequently begin to respond.

COASTAL HEALTH

I. Problem Statement

Contact (including external, ingestion, and inhalation)¹³ with nearshore waters of the Great Lakes can pose a risk to human health.¹⁴ As the primary source of drinking water, supplier of fish for both personal and commercial benefit, and recreational outlet for millions of U.S. residents, the nearshore waters of the Great Lakes should pose a *minimum* risk to human health through contact. (The Great Lakes are a natural body of water and hence the achievement of null risk is unrealistic.) To reduce human health risk, Great Lakes nearshore waters should be drinkable (with conventional treatment), swimmable, and the fish harvested should be consumable at all times. The need to close beaches, issue boil water notices, publish fish consumption advisories,¹⁵ and mechanically remove stranded algae should be minimized. These factors have led to the following trends and events in the Great Lakes.

- The estimated volume of combined sewer overflow (CSO) discharges in the U.S. is 850 billion gallons per year, with most of these CSOs located in the Great Lakes and Northeast regions;¹⁶
- In 2001-2002, 23 States reported 65 waterborne disease outbreaks affecting 2,536 individuals (61 hospitalized, eight died) which represent the largest number to occur since reporting began in 1978. Five of these outbreaks were attributed to water bodies in Great Lakes states (MI, WI);¹⁷ and
- The NRDC's annual survey of water quality monitoring and public notification at U.S. beaches finds that there were 51 percent more beach closings and advisories in 2003 than in 2002. Across the country, pollution caused more than 18,000 days of closings and advisories at ocean and Great Lakes beaches last year – more than ever recorded in the survey's 14-year history.¹⁸



¹³ Contact includes various levels of body contact experienced by swimmers, water skiers, users of personal watercraft, scuba divers and tribal communities who live along the shore.

¹⁴ Coastal Health is affected by the overall health of the natural ecosystem addressed in the Great Lakes Collaboration Habitat/Species strategy chapter. Coastal Health is also affected by the legacy of industrial pollution addressed in the Persistent Bio-accumulative Toxics Reduction and Areas of Concern/Restoration Sediments strategy chapters.

¹⁵ The Persistent Bio-accumulative Toxics Team will address fish consumption advisories.

¹⁶ 2004 CSO/SSO Report to Congress.

¹⁷ Morbidity and Mortality Weekly Report, CDC. 2004

¹⁸ NRDC Testing the Waters 2004.

II. Goals and Milestones

Goal: By 2020¹⁹ or sooner where possible, eliminate inputs of untreated or inadequately treated²⁰ human and industrial waste to Great Lakes basin waters from municipal wastewater treatment systems and on-site disposal systems.²¹

Interim Milestones:

- By 2006, EPA and the Great Lakes States will actively enforce NPDES authority to ensure pretreatment programs are properly implemented;
- By 2007, U.S. EPA and the Great Lakes States will undertake a thorough review of their ongoing wet weather control programs to identify and correct deficiencies, including adequate staffing and funding, to ensure that programs are achieving the requirements of the Clean Water Act (CWA), including anti-degradation;
- By 2007, watershed planning and applications of best management practices to promote infiltration and reduce impervious cover shall be components of wet weather management implemented by local governments;
- By 2007, Congress should fully fund the Clean Water State Revolving Fund;
- By 2008, U.S. EPA, in cooperation with Great Lakes States, will promulgate rules governing the disbursement of new wet weather management grant funds;
- By 2009, Congress will appropriate grant funds for a wet weather control program;
- By 2009, local governments shall develop ordinances to ensure proper construction, siting, and maintenance of on-site disposal systems, including conducting inspections at the time of property transfer;
- By 2010, or as soon as possible, all municipalities with wet weather overflows in the Great Lakes basin will have adopted and begun to implement comprehensive storm water control programs with the objective of meeting all appropriate state and federal regulations; and
- For communities with wet weather problems that have not proceeded with required planning and implementation by 2010, the States or U.S. EPA will apply necessary enforcement actions (administrative order or judicial action) to require correction of the problems by a date certain with appropriate penalties.

¹⁹ The date given in this goal assumes approximately five years for communities who have not done so already to create their long-term control plans (LTCPs) or other comprehensive wet weather solutions. The U.S. EPA CSO Control Policy of 1994, the driving engine for the LTCPs, did not provide a date by which communities needed to submit their plans for approval. However, the CSO Guidance for Financial Capability Assessment and Schedule Development of 1997 recommends a CSO control implementation period of 15 years for communities with high financial burden, while acknowledging that the time boundary is not intended to replace the negotiations and deliberations necessary to balance all of the environmental and financial considerations that influence the site specific nature of the controls and implementation schedules. Since the schedule recommendations laid out in the 1997 guidance have not been met in some communities, and considering the seriousness of CSOs' environmental impacts, the sense of the Coastal Health Strategy Team is that CSO control should be expedited. Therefore, the Team recommends a goal of implementing the LTCPs consistent with the guidance recommendations and, where feasible within 10 years of their approval. The recommended federal grant program would provide communities with the funding resources and storm water incentives to accelerate both their planning process and their LTCP (or other comprehensive wet weather solution) implementation. Particularly given the recommended 45 percent local match to this federal grant program, local funding would significantly leverage this accelerated schedule.

²⁰ Elimination and the adequacy of treatment are defined by the Clean Water Act, the 1994 CSO Control Policy, and subsequent federal guidance.

²¹ This goal is intended to capture the intent of the U.S. Policy Committee's 2002 Great Lakes Strategy goals, several of which are now outdated. For example: • "By 2003, U.S. EPA and States will assist local governments in establishing alternate funding vehicles to implement CSO/SSO abatement construction projects. Storm water permits will be in place for all phase II storm water discharges • By 2005, 100 percent of all CSO permits in the Great Lakes will be consistent with the national CSO policy. • By 2010, all sewer systems will be operated under LTCPs which will optimize performance and minimize discharges from SSOs. • By 2010, 90 percent of monitored high priority Great Lakes beaches will meet bacteria standards more than 95 percent of the swimming season." See the Nonpoint Source chapter for goals and action items related to minimizing storm water runoff from urban and agricultural areas. See the Persistent Bio-accumulative Toxics chapter for more on preventing discharges of industrial and pharmaceutical wastes from municipal sewage treatment systems.

Goal: Achieve a 90-95 percent reduction in bacterial, algal, and chemical contamination at all local beaches. Steps to achieve this include: identify indirect pollution sources capable of adversely impacting Great Lakes coastal health; educate communities regarding their environmental impact; and remediate all potential indirect pollution sources through identification, estimation of relative contribution (based on historical data and sanitary inspection), and remediation of these sources. This will result in 90-95 percent of all Great Lakes public bathing beaches being classified as having “good” water quality.

Interim Milestones:

- By 2005, the BEACH Act will be fully funded to continue routine compliance monitoring of coastal waters;
- By 2006, real-time testing methodologies will be evaluated and trialed at Great Lakes beaches;
- By 2006, coastal states will have complied with the BEACH Act requirements for public notification;
- By 2006, a standardized sanitary survey form will be drafted;
- By 2007, standardized sanitary surveys will be trialed at select coastal communities;
- By 2008, states will add to their existing water quality monitoring programs a standardized tool for conducting sanitary surveys that will identify sources of contamination at the local level in those instances when bacterial indicator levels exceed published standards;
- By 2009, real-time test methodologies will supplant existing test methods (which take in excess of 18 hours before results become available) under the BEACH Act of 2000; and
- By 2010, regional predictive models will be available using local data and forecasts of water mass movements derived from the Great Lakes Observation System.

Goal: At the local level, individual contamination events will occur no more than five percent of available days per bathing season, sources of these contamination events will be identified through standardized sanitary surveys, and remediation measures will be in place to address these events.

Interim Milestones:

- By 2007, coastal communities will have an education and outreach program in place for K-12, college, the general public, and coastal decision-makers, with assistance of the Great Lakes Sea Grant Network;
- By 2008, enforceable city ordinances will be in place that call for the placement of signs regarding the health risk associated with bather shedding, provision of adequate sanitary facilities for bathers, availability and importance of proper boater waste disposal, and prohibition of practices that attract nuisance wildlife to which fines are attached for violations;
- By 2008, use sanitary surveys to identify 90 to 95% of all indirect pollutant sources resulting in beach closures;
- By 2009, begin to control, manage, and/or remediate pollutant sources identified through sanitary surveys; and
- By 2020, nutrient loading will have decreased as evidenced by a decrease in nuisance algal blooms and ambient water concentrations of nitrogen and phosphorous in coastal areas.

Goal: The quality of Great Lakes basin drinking water from coastal and tributary sources will be protected from chronic and episodic threats of chemical and biological contamination that pose unacceptable risk following conventional water treatment.

Interim Milestones:

- By 2007, amendments to the Safe Drinking Water Act (SDWA) will be adopted to enhance flexibility in how State Revolving Funds may be used for infrastructure system improvements and the Clean Water SRF will be fully funded;
- By 2007, Bioterrorism Act amendments will be adopted to require implementation of security measures that address potential resource/facility vulnerabilities;
- By 2010, states will have strategies for protecting water quality for the intended use of public water supply; and
- By 2010, all states and local municipal water supply systems will complete plans for infrastructure upgrades that address aging system deficiencies and integrate security measures for vulnerable resources/facilities.

III. Recommendations

Based on assessments that identify existing pollution sources and potential threats to water quality, multiple actions are available to remediate and prevent adverse impacts on human health in nearshore waters. These include control/abatement and remediation of direct and indirect pollution sources into coastal and tributary Great Lakes waters, and protection of drinking source water quality. The following actions are required to achieve the Coastal Health goals for a minimum risk to human health within the Great Lakes.

1) Eliminate to the extent provided by existing regulation inputs of untreated or inadequately treated human and industrial waste to Great Lakes basin waters through implementation of wet weather programs, including improvements to wastewater treatment systems. Conditions governing this recommended action are presented in *Appendix C*.

- U.S. EPA and the States should fully implement, enforce, and report on their wet weather control programs to identify and correct deficiencies to ensure the requirements of the CWA are achieved in a timely manner.
- As part of a 55/45 percent federal/local cost share, \$7.535 billion²² in federal grants should be made available over five years. These monies would then support state and local resources in the amount of \$6.21 billion, thereby raising \$13.70 billion to fund wastewater treatment improvements.

²² U.S. EPA's Clean Watersheds Needs Survey (CWNS) 2000 Report to Congress (www.epa.gov/owm/mtb/cwns/index.htm) breaks down costs by watershed and need category. For the Great Lakes watershed, the total cost for need categories I-V is 13.75 billion in January 2000 dollars. This total includes I. Secondary Wastewater Treatment, II. Advanced Wastewater Treatment, III-A. Infiltration/Inflow correction, III-B. Sewer replacement/rehabilitation, IV-A. New collector sewers and appurtenances, IV-B. New interceptor sewers and appurtenances, and V. Combined sewer overflow correction. [However, the CWNS Report to Congress states that its estimated cost to control CSOs (Needs Category V) is based on "capturing 85 percent of the flows that enter the combined sewer system during wet weather events." Furthermore, this cost is only for "providing those flows with the equivalent of primary clarification, solids and floatables disposal, and disinfection of the effluent." (CWNS 2000 Report to Congress, page 3-8). To the extent that implementation of CSO controls exceeds 85 percent capture and/or provides treatment for those flows equivalent to more than primary clarification, solids/floatables disposal, and disinfection, this level of funding will be inadequate. Future estimates of the needed funding must be increased to reflect the actual levels of CSO capture and treatment undertaken in the Great Lakes watershed.] The Coastal Health team's recommendation is derived by allocating \$13.70 billion of this total to support a federal grants program, and the remaining \$50 million of this total to support the three Great Lakes U.S. EPA regions (\$10 million) and the eight Great Lakes States (\$40 million). To put this figure in some context, the Report found that the estimated total cost of the upgrade projects necessary to meet the objectives of the CWNS is \$181 billion. The Coastal Health team independently derived the 55/45 percent federal/local cost share for the grants program, resulting in a federal cost of \$7.535 billion over five years. On an annual basis, the team's recommendation calls for \$1.507 billion in federal grants per year for five years. Although this amount is essentially all new funding, a small fraction may be supplied by the State Revolving Fund (SRF). According to NRDC, \$393 million is budgeted for the Great Lakes States' SRF in 2005, and \$260 million budgeted for 2006. The portion of this budget that goes to communities actually within the Great Lakes basin is a much smaller amount. If the SRF continues at its current level, it could represent an approximate \$100 million (estimated) in existing

- \$10 million²³ should be made available over five years to the three U.S. EPA regions to review and upgrade their Great Lakes wet weather programs—including the CSO Control Policy, NPDES permit issuance and enforcement, and storm water management—to ensure that issues are addressed comprehensively.
- \$40 million²⁴ should be made available over five years to the Great Lakes States to administer a new grants program, review, and upgrade all of their wet weather programs (including NPDES permits and enforcement), and implement anti-degradation rules in relation to sewage system expansions.

Rationale: Direct sources of contamination affecting coastal health are those that originate from a single, identifiable, fixed point such as rivers, streams, sewer pipes, septic systems, or a point of industrial discharge. Aging or overburdened sewage infrastructure, which can release raw sewage to source waters in urban areas through sanitary sewer overflows (SSOs) or CSOs, still exist in many Great Lakes municipalities where storm and sanitary systems remain co-mingled (see *Appendix A*). Substantial reduction of the discharge of untreated sewage into the Great Lakes will reduce health risks for bathers and bacteria load in drinking water supplies. Given the potential impact on human health, overflows of untreated human and industrial waste into Great Lakes waters must be controlled through comprehensive solutions that may include structural controls such as separating storm and sanitary sewers, constructing storage capacity or controlling infiltration/inflow; non-structural controls such as land use planning and aggressive use of best management practices to allow no net increase in storm water run-off; and regulatory controls such as issuing, updating, and enforcing National Pollutant Discharge Elimination System (NPDES) permits.

Cost: \$13.75 billion in new funds over five years, with \$7.54 billion provided by the federal government and \$6.21 billion provided by non-federal partners.

2) Identify indirect pollution sources capable of adversely impacting Great Lakes coastal health and, upon identification, promulgate and enforce regulations, provide public education, promote research, and initiate remediation to reduce the impact of these sources.

- These may include, but are not limited to, bacterial loading from foreshore beach sand and submerged sediments, avian/animal deposition, algal blooms (can appear during dry weather, but are caused by nutrient loading during wet weather and aquatic invasive species), bather shedding, and untreated onboard boater waste.
- State and local public health agencies provide public education and/or incentives to reduce impacts from nutrient-loading, household and industrial products, attraction of nuisance wildlife, improper discharge of onboard boater waste, and bather shedding.
- Request that the Great Lakes Sea Grant Network make this an education/outreach priority for the region and a component of a Great Lakes Centers for Ocean Science Education Excellence (COSEE) program through NSF.
- State and local governments promulgate and enforce existing regulations which take action against boaters who discharge waste to the nearshore or open waters of the Great Lakes.
- Require regulations regarding the availability of adequate toilet and shower facilities based on projected bather density to receive BEACH Act grant funds.

_____ funding that could be subtracted from the team's recommended total on an annual basis. The CWNS 2000 Report states that "the needs must have existed as of January 1, 2000, to be included in the CWNS 2000." Therefore, the costs contained in the report do not have an implied timeframe or end date. The Coastal Health team, accordingly, recommends that the full cost of addressing these needs be provided over a five-year period. The CWNS is repeated and updated every five years. When the January 2005 data are published, the Coastal Health team's recommendations should be updated to reflect the most recent data.

²³ *Ibid.*

²⁴ *Ibid.*

- Assess extent of contaminated sediments, especially in Areas of Concern, that contribute to water quality concerns. (Addressed in AOC/Sediments chapter.)
- Research to clarify sources and transport of biotoxins (i.e., botulism) through foodweb.

Rationale: Indirect sources of contamination are sources whose origination cannot be traced to a single point such as a storm drain or sewer outfall (see *Appendix A*). The effects of indirect sources of contamination are diffuse and, therefore, determining their origin may require intensive investigation. For example, determining a correlation between increased bacterial level density at the bathing beach and various coastal processes, predominating weather conditions, and natural and human sources is often difficult. Remediating contamination sources responsible for indirect pollution water quality failures will reduce human health risks, increase availability/access to Great Lakes recreation, improve ecosystem health, promote sustainable practices, decrease economic loss (millions of dollars are lost each year due to beach closures), and increase commercial benefits.

Cost: Depends on indirect pollution sources identified at individual beaches based on annual sanitary surveys (see *Appendix E*). The costs associated with conducting educational campaigns and initiating remediation range between \$20,000 and \$1 million per source identified, based on the size of the population served, the extensiveness of the impact, and the need for infrastructure improvements. The cost would be shared between state and local agencies (possible through fines levied against offenders in some instances) and through the availability of federally approved loans or grant funding.

3) Standardize, test, and implement a risk-based approach²⁵ to manage recreational water.

- U.S. EPA to build the approach upon existing water quality monitoring programs and employ the latest technology for microbial assessment and standardized sanitary survey criteria, based on a holistic watershed assessment.
- U.S. EPA to take responsibility for accelerating the process necessary for field testing and approval of real-time test methodologies.
- Once these two tools are in place they can be tested at the local level, adopted by the federal government, and implemented at the state and tribal level.
- Federal, state, tribal and local municipalities have begun to work together to standardize the microbial assessment of recreational water and these working groups can also standardize the sanitary inspection process.

Rationale: Beach and coastal assessment methods (microbial and physical) are the front lines of defense for determining when contaminant influxes are most likely to impact human health in the context of surface water encounters. Tools available to beach managers and authorities responsible for monitoring these water bodies should accurately reflect risk, provide timely notification to the public, and enable investigation of potential contamination sources (both direct and indirect) thus leading to remediation of these sources.

Cost: \$2.0 million²⁶ annually to the Great Lake states to standardize, trial, and implement a risk-based approach to beach/coastal assessment, a portion of which could be appropriated from U.S. EPA BEACH Act funds (assuming that they are re-appropriated at the federal level). \$7.2 million for U.S. EPA to conclude and analyze data from National Epidemiological and Environmental Assessment of Recreational (NEEAR) Water Study (\$9.0 million of the total cost of \$16.2 million has already been funded).

²⁵ WHO, Annapolis Protocol, U.S. EPA National Beach Guidance and Required Performance Criteria for Grants, June 2002, EPA 823B02004.

²⁶ Note that the dollar amount appropriated for BEACH Act funds to the eight Great Lakes states in 2005 was \$1,965,460.

4) Protect drinking source water quality.

- U.S. EPA will establish ambient water quality criteria for parasites, pathogens, and disinfectant by-product (DBP) precursors for states to implement.
- The Clean Water State Revolving Fund (CWSRF) should be fully funded, and states should implement programs to assure that ambient water quality, following conventional treatment, does not pose an unacceptable risk to consumers.
- States should work with public water systems to reduce vulnerabilities identified in the source water assessments.

Rationale: In addition to effective implementation and enforcement of existing Safe Drinking Water Act (SDWA) and CWA requirements by EPA and the states, this action requires a combination of enhanced federal policy requirements to include ambient water quality criteria for parasites, pathogens and disinfectant by-product precursors, full federal funding and greater flexibility in how State Revolving Funds may be used. Ambient water quality criteria related to drinking water following conventional treatment are needed to support source water protection programs. Water quality criteria for pathogens, such as cryptosporidium, have not been promulgated under CWA authority, nor have criteria for DBP precursors been developed, while risk-based standards are being developed for finished water supplied by public water systems.

Cost: Fund the CWSRF at least to the level appropriated for FY 2004 (\$1.35 billion nationally and \$225 million to the Great Lakes States).

5) Use the Drinking Water State Revolving Fund to improve drinking water infrastructure and support source water protection.

- The Drinking Water State Revolving Fund (DWSRF) should be fully funded and increased flexibility should be given in how the funds may be used by the states and local municipalities for water infrastructure improvements.
- States and local public water supply systems to implement and enforce infrastructure improvement plans that include security measures to address resource/facility vulnerabilities and critical infrastructure facilities governed under the Bioterrorism Act.

Rationale: Protection of drinking water quality by public and private water supply systems throughout the Great Lakes basin must be improved. In addition to effective implementation and enforcement of existing Safe Drinking Water Act (SDWA) requirements by U.S. EPA and the states, this action requires a combination of enhanced federal policy requirements to include full federal funding and greater flexibility in how State Revolving Funds may be used to upgrade drinking water infrastructure, systems, and implementation of water infrastructure improvement plans with security measures for vulnerable resources/facilities to reduce chemical contaminant and bioterrorism risks to drinking water supplies.

Cost: Fully-fund the DWSRF at levels authorized by the SDWA (\$260 million to the Great Lakes States) through 2010.

AREAS OF CONCERN/SEDIMENTS

I. Problem Statement

In 1987, the U.S. and Canada committed to restoring the most degraded portions of the Great Lakes basin. Working through the International Joint Commission (IJC), the Great Lakes states and provinces designated 43 Areas of Concern (AOCs), including 26 in U.S. waters and five in binational waterways. AOCs were identified based on 14 types of impairment, reflecting human uses—such as eating fish, drinking water and swimming—and ecological impacts, such as loss of diversity in aquatic life and destruction of fish and wildlife habitat.

AOCs vary widely in geographic scope and extent of environmental problems. Some are confined to small harbors and others encompass an entire river watershed. Some are impacted primarily by one large contaminated sediment site and others face multiple sources of pollution and extensive loss of habitat.

The most common sources of impairment are contaminated sediments; sewage treatment plant discharges and combined sewer overflows; nonpoint source runoff; runoff from hazardous waste sites; and habitat degradation and destruction. Many of the sources that impact the AOCs are addressed in the other chapters of the Great Lakes Regional Collaboration report. Contaminated sediment is linked to impairments in all 31 U.S. AOCs. Due to the widespread, severe impacts of contaminated sediments, and because no other chapter covers them, this is the only pollution source this chapter will address.

Though progress has been made in the AOCs, much remains to be done. Restoration of AOCs has historically been approached through an array of programs, most designed for other purposes and none adequately funded. This is particularly true for the remediation of contaminated sediments. In January 2005, the U.S. Policy Committee for the Great Lakes identified 75 remaining sites in the AOCs with a total estimated volume of nearly 75 million cubic yards of contaminated sediments. Depending on the remedy, total cleanup costs for these sites could range from \$1.5 billion to \$4.5 billion.

There are three primary barriers to achieving further progress in restoring the AOCs: 1) optimizing program administration and effectiveness; 2) addressing contaminated sediments (including disposal and destruction technology issues); and, 3) establishing final restoration targets to facilitate “delisting” of AOCs – formally removing them from the list of designated Areas of Concern in the Great Lakes.

Program Administration and Effectiveness

At its inception, the AOC program generated much enthusiasm as a comprehensive, ecosystem-based approach with a strong emphasis on community leadership and stakeholder involvement. Federal funding has supported much of the planning, restoration, research and monitoring conducted in the AOCs. The states, capably assisted by local advisory councils in most AOCs, played an important role in engaging stakeholders, advising federal agencies, and implementing many planning and restoration efforts.

By the late 1990s, however, progress in some AOCs slowed due to diminished funding and a lack of organized federal program direction. Consequently, state, tribal, and local efforts declined. In



2002, the General Accounting Office (GAO, now called the Government Accountability Office) produced a report (<http://www.gao.gov/new.items/d02563.pdf>) documenting administrative problems in the AOC program. Since then, significant changes have begun to reinvigorate the program. However, there remains a need for more efficient processes and adequate, stable funding for federal, state, local, and tribal partners to carry out and achieve complete restoration and delisting of the AOCs.

Contaminated Sediment Issues

It is critical to address unstable and/or bioavailable concentrated deposits of contaminated sediments before they reach the lakes, where cleanup can be much more difficult and expensive. Many remediation projects are constrained by the complexity and cost of design and implementation, limited alternatives to contaminated sediment dredging and disposal, limited disposal capacity, and a lack of clear standards for beneficial re-use of some sediments.

Delisting

Despite the time and effort invested in the AOC program, no U.S. AOCs have been delisted and there is no consistent way to track progress in restoring these waterways. Further, most impacts are not clearly aligned with existing federal water quality regulations, making it difficult to meaningfully document environmental improvements in the AOCs. AOCs need scientifically justified, measurable delisting targets that address AOC-specific conditions and are consistent with federal, state, local, and tribal regulations and policies. Research, remediation and monitoring needed to achieve these restoration targets must be identified, funded, and implemented.

II. Goals and Milestones

The goal of the Great Lakes Regional Collaboration is to restore all the U.S. Great Lakes AOCs. Milestones toward this ultimate goal include:

- by the end of 2006, U.S. EPA should expand the existing U.S. EPA-State RAP Workgroup into a Federal-State AOC Coordinating Committee to better coordinate efforts and optimize existing programs and authorities to advance restoration of the AOCs;
- by the end of 2007, Congress should revise and reauthorize the Great Lakes Legacy Act;
- by the end of 2008, delisting targets for each U.S. AOC should be developed collaboratively by federal, state, local, and tribal partners;
- by the end of 2010, 10 AOCs should be delisted (restored to target goals); and
- by 2020, all known contaminated sediment sites in the AOCs should be remediated. Coupled with restoration measures identified in other chapters, this will facilitate complete restoration of the AOCs.

III. Recommendations

The following recommendations address obstacles to restoring the AOCs by:

- addressing inefficiencies in the Great Lakes Legacy Act and increasing available funding to a level sufficient to reach the goal of cleaning up all contaminated sediment sites in the AOCs by 2020;
- providing for the program capacity needed to develop measurable endpoints, design and implement remedial actions, and measure results;

- making better use of existing programs and funds through increased coordination at the federal, state, local and tribal levels; and
- working toward better alternatives to removal and disposal of sediments.

1) Great Lakes Legacy Act Funding, Amendments, Reauthorization and Guidance

- Over the next five years, the Administration should request and Congress should appropriate \$150 million annually for the Great Lakes Legacy Act to remediate contaminated sediment sites in the AOCs. Continued funding at this level over an additional ten years will be needed to achieve the goal of cleaning up all known contaminated sediment sites in Great Lakes AOCs by 2020.
- The Great Lakes Legacy Act should enhance and accelerate the pace of sediment remediation in the AOCs by serving as the primary remediation authority or supplementing existing remediation programs addressing contaminated sediments (such as CERCLA, RCRA, state remediation statutes and WRDA § 312, among others). Congress should amend the Act to allow for more efficient implementation of the program, as follows:
 - The “maintenance of effort” language in the Legacy Act should be dropped because it is not appropriate in the context of sediment remediation where costs often vary widely from year to year and, as a result, it can lead to inadvertent disqualification of otherwise eligible and valuable projects.
 - The life of appropriated Legacy Act funds should be extended beyond two years (as envisioned by the Legacy Act) to accommodate both responsible remediation and long-term monitoring of the effectiveness of implemented remedies, which is consistent with the 2002 *Great Lakes Strategy*.
 - The current 35 percent level of matching funds/in-kind services required under the Legacy Act from the nonfederal sponsor at “orphan sites” should be adjusted to 25 percent, or at a minimum, Legacy Act funds should be available for planning and design work with no match or reduced match, in order to “tee-up” projects and maintain momentum.
 - The current limitation in the Legacy Act which requires exclusive federal agency project implementation precludes disbursement of funds to other entities to assume the lead in project implementation. This requirement restricts the efficient implementation of remedial work in some cases, and should be amended to allow direct disbursement of project funds, which would allow for greater flexibility in implementing the program.
- U.S. EPA should develop guidance to clarify and reiterate the Legacy Act’s original intent to permit potentially responsible parties (PRPs) to participate as the non-federal sponsor for projects funded under the Act. The guidance should confirm that PRPs are neither excluded from eligibility to serve as nonfederal sponsors nor absolved from their liability for remediation of contaminated sediments under federal and state remediation programs. The eligibility of PRPs to provide some or all of the nonfederal share of a Legacy Act package should be evaluated on its merits on a site-specific basis, in the context of the concept of “added value.” Examples of circumstances where PRP participation in Legacy Act project funding would provide “added value” include, but are not limited to, sites where an “orphan share” exists or where the remedy will be enhanced (such as where the scope—quality or quantity—of the remediation is improved, innovative methods are employed or the remediation will be accelerated).

Rationale: Before the Great Lakes Legacy Act, there was no specific federal authorization for a contaminated sediments remediation program for the AOCs. The Act fills this gap and holds the

potential for an accelerated sediment remediation program that builds on considerable preparatory work by federal, state, local, and tribal agencies and PRPs to evaluate contaminated sediments and to design and implement remedial options.

Appropriations under the Legacy Act have lagged substantially behind authorized levels. U.S. EPA received \$9.9 million in FY 2004 and \$22.3 million in FY 2005, compared to authorized funding of \$50 million annually for remedial activities. If Congress were to appropriate the full \$50 million annually, the interim milestone of delisting ten AOCs by 2010 can be achieved. However, this spending level will not be adequate to reach the ultimate goal of remediating all contaminated sediment sites in the AOCs by 2020. Based on estimated volumes of contaminated sediments and depending on the remediation options selected, \$150 million (on average) each year matches up with both resource needs and state, local, and tribal capacity to plan and implement remedial projects.

2) AOC Program Capacity

- The Administration should request and Congress should appropriate \$10 million annually to the Great Lakes states and community-based coordinating councils in the AOCs; and \$1.7 million to U.S. EPA's Great Lakes National Program Office for regional coordination and program implementation.
- Furthermore, the U.S. Army Corps of Engineers Great Lakes Remedial Action Plan Program, authorized in Section 401 of the Water Resources Development Act of 1990, should be included in the President's budget to enable the Corps to participate in the Federal-State AOC Coordinating Committee and to request funding for projects that advance restoration of the AOCs.

Rationale: Restoration of the AOCs is critical to the restoration of the Great Lakes, yet the Clean Water Act provides no specific regulatory authority or funding for the AOC program. The decline in program effectiveness in the late 1990s, which corresponds directly to declining federal financial support and the associated loss of federal, state, tribal, and local programmatic capacity, is testament to the need to build and maintain core capacity among the partners involved in AOC restoration. Current funding levels should be enhanced to the recommended levels to ensure adequate technical capacity at the federal, state, local, and tribal levels so that large-scale cleanup programs, such as the Great Lakes Legacy Act, are utilized effectively.

To further enhance AOC program capacity, U.S. EPA and each state, in consultation with local AOC advisory groups, should establish cooperative agreements that outline their respective roles and responsibilities, priorities, anticipated outcomes, resource needs, staffing levels, and procedures for documenting and reporting progress.

The core funding recommended above also will enable more rapid development of the delisting targets that are a necessary foundation of remedial projects. Federal, state, local, and tribal partners should collaboratively develop delisting targets for each U.S. AOC by the end of 2008, in accordance with the Delisting Principles and Guidelines adopted by the U.S. Policy Committee in December 2001.

3) Federal-State Collaboration

The existing U.S. EPA/State RAP Work Group should be expanded to a Federal-State AOC Coordinating Committee to better coordinate efforts and optimize existing programs and authorities to advance restoration of the AOCs.

Rationale: No single agency at any level of government has the legal authority or programmatic resources to fully restore the AOCs. Further, the current lack of a coordinating mechanism means existing resources are not used as effectively as they could be. A sustained, outcome-oriented collaborative process is needed to effectively consolidate existing resources available for restoring the AOCs.

The Federal Interagency Task Force is charged under the Executive Order with coordinating the Great Lakes activities of federal agencies. While this is a valuable objective, much of the work to restore the AOCs is administered at the state, tribal, and local levels. Therefore, a broader collaborative framework is needed. The Coordinating Committee should act as a clearinghouse to move specific projects forward through technical assistance, data collection and sharing, identification of available resources, and joint work efforts. States should help local AOC councils and tribes access the support of the Coordinating Committee, plan and schedule restoration work, and identify nonfederal matching funds as necessary.

4) Promote Development of Environmentally-Sound Sediment Treatment and Destruction Technologies, Beneficial Re-Use of Sediments, and Best Available Disposal Options.

U.S. EPA, the U.S. Army Corps of Engineers, the states, and the tribes should actively examine innovative approaches to the ultimate disposition of contaminated sediments as an alternative to the current practice of disposing of them in Confined Disposal Facilities (CDFs) or landfills. Congress should fully fund, at \$3 million annually over the next five years, the research and development program authorized in Section 306 of the Great Lakes Legacy Act. This research will test and promote viable treatment technologies that allow for the separation, immobilization, neutralization or destruction of contaminants in sediments, in-situ or upon removal. A significant focus of this work should be on the development of technologies that produce no new contaminants and do not release contaminants to the environment.

Rationale: While it undoubtedly improves the condition of waterways, the removal and transporting of contaminated sediments to a disposal facility simply relocates the contamination. Disposal facilities can be difficult and expensive to site and build, and the lack of adequate disposal capacity keeps cleanups from moving forward. Alternatives to disposal would address these issues.

Federal, state, local, and tribal agencies should examine the feasibility of developing facilities where dredged sediments can be managed for disposal, treatment, destruction and/or beneficial re-use at a single location. Treatment technologies for decontamination and/or beneficial re-use of the dredged material at the facility should be included in project costs. In order to increase limited disposal capacity, the Corps and state and tribal agencies should encourage local communities to “mine” existing CDFs to facilitate the environmentally-sound beneficial re-use of dredged materials. There should be early, broad public outreach in siting decisions regarding disposal or treatment of contaminated sediments.

NONPOINT SOURCE

I. Problem Statement

Water pollution from nonpoint sources is a substantial contributor to the impairment of waters across the Great Lakes basin. Nonpoint source pollution is present throughout the basin, in many forms and with many interactions. The complexity of the pollutants and their presence in soil, water and air make pollution abatement for nonpoint sources particularly difficult to address. Strategies to date have failed to deliver widespread stream and lake restoration necessary for the protection and maintenance of the Great Lakes. This strategy recommends actions for mitigating stressors that cause nonpoint source pollution.

Nonpoint source impacts vary greatly in frequency and severity across the Great Lakes. Impacts have been particularly severe in the coastal wetlands and tributaries that once buffered the Lakes from environmental damage. Other prime impact areas include western Lake Erie, Saginaw Bay, Green Bay, the coastal region of Ohio, selected Areas of Concern (AOCs), and selected tributaries or near-shore areas. Due to this variability, the tools and strategies required to address nonpoint source pollution must be tightly coordinated among partner agencies and organizations and must be geographically targeted. In addition to working directly to address pollutant stressors, effective reduction of nonpoint sources will also include integrating control strategies with local land use and smart growth issues.

Nonpoint Pollution Stressors: Five nonpoint source pollution stressors – physical or chemical changes that occur within the ecosystem – significantly impact the biological components, patterns, and relationships in the natural system of the Great Lakes: these are nutrients, contaminants, pathogens, sedimentation, and altered flow regimes. These stressors enter the Great Lakes through three primary pathways: surface runoff, groundwater infiltration, and atmospheric deposition. Nonpoint source pollution in each of the five forms damages flora and fauna in the Lakes, threatens human health, reduces recreational opportunities, and increases the cost of treating drinking water and dredging our harbors and marinas. Actions against stressors have direct short-term costs, but often save money in the longer-term and sometimes make new sustainable growth possible.

Existing Programs and Their Effectiveness: The total input of stressors from nonpoint source pollution today considerably exceeds that from point sources. Work on point sources approaches a point of diminishing returns; funding to increase point source control beyond 90 percent or 95 percent is less effective than providing the same amount of funding to address nonpoint sources. Many governmental agencies, non-governmental organizations, including universities and colleges, and the regulated community, are already at work at, or interested in, reducing nonpoint source pollution in the Great Lakes. The combination of federal, state, tribal, and local institutions and programs that is already actively involved in reducing nonpoint sources has resulted in many successful projects across the basin. However, despite these successes, pollution from nonpoint sources has led to a Great Lakes ecosystem that is deteriorating in health and quality. Existing programs must be coordinated for efficient tracking of results, evaluated routinely for effectiveness, and held accountable for achieving environmental outcomes.

Monitoring: Water quality monitoring is an essential component of programs designed to protect and restore our water resources. Water



quality monitoring is needed so we can: set appropriate goals for water quality which promotes equitable water quality protection/restoration across the country; assist resource managers to effectively implement programs and help prioritize future efforts by collecting adequate water quality data and linking this information directly to relevant decision criteria; track the effectiveness of our programs; and reliably report on water quality changes; associate such changes with programmatic efforts, and establish the cost-effectiveness of our actions at appropriate spatial scales.

BMP Maintenance: It must be stressed that in order to be effective, BMPs typically require maintenance. Studies have shown that oftentimes BMPs are not maintained adequately. When implementation measures are being planned and put into practice, it is critical that this issue is adequately addressed.

There are three fundamental barriers to addressing nonpoint source pollution more effectively in the long-term: authority, funding, and coordination.

Authority: The authorities in place are spread out over a variety of jurisdictions primarily through voluntary programs and their application and implementation is inconsistent. While they have high participation rates, they can only penetrate so far into the market responsible for the nonpoint stressors.

Funding: Funding currently available to these programs is far less than is needed to achieve maximum penetration using voluntary measures. Current funding levels will not come close to reaching the levels of implementation needed to make a difference in the Great Lakes.

Coordination: These programs and the agencies implementing them often are not integrated. In the few places where there is an integrated watershed-based effort, it is usually at the sub-watershed area or smaller. To be effective for the Great Lakes, agencies and programs at all levels—federal, regional, state, tribal, and local—must coordinate to accomplish efficient delivery and utilization of resources, targeting of critical areas, and monitoring of progress toward common objectives.

II. Goals and Milestones

Goal: Protect existing wetlands and restore wetlands in both urban and rural areas so that rivers, streams, and lakes across the Great Lakes region function as healthy ecosystems.

Interim Milestones:

- By 2010, restore, recover, and protect a net increase of 550,000 acres of wetlands within the Great Lakes basin.²⁷
- By 2015, restore, recover, and protect a net increase of 1,000,000 acres (450,000 additional) of wetlands within the Great Lakes basin.

Goal: Measurably reduce at least hundreds of thousands of tons of sediment, pounds of phosphorous loading, and pounds of nitrogen loading in to the Great Lakes basin.

Interim Milestones:

- By 2010, create 335,000 new acres of buffer strips within the Great Lakes basin.
- By 2020, create 1,000,000 new acres (665,000 additional) of buffer strips within the basin.

²⁷ These 550,000 wetland acres are the same acres recommended by the Habitat Strategy Team.

Goal: Reduce the amount of sediment reaching the Great Lakes through installation and continued use of management practices on cropland, especially those that increase crop residue left on the surface.

Interim Milestones:

- By 2010, have 2,000,000 new acres of Great Lakes basin cropland under appropriate residue management. This increase corresponds to 40 percent decrease in soil loss.
- By 2015, extend to 2,800,000 new acres (800,000 additional new acres) of Great Lakes basin cropland under appropriate residue management.

Goal: Reduce livestock agriculture's contribution to nonpoint source loading by 40-70 percent through comprehensive nutrient management planning (CNMP) and practice implementation.

Interim Milestones:

- By 2008, 70 percent of all livestock farmers will attend education programming regarding nutrient management.
- By 2010, all acreage utilized for livestock production in a major phosphorous-impaired Great Lakes watershed in each Great Lakes State will be covered by certified CNMPs.
- By 2010, triple the number of certified CNMP providers in the basin that directly assist farmers.
- By 2015, 70 percent of all livestock production in the U.S. portion of the Great Lakes basin will be covered by certified, phosphorous-based CNMPs.

Goal: Improve flow regimes to meet sediment reduction goals and restore sustainable biological communities.

Interim Milestones:

- By 2010, in all watersheds classified as severely or moderately impacted based on degree of altered hydrology and ecological sensitivity using scientifically defensible indicators: develop better understanding of baseline conditions (appropriate time frame, natural vs. human influences) and relationship between stressors and ecological endpoints (water quantity as stressor, effectiveness of BMPs, cumulative impacts); develop appropriate assessment criteria (numeric vs. narrative; relate to societal values); develop/refine new methods (decision support systems, monitoring technology); and apply most strategic remediation alternatives to foster goal of restoring natural flow regime.
- By 2015, restore/manage the hydrologic regime in ten select watersheds to restore sustainable biological communities and reduce excessive sediment loadings.
- By 2020, document improvements in: measurable changes in hydrology (reduction in peak flow and volume); measurable reduction in bank erosion and sediment loading; and measurable improvement in the health of the biological community in significant portions (stream orders 1-3) of ten urban watersheds and/or sediment loading into areas where these watersheds discharge to the Lakes.

III. Recommendations

In general, programs need coordination at a higher level and a focus on mitigating specific problem areas, such as Areas of Concern. Although agencies offer grants to states, tribes, and local groups to address these concerns, the grants are given without any overall, interagency focus or strategy. Effectively targeting and addressing problems will require not only federal agency budget enhancements, but also coordination of efforts and data so that agencies at all levels concentrate their energies on the same priority problems. To this end, the NPS Strategy Team suggests designating or establishing an organization to coordinate efforts, roles, and initiatives among federal, state, and local agencies and private organizations in the Great Lakes basin.

1) Between \$77 million and \$188.7 should be provided annually over five years to fund restoration of 550,000 acres of wetlands.²⁸

- USDA and U.S. EPA will form a task force that includes, at a minimum, USACE, USFWS, NOAA and other federal, state, tribal and local agencies. Agencies will work in partnership with other federal, state, and local agencies and organizations.

Rationale: More than 50 percent and perhaps as much as 70 percent of historic Great Lakes wetlands have already been lost. This loss (through filling or draining) is primarily due to agriculture, urban uses, shoreline development, and resource extraction. These same causes continue to threaten the natural Great Lakes wetlands that remain in existence today. The loss of wetlands poses special problems for hydrological processes and water quality because of the natural storage and cleansing functions of wetlands.

Wetland priority areas for the Great Lakes exist in many active ongoing plans. To appropriately address NPS issues, wetland conservation efforts should occur throughout the watershed in areas strategically selected to best impact water quality concerns. Immediately available priority areas with active partnerships and implementation teams include: several watersheds currently active under USDA's Conservation Reserve Enhancement Programs in the Saginaw Bay watershed, the Maumee River watershed, and the western and central Lake Erie watersheds (OH and PA), River Raisin and Macatawa watersheds (MI), and Eastern Wisconsin riparian areas, and areas noted in the National Strategy to Restore Coastal and Estuary Habitats. The proposed funding would help restore up to 550,000 acres over the five year period, with an estimated restoration cost of \$1,000 per acre.

Cost: \$110 million annually for five years.

2) \$335 million should be provided to restore 335,000 acres of buffers over five years:²⁹

- Funds will be used to create a new program to address education and installation of buffers in urban and suburban environments.
- USDA, NRCS, and FSA will be the lead agencies and will work in partnership with other federal, state, tribal, and local agencies and organizations.
- Critical Geographies: Land areas draining to western and central Lake Erie, the Maumee River watershed, Green Bay, Saginaw Bay, Lake St. Clair, nearshore waters of Lake Michigan, and AOCs.

²⁸ The cost for wetland restoration is the same as that identified in the habitat/species protection strategy team chapter and addresses restoration of the same 550,000 acres of wetlands over the five year period.

²⁹ This level of funding and restored buffer acreage should be continued at the same rate over 15 years (until 2020) for a total of \$1 billion provided to restore one million acres of buffers.

Rationale: Buffer strips include a variety of practices including riparian buffers, filter strips, grassed waterways, windbreaks, living snow fences, contour grass strips, cross-wind trap strips, field borders and other vegetative barriers. Vegetative buffer strips slow water runoff, trap sediment; enhance infiltration within the buffer while trapping fertilizers, pesticides, pathogens, and heavy metals; and reduce blowing soil in areas with strong winds.

The anticipated results and benefits of increasing riparian buffer acreage will be improved water quality based on a measurable reduction of sediment load and of fertilizer, pesticide, pathogen and heavy metal contaminants, subsequently improving overall stream and riparian ecology for fish and wildlife habitat. A history of the program indicates that landowner willingness to participate exceeds program goals and that a state's ability to increase its acreage goal is directly related to the availability of adequate funding.

Cost: \$67 million annually for five years.

3) \$120 million should be allocated by 2010 to achieve a 40 percent reduction in soil loss in ten selected watersheds:

- By 2015, an additional \$48 million should be invested to reach a total of \$168,000,000.
- USDA and NRCS to lead in partnership with other federal, state, tribal, and local agencies and organizations. Utilize EQIP as the lead federal program to provide financial and technical assistance.
- Critical Geographies: Land areas draining to western and central Lake Erie, the Maumee River watershed, Green Bay, Saginaw Bay, Lake St. Clair, nearshore waters of Lake Michigan, and AOCs.

Rationale: Although conservation tillage has been heavily promoted in many areas of the Great Lakes region, many farmers still choose to use conventional tilling methods, which plow crop residues into the soil. Keeping crop residues can assist in preventing erosion between planting seasons. Achieving a 40 percent reduction in sediment loss from croplands will result in greater water clarity, greater desirable aquatic plant growth, less algae, better fish habitat, and less sedimentation of bays and harbors. The 40 percent reduction is largely consistent with the percent reduction in sediment and phosphorus loads (where information is available) to meet designated uses. Based on a cost of \$60/acre and a 2.5 ton/acre reduction in soil loss, this level of funding should lead to a 40 percent reduction in soil loss in these watersheds.

Cost: \$24 million annually over five years.

4) \$106 million in funding should be provided to support the development and implementation of comprehensive nutrient and manure management on livestock farms:

- This includes \$96 million to assist the approximate 12,000 farms with more than 50 animals (estimated cost of \$8,000 per CNMP), \$5 million for educational material development grants, and \$5 million for increased technical assistance at NRCS.³⁰
- USDA and NRCS to lead in partnership with other federal, state, tribal, and local agencies and organizations.
- Critical Geographies: Phosphorous impaired watersheds and leading livestock producing counties.

³⁰ 50 animals is the number used to derive 12,000 farms in accordance with the 2002 Agricultural Census. The number does not reflect a regulatory or statutory threshold for what defines an animal feeding operation; it is a value selected to ensure that resources go toward correction of problems on farms with greater nutrient management risk.

Rationale: Manures and nutrients generated by livestock production facilities contribute to nonpoint source pollution in the absence of conservation planning. If poorly controlled, manure and nutrient products can contaminate surface and ground waters, cause odor problems, and serve as a source of infectious disease. Increased comprehensive management of nutrients and manure on livestock farms will greatly reduce livestock agriculture's contribution to nonpoint source loading.

The anticipated results and benefits of the recommendation will be a 40-70 percent reduction in nonpoint source contribution of phosphorus from livestock agriculture. This result is from the fact that farms with certified CNMPs apply 20-30 lbs of phosphorous less per acre than farms that do not have CNMPs and minimize nutrients leaving the farm through site-specific conservation planning. The actions would provide livestock farmers with financial and technical assistance to complete certified CNMPs, reward farmers that complete and maintain CNMPs, and increase market demand for certified CNMP providers.

Cost: \$106 million over five years.

5) \$18 million should be provided annually over five years³¹ to hydrologically improve ten urban watersheds of various sizes.

- Four federal agencies, the Army Corps of Engineers (USACE), the U.S. Geological Survey (USGS), United States Department of Agriculture (USDA), and U.S. EPA have resources, expertise, and experience to assist in various aspects of any new federal initiative. USDA would modify/expand its focus to incorporate off-site impacts into their conservation programs. The CWA Section 319 funding for nonpoint source control programs would be used to address urban stream flow issues related to aquatic life impairments; however, traditional non-pollution abatement activities are the current focus. Lead agencies will work in partnership with other federal, state, tribal, and local agencies and organizations.
- Critical Geographies: The new program should focus on urbanized areas where runoff from development and the associated impairments directly affect natural waterways and their confluence with the Great Lakes or connecting waters. Likely candidates include smaller watersheds or sub-watersheds within the Duluth, Milwaukee, Green Bay, Gary, Detroit, Cleveland, Toledo, and Buffalo metropolitan areas.

Rationale: Alterations in the natural hydrology of surface and ground water in the Great Lakes basin, such as in the form of floods, droughts, reduced base flow, or altered timing of natural flow regimes, has resulted in changes to the structural and functional integrity of the physical, chemical, and biological elements in these ecosystems. Current federal assistance, regulatory and grant programs, and related state programs do not focus on in-stream flows in urban areas. A new, integrated federal initiative is needed to address flow regime issues in urban watersheds including infiltration and groundwater recharge. The anticipated results and benefits of protecting, conserving, and improving the hydrology of watersheds will be reduced infrastructure costs due to elevated stream flows and excessive sediment loadings, improved shipping capacity, increased public use, and improved aquatic ecosystem health.

State and local governments should also review zoning and building codes, setback ordinances and planning efforts to ensure that they reflect the use of green infrastructure and low impact development.

Cost: \$18 million per year over five years.

³¹This level of funding should be continued at the same rate for a total of 20 years (until 2025). Including a higher proportion of dollars in the first five years for the upfront costs may make restoration efforts more likely to succeed.

TOXIC POLLUTANT STRATEGY

I. Problem Statement

While certain persistent toxic substances (PTS) have been significantly reduced in the Great Lakes Basin Ecosystem over the past 30 years, they continue to be present at levels that pose threats to human and wildlife health, warrant fish consumption advisories in all five lakes, and disrupt a way of life for many in the basin, particularly the life ways and culture of tribal communities.

PTS releases from contaminated bottom sediments, various industrial processes, and non-point sources, loadings from atmospheric deposition, contaminated groundwater, and continuous cycling of PTS within the Great Lakes themselves, all contribute to this ongoing problem. More recently, researchers have documented the presence of additional chemicals of emerging concern that may also pose threats to the Great Lakes. Characteristics of these substances, such as sources, releases, fate, transport, persistence, bioaccumulation, and toxicity, must be better understood.

II. Goals and Milestones

To establish and maintain the chemical integrity of the Great Lakes Basin Ecosystem, as called for in the Great Lakes Water Quality Agreement, this Strategy sets forth the following goals:

- Goal 1: Virtually eliminate the discharge of any or all persistent toxic substances (PTS) to the Great Lakes basin ecosystem.
- Goal 2: Significantly reduce exposure to persistent toxic chemicals from historically contaminated sources through source reduction and other exposure reduction methods.
- Goal 3: Reduce environmental levels of toxic chemicals to the point that all restrictions on the consumption of Great Lakes fish can be lifted.
- Goal 4: Protect the health and integrity of wildlife populations and habitat from adverse chemical and biological effects associated with the release of PTS.

Interim Milestones, Goals 1-4:

- By 2008, collect 1M lbs waste pesticides per year.
- By 2010, 50 percent reduction in Basin-wide household garbage burning.
- By 2010, commence significant reductions in mercury emissions from coal-fired power plants.³²
- By 2015, full phase-outs of intentionally added mercury bearing products, as possible.³³
- By 2025, full phase-out of all PCB equipment in the basin.
- By 2025, significantly reduce PTS inputs from international sources.



³² A consensus on the rate of reductions of mercury emissions from coal fired power plants was not reached. The Federal Clean Air Mercury Rule (CAMR) is published at <http://www.epa.gov/air/mercuryrule/>. Six of eight Great Lakes State Attorneys General have challenged the CAMR in federal court.

³³ Examples include thermometers, thermostats, and manometers.

Goal 5: Prevent the discharge of toxic substances in toxic amounts.

Interim Milestones, Goal 5:

- By 2008, include pollution prevention and energy efficiency (P2/E2) provisions in federal and state rule making.
- By 2010, implement 200 P2/E2 projects for businesses in the Great Lakes States.

Goal 6: Protect the general public from toxic substances through effective outreach and education, including protective fish consumption advice throughout the Great Lakes Basin Ecosystem.

Interim Milestones, Goal 6:

- By 2007, commence basin-wide PTS public information campaign.
- By 2009, adopt consistent Great Lakes basin fish consumption advisories.

Goal 7: Identify and fill the gaps in our scientific understanding that limit our ability to effectively manage the risks of toxic substances found in the Great Lakes.

Interim Milestones, Goal 7:

- By 2008, initiate a central Great Lakes PTS database.
- By 2010, a basin-wide surveillance program of chemicals of emerging concern at wastewater treatment plants will be established. At least 50 percent of the large in-basin WWTPs will participate in the program.
- By 2010, implement a Great Lakes human PTS biomonitoring program.³⁴
- By 2010, complete an intercomparison study of mercury and PCB models.³⁵

III. Recommendations

This Strategy seeks to comprehensively address PTS issues in the Great Lakes, to 1) reduce and virtually eliminate sources of current priority pollutants, 2) prevent new chemical threats from entering the basin, 3) develop a sufficient knowledge base to address toxic chemicals in the Great Lakes environment, 4) protect public health and engage the public to do its part in reducing PTS sources, and 5) address international sources. The recommendations below are guided by a number of important principles. Historically, collaborative efforts within the Great Lakes basin to address PTS reduction have served as a model for statewide, national, and international efforts. These efforts provide a strong foundation for further endeavors. In particular, the principles, tenets and concepts embodied in the Great Lakes Binational Toxics Strategy (Binational Strategy) are incorporated here as the starting point for the Toxic Pollutant Strategy. This strategy also builds on the efforts of the Lakewide Management Plans (LaMPs) to help implement lake-specific high priority chemical reduction efforts and on recommendations from Remedial Action Plans to address beneficial uses impaired by PTS in Areas of Concern.

³⁴To be based on the PTS monitoring component of CDC's National Health and Nutrition Survey (NHANES).

³⁵Specifically, atmospheric fate and transport models on continental and global scales.

Effective and meaningful PTS reductions require both regulatory and non-regulatory approaches. Existing regulatory programs, particularly federal and state permitting and enforcement, must be adequately funded and implemented. Non-regulatory approaches can sometimes achieve results efficiently and are encouraged to the maximum extent practicable. New regulatory approaches must also be considered where necessary. Finally, significant amounts of PTS from both international and regional sources are deposited to the Great Lakes. Five key recommendations are presented below³⁶ :

1) Reduce and virtually eliminate the principal sources of mercury, PCBs, dioxins and furans, pesticides and other toxic substances that threaten the health of the Great Lakes basin ecosystem, through coordinated intergovernmental strategies.

- Mercury³⁷: Coal fired electric utilities constitute the largest remaining domestic source of mercury emissions. Utility sources must implement control measures to reduce these emissions. Mercury is still used in numerous products basin-wide. A basin-wide mercury product stewardship strategy should be developed to complete phase-outs of mercury uses, including a mercury waste management component, as practicable.
- PCBs: Consistent with the Stockholm Convention on Persistent Organic Pollutants, PCB-containing electrical equipment should be decommissioned and properly disposed.
- Dioxins and Furans: Uncontrolled burning of household waste constitutes the largest known airborne source of dioxins and furans to the Great Lakes. State, tribal and local authorities should address deficiencies in communities related to infrastructure for household waste collection, and/or enforcement to stop illegal burning. Agricultural waste burning should be addressed, as well.
- Cancelled Pesticides: State, tribal, and local waste pesticide collection efforts are very effective in reducing stockpiled sources of cancelled pesticides to the Great Lakes, but these programs are inconsistently supported. Each State should implement a robust and ongoing waste pesticide collection program.

Rationale: Principal sources of priority pollutants continue to threaten the health of the Great Lakes and drive fish consumption advisories, and should therefore be systematically reduced and virtually eliminated:³⁸

Implementation: The Great Lakes Binational Strategy in a coordinating role, LaMP chemical committees, EPA, state environment and agriculture agencies; The Great Lakes Cities Initiative, Great Lakes municipalities, and industry.³⁹

Costs⁴⁰: \$10M/yr - Burn Barrel Initiatives (all new), \$3.4M/yr - Clean Sweeps (\$2.0M/yr new).

³⁶Note that there is a matrix of all recommendations of the PBT Team included in the appendix.

³⁷ See appendix for information on mercury, PCBs, dioxins and furans.

³⁸ A comprehensive list of priority pollutants, sources and reduction activities may be found in the 2004 Great Lakes Binational Toxics Strategy Annual Report.

³⁹ The Binational Strategy engages a forum of Stakeholders from government, Industry and NGOs from the US and Canada that regularly gather to collaborate on toxics reduction projects, with a focus on priority pollutants such as mercury and PCBs.

⁴⁰ Costs are presented as current plus new (new funding in parenthesis). Costs are fully itemized in appendix A.

2) Prevent new toxic chemicals from entering the Great Lakes basin: Target production, use and sound disposal of toxic chemicals across the Great Lakes basin through strategic deployment of pollution prevention and waste minimization programs.

- To provide easier access and broaden dissemination of these programs to small and medium sized businesses, States should “bundle” technical assistance services, such as compliance assistance, pollution prevention (P2) audits, and energy efficiency (E2) audits, in “one-stop-shop” programs.
- Tax incentives and low interest loans should be utilized to promote investments in energy efficiency upgrades and pollution prevention projects.⁴¹
- Federal and state agencies should ensure that traditional regulatory programs, including enforcement, provide incentives to conduct pollution prevention and energy efficiency projects.

Rationale: Preventing new toxic substances from entering into the Great Lakes is as important to protecting ecosystem health as addressing current priority pollutants. Twelve federal agencies are responsible for chemical safety management pursuant to nearly 20 federal statutes, and subsequently promulgated regulations, and the United States is responsible through International Agreements (e.g., United Nations Environment Program, Prior Informed Consent)⁴² U.S. EPA’s many pollution prevention and waste minimization programs are described online at www.epa.gov/p2⁴³. These programs should be aggressively marketed and made available to Great Lakes businesses, their suppliers and customers through technical assistance providers⁴⁴.

Implementation: U.S. EPA, State technical assistance providers, Manufacturing Extension Partnerships, city environmental departments

Costs: \$16M/yr (\$15.12M/yr new), \$50M tax incentives/fund capitalization (all new)

3) Institute a comprehensive Great Lakes research, surveillance and forecasting capability to help identify, manage, and regulate⁴⁵ chemical threats to the Great Lakes basin ecosystem. A Great Lakes basin-wide coordinated program that incorporates and augments current efforts should be created to better characterize links between PTS sources and exposure. The multi-party program should preferably be housed within an existing program or organization and call upon the combined resources of federal agencies, states, academia, the private sector, and our Canadian neighbors. To be successful, the effort should include:

- Screening/long-term monitoring of PTS sources and concentrations in environmental media, including humans and wildlife, including:

⁴¹ EPA should award assistance for states and other eligible entities to authorize or enhance low-interest revolving loan funds that can be coupled with technical assistance efforts to assist in the implementation of P2 and E2 measures for both private and public sector facilities.

⁴² United States National Profile on Management of Chemicals, January 1997, OPPTS, U.S.EPA.

⁴³ EPA’s Sustainable Futures program promotes a number of innovative non-regulatory pollution prevention (P2) programs including the The PBT Profiler and Design for the Environment (DfE) which help industry screen out potential toxic substances and design safe non-toxic products, and the The Green Suppliers Network (GSN) and Environmentally Preferable Purchasing which promote PTS-free alternatives in production and purchasing. The Resource Conservation Challenge promotes a number of innovative waste minimization programs such as The Plug-In To eCycling Program, Product Stewardship Partnerships and The WasteWise Partnership Program.

⁴⁴ Providers include the Department of Commerce Manufacturing Extension Partnerships, State P2 technical assistance providers, and municipal environmental officials.

⁴⁵ Regulations include development support for TMDL, criteria, and water quality standards and permit issuance.

- a strategic review of TSCA-regulated substances and other federally regulated substances, using current pollution prevention models; and,
- enhanced Great Lakes monitoring programs to include chemicals of emerging concern.
- Research on chemical properties, exposure, and long term effects.⁴⁶
- Modeling, including evaluation and enhancement of current models, to better predict environmental impacts of reduction actions at various geographic scales, and to examine exposure scenarios.
- Information management, an easily-accessible, central Great Lakes PTS database for monitoring data, emissions and releases information, and research results, including a clearinghouse for toxicity data used to develop GLI criteria, and State GLI water quality standards.

Rationale: To manage and assess regulatory and voluntary PTS programs, Great Lakes lawmakers, program managers, and stakeholders need accurate information. This requires a coordinated system which monitors PTS sources and environmental conditions, tracks reduction actions, projects future trends in exposure and effects, and uses this information for decision-making. For many PTS, past and existing monitoring and research have given us a good understanding of sources, transport, and exposure pathways. However, in order to make cost-effective decisions, improved understanding of relative contributions of different sources to human exposure is also needed. For example, local sources may have a greater effect on exposure in a community than in the basin as a whole.

Implementation: The Great Lakes Binational Toxics Strategy, federal agencies, states, academia.

Cost: \$5-10M/yr (\$300K/yr current/balance new).

4) Protect human health through consistent and easily accessible basin-wide messages on fish consumption and toxic reduction methods and choices.

- With regard to PTS exposure, the Great Lakes Sport Fish Advisory Task Force should create consistent advice on fish and wildlife consumption to citizens in the Great Lakes basin, especially to sensitive populations, and to health care professionals, in multiple languages.
- Current state advisory programs should be fully funded and implemented to adequately protect the entire basin.
- To help the public do its part to reduce the use and release of PTS, a basin-wide public education and outreach campaign that focuses on habits of individuals, households, the workplace, and schools, should be developed in coordination with existing messages and stakeholder groups.^{47,48} Take-back and waste collection programs should be promoted as well.

Rationale: A consistent set of messages from federal, state, tribal, and local health and environment agencies is needed to protect the public from health effects of PTS exposure, and to provide the public with information about lifestyle choices which will help reduce PTS uses and releases to the Great Lakes.

⁴⁶ Expert program reviews of current regulatory and monitoring programs have defined some research needs.

⁴⁷ This would include high priority outreach topics such as backyard trash burning, mercury use reduction, energy conservation, personal care product use reduction, (non-toxic household cleaners, and reduction in household pesticide use.

⁴⁸ This outreach message should be conveyed through existing communication channels including lake stakeholder forums, human health networks, newsletters, conferences and other existing delivery mechanisms. A consistent outreach message could be included in the biennial LaMP reports and/or the annual public-friendly lake brochures.

Implementation: Great Lakes Sport Fish Advisory Task Force, National Sea Grant Program, state and tribal departments of public health, environment and natural resources, the GL Human Health Network, U.S. EPA, FDA.

Cost: \$15.9M/yr (\$11.7M/yr new)

5) Support efforts to reduce continental and global sources of PTS to the Great Lakes basin.

- As a leader in management of toxic chemicals, the United States should ratify the Stockholm Convention on Persistent Organic Pollutants.
- The United States should also support international PTS management and monitoring programs, in coordination with the Commission for Environmental Cooperation (CEC) and the United Nations Environment Programme (UNEP), and support capacity building and technology transfer programs, such as those administered by EPA's Office of International Activities.
- In particular, federal support should be provided to efforts to reduce international sources of mercury, including funding and technical support for UNEP's mercury efforts.

Rationale: Significant amounts of PTS come to the Great Lakes through air deposition from sources well beyond the U.S. border. International toxics reduction and monitoring programs are therefore essential to the protection of the Great Lakes.

Implementers: Congress, federal agencies, the Great Lakes Binational Strategy in a coordinating role.

Cost: \$7.725M/yr (\$6M/yr new)

INDICATORS AND INFORMATION

I. Problem Statement

The Great Lakes ecosystem, the largest freshwater system in the world, is a dynamic and complex interaction of biological, chemical and physical components that is not yet fully understood. The sensitivity of this system to human influence, however, has been repeatedly demonstrated in recent decades. Environmental degradation, caused by problems such as the introduction of invasive species, point source and non-point source pollution, and declining fisheries, has pointed to an urgent need for protection and restoration. Protection and restoration of the Great Lakes ecosystem require a well-documented, collaborative strategy, access to the best scientific information available, and coordinated action. A successful restoration strategy for the Great Lakes must also include an informed decision making process based on consistent methods to measure and monitor key indicators of the ecosystem's function. Such measurements need to occur before and after the initiation of restoration efforts at local and basin-wide scales. Once collected, information needs to be compiled and communicated consistently to inform the restoration process, decision makers and the public. These activities will provide resource managers, elected officials, and other stakeholders with the timely, accurate and cost-effective information necessary for making decisions concerning the protection and restoration of the Great Lakes ecosystem so as to sustain healthy societies, economic activities and natural systems. Unfortunately, ecosystem monitoring, observation, research, indicator development and modeling efforts in the Great Lakes region are currently under-funded, lack comprehensive ecosystem approaches and exist only as piecemeal programs.

Despite these drawbacks, the volume of data collected for the Great Lakes and their tributary watersheds has expanded considerably in recent years, coinciding with an increase in the complexity of issues that need to be addressed. The current lack of accessible, integrated information management systems limits decision-making abilities and application of adaptive management principles for the protection and restoration of ecological resources. Adaptive management requires one to identify priority issues, gather information, establish metrics, evaluate options, implement actions, track progress, reevaluate actions based on observed responses, communicate results and adjust both management approaches and monitoring activities. Although such capabilities are advancing within the Great Lakes basin, they exist only in piecemeal fashion and are have not been fully integrated for the comprehensive management of the Lakes. To further complicate matters, decisions made on one issue often affect other issues. Observing systems, monitoring programs, indicators, research, modeling and analysis, information management and communication must therefore be integrated into a holistic decision-making process.

Observing systems, including sensors, stations, networks and field data collection are the primary means for gathering information on the chemical, biological and physical characteristics of the Great Lakes ecosystem. These observations are used in a host of monitoring programs to take the pulse of the Great Lakes, assess natural variability, drive ecosystem forecasting models, and assess the progress of restorations efforts. Current challenges facing observing and monitoring include: incomplete inventories of federal, state/provincial and municipal observation and monitoring activities; insufficient spatial density of basic observations across the system; incomplete coverage over varying time scales (real-time to historic)



and over space (site-specific, watershed, and region-wide); a reluctance to adopt uniform or fully compatible monitoring protocols; and an inability to establish long-term financial commitments, all resulting in poor availability of information on condition and trends to managers and other stakeholders. Additional observation and monitoring are needed across the Great Lakes basin, including the open waters, coastal areas, tributaries and watersheds. Desired data collection efforts reach beyond measurement of the Great Lakes components and include such things as socio-economic data, inventories of pollutant releases or hazard potential and satellite remote sensing.

Some of the observations required are essential indicators that provide information on the state of the Great Lakes and progress toward achieving goals. Continued efforts are needed to ensure the viability of an informative and scientifically-based set of indicators (e.g., the State of the Lakes Ecosystem Conference (SOLEC) indicator suite) that are useful for management decisions and to inform the public. The SOLEC indicator suite has been refined over the last decade to be comprehensive yet practical and actionable. Several of the Great Lakes Regional Collaboration strategy teams have, however, identified that other indicators are needed to track progress on specific restoration areas both locally and across the Great Lakes – St. Lawrence River basin. These will require additional research to develop realistic endpoints, cause-effect relationships, appropriate metrics and monitoring protocols. Indicators also need to be flexible enough to account for the unique conditions of each Great Lake, differences in temperature, trophic status, native biota, etc. In addition, indicators should be used in relation to realistic “end points” or desired results which are accepted by most stakeholders. When identifying end points, stakeholders must recognize that variability is the norm in natural systems; therefore, many targets and goals should not be expressed as discrete numbers but rather as a ranges of desired, natural levels.

The U.S. Commission on Ocean Policy highlighted the need for “unbiased, credible and up-to-date scientific information” to properly manage the human activities that effect the nation’s oceans coasts and Great Lakes. The Commission found that new scientific findings demonstrate the complexity and interconnectedness of natural systems and that management approaches have not been updated to reflect this complexity with responsibilities remaining dispersed among a confusing array of agencies at the federal, state, and local levels. Managers, decision makers, and the public require timely access to reliable data and solid scientific information that have been translated into meaningful products. The Commission urged Congress to double the federal research budget over the next five years and to fund and adopt an integrated observing system on a regional basis.

Research on the Great Lakes specifically provides the understanding necessary to make informed, scientifically-supportable decisions and actions, to assess the associated risks, expectations and timelines of management actions, to plan for effective observation and monitoring programs and to identify sensitive and meaningful indicators of ecosystem status. Restoration requires research to develop innovative approaches and monitoring to determine if restoration is successful in meeting targets and goals. The current funding level for Great Lakes research does not sufficiently support the level of research and development needed to address the host of ecological issues currently affecting the system to meet present-day demands. Any new restoration efforts will require coupled research and observations programs. Research has traditionally been focused on single issues. This focus must transition to an ecosystem approach with greater emphasis on predictive forecasting and adaptive management. Research should be directed towards improving the understanding of natural fluctuations and interactions of ecosystem components. Improvements in predictive capabilities are needed, particularly regarding the impacts of chemical, biological and physical changes on ecosystem structure and function. Development of such capabilities requires a comprehensive research coordination strategy across partnering institutions.

Information produced by research and observations must be made readily available to managers, decision-makers and the public. This will require information integration, management and communication. Integration and management of information are hampered by institutional management approaches restricting access by outside entities and policy constraints that restrict a user's ability to discover the existence, location and characteristics of Great Lakes data. Data quality is also often not documented or communicated to data users. Coordination needs to be improved to ensure that critical decisions are made using the best available data. Standards for metadata (information about data) are required. Many institutions do not have the technological tools to implement data sharing protocols and applications such as Geographic Information Systems (GIS) and remote sensing techniques. Legal and institutional constraints, such as proprietary data and security provisions, can also adversely affect information sharing. A lack of strong, formal data exchange partnerships among Great Lakes organizations underlies many of these constraints.

Various methods are used to communicate information to those that require it, but coordination needs strengthening for the sheer breadth of information collected over the region. The lack of a coordinated message can make it difficult for audience groups to interpret and understand information. The audiences that require information are also diverse, requiring that complex information needs to be sufficiently repackaged to meet their needs. Some information, such as lake conditions and beach closings, requires rapid delivery. In addition, two-way communication needs to be promoted so that user needs are conveyed back to those producing the information. A comprehensive, two-way communication strategy has not been developed to address these needs.

II. Goals and Milestones

Goals:

- Stakeholders and decision makers will widely recognize and accept that physical, chemical, biological, socio-economic research and scientific information needs to be conducted/collected and disseminated.
- A widespread network of monitoring / observing systems will provide a steady stream of data and scientific findings that are translated into practical information and products for decision makers, educators, and the public. This network must be continually improved to adapt to technological advances and emerging informational needs of Great Lakes managers and stakeholders.
- Robust information gathering and integration tools will be made available to support scientifically informed decisions. Decision-support tools must be flexible, not constrain the user's viewpoint, and offer enhanced abilities for multi-participant decision making. Predictive modeling tools should be applied to priority restoration issues and be spatially integrated to provide lake-wide assessments.
- Great Lakes research programs will be conducted in a comprehensive, strategically coordinated manner and designed to meet user needs. Research should also be targeted at ecosystem level predictions.
- Progress achieved in the design of the scientifically-verified set of indicators for the Great Lakes ecosystem will be exploited. Indicators need to be implemented to meet the distinct needs of all user groups. A formalized approach for refinement of existing and development of new indicators should be followed to respond to evolving science, user needs, and ecosystem conditions.
- Standardized information management systems will be implemented by organizations within the region and connected through an integrated network of information systems. This should include application of appropriate information technology infrastructure and development of policies to share information across institutional and jurisdictional boundaries.

- Communication efforts in the Great Lakes will deliver accurate scientific and technical Great Lakes information to fulfill the needs of the decision makers, stakeholder groups, and the general public. Communication avenues must also be two-way, conveying user needs to information providers.

III. Recommended Actions

Each of the following recommended actions call for greater coordination within the Great Lakes region, including participation of numerous partners at the federal, state, local/municipal, Native American, and binational levels and partners from industry, academia, and public interest groups. Additional recommendations, further rationale and supporting information are contained in an appendix to the Information and Indicators strategy.

Recommendation 1: To provide accurate, complete and consistent information, the Great Lakes region must increase and better coordinate the collection of critical information regarding the Great Lakes ecosystem. The Great Lakes Interagency Task Force and other stakeholders need to implement the U.S. contribution to the Integrated Earth Observation System (IEOS) and the Integrated Ocean Observing System (IOOS) as part of the Global Earth Observing System of Systems (GEOSS). Monitoring must be better coordinated through the existing Great Lakes management entities, both at a lake-wide and region-wide basis.

Rationale: Observing systems and monitoring programs are the primary means for gathering information on the chemical, biological and physical characteristics of the Great Lakes ecosystem. These programs are needed to take the pulse of the Great Lakes, assess natural variability, drive ecosystem forecasting models, and assess the progress of restoration efforts. Monitoring and observing systems require continued improvements to adapt to changing technologies and informational needs of Great Lakes resource management. Initial activities should be focused on implementing the Great Lakes Observing System (GLOS) as the regional component of IOOS. Efforts should be continued to establish IEOS within the Great Lakes region.

Concerted action to address lake-wide and basin-wide problems requires consistent and coordinated information collection across municipal, state and national boundaries. U.S. agencies must lead the way in expanding and coordinating ecosystem-based and issue-focused monitoring programs including protocols, scientific rationale, and integration of indicators. Such coordination should be done on a binational basis for each lake through the Lakewide Management Plans (LaMPs).

Cost: \$28 million for five years

Recommendation 2: To meet the information and management needs of Great Lakes restoration activities, the Great Lakes Interagency Task Force should promote the continued development and implementation of science-based indicators, including implementation of indicators developed through the SOLEC process.

Rationale: Restoration of the Great Lakes ecosystem must begin by setting clear and quantifiable goals and desired endpoints for critical Great Lakes attributes. A set of measurable and meaningful indicators is essential for determining progress in meeting these goals and in helping decision-makers adapt their management actions in accordance with the ecosystems response. High-priority, management-relevant indicators must be identified, scientifically developed and tested for each critical restoration issue. Current indicators should be extended to include watershed issues and enhanced to draw in more stakeholder and scientific involvement. As an established and successful binational effort, the SOLEC process needs to receive increased financial support and stakeholder participation to accomplish the goals of comprehensive regional assessments.

Cost: \$4 million for five years

Recommendation 3: To support Great Lakes restoration activities with appropriate scientific foresight, planning and assurance of results, the overall federal research budget to the Great Lakes should be doubled over the next five years. In addition, adequate funds should be made available to support a Great Lakes Research Office as authorized in the 1987 Clean Water Act Amendments (33 U.S.C. 1268) to coordinate these research efforts. Finally, for all new appropriations in support of Great Lake' restoration activities, at least 10 percent of these funds should be dedicated toward research to aid planning and assessment.

Rationale: Additional research is required to: a) set management goals and expectations; b) assess risks in management alternatives; c) identify the most cost-effective restoration strategies; d) evaluate connectedness to other components of the ecosystem; and e) evaluate progress in achieving management goals and expectations. Research needs to be focused on improving predictive capabilities regarding the lakes, particularly regarding the impacts of chemical, biological, and physical changes on ecosystem structure and function. Per the U.S. Commission on Ocean Policy, overall research funding should be doubled over the next five years to fix the observation that “chronic under-investment has also left much of [the region’s] infrastructure in woefully poor condition.” The Great Lakes Research Office (GLRO) would work in conjunction with existing institutional entities to coordinate a comprehensive research strategy with an emphasis on predictive ecosystem-based research organized to address existing and emerging ecological issues. Great Lakes research programs need to be funded in accordance with an established research strategy, emphasizing research integration in the decision making process. The GLRO would closely coordinate all activities with the IJC’s Council of Great Lakes Research Managers. Research should also be a fundamental and integral part of a comprehensive Great Lakes restoration program. At least ten percent of the restoration funding should be devoted to the effort. To support independent and localized investigations, increased support of university-based Great Lakes science is needed through increased competitive grants for Great Lakes research through the National Science Foundation and other federal and state programs.

Cost: Overall doubling of current research funding (an annual increase of approximately \$35 million within five years), plus 10 percent of any additional restoration efforts and \$600,000 annually (or \$3 million over five years) would be used to support the research office.

Recommendation 4: To facilitate easy and accessible information exchange among all regional partners, stakeholders and decision makers and to create a consistent and comprehensive repository of Great Lakes data, the Great Lakes Interagency Task Force and all regional partners should augment the regional information management infrastructure (i.e. establish a network of networks), adopt standardized data management protocols and commit to open data availability.

Rationale: The U.S. Commission on Ocean Policy recognized that: “The data generated from increased research, enhanced monitoring networks, and new observing systems will be essential in improving our management of ocean and coastal resources. However, two major challenges face today’s data managers: the sheer volume of incoming data, which strains storage and assimilation capabilities, and the demand for timely access to the data in a variety of formats by user communities. Meeting these challenges will require a concerted effort to modernize the current data management system and will require greatly improved interagency planning and coordination.” In the Great Lakes, infrastructure is required to help turn data into useful information. Integrated and coordinated scientific and technical information is needed to adequately share results of ecosystem investigations with stakeholders. Long-term funding of an information management infrastructure to acquire and exchange timely, objective and accurate information is needed. The infrastructure will

facilitate two-way communication between scientists and stakeholders, also allowing stakeholder needs to inform the investigations. The information management infrastructure should mesh with and augment existing infrastructure, such as the Great Lakes Information Network (GLIN) and provide for sustainability of such a network as an independent regional asset. A workgroup of information management professionals is needed to implement the distributed network of servers and databases to support this infrastructure. The workgroup should include representatives from key stakeholders with recognized data stewardship expertise and would coordinate interagency and inter-jurisdictional partnerships and mitigate institutional and legal barriers. The workgroup would promulgate data standards, quality assurance protocols, metadata production and region-wide multi-server search and access capabilities.

Cost: \$2 million per year for five years

Recommendation 5: To coordinate and manage communication of scientific and technical information, the Great Lakes Interagency Task Force should establish a communications workgroup composed of public affairs specialists from Federal, State, and regional entities and key industries.

Rationale: Communications professionals from federal and state governmental agencies, environmental groups, regional and local organizations, Native American interests, relevant industry associations and academia would participate in the workgroup and provide oversight for the development and implementation of a comprehensive regional communications plan. The communication plan would include periodic reviews of audience needs and assess optimal methods of information delivery to decision-makers and the public. By sharing experience, tools and workloads, the workgroup would facilitate efficient and consistent delivery of Great Lakes information to disparate audiences and oversee small grants to regional and local organizations to enhance communications efforts. The workgroup should rely upon the expertise of established networks, such as the Great Lakes Sea Grant Network and the Great Lakes Information Network.

Cost: \$1 million per year for five years

SUSTAINABLE DEVELOPMENT

I. Problem Statement

Sustainable development is an approach to achieving balance between economic, societal, and ecological needs that has not been fully integrated into all aspects of the use, development, restoration, and conservation of Great Lakes resources. Sustainability works from the bottom-up, and is rooted in the actions and decisions by individuals, private enterprises and local communities. State and federal governments play important roles in promoting sustainable behavior through guidance, outreach, and support to enhance the capability of local communities, as well as policy and funding decisions.

Sustainable Development was examined with respect to six categories of services provided by the region's ecosystems: land use and development; agriculture and forestry; transportation; industrial activities; water infrastructure, and; recreation, tourism, and fishery. An evaluation of current and future human activities in the Great Lakes Basin highlights trends that continue to draw on ecosystem services and economic competitiveness, including:

- loss of natural and agricultural lands to development at rates far exceeding population growth;
- leveling or decline in conservation tillage practices;
- fragmentation of privately owned forest lands into smaller tracts and decreasing levels of active management on public forest lands;
- increased demands on ecosystems for recreation;
- aging transportation infrastructure that impedes more efficient intermodal systems;
- an aged water and wastewater infrastructure unable to handle current demands;
- disconnected programs for planning and management of ecosystem services;
- practices and policy disincentives that deter sustainability, and;
- outdated perceptions of the region ("rust belt") which fail to promote the potential of its sustainable ecosystem services.

II. Goals and Milestones

The goal is a Great Lakes Basin where human activities support a strong and vibrant economy, meeting societal and cultural needs in balance with a diverse and resilient ecosystem. A sub-goal that is essential to this desired state is a Great Lakes community that has fully embraced and routinely applies sustainability in all decisions and actions. While the near-term actions recommended herein will have specific milestones, the adoption and use of sustainability as a guide to local and regional decision making will take time. As sustainability becomes embedded in the fabric of individual, corporate and governmental thinking, the return on that investment should continue indefinitely.

III. Recommendations

This Team identified actions to promote sustainable development practices aligned with six categories of services provided by Great Lakes ecosystems. These include actions for all sectors of stakeholders, including federal, state, tribal and local governments, private business, industry and manufacturing, and nongovernmental organizations (NGOs). The complete set of these actions is provided in the full report of the Sustainable Development Team (Appendix) and are summarized by four major recommendations:



1. Adapt and maintain programs that promote sustainability across all sectors;
2. Align governance to enhance sustainable planning and management of resources;
3. Build outreach that brands the Great Lakes as an exceptional, healthy, and competitive place to live, work, invest and play; and
4. Provide leadership for sustainable development through the implementation of Strategy recommendations.

Each of these recommendations will be discussed with examples of near-term actions that can deliver measurable results, most without substantial new financial requirements.

1) **Adapt and maintain programs that promote sustainability across all sectors**

Among the most critical actions necessary to promote sustainability is to eliminate or modify existing programs that actually encourage non-sustainable practices. For example, some state and local tax laws and federal infrastructure aid programs inadvertently encourage urban sprawl and should be modified to give preference or additional funding attention to those projects and communities that encourage and practice sustainable actions. Some federal agricultural price supports tend to discourage conservation tillage practices, and need to be amended, and some taxes and user-fees impacting transportation may not encourage the most efficient and sustainable modes. Near-term actions to address these program shortcomings are:

Action (a): States should incorporate sustainable criteria into sewer and water infrastructure loan and grant programs in the Great Lakes as a means of prioritizing those projects that pursue sustainable objectives.

Timeframe: 2006

Lead: Governors and state agencies

Resources: Policy change; no new funding required

Action (b): Federal agencies should review existing grant, loan and subsidy programs applicable to the Great Lakes Basin and incorporate sustainable criteria to provide priority for those projects that pursue sustainable objectives.

Timeframe: 2006

Lead: Great Lakes Interagency Task Force

Resources: Policy change; no new funding required

Other programs that have greater potential to promote sustainability, but are under funded or need to be modified for greater effect include funding and tax incentive programs for brownfields and sustainable recreation, and incentives for development of renewable energy technologies, energy efficiency, and pollution prevention.

Action (c): Local communities should re-use brownfields to revitalize lakeside and tributary waterfronts, with emphasis on public access and recreational opportunities. Federal and state grant programs should give increased funding priority for these projects.

Timeframe: 2006-2007

Lead: Local governments, with priority funding from federal and state programs

Resources: Target existing program funds

Sources: Federal and state funding programs including: USEPA, Brownfields Program; U.S. Dept. of Housing and Urban Development (HUD), Brownfields Economic Development Initiative; US

Forest Service (USFS), US Dept of Interior (USDOJ) and US Fish & Wildlife Service (USFWS), Land and Water Conservation Fund; NOAA Coastal Brownfields and Portfields (with USEPA) programs, US Army Corps of Engineers (USACE), Great Lakes Remedial Action Plan, Beneficial Use of Dredged Material and ecosystem restoration programs.

An important tool in encouraging sustainable practices is to develop and apply specific metrics for sustainability, such as a set of standards for “green” marinas, sustainable forestry, or for sustainable urban, suburban and rural development. When creating and applying “green” standards and metrics, the integration of sustainable activities and cooperation within and among governmental jurisdictions is a key to success and should carry incentives. By recognizing preferred “green” practices with a “Contributing to a Healthy Great Lakes” label, the region can gain community support for sustainable practices.

Action (d): Conduct a review of examples of sustainable practices, evaluate their effectiveness and applicability to the Great Lakes Basin, and develop potential criteria for “green” certification and potential criteria for prioritizing proposals for funding programs.

Timeframe: 2006

Lead: Great Lakes Commission; Great Lakes Regional Planning Group; Sea Grant/University; contractors

Resources: \$200,000

Source: Federal and state funding programs including: USEPA, CEM funding through GLNPO/LaMP; NOAA, Coastal Zone Management (CZM) grants and Coastal Estuary Land Protection; Great Lakes Protection Fund

2) Align governance to enhance sustainable planning and management of resources

While the Great Lakes ecosystems are not aligned by political boundaries, human management of ecosystem services is. Our ability to balance economic, societal and ecosystem needs is challenged by the disconnection between economic drivers and the planning and management of ecosystem services. For example, existing programs for local and regional planning of land use are disjointed from the programs for planning and management of transportation, and water infrastructure. Recommend actions to realign governance institutions to sustain ecosystem services and integrate the planning and management of these services.

Action (e): Conduct a three-year demonstration project in three to four Great Lakes major metropolitan areas for development of a consistent, sustainable land use plan that uses best available new technologies to integrate with regional transportation plans and other public infrastructure plans including extensive public participation and local involvement. The regional 2040 framework plan of the Northeast Illinois Planning Commission provides a model.

Timeframe: 2006-2008

Lead: US Dept of Transportation (DOT), Federal Highway Administration and Federal Transit Agency; state DOTs; Regional Metropolitan Planning Organizations (MPOs)

Resources: 10-20 percent of selected demonstration MPOs’ annual Regional Transportation Plan (RTP) funding.

Sources: Funding 50 percent from RTP funds and balance from a range of existing program (that may vary by state) including: USEPA (Clean Water, Brownfields, LaMP), NOAA/Sea Grant; HUD Community Development Block Grant program, and; US Dept of Commerce (USDOC) Economic Development Funds; USDA programs; Foundations.

Activities to address the restoration of ecosystems should be integrated with activities that promote sustainable use of ecosystem services, especially where the uses and restoration are

linked. An ecosystem restoration plan that does not provide a path for economic development is as unsustainable as an economic development plan that fails to directly address ecological restoration and societal needs. The integration of restoration and sustainable use planning has been limited by the alignment of agencies along single purposes, and requires actions to promote integrated, multi-purpose planning.

Action (f): In order to start to address two critically inter-related issues, transportation and invasive species (aquatic and terrestrial), authorize and fund a comprehensive study that integrates long-term invasive species control and management with sustainable intermodal transportation for Great Lakes-St. Lawrence Basin.

Timeframe: 2006-2009

Lead: Congress

Resources: \$20 million over four years

Sources: Federal funding programs of USFWS, USDOT and USACE

Another element of governance that is limiting sustainability is the capacity of local communities, watershed councils, soil and water conservation districts, and MPOs which are challenged to attract and retain staff knowledgeable on sustainable practices due to unstable base funding. These organizations provide critical training, technical assistance, and are regional advocates for sustainability are challenged to maintain their institutional knowledge. Recommend actions to enhance the capacity of local and regional organizations to inform, promote, and implement sustainability.

Action (g): Identify, expand, and enhance existing online clearinghouses to provide additional capacity for education and outreach, tourism projects and products, and local watershed planning initiatives

Timeframe: 2006-2007

Lead: Great Lakes Commission/GLIN; Sea Grant/University

Resources: \$500K per year

Source: Federal and state funding programs including: USEPA, CEM funding through GLNPO/LaMP; NOAA, Coastal Zone Management (CZM) grants and Coastal Estuary Land Protection; Great Lakes Protection Fund

Action (h): Enhance the capacity of local communities to apply sustainability through training and technical assistance provided with priority funding from multiple federal and state grant and assistance programs.

Timeframe: 2006-2007

Lead: Watershed and regional councils, RAP groups, tribes, NGOs, soil & water conservation districts

Resources: \$2 million (ramping up to \$8 million in five years); \$100K per watershed per year

Source: US Dept Agriculture (USDA), Tech Asst Fund; USEPA, CEM funding through GLNPO/LaMP, Sec 319 grants through States; NOAA/CZM and Coastal Estuary Land Protection grants; USACE RAP Support (WRDA Sec 401) program; HUD Community Development Block Grant program, Great Lakes Protection Fund; Foundations

Action (i): Initiate two new and maintain two existing watershed or regional partnerships with emphasis on rural, multi-ecosystem watersheds that incorporate sustainable criteria and local government capacity enhancing programs into a comprehensive strategic planning initiative.

Timeframe: 2006-2007

Lead: Watershed and regional councils, RAP groups, tribes, NGOs, soil & water conservation districts

Resources: \$100-250K per watershed per year

Sources: USEPA, Section 319 grants through states; state watershed planning programs

Action (j): Enhance the capacity of Great Lakes ports and marinas to implement best management practices in partnership with the outreach initiative of the American Association of Port Authorities (AAPA)

Timeframe: 2006-2007

Lead: Port authorities, state, local and private harbor and marina interests, AAPA

Resources: \$300,000 annually

Sources: Federal and state funding programs, including USDOT and USACE

Commitments to existing partnerships that bridge governmental alignments and promote sustainability should be renewed and sustained. One example is the state/federal partnership of the Great Lakes Dredging Team.

3) Build outreach that brands the Great Lakes as an exceptional, healthy, and competitive place to live, work, invest, and play

In order to gain the public support, both within the basin and nationwide, to accomplish the recommendations identified in the Strategy and promote the sustainability of the Great Lakes as a national priority, a combination of marketing and outreach is required. Specific objectives of this outreach and marketing are to educate users and consumers on sustainable alternatives available and the consequences of decisions, build a sense of ownership and pride in regional ecosystems, attract new residents and businesses to the region with abundant ecosystem services and a society where sustainability is practiced, and develop national support for the restoration and protection of the Great Lakes because of its ecological and economic importance to the country.

Action (k): Develop and implement a marketing strategy for the Great Lakes targeted at a national audience that delivers messages of the region's ecological and economic importance to the nation/world

Timeframe: 2006-2008

Lead: Foundations and NGOs

Resources: \$2 million

Sources: Foundations and public interest funds

Action (l): Create new awards to recognize excellence in sustainable development within the Great Lakes

Timeframe: 2006

Lead: Foundations, business sector associations, NGOs

Resources: undetermined, but may not be required

Action (m): Develop additional education and outreach modules on sustainability (such as WET and Water Riches curricula for water conservation) and promote their incorporation into school curriculum (K-12)

Timeframe: 2006-2007

Lead: State resource and education agencies and NGOs in partnership with local school districts

Resources: \$2 million

Sources: State and federal funding programs, including: USEPA, Environmental Education grants; US Dept of Education grants; and state and local education funding programs

4) Provide leadership for sustainable development through the implementation of the Strategy recommendations

This Strategy document presents both short- and long-term actions required to restore and protect the ecosystem services provided by the Great Lakes. However, there is another critical step in moving forward from this document to the implementation of the recommended actions. That is the formulation of an implementation plan which provides the specifics for prioritization and sequencing of actions. This plan must also evaluate alternative actions, develop more detailed cost estimates, and assign responsibilities to assure that funds and human resources are used efficiently. Sustainable development cuts across all other priority issues addressed in this Strategy, it is future-oriented, and represents a sound platform for integrating efforts to restore and protect the Great Lakes.

Action (n): Congress should authorize and appropriate funding for development of a phased implementation plan for the recommendations in the Strategy that provides a scientifically sound process for prioritization, sequencing, development of detailed cost data, evaluation of alternatives, and assignment of responsibilities, utilizing sustainable development as the overarching guide

Timeframe: 2006

Lead: Congress

Resources: \$6 million over three years

A final action that is essential for the successful implementation of the Great Lakes Strategy is providing leadership. The Collaboration, a partnership of federal, state, tribal and local governments, is the logical choice for overseeing of the development of the implementation plan as well as tracking and reporting on its application. This will necessitate some changes to the Collaboration's charter and organization structure. It is also recommended that the Governors, Mayors and Tribal leaders provide leadership as the advocates for sustainable use, development and conservation of Great Lakes resources.

Action (o): The Great Lakes Regional Collaboration should amend its Framework to provide oversight of the development, approval, and application of a phased implementation plan for the Great Lakes Strategy using sustainable development as the overarching guide. The Collaboration should also monitor and report on the status of implementation.

Timeframe: 2006

Lead: Collaboration

Action (p): The Governors, Mayors, and Tribal leaders of the Great Lakes should renew and expand their commitments to the sustainable use, development and conservation of Great Lakes resources and utilize the Great Lakes Commission and Great Lakes and St. Lawrence Cities Initiative as a proactive advocates for sustainable development.

Timeframe: 2006

Lead: Governors, Mayors and Tribal leaders

Appendices



About the Appendices

The Appendices to the GLRC strategy (included on the CD) contain supplementary materials used or developed in the course of preparing the Strategy Team Reports included in the final GLRC Strategy. For example, they identify many successful ongoing efforts that contribute to Great Lakes protection and restoration, as well as recommendations that may be utilized for future action. They also contain valuable reference materials and other supplementary information that are an important part of the strategic collaborative process. However, the materials in the Appendices are not necessarily products of consensus and might not represent the views of all strategy team members; and, unless otherwise indicated in a particular item itself, have not received official endorsement by the Executive Committee, or the entities who are members of the Collaboration.





Great Lakes Water Quality Agreement



Revised

Great Lakes Water Quality Agreement of 1978

*As Amended by Protocol
Signed November 18, 1987*

Consolidated by the



International Joint Commission
United States and Canada

Revised

*Great Lakes Water Quality
Agreement of 1978*

Agreement, with Annexes
and Terms of Reference,
between the
United States and Canada
signed at Ottawa
November 22, 1978

and

Phosphorus Load Reduction Supplement
signed October 16, 1983

as amended by Protocol
signed November 18, 1987

Office Consolidation
INTERNATIONAL JOINT COMMISSION
UNITED STATES AND CANADA

Reprint February, 1994

REVISED GREAT LAKES WATER QUALITY AGREEMENT OF 1978

ARTICLE	SUBJECT	PAGE
I	Definitions	2
II	Purpose	4
III	General Objectives	5
IV	Specific Objectives	5
V	Standards, Other Regulatory Requirements, and Research	6
VI	Programs and Other Measures	7
VII	Powers, Responsibilities and Functions of the IJC	11
VIII	Joint Institutions and Regional Office	12
IX	Submission and Exchange of Information	13
X	Consultation and Review	14
XI	Implementation	14
XII	Existing Rights and Obligations	15
XIII	Amendment	15
XIV	Entry Into Force and Termination	15
XV	Supersession	15

ANNEX	SUBJECT	PAGE
1	Specific Objectives	16
	<i>Specific Objectives Supplement to Annex 1</i>	22
2	Remedial Action Plans and Lakewide Management Plans	24
3	Control of Phosphorus	29
	<i>Phosphorus Load Reduction and Supplement</i>	30
4	Discharges of Oil and Hazardous Polluting Substances from Vessels	35
5	Discharges of Vessel Wastes	38
6	Review of Pollution from Shipping Sources	39
7	Dredging	40
8	Discharges from Onshore and Offshore Facilities	41
9	Joint Contingency Plan	43
10	Hazardous Polluting Substances	44
	Appendix 1 - Hazardous Polluting Substances	46
	Appendix 2 - Potential Hazardous Polluting Substances	49
11	Surveillance and Monitoring	50
12	Persistent Toxic Substances	52
13	Pollution from Non-Point Sources	55
14	Contaminated Sediment	56
15	Airborne Toxic Substances	58
16	Pollution from Contaminated Groundwater	60
17	Research and Development	60
	<i>Terms of Reference for the Joint Institutions and the Great Lakes Regional Office</i>	62

**PROTOCOL AMENDING THE 1978 AGREEMENT BETWEEN THE
UNITED STATES OF AMERICA AND CANADA ON GREAT LAKES
WATER QUALITY, AS AMENDED ON OCTOBER 16, 1983**

The Government of the United States of America and the Government of Canada,

REAFFIRMING their commitment to achieving the purpose and objectives of the 1978 Agreement between the United States of America and Canada on Great Lakes Water Quality, as amended on October 16, 1983;

HAVING developed and implemented cooperative programs and measures to achieve such purpose and objectives;

RECOGNIZING the need for strengthened efforts to address the continuing contamination of the Great Lakes Basin Ecosystem, particularly by persistent toxic substances;

ACKNOWLEDGING that many of these toxic substances enter the Great Lakes System from air, from ground water infiltration, from sediments in the Lakes and from the runoff of non-point sources;

AWARE that further research and program development is now required to enable effective actions to be taken to address the continuing contamination of the Great Lakes;

DETERMINED to improve management processes for achieving Agreement objectives and to demonstrate firm leadership in the implementation of control measures;

Have agreed as follows:

**AGREEMENT BETWEEN CANADA AND THE UNITED STATES
OF AMERICA ON GREAT LAKES WATER QUALITY, 1978**

The Government of Canada and the Government of the United States of America,

HAVING in 1972 and 1978 entered into *Agreements* on Great Lakes Water Quality;

REAFFIRMING their determination to restore and enhance water quality in the Great Lakes System;

CONTINUING to be concerned about the impairment of water quality on each side of the boundary to an extent that is causing injury to health and property on the other side, as described by the International Joint Commission;

REAFFIRMING their intent to prevent further pollution of the Great Lakes Basin Ecosystem owing to continuing population growth, resource development and increasing use of water;

REAFFIRMING in a spirit of friendship and cooperation the rights and obligations of both countries under the Boundary Waters Treaty, signed on January 11, 1909, and in particular their obligation not to pollute boundary waters;

CONTINUING to recognize that right of each country in the use of the Great Lakes waters;

HAVING decided that the Great Lakes Water Quality *Agreements of 1972 and 1978* and subsequent reports of the International Joint Commission provide a sound basis for new and more effective cooperative actions to restore and enhance water quality in the Great Lakes Basin Ecosystem;

RECOGNIZING that restoration and enhancement of the boundary waters cannot be achieved independently of other parts of the Great Lakes Basin Ecosystem with which these waters interact;

CONCLUDING that the best means to preserve the aquatic ecosystem and achieve improved water quality throughout the Great Lakes System is by adopting common objectives, developing and implementing cooperative programs and other measures, and assigning special responsibilities and functions to the International Joint Commission;

Have agreed as follows:

ARTICLE 1

DEFINITIONS

As used in this Agreement:

- (a) "Agreement" means the present Agreement as distinguished from the Great Lakes Water Quality Agreement of April 15, 1972;
- (b) "Annex" means any of the Annexes to this Agreement, each of which is attached to and forms and integral part of this Agreement;
- (c) "Boundary waters of the Great Lakes System" or "boundary waters" means boundary waters, as defined in the Boundary Waters Treaty, that are within the Great Lakes System;
- (d) "Boundary Waters Treaty" means the Treaty between the United States and Great Britain Relating to Boundary Waters, and Questions Arising Between the United States and Canada, signed at Washington on January 11, 1909;
- (e) "Compatible regulations" means regulations no less restrictive than the agreed principles set out in this Agreement;
- (f) "General Objectives" are broad descriptions of water quality conditions consistent with the protection of the beneficial uses and the level of environmental quality which the Parties desire to secure and which will provide overall water management guidance;

- (g) "Great Lakes Basin Ecosystem" means 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;
- (h) "Great Lakes System" means all of the streams river, lakes and other bodies of water that are within the drainage basin on the St. Lawrence River at or upstream from the point at which this river becomes the international boundary between Canada and the United States;
- (i) "Harmful quantity" means any quantity of a substance that if discharged into receiving water would be inconsistent with the achievement of the General and Specific Objectives;
- (j) "Hazardous polluting substance" means any element or compound identified by the Parties which, if discharged in any quantity into or upon receiving waters or adjoining shorelines, would present an imminent and substantial danger to public health or welfare; for this purpose, "public health or welfare" encompasses all factors affecting the health and welfare of *humans* including but not limited to human health, and conservation and protection of flora and fauna, public and private property, shorelines and beaches;
- (k) "International Joint Commission" or "Commission" means the International Joint Commission established by the Boundary Waters Treaty;
- (l) "Monitoring" means a scientifically designed system of continuing standardized measurements and observations and the evaluation thereof;
- (m) "Objectives" means the General Objectives adopted pursuant to Article III and the Specific Objectives adopted pursuant to Article IV of this Agreement;
- (n) "Parties" means the Government of Canada and the Government of the United States of America;
- (o) "Phosphorus" means the element phosphorus present as a constituent of various organic and inorganic complexes and compounds;
- (p) "Research" means development, *interpretation and demonstration of advanced scientific knowledge for the resolution of issues* but does not include monitoring and surveillance of water or air quality;
- (q) "Science Advisory Board" means the Great Lakes Science Advisory Board of the International Joint Commission established pursuant to Article VIII of this Agreement;
- (r) "Specific Objectives" means the concentration or quantity of a substance or level of effect that the Parties agree, after investigation, to recognize as a maximum or minimum desired limit for a defined body of water or portion thereof, taking into account the beneficial uses or level of environmental quality which the Parties desire to secure and protect;

- (s) "State and Provincial Governments" means the Governments of the States of Illinois, Indiana, Michigan, Minnesota, New York, Ohio, Wisconsin, and the Commonwealth of Pennsylvania, and the Government of the Province of Ontario;
- (t) "Surveillance" means specific observations and measurements relative to control or management;
- (u) "Terms of Reference" means the Terms of Reference for the Joint Institutions and the Great Lakes Regional Office established pursuant to this Agreement, which are attached to and form an integral part of this Agreement;
- (v) "Toxic substance" means a substance which can cause death, disease, behavioural abnormalities, cancer, genetic mutations, physiological or reproductive malfunctions or physical deformities in any organism or its offspring, or which can become poisonous after concentration in the food chain or in combination with other substances;
- (w) "Tributary waters of the Great Lakes System" or "tributary waters" means all the waters within the Great Lakes System that are not boundary waters;
- (x) "Water Quality Board" means the Great Lakes Water Quality Board of the International Joint Commission established pursuant to Article VIII of this Agreement.

ARTICLE II

PURPOSE

The purpose of the Parties is to restore and maintain the chemical, physical, and biological integrity of the waters of the Great Lakes Basin Ecosystem. In order to achieve this purpose, the Parties agree to make a maximum effort to develop programs, practices and technology necessary for a better understanding of the Great Lakes Basin Ecosystem and to eliminate or reduce to the maximum extent practicable the discharge of pollutants into the Great Lakes System.

Consistent with the provisions of this Agreement, it is the policy of the Parties that:

- (a) The discharge of toxic substances in toxic amounts be prohibited and the discharge of any or all persistent toxic substances be virtually eliminated;
- (b) Financial assistance to construct publicly owned waste treatment works be provided by a combination of local, state, provincial, and federal participation; and
- (c) Coordinated planning processes and best management practices be developed and implemented by the respective jurisdictions to ensure adequate control of all sources of pollutants.

ARTICLE III
GENERAL OBJECTIVES

The Parties adopt the following General Objectives for the Great Lakes System. These waters should be:

- (a) Free from substances that directly or indirectly enter the waters as a result of human activity and that will settle to form putrescent or otherwise objectionable sludge deposits, or that will adversely affect aquatic life or waterfowl;
- (b) Free from floating materials such as debris, oil, scum, and other immiscible substances resulting from human activities in amounts that are unsightly or deleterious;
- (c) Free from materials and heat directly or indirectly entering the water as a result of human activity that alone, or in combination with other materials, will produce colour, odour, taste, or other conditions in such a degree as to interfere with beneficial uses;
- (d) Free from materials and heat directly or indirectly entering the water as a result of human activity that alone, or in combination with other materials, will produce conditions that are toxic or harmful to human, animal, or aquatic life; and
- (e) Free from nutrients directly or indirectly entering the waters as a result of human activity in amounts that create growths of aquatic life that interfere with beneficial uses.

ARTICLE IV
SPECIFIC OBJECTIVES

- 1. The Parties adopt the Specific Objectives for the boundary waters of the Great Lakes System as set forth in Annex 1, subject to the following:
 - (a) The Specific Objectives adopted pursuant to this Article represent the minimum levels of water quality desired in the boundary waters of the Great Lakes System and are not intended to preclude the establishment of more stringent requirements.
 - (b) The determination of the achievement of Specific Objectives shall be based on statistically valid sampling data.
 - (c) Notwithstanding the adoption of Specific Objectives, all reasonable and practicable measures shall be taken to maintain or improve the existing water quality in those areas of the boundary waters of the Great Lakes System where such water quality is better than that prescribed by the Specific Objectives, and in those areas having outstanding natural resource value.
 - (d) The responsible regulatory agencies shall not consider flow augmentation as a substitute for adequate treatment to meet the Specific Objectives.

- (e) The Parties recognize that in certain areas of inshore waters natural phenomena exist which, despite the best efforts of the Parties, will prevent the achievement of some of the Specific Objectives. As early as possible, these areas should be identified explicitly by the appropriate jurisdictions and reported to the International Joint Commission.
 - (f) *The Parties recognize that there are areas in the boundary waters of the Great Lakes System where, due to human activity, one or more of the General or Specific Objectives of the Agreement are not being met. Pending virtual elimination of the persistent toxic substances in the Great Lakes System, the Parties, in cooperation with the State and Provincial Governments and the Commission, shall identify and work toward the elimination of:*
 - (i) *Areas of Concern pursuant to Annex 2;*
 - (ii) *Critical Pollutants pursuant to Annex 2; and*
 - (iii) *Point Source Impact Zones pursuant to Annex 2.*
2. The Specific Objectives for the boundary waters of the Great Lakes System or for particular portions thereof shall be kept under review by the Parties and the International Joint Commission, which shall make appropriate recommendations.
 3. The Parties shall consult on:
 - (a) The establishment of Specific Objectives to protect beneficial uses from the combined effects of pollutants; and
 - (b) The control of pollutant loading rates for each lake basin to protect the integrity of the ecosystem over the long term.

ARTICLE V

STANDARDS, OTHER REGULATORY REQUIREMENTS, AND RESEARCH

1. Water quality standards and other regulatory requirements of the Parties shall be consistent with the achievement of the General and Specific Objectives. The Parties shall use their best efforts to ensure that water quality standards and other regulatory requirements of the State and Provincial Government shall similarly be consistent with the achievement of these Objectives. Flow augmentation shall not be considered as a substitute for adequate treatment to meet water quality standards or other regulatory requirements.
2. The Parties shall use their best efforts to ensure that:
 - (a) The principal research funding agencies in both countries orient the research programs of their organizations in response to research priorities identified by the Science Advisory Board and recommended by the Commission;

- (b) Mechanisms be developed for appropriate cost-effective international cooperation; and
- (c) Research priorities are undertaken in accordance with Annex 17.

ARTICLE VI
PROGRAMS AND OTHER MEASURES

- 1. The Parties, in cooperation with State and Provincial Governments, shall continue to develop and implement programs and other measures to fulfil the purpose of this Agreement and to meet the General and Specific Objectives. Where present treatment is inadequate to meet the General and Specific Objectives, additional treatment shall be required. The programs and measures shall include the following:
 - (a) **Pollution from Municipal Sources.** Programs for the abatement, control and prevention of municipal discharges and urban drainage into the Great Lakes System. These programs shall be completed and in operation as soon as practicable, and in the case of municipal sewage treatment facilities no later than December 31, 1982. These programs shall include:
 - (i) Construction and operation of waste treatment facilities in all municipalities having sewer systems to provide levels of treatment consistent with the achievement of phosphorus requirements and the General and Specific Objectives, taking into account the effects of waste from other sources;
 - (ii) Provision of financial resources to ensure prompt construction of needed facilities;
 - (iii) Establishment of requirements for construction and operating standards for facilities;
 - (iv) Establishment of pre-treatment requirements for all industrial plants discharging waste into publicly owned treatment works where such industrial wastes are not amenable to adequate treatment or removal using conventional municipal treatment processes;
 - (v) Development and implementation of practical programs for reducing pollution from storm, sanitary, and combined sewer discharges; and
 - (vi) Establishment of effective enforcement programs to ensure that the above pollution abatement requirements are fully met;
 - (b) **Pollution from Industrial Sources.** Programs for the abatement, control and prevention of pollution from industrial sources entering the Great Lakes System. These programs shall be completed and in operation as soon as practicable and in any case no later than December 31, 1983, and shall include:

- (i) Establishment of water treatment or control requirements expressed as effluent limitations (concentrations and/or loading limits for specific pollutants where possible) for all industrial plants, including power generating facilities, to provide levels of treatment or reduction or elimination of inputs of substances and effects consistent with the achievement of the General and Specific Objectives and other control requirements, taking into account the effects of waste from other sources;
 - (ii) Requirements for the substantial elimination of discharges into the Great Lakes System of persistent toxic substances;
 - (iii) Requirements for control of thermal discharges;
 - (iv) Measures to control the discharges of radioactive materials into the Great Lakes System;
 - (v) Requirements to minimize adverse environmental impacts of water intakes;
 - (vi) Development and implementation of programs to meet industrial pre-treatment requirements as specified under sub-paragraph (a) (iv) above; and
 - (vii) Establishment of effective enforcement programs to ensure the above pollution abatement requirements are fully met;
- (c) **Inventory of Pollution Abatement Requirements.** Preparation of an inventory of pollution abatement requirements for all municipal and industrial facilities discharging into the Great Lakes System in order to gauge progress toward the earliest practicable completion and operation of the programs listed in sub-paragraphs (a) and (b) above. This inventory, prepared and revised annually, shall include compliance schedules and status of compliance with monitoring and effluent restrictions, and shall be made available to the International Joint Commission and to the public. In the initial preparation of this inventory, priority shall be given to the problem areas previously identified by the Water Quality Board;
- (d) **Eutrophication.** Programs and measures for the reduction and control of inputs of phosphorus and other nutrients, in accordance with the provisions of Annex 3;
- (e) **Pollution from Agriculture, Forestry, and Other Land Use Activities.** Measures for the abatement and control of pollution from agriculture, forestry and other land use activities including:
- (i) Measures for the control of pest control products used in the Great Lakes Basin to ensure that pest control products likely to have long term deleterious effects on the quality of water or its biota be used only as authorized by the responsible regulatory agencies; that inventories of pest control products used in the Great Lakes Basin be established and maintained by appropriate agencies; and that research and educational programs be strengthened to facilitate integration of cultural, biological and chemical pest control techniques;

- (ii) Measures for the abatement and control of pollution from animal husbandry operations, including encouragement to appropriate agencies to adopt policies and regulations regarding utilization of animal wastes, and site selection and disposal of liquid and solid wastes, and to strengthen educational and technical assistance programs to enable farmers to establish waste utilization, handling and disposal systems;
 - (iii) Measures governing the hauling and disposal of liquid and solid wastes, including encouragement to appropriate regulatory agencies to ensure proper location, design and regulation governing land disposal, and to ensure sufficient, adequately trained technical and administrative capability to review plans and to supervise and monitor systems for application of wastes on land;
 - (iv) Measures to review and supervise road salting practices and salt storage to ensure optimum use of salt and all-weather protection of salt stores in consideration of long-term environmental impact;
 - (v) Measures to control soil losses from urban and suburban as well as rural areas;
 - (vi) Measures to encourage and facilitate improvements in land use planning and management programs to take account of impacts on Great Lakes water quality;
 - (vii) Other advisory programs and measures to abate and control inputs of nutrients, toxic substances and sediments from agricultural, forestry and other land use activities;
 - (viii) Consideration of future recommendations from the International Joint Commission based on the Pollution from Land Use Activities Reference;
and
 - (ix) Conduct further non-point source programs in accordance with Annex 13;
- (f) **Pollution from Shipping Activities.** Measures for the abatement and control of pollution from shipping sources, including:
- (i) Programs and compatible regulations to prevent discharges of harmful quantities of oil and hazardous polluting substances, in accordance with Annex 4;
 - (ii) Compatible regulations for the control of discharges of vessel wastes, in accordance with Annex 5;
 - (iii) Such compatible regulations to abate and control pollution from shipping sources as may be deemed desirable in the light of continuing reviews and studies to be undertaken in accordance with Annex 6;
 - (iv) Programs and any necessary compatible regulations in accordance with

Annexes 4 and 5, for the safe and efficient handling of shipboard generated wastes, including oil, hazardous polluting substances, garbage, waste water and sewage, and for their subsequent disposal, including the type and quantity of reception facilities and, if applicable, treatment standards; and

- (v) Establishment by the Canadian Coast Guard and the United States Coast Guard of a coordinated system for aerial and surface surveillance for the purpose of enforcement of regulations and the early identification, abatement and clean-up of spills of oil, hazardous polluting substances, or other pollution;
- (g) **Pollution from Dredging Activities.** Measures for the abatement and control of pollution from all dredging activities, including the development of criteria for the identification of polluted sediments and compatible programs for disposal of polluted dredged material, in accordance with Annex 7. Pending the development of compatible criteria and programs, dredging operations shall be conducted in a manner that will minimize adverse effects on the environment;
- (h) **Pollution from Onshore and Offshore Facilities.** Measures for the abatement and control of pollution from onshore and offshore facilities, including programs and compatible regulations for the prevention of discharges of harmful quantities of oil and hazardous polluting substances, in accordance with Annex 8;
- (i) **Contingency Plan.** Maintenance of a joint contingency plan for use in the event of a discharge or the imminent threat of a discharge of oil or hazardous polluting substances, in accordance with Annex 9;
- (j) **Hazardous Polluting Substances.** Implementation of Annex 10 concerning hazardous polluting substances. The Parties shall further consult from time to time for the purpose of revising the list of hazardous polluting substances and of identifying harmful quantities of these substances;
- (k) **Persistent Toxic Substances.** Measures for the control of inputs of persistent toxic substances including control programs for their production, use, distribution and disposal, in accordance with Annex 12;
- (l) **Airborne Toxic Substances.** Programs to identify pollutant sources and relative source contribution, including the more accurate definition of wet and dry deposition rates, for those substances which may have significant adverse effects on environmental quality including the indirect effects of impairment of tributary water quality through atmospheric deposition in drainage basins. In cases where significant contributions to Great Lakes pollution from atmospheric sources are identified, the Parties agree to consult on appropriate remedial programs. *The Parties shall conduct such programs in accordance with Annex 15;*
- (m) **Surveillance and Monitoring.** Implementation of a coordinated surveillance and monitoring program in the Great Lakes System, in accordance with Annex 11, to assess compliance with pollution control requirements and achievement of the Objectives, to provide information for measuring local and whole lake response to

control measures, and to identify emerging problems.

- (n) **Remedial Action Plans.** Measures to ensure the development and implementation of Remedial Action Plans for Areas of Concern pursuant to Annex 2;
 - (o) **Lakewide Management Plans.** Measures to ensure the development and implementation of Lakewide Management Plans to address Critical Pollutants pursuant to Annex 2.
 - (p) **Pollution from Contaminated Sediments.** Measures for the abatement and control of pollution from all contaminated sediments, including the development of chemical and biological criteria for assessing the significance of the relative contamination arising from the sediments and compatible programs for remedial action for polluted sediments in accordance with Annex 14; and
 - (q) **Pollution from Contaminated Groundwater and Subsurface Sources.** Programs for the assessment and control of contaminated groundwater and subsurface sources entering the boundary waters of the Great Lakes System pursuant to Annex 16.
2. The Parties shall develop and implement such additional programs as they jointly decide are necessary and desirable to fulfil the purpose of this Agreement and to meet the General and Specific Objectives.

ARTICLE VII

POWERS, RESPONSIBILITIES AND FUNCTIONS OF THE INTERNATIONAL JOINT COMMISSION

1. The International Joint Commission shall assist in the implementation of this Agreement. Accordingly, the Commission is hereby given, by a Reference pursuant to Article IX of the Boundary Waters Treaty, the following responsibilities:
- (a) Collation, analysis and dissemination of data and information supplied by the Parties and State and Provincial Governments relating to the quality of the boundary waters of the Great Lakes System and to pollution that enters the boundary waters from tributary waters and other sources;
 - (b) Collection, analysis and dissemination of data and information concerning the General and Specific Objectives and the operation and effectiveness of the programs and other measures established pursuant to this Agreement;
 - (c) Tendering of advice and recommendations to the Parties and to the State and Provincial Governments on problems of and matters related to the quality of the boundary waters of the Great Lakes System including specific recommendations concerning the General and Specific Objectives, legislation, standards and other regulatory requirements, programs and other measures, and intergovernmental agreements relating to the quality of these waters;
 - (d) Tendering of advice and recommendations to the Parties in connection with matters covered under the Annexes to this Agreement;

- (e) Provision of assistance in the coordination of the joint activities envisaged by this Agreement;
 - (f) Provision of assistance in and advice on matters related to research in the Great Lakes Basin Ecosystem, including identification of objectives for research activities, tendering of advice and recommendations concerning research to the Parties and to the State and Provincial Governments, and dissemination of information concerning research to interested persons and agencies;
 - (g) Investigations of such subjects related to the Great Lakes Basin Ecosystem as the Parties may from time to time refer to it.
2. In the discharge of its responsibilities under this Reference, the Commission may exercise all of the powers conferred upon it by the Boundary Waters Treaty and by any legislation passed pursuant thereto including the power to conduct public hearings and to compel the testimony of witnesses and the production of documents.
 3. The Commission shall make a full report to the Parties and to the State and Provincial Governments no less frequently than biennially concerning progress toward the achievement of the General and Specific Objectives including, as appropriate, matters related to Annexes to this Agreement. This report shall include an assessment of the effectiveness of the programs and other measures undertaken pursuant to this Agreement, and advice and recommendations. In alternate years, the Commission may submit a summary report. The Commission may at any time make special reports to the Parties, to the State and Provincial Governments and to the public concerning any problem of water quality in the Great Lakes System.
 4. The Commission may in its discretion publish any report, statement or other document prepared by it in the discharge of its functions under this Reference.
 5. The Commission shall have authority to verify independently the data and other information submitted by the Parties and by the State and Provincial Governments through such tests or other means as appear appropriate to it, consistent with the Boundary Waters Treaty and with applicable legislation.
 6. The Commission shall carry out its responsibilities under the Reference utilizing principally the services of the Water Quality Board and the Science Advisory Board established under Article VIII of this Agreement. The Commission shall also ensure liaison and coordination between the institutions established under this Agreement and other institutions which may address concerns relevant to the Great Lakes Basin Ecosystem, including both those within its purview, such as those Boards related to the Great Lakes levels and air pollution matters, and other international bodies as appropriate.

ARTICLE VIII

JOINT INSTITUTIONS AND REGIONAL OFFICE

1. To assist the International Joint Commission in the exercise of the powers and responsibilities assigned to it under this Agreement, there shall be two Boards:

- (a) A Great Lakes Water Quality Board which shall be the principal advisor to the Commission. The Board shall be composed of an equal number of members from Canada and the United States, including representatives from the Parties and each of the State and Provincial Governments; and
 - (b) A Great Lakes Science Advisory Board shall provide advice on research to the Commission and to the Water Quality Board. The Board shall further provide advice on scientific matters referred to it by the Commission, or by the Water Quality Board in consultation with the Commission. The Science Advisory Board shall consist of managers of Great Lakes research programs and recognized experts on Great Lakes water quality problems and related fields.
2. The members of the Water Quality Board and the Science Advisory Board shall be appointed by the Commission after consultation with the appropriate government or governments concerned. The functions of the Boards shall be as specified in the terms of Reference appended to this Agreement.
 3. To provide administrative support and technical assistance to the two Boards, and to provide information service for the programs, including public hearings, undertaken by the International Joint Commission and by the Boards, there shall be a Great Lakes Regional Office of the International Joint Commission. Specific duties and organization of the Office shall be as specified in the Terms of Reference appended to this Agreement.
 4. The Commission shall submit an annual budget of anticipated expenses to be incurred in carrying out its responsibilities under this Agreement to the Parties for approval. Each Party shall seek funds to pay one-half of the annual budget so approved, but neither Party shall be under an obligation to pay a larger amount than the other toward this budget.

ARTICLE IX

SUBMISSION AND EXCHANGE OF INFORMATION

1. The International Joint Commission shall be given at its request any data or other information relating to water quality in the Great Lakes System in accordance with procedures established by the Commission.
2. The Commission shall make available to the Parties and to the State and Provincial Governments upon request all data or other information furnished to it in accordance with the Article.
3. Each Party shall make available to the other at its request any data or other information in its control relating to water quality in the Great Lakes System.
4. Notwithstanding any other provision of this Agreement, the Commission shall not release without the consent of the owner any information identified as proprietary information under the law of the place where such information has been acquired.

ARTICLE X
CONSULTATION AND REVIEW

1. Following the receipt of each report submitted to the Parties by the International Joint Commission in accordance with paragraph 3 of Article VII of this Agreement, the Parties shall consult on the recommendations contained in such report and shall consider such action as may be appropriate, including:
 - (a) The modification of existing Objectives and the adoption of new Objectives;
 - (b) The modification or improvement of programs and joint measures; and
 - (c) The amendment of this Agreement or any Annex thereto.

Additional consultations may be held at the request of either Party on any matter arising out of the implementation of this Agreement.

2. When a Party becomes aware of a special pollution problem that is of joint concern and requires an immediate response, it shall notify and consult the other Party forthwith about appropriate remedial action.
3. *The Parties, in cooperation with State and Provincial Governments, shall meet twice a year to coordinate their respective work plans with regard to the implementation of this Agreement and to evaluate progress made.*
4. The Parties shall conduct a comprehensive review of the operation and effectiveness of this Agreement following *every* third biennial report of the Commission required under Article VII of this Agreement.

ARTICLE XI
IMPLEMENTATION

1. The obligations undertaken in this Agreement shall be subject to the appropriation of funds in accordance with the constitutional procedures of the Parties.
2. The Parties commit themselves to seek:
 - (a) The appropriation of funds required to implement this Agreement, including the funds needed to develop and implement the programs and other measures provided for in Article VI of this Agreement, and the funds required by the International Joint Commission to carry out its responsibilities effectively;
 - (b) The enactment of any additional legislation that may be necessary in order to implement the programs and other measures provided for in Article VI of this Agreement; and
 - (c) The cooperation of the State and Provincial Governments in all matters relating to this Agreement.

ARTICLE XII
EXISTING RIGHTS AND OBLIGATIONS

Nothing in this Agreement shall be deemed to diminish the rights and obligations of the Parties as set forth in the Boundary Waters Treaty.

ARTICLE XIII
AMENDMENT

1. This Agreement, the Annexes, and the Terms of Reference may be amended by agreement of the Parties. The Annexes may also be amended as provided therein, subject to the requirement that such amendments shall be within the scope of this Agreement. All such amendments to the Annexes shall be confirmed by an exchange of notes or letters between the Parties through diplomatic channels which shall specify the effective date or dates of such amendments.
2. All amendments to this Agreement, the Annexes, and the Terms of Reference shall be communicated promptly to the International Joint Commission.

ARTICLE XIV
ENTRY INTO FORCE AND TERMINATION

This Agreement shall enter into force upon signature by the duly authorized representatives of the Parties, and shall remain in force for a period of five years and thereafter until terminated upon twelve months' notice given in writing by one of the Parties to the other.

ARTICLE XV
SUPERSESSION

This Agreement supersedes the Great Lakes Water Quality Agreement of April 15, 1972, and shall be referred to as the "Great Lakes Water Quality Agreement of 1978".

IN WITNESS WHEREOF the undersigned representatives, duly authorized by their respective Governments, have signed this Agreement.

DONE in duplicate at Ottawa in the English and French languages, both versions being equally authentic, this 22nd day of November 1978.

EN FOI DE QUOI, les représentants soussignés, dûment autorisés par leur Gouvernement respectif, ont signé le présent Accord.

FAIT en double exemplaire à Ottawa en français et en anglais, chaque version faisant également foi, ce 22^e jour de novembre 1978.

ANNEX1
SPECIFIC OBJECTIVES

These Objectives are based on available information on cause/effect relationships between pollutants and receptors to protect the recognized most sensitive use in all waters. These Objectives may be amended, or new Objectives may be added, by mutual consent of the Parties.

I. CHEMICAL

A. Persistent Toxic Substances

1. Organic

(a) Pesticides

Aldrin/Dieldrin

The sum of the concentration of aldrin and dieldrin in water should not exceed 0.001 micrograms per litre. The sum of concentrations of aldrin and dieldrin in the edible portion of fish should not exceed 0.3 micrograms per gram (wet weight basis) for the protection of human consumers of fish.

Chlordane

The concentration of chlordane in water should not exceed 0.06 micrograms per litre for the protection of aquatic life.

DDT and Metabolites

The sum of the concentrations of DDT and its metabolites in water should not exceed 0.003 micrograms per litre. The sum of the concentrations of DDT and its metabolites in whole fish should not exceed 1.0 microgram per gram (wet weight basis) for the protection of fish-consuming aquatic birds.

Endrin

The concentration of endrin in water should not exceed 0.002 micrograms per litre. The concentration of endrin in the edible portion of fish should not exceed 0.3 microgram per gram (wet weight basis) for the protection of human consumers of fish.

Heptachlor/Heptachlor Epoxide

The sum of the concentrations of heptachlor and heptachlor epoxide in water should not exceed 0.001 micrograms per litre. The sum of concentrations of heptachlor and heptachlor epoxide in edible portions of fish should not exceed 0.3 micrograms per gram (wet weight basis) for the protection of human consumers of fish.

Lindane

The concentration of lindane in water should not exceed 0.01 micrograms per litre for the protection of aquatic life. The concentration of lindane in edible portions of fish should not exceed 0.3 micrograms per gram (wet weight basis) for the protection of human consumers of fish.

Methoxychlor

The concentration of methoxychlor in water should not exceed 0.04 micrograms per litre for the protection of aquatic life.

Mirex

For the protection of aquatic organisms and fish-consuming birds and animals, mirex and its degradation products should be substantially absent from water and aquatic organisms. Substantially absent here means less than detection levels as determined by the best scientific methodology available.

Toxaphene

The concentration of toxaphene in water should not exceed 0.008 micrograms per litre for the protection of aquatic life.

(b) Other Compounds

Phthalic Acid Esters

The concentration of dibutyl phthalate and di (2-ethylhexyl) phthalate in water should not exceed 4.0 micrograms per litre and 0.6 micrograms per litre, respectively, for the protection of aquatic life. Other phthalic acid esters should not exceed 0.2 micrograms per litre in waters for the protection of aquatic life.

Polychlorinated Biphenyls (PCBs)

The concentration of total polychlorinated biphenyls in fish tissues (whole fish, calculated on a wet weight basis), should not exceed 0.1 micrograms per gram for the protection of birds and animals which consume fish.

Unspecific Organic Compounds

For other organic contaminants, for which Specific Objectives have not been defined, but which can be demonstrated to be persistent and are likely to be toxic, the concentrations of such compounds in water or aquatic organisms should be substantially absent, i.e., less than detection levels as determined by the best scientific methodology available.

2. Inorganic

(a) Metals

Arsenic

The concentrations of total arsenic in an unfiltered water sample should not exceed 50 micrograms per litre to protect raw waters for public water supplies.

Cadmium

The concentration of total cadmium in an unfiltered water sample should not exceed 0.2 micrograms per litre to protect aquatic life.

Chromium

The concentration of total chromium in an unfiltered water sample should not exceed 50 micrograms per litre to protect raw waters of public water supplies.

Copper

The concentration of total copper in an unfiltered water sample should not exceed 5 micrograms per litre to protect aquatic life.

Iron

The concentration of total iron in an unfiltered water sample should not exceed 300 micrograms per litre to protect aquatic life.

Lead

The concentration of total lead in an unfiltered water sample should not exceed 10 micrograms per litre in Lake Superior, 20 micrograms per litre in Lake Huron and 25 micrograms per litre in all remaining Great Lakes to protect aquatic life.

Mercury

The concentration of total mercury in a filtered water sample should not exceed 0.2 micrograms per litre nor should the concentration of total mercury in whole fish exceed 0.5 micrograms per gram (wet weight basis) to protect aquatic life and fish-consuming birds.

Nickel

The concentration of total nickel in an unfiltered water sample should not exceed 25 micrograms per litre to protect aquatic life.

Selenium

The concentration of total selenium in an unfiltered water sample should not exceed 10 micrograms per litre to protect the raw water for public water supplies.

Zinc

The concentration of total zinc in an unfiltered water sample should not exceed 30 micrograms per litre to protect aquatic life.

(b) Other Inorganic Substances

Fluoride

The concentration of total fluoride in an unfiltered water sample should not exceed 1200 micrograms per litre to protect raw water for public water supplies.

Total Dissolved Solids

In Lake Erie, Lake Ontario and the International Section of the St. Lawrence River, the level of total dissolved solids should not exceed 200 milligrams per litre. In the St. Clair River, Lake St. Clair, the Detroit River and the Niagara River, the level should be consistent with maintaining the levels of total dissolved solids in Lake Erie and Lake Ontario not to exceed 200 milligrams per litre. In the remaining boundary waters, pending further study, the level of total dissolved solids should not exceed present levels.

B. Non-Persistent Toxic Substances

1. Organic Substances

(a) Pesticides

Diazinon

The concentration of diazinon in an unfiltered water sample should not exceed 0.08 micrograms per litre for the protection of aquatic life.

Guthion

The concentration of guthion in an unfiltered water sample should not exceed 0.005 micrograms per litre for the protection of aquatic life.

Parathion

The concentration of parathion in an unfiltered water sample should not exceed 0.008 micrograms per litre for the protection of aquatic life.

Other Pesticides

The concentration of unspecified, non-persistent pesticides should not exceed 0.05 of the median lethal concentration on a 96-hour test for any sensitive local species.

(b) Other substances

Unspecified Non-Persistent Toxic Substances and Complex Effluents

Unspecified non-persistent toxic substances and complex effluents of municipal, industrial or other origin should not be present in concentrations which exceed 0.05 of the median lethal concentration in a 96-hour test for any sensitive local species to protect aquatic life.

Oil and Petrochemicals

Oil and petrochemicals should not be present in concentrations that:

- (i) can be detected as visible film, sheen or discoloration on the surface;
- (ii) can be detected by odour;
- (iii) can cause tainting of edible aquatic organisms; and
- (iv) can form deposits on shorelines and bottom sediments that are detectable by sight or odour, or are deleterious to resident aquatic organisms.

2. Inorganic Substances

Ammonia

The concentration of un-ionized ammonia (NH₃) should not exceed 20 micrograms per litre for the protection of aquatic life. Concentrations of total ammonia should not exceed 500 micrograms per litre for the protection of public water supplies.

Hydrogen Sulfide

The concentration of undissociated hydrogen sulfide should not exceed 2.0 micrograms per litre to protect aquatic life.

C. Other Substances

1. Dissolved oxygen

In the connecting channels and in the upper waters of the Lakes, the dissolved oxygen level should not be less than 6.0 milligrams per litre at any time; in hypolimnetic waters, it should be not less than necessary for the support of fishlife, particularly cold water species.

2. pH

Values of pH should not be outside the range of 6.5 to 9.0, nor should discharge change the pH at the boundary of a limited use zone more than 0.5 units from that of the ambient waters.

3. Nutrients

Phosphorus

The concentration should be limited to the extent necessary to prevent nuisance growths of algae, weeds and slimes that are or may become injurious to any beneficial water use. (Specific phosphorus control requirements are set out in Annex 3.)

4. Tainting Substances

- (a) Raw public water supply sources should be essentially free from objectionable taste and odour for aesthetic reasons.
- (b) Levels of phenolic compounds should not exceed 1.0 microgram per litre in public water supplies to protect against taste and odour in domestic water.
- (c) Substances entering the water as the result of human activity that cause tainting of edible aquatic organisms should not be present in concentrations which will lower the acceptability of these organisms as determined by organoleptic tests.

II. PHYSICAL

A. *Asbestos*

Asbestos should be kept at the lowest practical level and in any event should be controlled to the extent necessary to prevent harmful effects on human health.

B. *Temperature*

There should be no change in temperature that would adversely affect any local or general use of the waters.

C. *Settleable and suspended Solids, and Light Transmission*

For the protection of aquatic life, waters should be free from substances attributable to municipal, industrial or other discharges resulting from human activity that will settle to form putrescent or otherwise objectionable sludge deposits or that will alter the value of Secchi disc depth by more than 10 per cent.

III. MICROBIOLOGICAL

Waters used for body contact recreation activities should be substantially free from bacteria, fungi, or viruses that may produce enteric disorders or eye, ear, nose, throat and skin infections or other human diseases and infections.

IV. RADIOLOGICAL

The level of radioactivity in waters outside of any defined source control area should not result in a TED_{50} (total equivalent dose integrated over 50 years as calculated in accordance with the methodology established by the International Commission on Radiological Protection) greater than 1 millirem to the whole body from a daily ingestion of 2.2 litres of lake water for one year. For dose commitments between 1 and 5 millirem at the periphery of the source control area, source investigation and corrective action are recommended if releases are not as low as reasonably achievable. For dose commitments greater than 5 millirem, the responsible regulatory authorities shall determine appropriate corrective action.

SPECIFIC OBJECTIVES SUPPLEMENT TO ANNEX 1

1. General Principles

(a) *Interim Objectives for Persistent Toxic Substances*

Consistent with the policy stated in paragraph (a) of Article II and Paragraph 2 of Annex 12 that the discharge of any or all persistent toxic substances be virtually eliminated, the Specific Objectives set out in Annex 1 for such substances are adopted as interim objectives.

(b) *Detention Levels*

As used in this Annex, "absent" means that the substances are not detectable when analyzed using the best available technology, which may include biological indicators. Detection levels will be subject to change as technology improves and new levels are adopted.

2. Specific Objectives Review Process

(a) The Parties, in consultation with State and Provincial Governments, shall consult on or before July 1, 1988, and at least once every two years thereafter for the purpose of considering the adoption of proposals by the Parties, State and Provincial Governments or recommendations of the Commission to:

- (i) establish or modify Specific Objectives under Annex 1; and
- (ii) establish action levels under Annex 12.

The Parties, in cooperation with State and Provincial Governments, shall ensure that the public is consulted in the development and adoption of the Specific Objectives.

(b) In proposing a substance for a new Specific Objective, the Parties, State and Provincial Governments or the Commission shall be guided by, but not limited to, the lists prepared by the Parties under paragraph (c), below, identifying substances that are present or potentially present within the water, sediment or aquatic biota of the Great Lakes System and are believed, singly or in synergistic or additive combination with another substance, to have acute or chronic toxic effects on aquatic, animal or human life.

(c) The Parties, on or before December 31, 1988, shall compile and maintain three lists of substances as follows:

- (i) *List No. 1 shall consist of all substances (1) believed to be present within the water, sediment or aquatic biota of the Great Lakes System and (2) believed, singly or in synergistic or additive combination with another substance, to have acute or chronic toxic effects on aquatic, animal or human life.*

- (ii) **List No. 2** shall consist of all substances (1) believed to be present within the water, sediment or aquatic biota of the Great Lakes System and (2) believed, singly, or in synergistic or additive combination with another substance to have the potential to cause acute or chronic toxic effects on aquatic, animal or human life.
- (iii) **List No. 3** shall consist of all substances (1) believed to have the potential of being discharged into the Great Lakes System and (2) believed, singly or in synergistic or additive combination with another substance, to have acute or chronic toxic effects on aquatic, animal or human life.

In compiling such lists, the Parties shall employ all data available, including that resulting from activities undertaken pursuant to Annex 12.

(d) Determinations regarding whether a substance, singly or in synergistic or additive combinations with another substance, has actual or potential acute or chronic effects or whether a substance has the potential of being discharged into the Great Lakes System according to paragraph (c) above, shall be made using standard methods agreed to by the Parties in consultation with State and Provincial Governments by April 1988.

3. Lake Ecosystem Objectives

Consistent with the purpose of this Agreement to maintain the chemical, physical and biological integrity of the waters of the Great Lakes Basin Ecosystem, the Parties, in consultation with State and Provincial boundary waters of the Great Lakes System, or portions thereof, and for Lake Michigan:

(a) **Lake Superior**

The Lake should be maintained as a balanced and stable oligotrophic ecosystem with lake trout as the top aquatic predator of a cold-water community and the *Pontoporeia hoyi* as a key organism in a food chain; and

(b) **Other Great Lakes**

Ecosystem Objectives shall be developed as the state of knowledge permits for the rest of the boundary of the Great Lakes System, or portions thereof, and for Lake Michigan.

ANNEX 2

REMEDIAL ACTION PLANS AND LAKEWIDE MANAGEMENT PLANS

1. *Definitions*

As used in this Annex:

- (a) "Areas of Concern" means a geographic area that fails to meet the General or Specific Objectives of the Agreement where such failure has caused or is likely to cause impairment of beneficial use or of the area's ability to support aquatic life.
- (b) "Critical Pollutants" means substances that persist at levels that, singly or in synergistic or additive combination, are causing, or are likely to cause, impairment of beneficial uses despite past application of regulatory controls due to their:
 - (i) presence in open lake waters;
 - (ii) ability to cause or contribute to a failure to meet Agreement objectives through their recognized threat to human health and aquatic life; or
 - (iii) ability to bioaccumulate.
- (c) "Impairment of beneficial use(s)" means a change in the chemical, physical or biological integrity of the Great Lakes System sufficient to cause any of the following:
 - (i) restrictions on fish and wildlife consumption;
 - (ii) tainting of fish and wildlife flavour;
 - (iii) degradation of fish wildlife populations;
 - (iv) fish tumors or other deformities;
 - (v) bird or animal deformities or reproduction problems;
 - (vi) degradation of benthos;
 - (vii) restrictions on dredging activities;
 - (viii) eutrophication or undesirable algae;
 - (ix) restrictions on drinking water consumption, or taste and odour problems
 - (x) beach closings;
 - (xi) degradation of aesthetics;
 - (xii) added costs to agriculture or industry;
 - (xiii) degradation of phytoplankton and zooplankton populations; and
 - (xiv) loss of fish and wildlife habitat.

- (d) "Point Source Impact Zone" is defined as an area of water contiguous to a point source where the water quality does not comply with the General and Specific Objectives of this Agreement.

2. *General Principles*

- (a) Remedial Action Plans and Lakewide Management Plans shall embody a systematic and comprehensive ecosystem approach to restoring and protecting beneficial uses in Areas of Concern or in open lake waters.
- (b) Such Plans shall provide a continuing historical record of the assessment of Areas of Concern or Critical Pollutants, proposed remedial actions and their method of implementation, as well as changes in environmental conditions that result from such actions, including significant milestones in restoring beneficial uses to Areas of Concern or open lake waters. They are to serve as an important step toward virtual elimination of persistent toxic substances and toward restoring and maintaining the chemical, physical and biological integrity of the Great Lakes Basin Ecosystem.
- (c) The Parties, State and Provincial Governments, and the Commission have identified Areas of Concern and the development of the of Remedial Action Plans for them has begun. Furthermore, the Parties and State and Provincial Governments have begun developing lakewide strategies for Lakes Ontario and Michigan. By incorporating an Annex for Remedial Action Plans and Lakewide Management Plans in this Agreement, the Parties intend to endorse and build upon these existing efforts.
- (d) Point source impact zones exist in the vicinity of some point source discharges. Pending the achievement of the virtual elimination of persistent toxic substances, the size of such zones shall be reduced to the maximum extent possible by the best available technology so as to limit the effects of toxic substances in the vicinity of these discharges. These zones shall not be acutely toxic to aquatic species, nor shall their recognition be considered a substitute for adequate treatment or control of discharges at their sources.
- (e) The Parties, in cooperation with State and Provincial Governments, shall ensure that the public is consulted in all actions undertaken pursuant to this Annex.

3. *Designation of Areas of Concern*

The Parties, in cooperation with State and Provincial Governments and the Commission, shall designate geographic Areas of Concern. The Commission, in its evaluation role, shall review progress in addressing Areas of Concern, and recommend additional Areas of Concern for designation by each Party.

4. *Remedial Action Plans for Areas of Concern*

- (a) The Parties shall cooperate with State and Provincial Governments to ensure that Remedial Action Plans are developed and implemented for Areas of Concern. Each plan shall include:

- (i) a definition and detailed description of the environmental problem in the Areas of Concern, including a definition of the beneficial uses that are impaired, the degree of impairment and the geographic extent of such impairment;
 - (ii) a definition of the causes of the use impairment, including a description of all known sources of pollutants involved and an evaluation of other possible sources;
 - (iii) an evaluation of remedial measures in place;
 - (iv) an evaluation of alternative additional measures to restore beneficial uses;
 - (v) a selection of additional remedial measures to restore beneficial uses and a schedule for their implementation;
 - (vi) an identification of the persons or agencies responsible for implementation of remedial measures;
 - (vii) a process for evaluating remedial measure implementation and effectiveness; and
 - (viii) a description of surveillance and monitoring processes to track the effectiveness of remedial measures and the eventual confirmation of the restoration of uses.
- (b) The Parties, in cooperation with State and Provincial Governments, shall ensure that affected State and Provincial Governments not now covered by this Agreement will be involved in the development of such plans and consulted on their implementation.
- (c) The Parties shall cooperate with State and Provincial Governments to classify Areas of Concern by their stage of restoration progressing from the definition of the problems and causes, through the selection of remedial measures, to the implementation of remedial programs, the monitoring of recovery, and, when identified beneficial uses are no longer impaired and the area restored, the removal of its designation as an Area of Concern.
- (d) The Remedial Action Plans shall be submitted to the Commission for review and comment at three stages:
- (i) When a definition of the problem has been completed under sub-paragraphs 4 (a) (i) and (ii);
 - (ii) When remedial and regulatory measures are selected under sub-paragraphs 4 (a)(iii), (iv),(v) and (vi); and
 - (iii) when monitoring indicates that identified beneficial uses have been restored under sub-paragraphs 4(a) (vii) and (viii).

5. *Designation of Critical Pollutants for the Development of Lakewide Management Plans*

The Parties, in cooperation with State and Provincial Governments and the Commission, shall designate Critical Pollutants for the boundary waters of the Great Lakes System or for a portion thereof. The Commission, in its evaluative role, shall review progress in addressing Critical Pollutants and recommend additional Critical Pollutants for designation by the Parties. Substances on List No. 1 under Annex 1 Supplement shall be considered for designation as Critical Pollutants.

6. *Lakewide Management Plans for Critical Pollutants*

- (a) The Parties, in consultation with State and Provincial Governments, shall develop and implement Lakewide Management Plans for open lake waters, except for Lake Michigan where the Government of the United States of America shall have that responsibility. Such Plans shall be designed to reduce loadings of Critical Pollutants in order to restore beneficial uses, Lakewide Management Plans shall not allow increases in pollutant loadings in areas where Specific Objectives are not exceeded.

Such Plans shall include:

- (i) a definition of the threat to human health or aquatic life posed by Critical Pollutants, singly or in synergistic or additive combinations with another substance, including their contribution to the impairment of beneficial uses;
- (ii) an evaluation of information available on concentration, sources, and pathways of the Critical Pollutants in the Great Lakes System, including all information on loadings of the Critical Pollutants from all sources, and an estimation of total loadings of the Critical Pollutants by modelling or other identified methods;
- (iii) steps to be taken pursuant to Article VI of this Agreement to develop the information necessary to determine the schedule of load reduction of Critical Pollutants that would result in meeting Agreement Objectives, including steps to develop the necessary standard approached and agreed procedures;
- (iv) a determination of load reduction of Critical Pollutants necessary to meet Agreement Objectives;
- (v) an evaluation of remedial measures presently in place, and alternative additional measures that could be applied to decrease loadings of Critical Pollutants;
- (vi) identification of the additional remedial measures that are need to achieve the reduction of loadings and to eliminate the contribution to impairment of beneficial uses from Critical Pollutants, including an implementation schedule;

- (vii) identification of the persons or agencies responsible for implementation of the remedial measures in question;
 - (viii) a process for evaluating remedial measure implementation and effectiveness;
 - (ix) a description of surveillance and monitoring to track the effectiveness of the remedial measures and the eventual elimination of the contribution to impairments of beneficial uses from the Critical Pollutants;
 - (x) a process for recognizing the absence of a Critical Pollutant in open lake waters.
- (b) The Parties shall classify efforts to reduce Critical Pollutants by their stages of elimination progressing from the definition of the problem, through the selection of remedial measures, to the implementation of remedial programs, the monitoring of recovery, and the removal of designation as a Critical Pollutant when it is no longer likely to cause, singly or in synergistic or additive combination with another substance, impairment of identified beneficial uses.
- (c) Lakewide Management Plans shall be submitted to the Commission for review and comment at four stages;
- (i) When a definition of the problem has been completed under sub-paragraphs 6 (a)(i), (ii) and (iii);
 - (ii) When the schedule of load reductions is determined under sub-paragraph 6 (a) (i), (ii) and (iii);
 - (iii) When remedial measures are selected under sub-paragraph 6 (a)(v), (vi) and (vii); and
 - (iv) When monitoring indicates that the contribution of the Critical Pollutants to impairment of identified beneficial uses has been eliminated under sub-paragraphs 6(a)(viii) and (ix).

7. *Reporting Progress*

- (a) Point Source Impact Zones that are associated with direct significant discharges of industrial and municipal wastes shall be identified delineated and reported to the Commission beginning September 30, 1989. They shall be reviewed biennially and their limits revised to achieve the maximum possible reduction in size and effect in accordance with improvements in waste treatment technology and consistent with the policy of virtual elimination of persistent toxic substances.
- (b) The Parties shall report, by December 31, 1988, and biennially thereafter, to the Commission on the progress in developing and implementing the Remedial Action Plans and Lakewide Management Plans and in restoring beneficial uses. Information from these reports shall be included in the Commission's biennial report under paragraph 3 of Article VII.

ANNEX 3

CONTROL OF PHOSPHORUS

1. The purpose of the following programs is to minimize eutrophication problems and to prevent degradation with regard to phosphorus in the boundary waters of the Great Lakes System. The Goals of phosphorus control are:
 - (a) Restoration of year-round aerobic conditions in the bottom waters of the Central Basin of Lake Erie;
 - (b) Substantial reduction in the present levels of algal biomass to a level below that of a nuisance condition in Lake Erie;
 - (c) Reduction in present levels of algal biomass to below that of a nuisance condition in Lake Ontario unloading the International Section of the St. Lawrence River;
 - (d) Maintenance of the oligotrophic state and relative algal biomass of Lakes Superior and Huron;
 - (e) Substantial elimination of algal nuisance growths in Lake Michigan to restore it to oligotrophic state; and
 - (f) The elimination of algal nuisance in bays and in other areas wherever they occur.
2. The following programs shall be developed and implemented to reduce input of phosphorus to the Great Lakes:
 - (a) Construction and operation of municipal waste treatment facilities in all plants discharging more than one million gallons per day to achieve, where necessary to meet the loading allocation be developed pursuant to paragraph 3 below, or to meet local conditions, whichever are more stringent, effluent concentration of 1.0 milligram per litre total phosphorus maximum for plants in the basins of Lakes Superior, Michigan, and Huron, and of 0.5 milligrams per litre total phosphorus maximum for plants in the basins of Lakes Ontario and Erie.
 - (b) Regulation of phosphorus introduction from industrial to the maximum practicable extent.
 - (c) Reduction to the maximum extent practicable of phosphorus introduced from diffuse sources into Lakes Superior, Michigan, and Huron; and the reduction by 30 per cent of phosphorus introduced from diffuse sources into Lakes Ontario and Erie, where necessary to meet the loading allocation to be developed pursuant to paragraph 3 below, or to meet local conditions, whichever is more stringent.
 - (d) Reduction of phosphorus in household detergents to 0.5 per cent by weight where necessary to meet the loading allocation to be developed pursuant to paragraph 3 below, or to meet local conditions, whichever are more stringent.
 - (e) Maintenance of a viable research program to seek maximum efficiency and effectiveness in the control of phosphorus introductions into the Great Lakes.

3. The following table establishes phosphorus loads for the base year (1976) and future phosphorus loads. The Parties, in cooperation with the State and Provincial Governments, shall within eighteen months after the date of entry into force of this Agreement confirm the future phosphorus loads, and based on these establish load allocations and compliance schedules, taking into account the recommendations of the International Joint Commission arising from the Pollution from Land Use Activities Reference. Until such loading allocations and compliance schedules are established, the Parties agree to maintain the programs and other measures specified in Annex 2 of the Great Lakes Water Quality Agreement of 1972.

	1976 Phosphorus Load in Metric Tonnes	Future Phosphorus Load in Metric Tonnes
Basin	Per Year	Per Year
Lake Superior	3600	3400*
Lake Michigan	6700	5600*
Main Lake Huron	3000	2800
Georgian Bay	630	600*
North Channel	550	520*
Saginaw Bay	870	440*
Lake Erie	20000	11000**
Lake Ontario	11000	7000**

* *These loadings would result if all municipal plants over one million gallons per day achieved an effluent of 1 milligram per litre of phosphorus.*

** *These loadings are required to meet the goals stated in paragraph 1 above.*

**PHOSPHORUS LOAD REDUCTION SUPPLEMENT TO ANNEX 3 OF THE 1978
AGREEMENT BETWEEN THE UNITED STATES OF AMERICA AND
CANADA ON GREAT LAKES WATER QUALITY**

1. The purpose of this Supplement is to outline measures to fulfill the commitments undertaken pursuant to paragraph 3 of Annex 3 of the 1978 Great Lakes Water Quality Agreement which requires that:

“... The Parties, in cooperation with the State and Provincial Governments, shall within eighteen months after the date of entry into force of this Agreement confirm the future phosphorus loads, and based on these establish load allocations and compliance schedules, taking into account the recommendations of the International Joint Commission arising from the Pollution from Land Use Activities Reference ...”

2. Phosphorus Target Loads

Table 1 establishes the recommended phosphorus target loads which represent planning guides for the Parties. Table 1 replaces the table contained in paragraph 3 of Annex 3 of the 1978 Great Lakes Water Quality Agreement (GLWQA).

Table 1

Basin	Phosphorus Target Loads (metric tonnes per year)
Lake Superior	(See Section 3(b))
Lake Michigan	"
Main Lake Huron	"
Georgian Bay	"
North Channel	"
Saginaw Bay	440. (Note 1)
Lake Erie	11000. (Note 2)
Lake Ontario	7000. Note 2)

Note 1 Target load designed to alleviate drinking water taste and odour problems.

Note 2 Target loads proposed to meet ecosystem objectives in Annex 3. The allocation of the phosphorus target loads between the two countries shall be consistent with the equal rights of both Parties in the use of their boundary waters.

3. Phosphorus Load Reductions

(a) Lower Lakes:

Table 2 summarizes the estimated phosphorus loading that will be discharged to the Lower Lakes basins when all municipal waste treatment facilities over one million gallons per day achieve compliance with the one milligram per litre (1 mg/l) effluent concentration (on a monthly average basis) as required by Article VI, 1(a) of the 1978 GLWQA. The table also shows the further reductions required to meet the Phosphorus Target Loads.

Table 2

<i>Phosphorus Load Reduction Targets - metric tonnes per year</i>			
Basin	Estimated Loadings at 1 mg/l (Note 1)	Phosphorus Target Load	Estimates of Further Reductions Required
Lake Erie	13,000	11,000	2,000
Lake Ontario	7,430	7,000	430

Note 1 Estimated loading when all municipal waste treatment facilities over one million gallons/day achieve 1 mg/l phosphorus effluent target levels.

(b) Upper Lakes:

Load reductions for the Upper Lakes will be accomplished by achieving the 1 mg/l phosphorus effluent concentration (on a monthly average) at municipal

waste treatment facilities discharging more than one million gallons per day. The Parties further agree to maintain the present oligotrophic state of the open waters and relative algal biomass of Lakes Superior and Huron. In addition, the United States agrees to undertake efforts to achieve the substantial elimination of algal nuisance growths in Lake Michigan. Further measures will be implemented as required for Saginaw Bay, various localized nearshore problem areas and Green Bay.

- (c) Table 3 presents the distribution of further reductions in phosphorus loading required for Lake Erie (in metric tonnes/year) in order to achieve the estimated target loads. These figures will be used by the Parties in the development of detailed plans for achieving further phosphorus reductions as described in 4(a) and (b) below.

Table 3

<i>Allocation of reductions to meet target loads for Lake Erie as shown in Table 1</i>		
CANADA	U.S.	TOTAL
300	1700	2000

- (d) For Lake Ontario, the Parties, in cooperation and full consultation with State and Provincial Governments, agree to review the measures to achieve further phosphorus reductions in this Basin and will, within one year, meet to allocate the further phosphorus reductions between the parties. Plans to achieve the required reductions set out in Table 2 will be developed using these figures in accordance with procedures described in 4(a) and (b) below.

4. Phosphorus Load Reduction Plans

- (a) Phosphorus load reduction plans will be developed and implemented by the Parties in cooperation and full consultation with State and Provincial governments to achieve the phosphorus reductions for Lake Erie and Ontario described in Table 2. The plans will include phosphorus control programs and other measures as outlined in Section 5 and will describe any additional measures which will be undertaken to evaluate and review progress in achieving the phosphorus load reductions. A staged approach, incorporating target dates for achieving further reductions, will be included in the plans to provide the Parties and State and Provincial governments with a framework for implementing and evaluating the effectiveness of controls.
- (b) These detailed plans shall be tabled by the Parties with the International Joint Commission 18 months after agreement on this Supplement to Annex 3. The Parties will provide the Commission with progress reports and annual updates of these plans.

5. Programs and Other Measures

The following phosphorus control programs and measures will be developed and implemented by the Parties in cooperation and full consultation with State and Provincial governments to achieve the required reductions in accordance with the plans developed pursuant to Section 4. The Parties recognize that the responsibility for the control on nonpoint sources is shared between the Parties and the State and Provincial governments.

(a) *Municipal Waste Treatment Facilities*

- (i) Priority will be given to the continuation and intensification of efforts to ensure that municipal waste treatment facilities discharging more than one million gallons per day achieve an effluent concentration of 1 mg/1 total phosphorus on a monthly average.
- (ii) Where necessary, consideration will be given to operating facilities capable of greater phosphorus reduction at higher level of phosphorus removal than that required in 5(a)(i).
- (iii) Where necessary, municipal waste treatment facilities designed, built, expanded or modified after October 1, 1983 should allow for later modification to provide for greater removal of phosphorus than that required under 5 (a)(i).

(b) *Detergent Phosphorus Limitation*

Priority will be given to continuing efforts to limit phosphorus in household detergents.

(c) *Industrial Discharges*

Reasonable and practical measures will be undertaken to control industrial sources of phosphorus.

(d) *Nonpoint Source Programs and Measures*

Priority management areas will be identified and designated for application of urban and agricultural programs and measures which include:

- (i) Urban drainage management control programs where feasible consisting of level 1 measures throughout the Great Lakes Basin; and level 2 measures where necessary to achieve reductions or where local environmental conditions dictate (Note 1); and
- (ii) Agricultural nonpoint source management programs where feasible consisting of level 1 measures throughout the Basin and level 2 measures where necessary to achieve reductions of where local environmental conditions dictate (Note 1).

Note 1: *Level 1 nonpoint source control options include:*

Agricultural: adoption of management practices such as: animal husbandry control measures, crop residue management, conservation tillage, no-till, winter cover-crops,

crop rotation, strip cropping, vegetated buffer strips along stream and ditch banks, and improved fertilizer management practices.

Urban: adoption of management practices such as: erosion controls, use of natural storage capacities and street cleaning.

Level 2 nonpoint source controls include Level 1 plus:

Agricultural: adoption of intensive practices such as: contour plowing, contour strip cropping, contour diversions, tile outlet-terraces, flow control structures, grassed waterways, sedimentation basins and livestock manure storage facilities.

Urban: adoption of practices such as: artificial detention and sedimentation of stormwater and runoff and reduction of phosphorus in combined sewer overflows.

(e) Research

Pursuant to the provisions of paragraph 2(e) of Annex 3, the Parties will make special efforts to assure that their research activities will be responsive to the Programs and Other Measures described herein.

(f) Monitoring and Surveillance

The parties will develop and implement surveillance and monitoring measures to determine the progress of Phosphorus Load Reduction Plans for the Lower Lakes as called for under Section 4 above, and to evaluate efforts taken by the Parties to reduce phosphorus in the Great Lakes Basin. These measures will include an inventory of areas treated, watershed modelling and improved measurement of tributary loadings to the Lower Lakes for the purpose of providing improved nonpoint source loading estimates and the monitoring of mass loadings to the Upper Lakes to maintain or improve the environmental conditions described in Section 3(b).

6. Review

The Parties shall meet no later than December 31, 1988, to review the effectiveness of the programs and measures described herein, and any remaining load reduction measures required to achieve the target loads.

ANNEX 4

DISCHARGES OF OIL AND HAZARDOUS POLLUTING SUBSTANCES FROM VESSELS

1. **Definition.** As used in this Annex:
 - (a) "Discharge" includes, but is not limited to, any spilling, leaking, pumping, pouring, emitting or dumping; it does not include unavoidable direct discharges of oil from a properly functioning vessel engine;
 - (b) "Harmful quantity of oil" means any quantity of oil that, if discharged from a ship that is stationary into clear calm water on a clear day, would produce a film or a sheen upon, or discolouration of, the surface of the water or adjoining shoreline, or that would cause a sludge or emission to be deposited beneath the surface of the water or upon the adjoining shoreline;
 - (c) "Oil" means oil of any kind or in any form, including, but not limited to, petroleum, fuel oil, oil sludge, oil refuse, oil mixed with ballast or bilge water and oil mixed with wastes other than dredged material;
 - (d) "Tanker" means any vessel designed for the carriage of liquid cargo in bulk; and
 - (e) "Vessel" means any ship, barge or other floating craft, where or not self-propelled.
2. **General Principles.** Compatible regulation shall be adopted for the prevention of discharges into the Great Lakes System of harmful quantities of oil and hazardous polluting substances from vessels in accordance with the following principles:
 - (a) The discharge of a harmful quantity of oil or hazardous polluting substance, *including any such quantities as may be contained in ballast water*, shall be prohibited and made subject to appropriate penalties; and
 - (b) As soon as any person in charge has knowledge of any discharge, *or probable discharge*, of harmful quantities of oil or hazardous polluting substances, immediate notice of such discharge shall be given to the appropriate agency in the jurisdiction where the discharge occurs; *failure to give this notice shall be made subject to appropriate penalties.*
3. **Oil.** The programs and measures to be adopted for the prevention of discharges of harmful quantities of oil shall include:
 - (a) Compatible regulations for design, construction, and operation of vessels based on the following principles.
 - (i) Each vessel shall have a suitable means of containing on board cargo oil spills caused by loading or unloading operations;
 - (ii) Each vessel shall have a suitable means of containing on board fuel oils spills caused by loading or unloading operations, including those from tank vents and overflow pipes;

- (iii) Each vessel shall have the capability of retaining on board oily wastes accumulated during vessel operation;
 - (iv) Each vessel shall be capable of off-loading retained oily wastes to a reception facility;
 - (v) Each vessel shall be provided with a means for rapidly and safely stopping the flow of cargo or fuel oil during loading, unloading or bunkering operations in the event of an emergency;
 - (vi) Each vessel shall be provided with suitable lighting to adequately illuminate all cargo and fuel oil handling areas if the loading, unloading or bunkering operations occur at night;
 - (vii) Hose assemblies used on board vessels for oil loading, unloading, or bunkering shall be suitably designed, identified, and inspected to minimize the possibility of failure; and
 - (viii) Oil loading, unloading, and bunkering systems shall be suitably designed, identified, and inspected to minimize the possibility of failure; and
- (b) Programs to ensure that merchant vessel personnel are trained in all functions involved in the use, handling, and stowage of oil and in procedures for abatement of oil pollution.

4. **Hazardous Polluting Substances.** The programs and measures to be adopted for the prevention of discharges of harmful quantities of hazardous polluting substances carried as cargo shall include:

- (a) Compatible regulations for the design, construction, and operation of vessels using as a guide *the standards developed by the International Maritime Organizations (IMO)*, including the following *additional* requirements:
 - (i) Each vessel shall have a suitable means of containing on board spills caused by loading or unloading operations;
 - (ii) Each vessel shall have a capability of retaining on board wastes accumulated during vessel operation;
 - (iii) Each vessel shall be capable of off-loading wastes retained to a reception facility;
 - (iv) Each vessel shall be provided with a means for rapidly and safely stopping the flow during loading or unloading operations in the event of an emergency; and
 - (v) Each vessel shall be provided with suitable lighting to adequately illuminate all cargo handling areas if the loading or unloading operations occur at night;

- (b) Identification of vessels carrying cargoes of hazardous polluting substances in bulk, containers, and package form, and of all such cargoes;
- (c) Identification in vessel manifests of all hazardous polluting substances;
- (d) Carriage and storage arrangements of all hazardous polluting substances in packaged form using as a guide the International Maritime Dangerous Goods Code; *and*
- (e) Programs to ensure that merchant vessel personnel are trained in all functions involving the use, handling, and stowage of hazardous polluting substances; the abatement of pollution from such substances; and the hazards associated with the handling of such substances.

5. **Additional Measures.** Both Parties, *in cooperation with State and Provincial Governments* shall take, as appropriate, action to ensure the provision of adequate facilities for the reception, treatment, and subsequent disposal of oil and hazardous polluting substances wastes from all vessels.

ANNEX 5

DISCHARGES OF VESSEL WASTES

1. **Definitions.** As used in this Annex:
 - (a) "Discharge" includes, but is not limited to, any spilling, leaking, pumping, emitting, and dumping;
 - (b) "Garbage" means all kinds of victual, domestic, and operational wastes, excluding fresh fish and parts thereof generated during the normal operation of the ship and liable to be disposed of continually or periodically;
 - (c) "Sewage" means human or animal waste generated on board ship and includes wastes from water closets, urinals, or a hospital facility;
 - (d) "Vessel" means any ship, barge or other floating craft, whether or not self-propelled; and
 - (e) "Waste water" means water in combination with other substances, including ballast water and water used for washing cargo holds, but excluding water in combination with oil, hazardous polluting substances, or sewage.
2. **General Principles.** Compatible regulations shall be adopted governing the discharge into the Great Lakes System of garbage, sewage, and waste water from vessels in accordance with the following principles:
 - (a) The discharge of garbage shall be prohibited and made subject to appropriate penalties;
 - (b) The discharge of waste water in *harmful amounts or concentrations* shall be prohibited and made subject to appropriate penalties; and
 - (c) Every vessel operating in these waters that is provided with toilet facilities shall be equipped with a device or devices to contain, incinerate, or treat sewage to an adequate degree; appropriate penalties shall be provided for failure to comply with the regulation.
3. **Critical Use Areas:** Critical use areas of the Great Lakes System may be designate where the discharge of waste water or sewage shall be limited of prohibited.
4. The Parties, in cooperation with State and Provincial Governments, shall establish regulation to control the discharge of sewage from pleasure craft of other classes of vessels operating in the Great Lakes System or designated areas thereof.
5. **Additional Measures.** The Parties shall take, as appropriate, action to ensure the provision of adequate facilities for the reception, treatment, and subsequent disposal of garbage, waste water, and sewage from all vessels.

ANNEX 6

REVIEW OF POLLUTION FROM SHIPPING SOURCES

1. **Review.** The Canadian Coast Guard and the United States Coast Guard shall continue to review services, systems, programs, recommendations, standards and regulations relating to shipping activities for the purpose of maintaining or improving Great Lakes water quality. The reviews shall include:
 - (a) Review of vessel equipment, vessel manning, and navigation practices or procedures, and of aids to navigation and vessel traffic management, for the purpose of precluding casualties which may be deleterious to water quality;
 - (b) Review of practices and procedures regarding waste water and their deleterious effect on water quality, including, as required, studies to determine if live fish or invertebrates in ballast water discharges into the Great Lakes System constitute a threat to the System;
 - (c) Review of practices and procedures, as well as current technology for the treatment of vessel sewage;
 - (d) Review of current practices and procedures regarding the prevention of pollution from the loading, or unloading, or on board transfer of cargo; *and*
 - (e) Review of international ship safety, pollution prevention and civil liability conventions and standards developed by the International Maritime Organization to determine their applicability in the boundary waters of the Great Lakes System.

2. **Consultation.** Representatives of the Canadian Coast Guard and the United States Coast Guard, and other interested agencies, shall meet at least annually to consider *Annexes 4,5,6,8 and 9 of this Agreement*. A report of this annual consultation shall be furnished to the International Joint Commission prior to its annual meeting on Great Lakes water quality. The purpose of the consultation shall be to:
 - (a) Provide an interchange of information with respect to continuing reviews, ongoing studies, and areas of concern;
 - (b) Identify and determine the relative importance of problems requiring further study; *and*
 - (c) Apportion responsibility, as between the Canadian Coast Guard and the United States Coast Guard, for the studies, or portions thereof, which were identified in subparagraph 2(b) above.

3. **Studies.** Where a review identifies additional areas for improvement, the Canadian Coast Guard and the United States Coast Guard, and other interested agencies, will undertake a study to establish improved procedures for the abatement and control of pollution from shipping sources, and will:
 - (a) Develop a brief study description which will include the nature of the perceived problem, procedures to quantify the problem, alternative solutions to the problem, *procedures to determine the best alternative, and an estimated completion date;*

- (b) Transmit study descriptions to the International Joint Commission and other interested agencies:
 - (c) Transmit the study, or a brief summary of its conclusions, to the International Joint Commission and other interested agencies; and
 - (d) Transmit a brief status report to the International Joint Commission and other interested agencies if the study is not completed by the estimated completion date.
4. **Responsibility.** Responsibility for the coordination of the review, consultation, and studies is assigned to the Canadian Coast Guard and the United States Coast Guard.

ANNEX 7

DREDGING

1. There shall be established, under the auspices of the Water Quality Board, a Subcommittee on Dredging. The Subcommittee shall:
- (a) Review the existing practices in both countries relating to dredging activities, as well as the previous work done by the International Working Group on Dredging, with the objective of developing, within one year of the date of entry into force of this Agreement, compatible guidelines and criteria for dredging activities in the boundary waters of the Great Lakes System;
 - (b) Maintain a register of significant dredging projects being undertaken in the Great Lakes System with information to allow for the assessment of the environmental effects of the projects. The register shall include pertinent statistics to allow for the assessment of pollution loadings from dredged materials to the Great Lakes System;
 - (c) Encourage the exchange of information relating to developments of dredging technology and environmental research.
2. The Subcommittee shall identify specific criteria for the classification of polluted sediments of designated areas of intensive and continuing dredging activities within the Great Lakes System. Pending development of criteria and guidelines by the Subcommittee, and their acceptance of the Parties, the Parties shall continue to apply the criteria now in use by the regulatory authorities; however, neither party shall be precluded from applying standards more stringent than those now in use.
3. The Parties shall continue to direct particular attention to the identification and preservation of significant wetland areas in the Great Lakes Basin Ecosystem which are threatened by dredging and disposal activities.
4. The Parties shall encourage research and investigate advances in dredging technology and the pathways, fate and effects of nutrients and contaminants of dredged materials.
5. The Subcommittee shall undertake any other activities as the Water Quality Board may direct.

ANNEX 8

DISCHARGES FROM ONSHORE AND OFFSHORE FACILITIES

1. **Definitions.** As used in this Annex:
 - (a) "Discharge" means the introduction of polluting substances into receiving waters and includes, but is not limited to, any spilling, leaking, pumping, pouring, emitting or dumping; it does not include continuous effluent discharges from municipal or industrial treatment facilities;
 - (b) "Harmful quantity of oil" means any quantity of oil that, if discharged into clear calm waters on a clear day, would produce a film or sheen upon, or discoloration of the surface of the water or adjoining shoreline, or that would cause a sludge or emulsion to be deposited beneath the surface of the water or upon the adjoining shoreline;
 - (c) "Facility" includes motor vehicles, rolling stock, pipelines, and any other facility that is used or capable of being used for the purpose of processing, producing, storing, disposing, transferring or transporting oil or hazardous polluting substances, but excludes vessels;
 - (d) "Offshore facility" means any facility of any kind located in, on or under any water;
 - (e) "Onshore facility" means any facility of any kind located in, on or under, any land other than submerged land;
 - (f) "Oil" means oil of any kind or in any form, include, but not limited to petroleum, fuel oil, oil sludge, oil refuse, and oil mixed with wastes, but does not include constituents of dredged spoil.
2. **Principles.** Regulations shall be adopted for the prevention of discharges into the Great Lakes System of harmful quantities of oil and hazardous polluting substances from onshore and offshore facilities in accordance with the following principles:
 - (a) Discharges of harmful quantities of oil or hazardous polluting substances shall be prohibited and made subject to appropriate penalties;
 - (b) As soon as any person in charge has knowledge of any discharge of harmful quantities of oil or hazardous polluting substances, immediate notice of such discharge shall be given to the appropriate agency in the jurisdiction where the discharge occurs; failure to give this notice shall be made subject to appropriate penalties.
3. **Programs and Measures.** The programs and measures to be adopted shall include the following:
 - (a) Review of the design, construction, and location of both existing and new facilities for their adequacy to prevent the discharge of oil or hazardous polluting substances;

- (b) Review of the operation, maintenance and inspection procedures of facilities for their adequacy to prevent the discharge of oil or hazardous polluting substances;
- (c) Development and implementation of regulations and personnel training programs to ensure the safe use and handling of oil or hazardous polluting substances;
- (d) Programs to ensure that at each facility plans and provisions are made and equipment provided to stop rapidly and safely, contain, and clean up discharges of oil or hazardous polluting substances; and
- (e) Compatible regulations and other programs for the identification and placarding of containers, vehicles and other facilities containing, carrying, or handling oil or hazardous polluting substances; and where appropriate notification to appropriate agencies of vehicle movements, maintenance of a registry, and identification in manifests of such substances to be carried.

4. Implementation.

- (a) Each Party shall submit a report to the International Joint Commission outlining its programs and measures, existing or proposed, for the implementation of this Annex within six months of the date of entry into force of this Agreement.
- (b) The report shall outline programs and measures, existing or proposed, for each of the following types of onshore and offshore facilities:
 - (i) land transportation including rail and road modes;
 - (ii) pipelines on land and submerged under water;
 - (iii) offshore drilling rigs and wells;
 - (iv) storage facilities both onshore and offshore; and
 - (v) wharves and terminals with trestle or underwater pipeway connections to land and offshore island type structures and buoys used for the handling of oil and hazardous polluting substances.
- (c) The report shall outline programs and measures, existing or proposed, for any other type of onshore or offshore facility.
- (d) Upon receipt of the reports, the Commission, in consultation with the Parties, shall review the programs and measures outlined for adequacy and compatibility and, if necessary, make recommendation to rectify any such inadequacy or incompatibility it finds.

ANNEX 9
JOINT CONTINGENCY PLAN

1. **The Plan.** *Annex one (CANUSLAK) of the Canada-United States Joint Marine Contingency Plan, as amended or reviewed, shall be maintained in force for the Great Lakes.* The Canadian Coast Guard and the United States Coast Guard shall, in cooperation with other affected parties, identify and provide detailed Supplements for areas of high risk and of particular concern in augmentation of CANUSLAK. It shall be the responsibility of the United States Coast Guard and the Canadian Coast Guard to coordinate and to maintain the Plan and the Supplements appended *thereto*.
2. **Purpose.** The purpose of the Plan is to provide for coordinated and integrated response to pollution incidents in the Great Lakes System by responsible federal, state, provincial and local agencies. the Plan supplements the national, provincial and regional plans of the Parties.
3. **Pollution Incidents.**
 - (a) A pollution incident is a discharge, or an imminent threat of discharge of oil, hazardous polluting substance or other substance or other substance of such magnitude or significance as to require immediate response to contain, clean up, and dispose of the material.
 - (b) The objectives of the Plan in pollution incidents are:
 - (i) To develop appropriate preparedness measures and effective systems for discovery and reporting the existence of a pollution incident within the area covered by the Plan;
 - (ii) To institute prompt measures to restrict the further spread of the pollutant; and
 - (iii) To provide adequate cleanup response to pollution incidents.
4. **Funding.** The costs of operations of both Parties under the Plan shall be borne by the Party in whose waters the pollution incident occurred, unless otherwise agreed.
5. **Amendment.** The Canadian Coast Guard and the United States Coast Guard are empowered to amend the Plan subject to the requirement that such amendments shall be consistent with the purpose and objectives of this Annex.

ANNEX 10
HAZARDOUS POLLUTING SUBSTANCES

1. The Parties shall:
 - (a) Maintain a list, to be known as Appendix 1 of the Annex (hereinafter referred to as Appendix 1), of the substances known to have toxic effects on aquatic and animal life and a risk of being discharged to the Great Lakes System;
 - (b) Maintain a list, to be known as Appendix 2 of this Annex (hereinafter referred to as Appendix 2), of substances potentially having such effects and such a risk of discharge, and to give priority to the examination of these substances for possible transfer to Appendix 1;
 - (c) Ensure that these lists are continually revised in the light of growing scientific knowledge; and
 - (d) Develop and implement programs and measures to minimize or eliminate the risk of release of hazardous polluting substances to the Great Lakes System.
2. Hazardous polluting substances to be listed in Appendix 1 shall be determined in accordance with the following procedures:
 - (a) Selection of all hazardous substances for listing in Appendix 1 shall be based upon documented toxicological and discharge potential data which have been evaluated by the Parties and deemed to be mutually acceptable.
 - (b) Revisions to Appendix 1 may be made by mutual consent of the Parties and shall be treated as amendments to this Annex for the purposes of Article XIII of this Agreement.
 - (c) Using the agreed selection criteria, either Party may recommend at any time a substance to be added to the list in Appendix 1. Such substance need not previously have been listed in Appendix 2. The Party receiving the recommendation will have 60 days to review the associated documentation and either reject the proposed substance or accept the substance pending completion of appropriate procedural or domestic regulatory requirements. Cause for rejection must be documented and submitted to the initiating Party and may be the basis for any further negotiations.
3. The criteria to be applied to the selection of substances as candidates for listing in Appendix 1 are:
 - (a) Acute toxicological effects, as determined by whether the substance is lethal to:
 - (i) One-half of a test population of aquatic animals in 96 hours or less at a concentration of 500 milligrams per litre or less; or
 - (ii) One-half of a test population of animals in 14 days or less when adminis-

tered in a single oral dose equal to or less than 50 milligrams per kilogram of body weight; or

- (iii) One-half of a test population of animals in 14 days or less when dermally exposed to an amount equal to or less than 200 milligrams per kilogram body weight for 24 hours; or
- (iv) One-half of a test population of animals in 14 days or less when exposed to a vapour concentration equal to or less than 20 cubic centimetres per cubic meter in air for one hour; or
- (v) Aquatic flora as measured by a maximum specific growth rate or total yield of biomass which is 50 per cent lower than a control culture over 14 days in medium at concentrations equal to or less than 100 milligrams per litre.

(b) Risk of discharge into the Great Lakes System, as determined by:

- (i) Gathering information on the history of discharges or accidents;
- (ii) Assessing the modal risks during transport and determining the use and distribution patterns;
- (iii) Identifying quantities manufactured or imported.

4. Potentially hazardous polluting substances to be listed in Appendix 2 of this Annex shall be determined in accordance with the following procedures:

- (a) Either Party may add new substances to Appendix 2 by notifying the other in writing that the substance is considered to be a potential hazard because of documented information concerning aquatic toxicity mammalian and other vertebrate toxicity, phytotoxicity, persistence, bio-accumulation, mutagenicity, teratogenicity, carcinogenicity, environmental translocation or because of documented information on risk of discharge to the environment. The documentation of the potential hazard and the selected criteria upon which it is based will also be submitted.
- (b) Removal of substances from Appendix 2 shall be by mutual consent of the Parties.
- (c) The Parties shall give priority to the examination of substances listed in Appendix 2 for possible transfer to Appendix 1.

5. Programs and measures to control the risk of pollution from transport, storage, handling and disposal of hazardous polluting substances are contained in Annexes 4 and 8; and

6. In addition to the lists of hazardous polluting substances described in Appendices 1 and 2 to this Annex, practice and procedures consistent with the general principles of this Agreement shall be applied to those substances categorized as marine pollutants by the International Maritime Organization.

APPENDIX 1
HAZARDOUS POLLUTING SUBSTANCES

Acetaldehyde	Arsenic Trioxide
Acetic Acid	Arsenic Trisulphide
Acetic Anhydride	Barium Cyanide
Acetone Cyanohydrin	Benzene
Acetyl Bromide	Benzoic Acid
Acetyl Chloride	Benzonitrile
Acrolein	Benzoyl Chloride
Acrylonitrile	Benzyl Chloride
Aldrin	Beryllium Chloride
Allyl Alcohol	Beryllium Fluoride
Allyl Chloride	Beryllium Nitrate
Aluminum Sulfate	Butyl Acetate
Ammonia	Butylamine
Ammonium Acetate	Butyric Acid
Ammonium Benzoate	Cadmium Acetate
Ammonium Bicarbonate	Cadmium Bromide
Ammonium Bichromate	Cadmium Chloride
Ammonium Bifluoride	Calcium Arsenate
Ammonium Bisulfite	Calcium Arsenite
Ammonium Carbamate	Calcium Carbide
Ammonium Carbonate	Calcium Chromate
Ammonium Chloride	Calcium Cyanide
Ammonium Chromate	Calcium Dodecylbenzenesulfonate
Ammonium Citrate, Dibasic	Calcium Hydroxide
Ammonium Fluoborate	Calcium Hypochlorite
Ammonium Fluoride	Calcium Oxide
Ammonium Hydroxide	Captan
Ammonium Oxalate	Carbaryl
Ammonium Silicofluoride	Carbon Disulfide
Ammonium Sulfamate	Chlordane
Ammonium Sulfide	Chlorine
Ammonium Sulfite	Chlorobenzene
Ammonium Tartrate	Chloroform
Ammonium Thiocyanate	Chlorosulfonic Acid
Ammonium Thiosulfate	Chlorpyrifos
Amyl Acetate	Chromic Acetate
Aniline	Chromic Acid
Antimony Pentachloride	Chromic Sulfate
Antimony Potassium Tartrate	Chromous Chloride
Antimony Tribromide	Cobaltous Bromide
Antimony Trichloride	Cobaltous Foremate
Antimony Trifluoride	Cobaltous Sulfamate
Antimony Trioxide	Coumaphos
Arsenic Disulfide	Cresol
Arsenic Pentoxide	Cupric Acetate
Arsenic Trichloride	Cupric Acetoarsenite

Cupric Chloride	Isoprene
Cupric Nitrate	Isopropanolamine
Cupric Oxalate	Dodecylbenzenesulfonate
Cupric Sulfate	Kelthane
Cupric Sulfate, Ammoniated	Lead Acetate
Cupric Tartrate	Lead Arsenate
Cyanogen Chloride	Lead Chloride
Cyclohexane	Lead Fluoborate
2, 4-D Acid	Lead Fluoride
2, 4-D Esters	Lead Iodide
Dalapon	Lead Nitrate
DDT	Lead Stearate
Diazinon	Lead Sulfate
Dicamba	Lead Sulfide
Dichlobenil	Lead Thiocyanate
Dichlone	Lindane
Dichlorvos	Lithium Chromate
Dieldrin	Malathion
Diethylamine	Maleic Acid
Dimethylamine	Maleic Anhydride
Dinitrobenzene (mixed)	Mercuric Cyanide
Dinitrophenol	Mercuric Nitrate
Diquat	Mercuric Sulfate
Disulfoton	Mercuric Thiocyanate
Diuron	Mercurous Nitrate
Dedocylbenzenesulfonic Acid	Methoxychlor
Endosulfan	Methyl Mercaptan
Endrin	Methyl Methacrylate
Ethion	Methyl Parathion
Ethylbenzene	Mevinphos
Ethylenediamine	Mexacarbate
EDTA	Monoethylamine
Ferric Ammonium Citrate	Monomethylamine
Ferric Ammonium Oxalate	Naled
Ferric Chloride	Naphthalene
Ferric Fluoride	Napthenic Acid
Ferric Nitrate	Nickel Ammonium Sulfate
Ferric Sulfate	Nickel Chloride
Ferrous Ammonium Sulfate	Nickel Hydroxide
Ferrous Chloride	Nickel Nitrate
Ferrous Sulfate	Nickel Sulfate
Formaldehyde	Nitric Acid
Formic Acid	Nitrobenzene
Fumaric Acid	Nitrogen Dioxide
Furfural	Nitrophenol (mixed)
Guthion	Paraformaldehyde
Heptachlor	Parathion
Hydrochloric Acid	Pentachlorophenol
Hydrofluoric Acid	Phenol
Hydrogen Cyanide	Phosgene

Phosphoric Acid	Trichlorophenol
Phosphorous	Triethanolamine Dodecylbenzenesulfonate
Phosphorus Oxychloride	Triethylamine
Phosphorus Pentasulfide	Thrimethylamine
Phosphorus Trichloride	Uranyl Acetate
Polychlorinated Biphenyls	Uranyl Nitrate
Potassium Arsenate	Vanadium Pentoxide
Potassium Arsenite	Vanadyl Sulfate
Potassium Bichromate	Vinyl Acetate
Potassium Chromate	Xylene (mixed)
Potassium Cyanide	Xylenol
Potassium Hydroxide	Zinc Acetate
Potassium Permanganate	Zinc Ammonium Chloride
Propionic Acid	Zinc Borate
Propionic Anhydride	Zinc Bromide
Pyrethrins	Zinc Charbonate
Quinoline	Zinc Chloride
Resorcinol	Zinc Cyanide
Selenium Oxide	Zinc Fluoride
Sodium	Zinc Formate
Sodium Arsenate	Zinc Hydrosulfite
Sodium Arsenite	Zinc Nitrate
Sodium Bichromate	Zinc Phenolsulfonate
Sodium Bifluoride	Zinc Phosphide
Sodium Bisulfite	Zinc Silicofluoride
Sodium Chromate	Zinc Sulfate
Sodium Cyanide	Zirconium Nitrate
Sodium Dodecylbenzenesulfonate	Zirconium Potassium Fluoride
Sodium Fluoride	Zirconium Sulfate
Sodium Hydrosulfide	Zirconium Tetrachloride
Sodium Hydroxide	
Sodium Hypochlorite	
Sodium Methylate	
Sodium Nitrite	
Sodium Phosphate, Dibasic	
Sodium Phosphate, Tribasic	
Sodium Selenite	
Strontium Chromate	
Strychnine	
Styrene	
Sulfuric Acid	
Sulfur Monochloride	
2,4,5-T Acid	
2,4,5-7 Esters	
TDE	
Tetraethyl Lead	
Tetraethyl Pyrophosphate	
Toluene	
Toxaphene	
Trichlorfon	

APPENDIX 2
 POTENTIAL HAZARDOUS POLLUTING SUBSTANCES

Acridine	Dinocap	Sodium
Allethrin	Dinoseb	Pentachlorophenate
Aluminum Fluoride	Dioxathion	Sodium Phosphate,
Aluminum Nitrate	Dodine	Monobasic
Ammonium Bromide	EPN	Sodium Sulfide
Ammonium Hypophosphite	Gold Trichloride	Stannous Fluoride
Ammonium Iodide	Hexachlorophene	Strontium Nitrate
Ammonium Pentaborate	Hydrogen Sulfide	Sulfoxide
Ammonium Persulfate	m-Hydroxybenzoic Acid	Temephos
Antimony Pentafluoride	p-Hydroxybenzoic Acid	Thallium
Antimycin A	Hydroxylamine	Thionazin
Arsenic Acid	2-Hydroxyphenazine-1-	1,2,4-Trichlorobenzene
Barhan	Carboxylic Acid	Uranium Peroxide
Benfluralin	Lactonitrile	Uranyl Sulfate
Bensulide	Lead Tetraacetate	Zinc Bichromate
Benzene Hexachloride	Lead Thiosulfate	Zinc Potassium Chromate
Beryllium Sulfate	Lead Tungstate	Zirconium Acetate
Butifos	Lithium Bichromate	Zirconium Oxychloride
Cadmium	Malachite Green	
Cadmium Cyanide	Manganese Chloride,	
Cadmium Nitrate	Anhydrous	
Captafol	MCPA	
Carbophenothion	Mercuric Acetate	
Chlorflurazole	Mercuric Chloride	
Chlorothion	Mercury	
Chlorpropham	Metam-Sodium	
Chromic Chloride	p-Methylamino-Phenol	
Chromium	2-Methyl-Napthoquinone	
Chromyl Chloride	Neburon	
Cobaltous Fluoride	Nickel Formate	
Copper	Phenylmercuric Acetate	
Crotoxyphos	n-Phenyl Naphthylamine	
Cupric Carbonate	Phorate	
Cupric Citrate	Phosphamidon	
Cupric Formate	Picloram	
Cupric Glycinate	Potassium Azide	
Cupric Lactate	Potassium Cuprocyanide	
Cupric Paraamino Benzoate	Potassium Ferricyanide	
Cupric Salicylate	Propyl Alcohol	
Cupric Subacetate	Pyridyl Mercuric Acetate	
Cuprous Bromide	Rotenone	
Demeton	Silver	
Dibutyl Phthalate	Silver Nitrate	
Dicapthon	Silver Sulfate	
2,4-Dinitrochlorobenzene	Sodium Azide	
p-Dinitrocresol	Sodium 2-Chlorotoluene-5-Sulfonate	

ANNEX 11
SURVEILLANCE AND MONITORING

1. Surveillance and monitoring activities shall be undertaken for the following purposes:
 - (a) **Compliance.** To assess the degree to which jurisdictional control requirements are being met.
 - (b) **Achievement of General and Specific Objectives.** To provide definitive information on the location, severity, areal or volume extent, frequency and duration of non-achievement of the Objectives, as a basis for determining the need for more stringent control requirements.
 - (c) **Evaluation of Water Quality Trends.** To provide information for measuring local and whole lake response to control measures using trend analysis and cause/effect relationships, and to provide information which will assist in the development and application of predictive techniques for assessing impact of new developments and pollution sources. The results of water quality evaluations will be used for:
 - (i) assessing the effectiveness of remedial and preventative measures and identifying the need for the improved pollution control;
 - (ii) assessing enforcement and management strategies; and
 - (iii) identifying the need for further technology development and research activities.
 - (d) **Identification of Emerging Problems.** To determine the presence of new or hitherto detected problems in the Great Lakes Basin Ecosystem, leading to the development and implementation of appropriate pollution control measures.
 - (e) **Annex 2 Programs.** To support the development of Remedial Action Plans for Areas of Concern and Lakewide Management Plans for Critical Pollutants pursuant to Annex 2.
2. A joint surveillance and monitoring program necessary to ensure the attainment of the foregoing purposes shall be developed and implemented among the Parties and the State and Provincial Governments. The Great Lakes International Surveillance Plan contained in the Water Quality Board Annual Report of 1975 and revised in subsequent reports shall serve as a model for the development of the joint surveillance and monitoring program.
3. The program shall include baseline data collection, sample analysis, evaluation and quality assurance programs (including standard sampling and analytical methodology, inter-laboratory comparisons, and compatible data management) to allow assessment of the following:

- (a) Inputs from tributaries, point source discharges, atmosphere, and connecting channels;
- (b) Whole lake data including that for nearshore areas (such as harbours and embayments, general shoreline and cladophora growth areas), open waters of the Lakes, fish contaminants, and wildlife contaminants;
- (c) Overflows including connecting channels, water intakes and outlets;
- (d) Total pollutant loadings to, storage and transformation within, and export from the Great Lakes System;
- (e) The adequacy of proposed load reductions and schedules contained in Lakewide Management Plans; and
- (f) Contributions of various exposure media to the overall human intake of toxic substances in the Great Lakes Basin Ecosystem.

4. **Development of Ecosystem Health Indicators for the Great Lakes.** The Parties agree to develop ecosystem health indicators to assist in evaluating the achievement of the specific objectives for the ecosystem pursuant to Annex 1:

- (a) with respect to Lake Superior, lake trout and the crustacean *Pontoporeia hoyi* shall be used as indicators:

Lake Trout

- productivity greater than 0.38 kilograms/hectare;
- stable, self-producing stocks;
- free from contaminants at concentrations that adversely affect the trout themselves or the quality of the harvested products.

Pontoporeia hoyi

- the abundance of the crustacean, *Pontoporeia hoyi*, maintained throughout the entire lake at present levels of 220-320/(metres)² (depths less than 100 metres) and 30-160/(metres)² (depths greater than 100 metres); and

- (b) with respect to the rest of the boundary waters of the Great Lakes System or portions thereof, and for Lake Michigan, the indicators are to be developed.

ANNEX 12

PERSISTENT TOXIC SUBSTANCES

1. **Definitions.** As used in this Annex:
 - (a) "Persistent toxic substance" means any toxic substance with a half-life in water of greater than eight weeks;
 - (b) "Half-life" means the time required for the concentration of a substance to diminish to one-half of its original value in a lake or water body;
 - (c) "Early warning system" means a procedure to anticipate future environmental contaminants (i.e., substances having an adverse effect on human health or the environment) and to set priorities for environmental research, monitoring and regulatory action.

2. **General Principles.**
 - (a) Regulatory strategies for controlling or preventing the input of persistent toxic substances to the Great Lakes System shall be adopted in accordance with the following principles:
 - (i) The intent of programs specified in this Annex is to virtually eliminate the input of persistent toxic substances in order to protect human health and to ensure the continued health and productivity of living aquatic resources and human use thereof;
 - (ii) The philosophy adopted for control of inputs of persistent toxic substances shall be zero discharge; and
 - (iii) The reduction in the generation of contaminants, particularly persistent toxic substances, either through the reduction of the total volume or quantity of waste or through the reduction of the toxicity of waste, or both, shall, wherever possible, be encouraged.
 - (b) The Parties shall take all reasonable and practical measures to rehabilitate those portions of the Great Lakes System adversely affected by persistent toxic substances.

3. **Programs.** The Parties in cooperation with the State and Provincial Governments, shall develop and adopt the following programs and measures for the elimination of discharges of persistent toxic substances:
 - (a) Identification of raw materials, processes, products, by-products, waste sources and emissions involving persistent toxic substances, and quantitative data on the substances, together with recommendations on handling, use and disposition. Every effort shall be made to complete this inventory by January, 1982;
 - (b) Establishment of close coordination between air, water and solid waste programs in order to assess the total input of toxic substances to the great Lakes System and to define comprehensive, integrated controls;

- (c) Joint programs for disposal of hazardous materials to ensure that these materials such as pesticides, contaminated petroleum products, contaminated sludge and dredge spoils and industrial wastes are properly transported and disposed of. Every effort shall be made to implement these programs by 1980.

4. **Monitoring.** Monitoring and research programs in support of the Great Lakes International Surveillance Plan should be established at a level sufficient to identify:

- (a) Temporal and spatial trends in concentration of persistent toxic substances such as PCB, mirex, DDT, mercury and dieldrin, and of these substances known to be present in biota and sediment of the Great Lakes System;
- (b) The impact of persistent toxic substances on the health of humans and the quality and health of living aquatic systems;
- (c) The sources of input of persistent toxic substances; and
- (d) The presence of previously unidentified persistent toxic substances.

5. **Early Warning System.** An early warning system consisting of, but not restricted to, the following elements shall be established to anticipate future toxic substances problems:

- (a) Development and use of structure-activity correlations to predict environmental characteristics of chemicals;
- (b) Compilation and review of trends in the production, import, and use of chemicals;
- (c) Review of the results of environmental testing on new chemicals;
- (d) Toxicological research on chemicals, and review of research conducted in other countries;
- (e) Maintenance of a biological tissue bank and sediment to permit retroactive analysis to establish trends over time;
- (f) Monitoring to characterize the presence and significance of chemical residues in the environment;
- (g) Development and use of mathematical models to predict consequences of various loading rates of different chemicals;
- (h) Development of a data bank for storage of information on physical/chemical properties, toxicology, use and quantities in commerce of known and suspected persistent toxic substances;
- (i) Development of data necessary to evaluate the loadings of critical pollutants or other polluting substances identified in the boundary waters of the Great Lakes System; and

- (j) Further development and use of reproduction, physiological and biochemical measures in wildlife, fish and humans as health effects indicators and the establishment of a data base for storage, retrieval and interpretation of the data.
6. **Human Health.** The Parties shall establish action levels to protect human health *based on multimedia exposure and the interactive effects of toxic substances.*
7. **Research.** Research should be intensified to determine the pathways, fate and effects of toxic substances aimed at the protection of human health, fishery resources and wildlife of the Great Lakes Basin Ecosystem. In particular, research should be conducted to determine:
- (a) The significance of effects of persistent toxic substances on human health and aquatic life;
 - (b) Interactive effects of residues of toxic substances on aquatic life, wildlife, and human health; and
 - (c) Approaches to calculation of acceptable loading rates for persistent toxic substances, especially those which, in part, are naturally occurring.
8. **Reporting.** The Parties shall report, by December 31, 1988 and biennially thereafter, on the progress of programs and measures to reduce the generation of contaminants in accordance with the principle in sub-paragraph 2 (a) (iii) above.

ANNEX 13

POLLUTION FROM NON-POINT SOURCES

1. **Purpose.** This Annex further delineates programs and measures for the abatement and reduction on non-point sources of pollution from land-use activities. These include efforts to further reduce non-point source inputs of phosphorus, sediments, toxic substances and microbiological contaminants contained in drainage from urban and rural land, including waste disposal sites, in the Great Lakes System.
2. **Implementation.** The Parties, in conjunction with State and Provincial Governments, shall:
 - (a) identify land-based activities contribution to water quality problems described in Remedial Action Plans for Areas of Concern, or in Lakewide Management Plans including, but not limited to, phosphorus and Critical Pollutants; and
 - (b) develop and implement watershed management plans, consistent with the objectives and schedules for individual Remedial Action Plans or Lakewide Management Plans, on priority hydrologic units to reduce non-point source inputs. Such watershed plans shall include a description of priority areas, intergovernmental agreements, implementation schedules, and programs and other measures to fulfill the purpose of this Annex and the General and Specific Objectives of this Agreement. Such measures shall include provisions for regulation of non-point sources of pollution.
3. **Wetlands and their Preservation.** Significant wetland areas in the Great Lakes System that are threatened by urban and agricultural development and waste disposal activities should be identified, preserved and, where necessary, rehabilitated.
4. **Surveillance, Surveys and Demonstration Projects.** Programs and projects shall be implemented in order to determine:
 - (a) non-point source pollutants inputs to and outputs from rivers and shoreline areas sufficient to estimate loadings to the boundary waters of the Great Lakes System; and
 - (b) the extent of change in land-use and land management practices that significantly affect water quality for the purpose of tracking implementation of remedial measures and estimating associated changes in loadings to the Lakes.

Demonstration projects of remedial programs on pilot urban and rural watersheds shall be encouraged to advance knowledge and enhance information and education services, including extension services, where applicable.

5. The Parties shall report by December 31, 1988 and biennially thereafter, to the Commission on progress in developing specific watershed management plans and implementing programs and measures to control non-point sources of pollution.

ANNEX 14
CONTAMINATED SEDIMENT

1. **Objectives.** The Parties shall, in cooperation with State and Provincial Governments, identify the nature and extent of sediment pollution of the Great Lakes System. Based on these findings, they shall develop methods to evaluate both the impact of polluted sediments on the Great Lakes System, and the technological capabilities of programs to remedy such pollution. Information obtained through research and studies pursuant to this Annex shall be used to guide the development of Remedial Action Plans and Lakewide Management Plans pursuant to Annex 2, but shall not be used to forestall the implementation of remedial measures already under way. Dredging for the purpose of navigation is addressed in Annex 7.

2. **Research and Studies.**

(a) **General.** The Parties, in cooperation with State and Provincial Governments, shall exchange information relating to the mapping, assessment and management of contaminated sediments in the Great Lakes System.

(b) **Surveillance Programs.** The Parties, in cooperation with State and Provincial Governments shall:

(i) evaluate, on or before December 31, 1988 and biennially thereafter, existing methods for quantifying the transfer of contaminants and nutrients to and from bottom sediments for use in determining the impact of polluted sediments on the Great Lakes Basin Ecosystem;

(ii) review practices in both countries regarding the classification of contaminated sediments and establish compatible criteria for the classification of sediment quality;

(iii) develop common methods to quantify the transfer of contaminants and nutrients to and from bottom sediments. Such methods shall be used to determine the impact of polluted sediment of the Great Lakes System. As a first step, biological indicators shall be developed to determine accumulation rates in biota from polluted bottom sediments; and

(iv) develop a standard approach and agreed procedures for the management of contaminated sediments by December 31, 1988.

(c) **Technology Programs**

(i) The Parties shall, on or before December 31, 1988 and biennially thereafter, in cooperation with State and Provincial Governments, evaluate existing technologies for the management of contaminated sediments such as isolation, capping, in-place decontamination and removal of polluted bottom sediment.

(ii) The Parties, in cooperation with State and Provincial Governments shall design and implement demonstration projects for the management of

polluted bottom sediment at selected Areas of Concern identified pursuant to Annex 2. The design shall be based on the evaluation(s) made pursuant to sub-paragraph (i) above, the Parties shall meet by June 20, 1988 and jointly design a demonstration program and implementation schedule and report progress biennially thereafter.

3. **Long-Term Measures.** The Parties, in cooperation with State and Provincial Governments, shall also ensure that measures are adopted for the management of contaminated sediment respecting:

- (a) the construction and the long-term maintenance of disposal facilities; and
- (b) the use of contaminated sediment in the creation of land.

4. **Reporting.** The Parties shall report their progress in implementing this Annex to the Commission biennially, commencing with a report no later than December 31, 1988.

ANNEX 15
AIRBORNE TOXIC SUBSTANCES

1. **Purpose.** The Parties, in cooperation with State and Provincial Governments, shall conduct research, surveillance and monitoring and implement pollution control measures for the purpose of reducing atmospheric deposition of toxic substances, particularly persistent toxic substances, to the Great Lakes Basin Ecosystem.

2. **Research.** Research activities shall be conducted to determine pathways, fate and effects of such toxic substances for the protection of the Great Lakes System. In particular, research shall be conducted to:
 - (a) understand the processes of wet and dry deposition and those associated with the vapor exchange of toxic substances;

 - (b) understand the effects of persistent toxic substances, singly or in synergistic or additive combination with other substances, through aquatic exposure routes on the health of humans and the quality and health of aquatic life where a significant source of these substances is the atmosphere, in accordance with sub-paragraph 4(b) of Annex 12; and

 - (c) develop models of the intermediate and long-range movement and transformation of toxic substances to determine;
 - (i) the significance of atmospheric loadings to the Great Lakes System relative to other pathways; and

 - (ii) the sources of such substances from outside the Great Lakes System.

3. **Surveillance and Monitoring.** The Parties shall:
 - (a) establish, as part of the Great Lakes International Surveillance Plan (GLISP) instituted under Annex 11, an Integrated Atmospheric Deposition Network in accordance with paragraph 4 below;

 - (b) identify, by means of this Network, toxic substances and, in particular, persistent toxic substances, appearing on List No. 1 described in Annex 1, of those designated as Critical Pollutants pursuant to Annex 2 and their significant sources in accordance with sub-paragraph 4(c) of Annex 12, and to track their movements; and

 - (c) utilize this Network in order to:
 - (i) determine atmospheric loadings of toxic substances to the Great Lakes System by quantifying the total and net atmospheric input of these same contaminants, pursuant to sub-paragraph 3(a) of Annex 11;

 - (ii) define the temporal and spatial trends in the atmospheric deposition of such toxic substances in accordance with sub-paragraph 4(a) of Annex 12; and

- (iii) develop Remedial Action Plans and Lakewide Management Plans pursuant to Annex 2.

4. **Components of the Integrated Atmospheric Deposition Network.** The Parties shall confer on or before October 1, 1988, regarding;

- (a) the identity of the toxic substances to be monitored;
- (b) the number of monitoring and surveillance stations;
- (c) the locations of such stations;
- (d) the equipment at such stations;
- (e) quality control and quality assurance procedures; and
- (f) a schedule for the construction and commencement of the operation of the stations.

5. **Pollution Control Measures.**

- (a) The Parties, in cooperation with State and Provincial Governments, shall develop, adopt and implement measures for the control of the sources of emissions of toxic substances and the elimination of the sources of emissions of persistent toxic substances in cases where atmospheric deposition of these substances, singly or in synergistic or additive combination with other substances, significantly contributes to pollution of the Great Lakes System. Where such contributions arise from sources beyond the jurisdiction of the Parties, the Parties shall notify the responsible jurisdiction and the Commission of the problem and seek a suitable response.
- (b) The Parties shall also assess and encourage the development of pollution control technologies and alternative products to reduce the effect of airborne toxic substances on the Great Lakes System.

6. **Reporting.** The Parties shall report their progress in implementing this Annex to the Commission biennially, commencing with a report no later than December 31, 1988.

ANNEX 16

POLLUTION FROM CONTAMINATED GROUNDWATER

The Parties, in cooperation with State and Provincial Governments, shall coordinate existing program to control contaminated groundwater affecting the boundary waters of the Great Lakes System. For this purpose, the Parties shall;

- (i) identify existing and potential sources of contaminated groundwater affecting the Great Lakes;
- (ii) map hydrogeological conditions in the vicinity of existing and potential sources of contaminated groundwater;
- (iii) develop a standard approach and agreed procedures for sampling and analysis of contaminants in groundwater in order to: (1) assess and characterize the degree and extent of contamination; and (2) estimate the loadings of contaminants from groundwater to the Lakes to support the development of Remedial Action Plans and Lakewide Management Plans pursuant to Annex 2;
- (iv) control the sources of contamination of groundwater and the contaminated groundwater itself, when the problem has been identified; and
- (v) report progress on implementing this Annex to the Commission biennially, commencing with a report no later than December 31, 1988.

ANNEX 17

RESEARCH AND DEVELOPMENT

1. **Purpose.** This Annex delineates research need to support the achievement of the goals of this Agreement.
2. **Implementation.** The Parties, in cooperation with State and Provincial Governments, shall conduct research in order to:
 - (a) determine the mass transfer of pollutants between the Great Lakes Basin Ecosystem components of water, sediments, air, land and biota, and the processes controlling the transfer of pollutants across the interfaces between these components in accordance with Annexes 13, 14, 15 and 16;
 - (b) develop load reduction models for pollutants in the Great Lakes System in accordance with the research requirements of Annexes 2, 11, 12 and 13.
 - (c) determine the physical and transformational processes affecting the delivery of pollutants by tributaries to the Great Lakes in accordance with Annexes 2, 11, 12 and 13;

- (d) determine cause-effect inter-relations of productivity and ecotoxicity, and identify future research needs in accordance with Annexes 11, 12, 13 and 15;
- (e) determine the relationship of contaminated sediments on ecosystem health, in accordance with the research needs of Annexes 2, 12 and 14.
- (f) determine pollutant exchanges between the Areas of Concern and the open lakes including cause-effect inter-relationships among nutrients, productivity, sediments, pollutants, biota and ecosystem, health, and to develop in-situ chemical, physical and biological remedial options in accordance with Annexes 2, 12, 14 and sub-paragraph 1(f) of Annex 3.
- (g) determine the aquatic effects of varying lake levels in relation to pollution sources, particularly respecting the conservation of wetlands and the fate and effects of pollutants in the Great Lakes Basin Ecosystem in accordance with Annexes 2, 11, 12, 13, 15 and 16;
- (h) determine the ecotoxicity and toxicity effects of pollutants in the development of water quality objectives in accordance with Annex 1;
- (i) determine the impact of water quality and the introduction of non-native species on fish and wildlife populations and habitats in order to develop feasible options for their recover, restoration or enhancement in accordance with sub-paragraph 1(a) of Article IV and Annexes 1, 2, 11 and 12;
- (j) encourage the development of control technologies for treatment of municipal and industrial effluents, atmospheric emissions and the disposal of wastes, including wastes deposited in landfills;
- (k) develop action levels for contamination that incorporate multi-media exposures and the interactive effects of chemicals; and
- (l) develop approaches to population-based studies to determine the long-term, low-level effects of toxic substances on human health.

**TERMS OF REFERENCE
FOR THE JOINT INSTITUTIONS
AND THE
GREAT LAKES REGIONAL OFFICE**

1. Great Lakes Water Quality Board

- (a) This Board shall be the principal advisor to the International Joint Commission with regard to the exercise of all the function, powers, and responsibilities (other than those functions and responsibilities of the Science Advisory Board pursuant to paragraph 2 of these Terms of Reference) assigned to the Commission under this Agreement. In addition, the Board shall carry out such other functions, related to the water quality of the boundary waters of the Great Lakes System, as the Commission may request from time to time.
- (b) The Water Quality Board, at the direction of the Commission, shall:
 - (i) Make recommendations on the development and implementation of programs to achieve the purpose of this Agreement;
 - (ii) Assemble and evaluate information evolving from such programs;
 - (iii) Identify deficiencies in the scope and funding of such programs and evaluate the adequacy and compatibility of results;
 - (iv) Examine the appropriateness of such programs in light of present and future socio-economic imperatives; and
 - (v) Advise the Commission on the progress and effectiveness of such programs and submit appropriate recommendations.
- (c) The Water Quality Board, on behalf of the Commission, shall undertake liaison and coordination between the institutions established under this Agreement and other institutions and jurisdictions which may address concerns relevant to the Great Lakes Basin Ecosystem so as to ensure a comprehensive and coordinated approach to planning and to the resolution of problems, both current and anticipated.
- (d) The Water Quality Board shall report to the Commission periodically as appropriate, or as required by the Commission, on all aspects relating to the operation and effectiveness of this Agreement.

2. Great Lakes Science Advisory Board

- (a) This Board shall be the scientific advisor to the Commission and the Water Quality Board.
- (b) The Science Advisory Board shall be responsible for developing recommendations on all matters related to research and the development of scientific knowledge

pertinent to the identification, evaluation and resolution of current and anticipated problems related to Great Lakes water quality.

- (c) To effect these responsibilities the Science Advisory Board shall;
 - (i) Review scientific information in order to:
 - a. examine the impact and adequacy of research and the reliability of research results, and ensure the dissemination of such results;
 - b. identify additional research requirements;
 - c. identify specific research programs for which international cooperation is desirable; and
 - (ii) Advise jurisdictions of relevant research needs, solicit their involvement and promote coordination.
- (d) The Science Advisory Board shall seek analyses, assessments and recommendations from other scientific, professional, academic, governmental or intergovernmental relevant to Great Lakes Basin Ecosystem research.
- (e) The Science Advisory Board shall report to the Commission and the Water Quality Board periodically as appropriate, or as required by the Commission, on all matters of a scientific or research nature relating to the operation and effectiveness of this Agreement.

3. **The Great Lakes Regional Office**

- (a) This office, located in Windsor, Ontario, shall assist the Commission and the two Boards in the discharge of the functions specified in subparagraph (b) below.
- (b) The Office shall perform the following functions:
 - (i) Provide administrative support and technical assistance for the Water Quality Board and the Science Advisory Board and their sub-organizations, to assist the Boards in discharging effectively the responsibilities, duties and functions assigned to them.
 - (ii) Provide a public information service for the programs, including public hearings, undertaken by the Commission and its Boards.
- (c) The Office shall be headed by a Director who shall be appointed by the Commission in consultation with the Parties and with the Co-Chairmen of the Boards. The position of Director shall alternate between a Canadian citizen and a United States citizen. The term of the office for the Director shall be determined in the review referred to in subparagraph (d) below.

- (d) The Parties, mindful of the need to staff the Great Lakes Regional Office to carry out the functions assigned the Commission by this Agreement, shall, within six months from the date of entry into force of this Agreement, complete a review of the staffing of the Office. This review shall be conducted by the Parties based upon recommendations of the Commission after consultation with the Co-Chairmen of the Boards. Subsequent review may be requested by either Party, or recommended by the Commission, in order to ensure that the staffing of the Regional Office is maintained at a level and character commensurate with its assigned functions.
- (e) Consistent with the responsibilities assigned to the Commission, and under the general supervision of the Water Quality Board, the Director shall be responsible for the management of the Regional Office and its staff in carrying out the functions described herein.
- (f) The Co-Chairmen of the Boards, in consultation with the Director, will determine the activities which they wish the Office to carry out on behalf of, or in support of the Boards, within the current capability of the Office and its staff. The Director is responsible to the Co-Chairmen of each Board for activities carried out on behalf of, or in support of such Board, by the Office or individual staff members.
- (g) The Commission, in consultation with the Director, will determine the public information activities to be carried out on behalf of the Commission by the Regional Office.
- (h) The Director shall be responsible for preparing an annual budget to carry out the functions of the Boards and the Regional Office for submission jointly by the two Boards to the Commission for approval and procurement of resources.



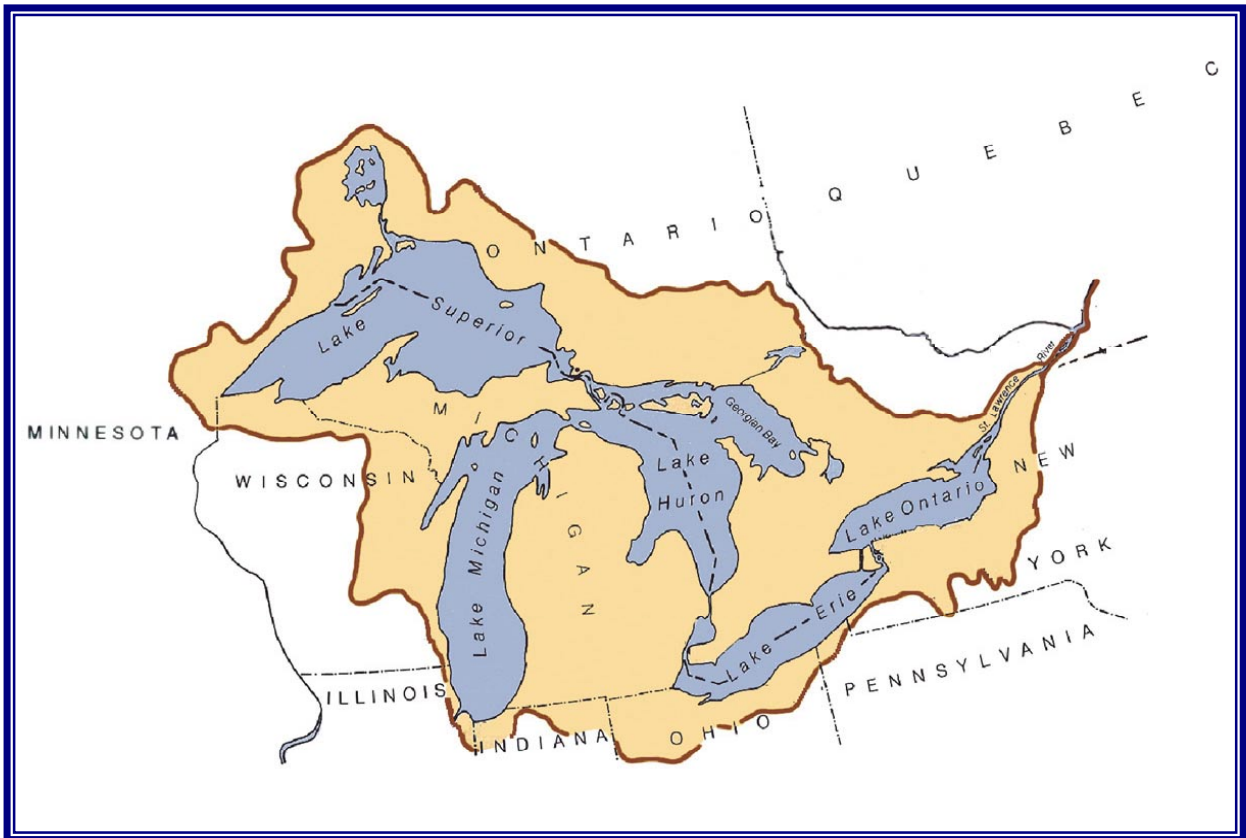
Great Lakes Charter



The Great Lakes Charter

Principles for the Management of Great Lakes Water Resources

February 11, 1985



La Charte des Grands Lacs

Principes de gestion des ressources en eau des Grands Lacs

11 février 1985

The Council of Great Lakes Governors is a non-profit, non-partisan partnership of Governors of the Great Lakes states—Illinois (George H. Ryan), Indiana (Frank O'Bannon), Michigan (John Engler), Minnesota (Jesse Ventura), New York (George E. Pataki), Ohio (Bob Taft), Pennsylvania (Tom Ridge), and Wisconsin (Scott McCallum). The Premiers of Ontario (Mike Harris) and Quebec (Bernard Landry) are associate members. Through the Council, the Governors collectively tackle the environmental and economic challenges facing the citizens of the region.

The Great Lakes Basin map is courtesy of the International Joint Commission.

Printed June 2001

THE GREAT LAKES CHARTER

PRINCIPLES FOR THE MANAGEMENT OF GREAT LAKES WATER RESOURCES

FINDINGS

THE GOVERNORS AND PREMIERS OF THE GREAT LAKES STATES AND PROVINCES JOINTLY FIND AND DECLARE THAT:

The water resources of the Great Lakes Basin are precious public natural resources, shared and held in trust by the Great Lakes States and Provinces.

The Great Lakes are valuable regional, national and international resources for which the federal governments of the United States and Canada and the International Joint Commission have, in partnership with the States and Provinces, and important, continuing an abiding role and responsibility.

The waters of the Great Lakes Basin are interconnected and part of a single hydrologic system. The multiple uses of these resources for municipal, industrial and agricultural water supply; mining; navigation; hydroelectric power and energy production; recreation; and the maintenance of fish and wildlife habitat and a balanced ecosystem are interdependent.

Studies conducted by the International Joint Commission, the Great Lakes States and Provinces, and other agencies have found that without careful and prudent management, the future development of diversions and consumptive uses of the water resources of the Great Lakes Basin may have significant adverse impacts on the environment, economy, and welfare of the Great Lakes region.

As trustees of the Basin's natural resources, the Great Lakes States and Provinces have a shared duty to protect, conserve, and manage the renewable but finite waters of the Great Lakes Basin for the use, benefit, and enjoyment of all their citizens, including generations yet to come. The most effective means of protecting, conserving, and managing the water resources of the Great Lakes is through the joint pursuit of unified and cooperative principles, policies and programs mutually agreed upon, enacted and adhered to by each and every Great Lakes State and Province.

Management of the water resources of the Basin is subject to the jurisdiction, rights and responsibilities of the signatory States and Provinces. Effective management of the water resources of the Great Lakes requires the exercise of such jurisdiction, rights, and responsibilities in the interest of all the people of the Great Lakes Region, acting in a continuing spirit of comity and mutual cooperation. The Great Lakes States and Provinces reaffirm the mutual rights and obligations of all Basin jurisdictions to use, conserve, and protect Basin water resources, as expressed in the Boundary Waters Treaty of 1909, the Great Lakes Water Quality Agreement of 1978, and the principles of other applicable international agreements.

PURPOSE

THE PURPOSES OF THIS CHARTER are to conserve the levels and flows of the Great Lakes and their tributary and connecting waters; to protect and conserve the environmental balance of the Great Lakes Basin ecosystem; to provide for cooperative programs and management of the water resources of the Great Lakes Basin by the signatory States and Provinces; to make secure and protect present

developments within the region; and to provide a secure foundation for future investment and development within the region.

PRINCIPLES FOR THE MANAGEMENT OF GREAT LAKES WATER RESOURCES

IN ORDER TO ACHIEVE THE PURPOSES OF THIS CHARTER, THE GOVERNORS AND PREMIERS OF THE GREAT LAKES STATES AND PROVINCES AGREE TO THE FOLLOWING PRINCIPLES:

Principle I Integrity of the Great Lakes Basin

The planning and management of the water resources of the Great Lakes Basin should recognize and be founded upon the integrity of the natural resources and ecosystem of the Great Lakes Basin. The water resources of the Basin transcend political boundaries within the Basin, and should be recognized and treated as a single hydrologic system. In managing Great Lakes Basin waters, the natural resources and ecosystem of the Basin should be considered as a unified whole.

Principle II Cooperation Among Jurisdictions

The signatory States and Provinces recognize and commit to a spirit of cooperation among local, state, and provincial agencies, the federal governments of Canada and the United States, and the International Joint Commission in the study, monitoring, planning, and conservation of the water resources of the Great Lakes Basin.

Principle III Protection of the Water Resources of the Great Lakes

The signatory States and Provinces agree that new or increased diversions and consumptive uses of Great Lakes Basin water resources are of serious concern. In recognition of their shared responsibility to conserve and protect the water resources of the Great Lakes Basin for the use, benefit, and enjoyment of all their citizens, the States and Provinces agree to seek (where necessary) and to implement legislation establishing programs to manage and regulate the diversion and consumptive use of Basin water resources. It is the intent of the signatory States and Provinces that diversions of Basin water resources will not be allowed if individually or cumulatively they would have any significant adverse impacts on lake levels, in-basin uses, and the Great Lakes Ecosystem.

Principle IV Prior Notice and Consultation

It is the intent of the signatory States and Provinces that no Great Lakes State or Province will approve or permit any major new or increased diversion or consumptive use of the water resources of the Great Lakes Basin without notifying and consulting with and seeking the consent and concurrence of all affected Great Lakes States and Provinces.

Principle V Cooperative Programs and Practices

The Governors and Premiers of the Great Lakes States and Provinces commit to pursue the development and maintenance of a common base of data and information regarding the use and management of the Basin water resources, to the establishment of a systematic arrangements for the exchange of water data and information, to the creation of a Water Resources Management Committee, to the development of a Great Lakes Water Resources Management Program, and to additional and concerted and coordinated research efforts to provide improved information for future water planning and management decisions.

IMPLEMENTATION OF PRINCIPLES

Common Base of Data

THE GREAT LAKES STATES AND PROVINCES WILL PURSUE THE DEVELOPMENT AND MAINTENANCE OF A COMMON BASE OF DATA AND INFORMATION regarding the use and management of Basin water resources and the establishment of systematic arrangements for the exchange of water data and information. The common base of data will include the following:

1. Each State and Province will collect and maintain, in comparable form, data regarding the location, type, and quantities of water use, diversion, and consumptive use, and information regarding projections of current and future needs.
2. In order to provide accurate information as a basis for future water resources planning and management, each State and Province will establish and maintain a system for the collection of data on major water uses, diversions, and consumptive uses in the Basin. The States and Provinces, in cooperation with the Federal Governments of Canada and the United States and the International Joint Commission, will seek appropriate vehicles and institutions to assure responsibility for coordinated collation, analysis, and dissemination of data and information.
3. The Great Lakes States and Provinces will exchange on a regular basis plans, data, and other information on water use, conservation, and development, and will consult with each other in the development of programs and plans to carry out these provisions.

Water Resources Management Committee

A WATER RESOURCES MANAGEMENT COMMITTEE WILL BE FORMED, COMPOSED OF REPRESENTATIVES APPOINTED BY THE GOVERNORS AND PREMIERS OF EACH OF THE GREAT LAKES STATES AND PROVINCES. Appropriate agencies of the federal governments, the International Joint Commission, and other interested and expert organizations will be invited to participate in discussions of the Committee.

The Committee will be charged with responsibility to identify specific common water data needs; to develop and design a system for the collection and exchange of comparable water resources management data; to recommend institutional arrangements to facilitate the exchange and maintenance of such information; and to develop procedures to implement the prior notice and consultation process established in this Charter. The Committee will report its findings to the Governors and Premiers of the Great Lakes States and Provinces within 15 months of the appointment of the Committee.

Consultation Procedures

THE PRINCIPLE OF PRIOR NOTICE AND CONSULTATION WILL APPLY TO ANY NEW OR INCREASED DIVERSION OR CONSUMPTIVE USE OF THE WATER RESOURCES OF THE GREAT LAKES BASIN which exceeds 5,000,000 gallons (19 million litres) per day average in any 30-day period.

The consultation process will include the following procedures:

1. The State or Province with responsibility for issuing the approval or permit, after receiving an application for such diversion or consumptive use, will notify the Offices of the Governors and Premiers of the respective Great Lakes States and Provinces, the appropriate water management agencies of the Great Lakes States and Provinces and, where appropriate, the International Joint Commission.
2. The permitting State or Province will solicit and carefully consider the comments and concerns of the other Great Lakes States and Provinces, and where applicable the International Joint Commission, prior to rendering a decision on an application.
3. Any State or Province which believes itself to be affected may file a written objection to the proposed diversion or consumptive use. Notice of such objection stating the reasons therefore will be given to the permitting State or Province and all other Great Lakes States and Provinces.
4. In the event of an objection to a proposed diversion or consumptive use, the permitting State or Province will convene a consultation process of the affected Great Lakes States and Provinces to investigate and consider the issues involved, and to seek and provide mutually agreeable recommendations to the permitting State or Province.
5. The permitting State or Province will carefully consider the concerns and objections expressed by other Great Lakes States and Provinces, and the recommendations of any consultation process convened under this Charter.
6. The permitting State or Province will have lead responsibility for resolution of water management permit issues. The permitting State or Province will notify each affected Great Lakes State or Province of its final decision to issue, issue with conditions, or deny a permit.

The prior notice and consultation process will be formally initiated following the development of procedures by the Water Resources Management Committee and approval of those procedures by the Governors and Premiers. During the interim period prior to approval of formal procedures, any State or Province may voluntarily undertake the notice and consultation procedure as it deems appropriate.

Basin Water Resources Management Program

IN ORDER TO GUIDE THE FUTURE DEVELOPMENT, MANAGEMENT, AND CONSERVATION OF THE WATER RESOURCES OF THE GREAT LAKES BASIN, THE SIGNATORY STATES AND PROVINCES COMMIT TO THE DEVELOPMENT OF A COOPERATIVE WATER RESOURCES MANAGEMENT PROGRAM FOR THE GREAT LAKES BASIN.

Such a program should include consideration of the following elements:

1. An inventory of the Basin's surface and groundwater resources;

2. An identification and assessment of existing and future demands for diversions, into as well as out of the Basin, withdrawals, and consumptive uses for municipal, domestic, agricultural, manufacturing, mining, navigation, power production, recreation, fish and wildlife, and other uses and ecological considerations;
3. The development of cooperative policies and practices to minimize the consumptive use of the Basin's water resources; and
4. Recommended policies to guide the coordinated conservation, development, protection, use, and management of the water resources of the Great Lakes Basin.

Research Program

THE GREAT LAKES STATES AND PROVINCES RECOGNIZE THE NEED FOR AND SUPPORT ADDITIONAL RESEARCH in the area of flows and lake levels required to protect fisheries and wildlife, a balanced aquatic environment, navigation, important recreational uses, and the assimilative capacity of the Great Lakes system. Through appropriate state, provincial, federal and international agencies and other institutions, the Great Lakes States and Provinces will encourage coordinated and concerted research efforts in these areas, in order to provide improved information for future water planning and management decisions.

PROGRESS TOWARD IMPLEMENTATION

THE GOVERNORS AND PREMIERS OF THE GREAT LAKES STATES AND PROVINCES COMMIT TO THE COORDINATED IMPLEMENTATION OF THIS CHARTER. To this end, the Governors and Premiers shall, no less than once per year, review progress toward implementation of this Charter and advise one another on actions taken to carry out the principles of the Charter together with recommendations for further action or improvements to the management of the Great Lakes Basin water resources.

The signatory States and Provinces consider each of the principles and implementing provisions of this Charter to be material and interdependent. The rights of each State and Province under this Charter are mutually dependent upon the good faith performance by each State and Province of its commitments and obligations under the Charter.

The following sequence will be adhered to by the Great Lakes States and Provinces in implementing the provisions of this Charter:

1. The Water Resources Management Committee will be appointed by the Governors and Premiers within 60 days of the effective date of this Charter and will submit its recommendations to the Governors and Premiers of the Great Lakes States and Provinces within 15 months of the appointment of the Committee.
2. Upon the signing of the Charter, and concurrent with the activities of the Water Resources Management Committee, the Great Lakes States and Provinces will commence collecting and assembling existing Great Lakes water use data and information. The water use data collected and assembled by the States and Provinces will include, but not be limited to, the data and information specified under the "Common Base of Data" provisions of the Charter.

Copies of the data and information collected and assembled by the States and Provinces will be submitted to the Water Resources Management Committee. The Great Lakes States and Provinces will pursue: the collection of data and information on the use and management of Basin water resources; the establishment of systematic arrangements for the exchange of water data and information on a continuing basis as enabled by existing state and provincial data

collection and regulatory programs; and where necessary, the enactment of water withdrawal registration and diversion and consumptive use management and regulatory programs pursuant to the provisions of the Charter.

3. To assist in the ongoing collection of Great Lakes water use data and information, and in the development of the Basin Water Resources Management Program, States and Provinces will pursue the enactment of legislation where it is needed for the purpose of gathering accurate and comparable information on any new or increased withdrawal of Great Lakes Basin water resources in excess of 100,000 gallons (380,000 litres) per day average in any 30-day period.
4. The prior notice and consultation process will be formally initiated following the development of procedures by the Water Resources Management Committee and approval of those procedures by the Governors and Premiers. Any State or Province may voluntarily undertake additional notice and consultation procedures as it deems appropriate. However, the right of any individual State or Province to participate in the prior notice and consultation process, either before or after approval of formal procedures by the Governors and Premiers, is contingent upon its ability to provide accurate and comparable information on water withdrawals in excess of 100,000 gallons (380,000 litres) per day average in any 30-day period and its authority to manage and regulate water withdrawals involving a total diversion or consumptive use of Great Lakes Basin water resources in excess of 2,000,000 gallons (7,600,000 litres) per day average in any 30-day period.
5. Development of the Basin Water Resources Management Program will commence upon receipt and formal approval by the Great Lakes Governors and Premiers of the recommendations of the Water Resources Management Committee.

RESERVATION OF RIGHTS

THE GREAT LAKES STATES AND PROVINCES MUTUALLY RECOGNIZE THE RIGHTS AND STANDING OF ALL GREAT LAKES STATES AND PROVINCES TO represent and protect the rights and interests of their respective jurisdictions and citizens in the shared water and other natural resources of the Great Lakes region.

Each Great Lakes State and Province reserves and retains all rights and authority to seek, in any state, provincial, federal, or other appropriate court or forum, adjudication or protection of its rights in and to Basin water resources, in such manner as may now or hereafter be provided by law.

In entering into this Charter, no Great Lakes State or Province shall be deemed to imply its consent to any diversion or consumptive use of Great Lakes Basin water resources now or in the future.

DEFINITIONS

FOR PURPOSES OF THIS CHARTER:

Withdrawal means the removal or taking of water from surface or groundwater.

Consumptive use means that portion of water withdrawn or withheld from the Great Lakes Basin and assumed to be lost or otherwise not returned to the Great Lakes Basin due to evaporation, incorporation into products, or other processes.

Diversion means a transfer of water from the Great Lakes Basin into another watershed, or from the watershed of one of the Great Lakes into that of another.

Interbasin diversion means a transfer of water from the Great Lakes Basin into another watershed.

Great Lakes Basin means the watershed of the Great Lakes and the St. Lawrence River upstream from Trois Rivieres, Quebec.

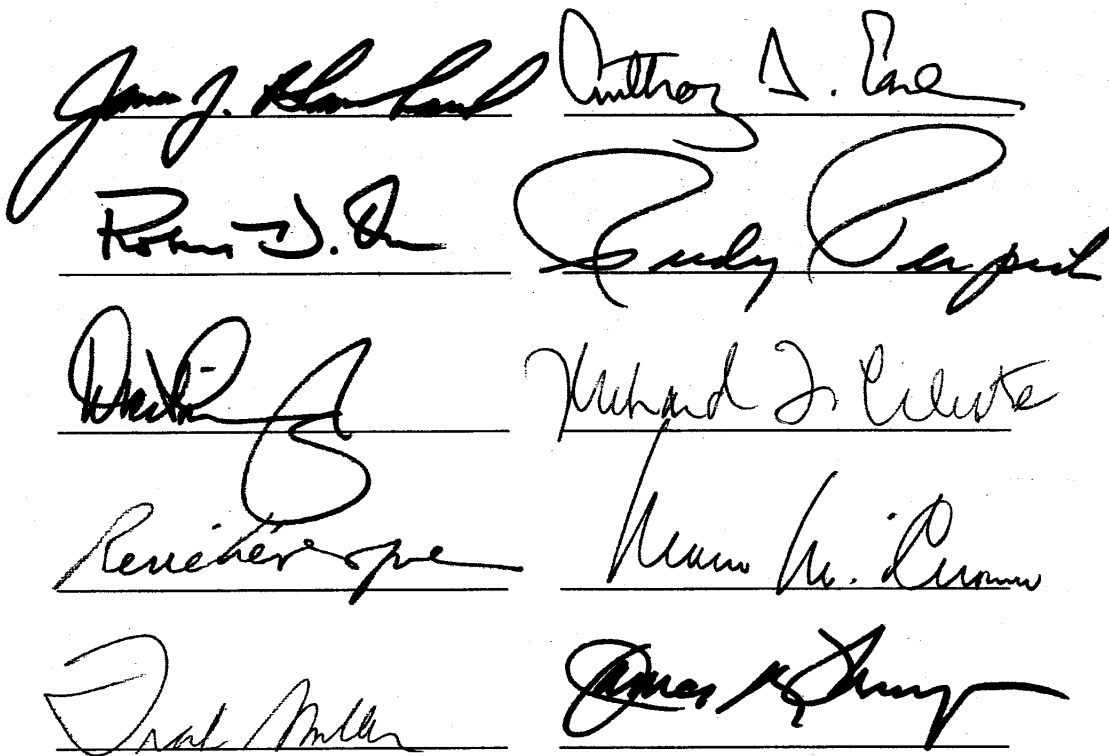
Great Lakes Basin water resources means the Great Lakes and all streams, rivers, lakes, connecting channels, and other bodies of water, including tributary groundwater, within the Great Lakes Basin.

Great Lakes Basin Ecosystem means the interacting components of air, land, water, and living organisms, including humankind, within the Great Lakes Basin.

Great Lakes States and Provinces means the States of Illinois, Indiana, Michigan, Minnesota, New York, Ohio, and Wisconsin, the Commonwealth of Pennsylvania, and the Provinces of Ontario and Quebec.

Great Lakes Region means the geographic region comprised of the Great Lakes States and Provinces.

Signed and entered into the 11th of February 1985.



James J. Blanchard, Governor of Michigan
Robert D. Orr, Governor of Indiana
Dick Thornburgh, Governor of Pennsylvania
René Lévesque, Premier of Quebec
Frank Miller, Premier of Ontario

Anthony S. Earl, Governor of Wisconsin
Rudy Perpich, Governor of Minnesota
Richard F. Celeste, Governor of Ohio
Mario M. Cuomo, Governor of New York
James R. Thompson, Governor of Illinois

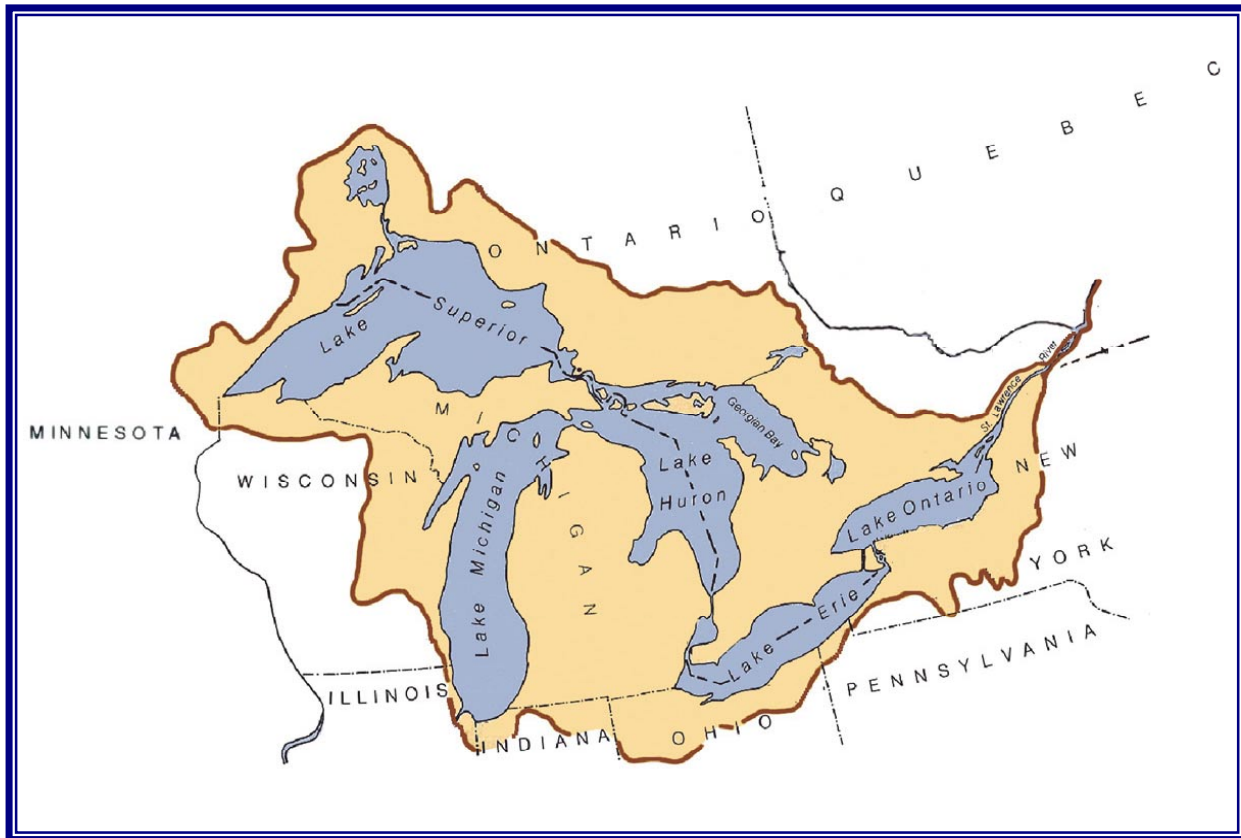


Great Lakes Charter Annex

The Great Lakes Charter Annex

A Supplementary Agreement to The Great Lakes Charter

June 18, 2001



Annexe à la Charte des Grands Lacs

Entente additionnelle à la Charte des Grands Lacs

18 juin 2001

The Council of Great Lakes Governors is a non-profit, non-partisan partnership of Governors of the Great Lakes states—Illinois (George H. Ryan), Indiana (Frank O'Bannon), Michigan (John Engler), Minnesota (Jesse Ventura), New York (George E. Pataki), Ohio (Bob Taft), Pennsylvania (Tom Ridge), and Wisconsin (Scott McCallum). The Premiers of Ontario (Mike Harris) and Quebec (Bernard Landry) are associate members. Through the Council, the Governors collectively tackle the environmental and economic challenges facing the citizens of the region.

The Great Lakes Basin map is courtesy of the International Joint Commission.

Printed June 2001

THE GREAT LAKES CHARTER ANNEX

A SUPPLEMENTARY AGREEMENT TO THE GREAT LAKES CHARTER

June 18, 2001

FINDINGS

The Great Lakes are a bi-national public treasure and are held in trust by the Great Lakes States and Provinces. For the last sixteen years, the Great Lakes Governors and Premiers have followed a set of principles to guide them in developing, maintaining, and strengthening the regional management regime for the Great Lakes ecosystem. Protecting, conserving, restoring, and improving the Great Lakes is the foundation for the legal standard upon which decisions concerning water resource management should be based.

There has been significant progress in restoring and improving the health of the ecosystem of the Great Lakes Basin. However, the Waters and Water-Dependent Natural Resources of the Basin remain at risk of damage from pollution, environmental disruptions, and unsustainable water resource management practices which may individually and cumulatively alter the hydrology of the Great Lakes ecosystem.

PURPOSE

In agreeing to this Annex, the Great Lakes Governors and Premiers reaffirm their commitment to the five broad principles set forth in the Great Lakes Charter, and further reaffirm that the provisions of the Charter will continue in full force and effect. The Governors and Premiers commit to further implementing the principles of the Charter by developing an enhanced water management system that is simple, durable, efficient, retains and respects authority within the Basin, and, most importantly, protects, conserves, restores, and improves the Waters and Water-Dependent Natural Resources of the Great Lakes Basin.

State and Provincial authorities should be permanent, enforceable, and consistent with their respective applicable state, provincial, federal, and international laws and treaties. To that end, and in order to adequately protect the water resources of the Great Lakes and the Great Lakes ecosystem, the Governors and Premiers commit to develop and implement a new common, resource-based conservation standard and apply it to new water withdrawal proposals from the Waters of the Great Lakes Basin. The standard will also address proposed increases to existing water withdrawals and existing water withdrawal capacity from the Waters of the Great Lakes Basin.

DIRECTIVES

The Governors and Premiers put forward the following DIRECTIVES to further the principles of the Charter.

DIRECTIVE #1

Develop a new set of binding agreement(s).

The Governors and Premiers agree to immediately prepare a Basin-wide binding agreement(s), such as an interstate compact and such other agreements, protocols or other arrangements between the States and Provinces as may be necessary to create the binding agreement(s) within three years of the effective date of the Annex. The purpose of the agreement(s) will be to further the Governors' and Premiers' objective to protect, conserve, restore, improve, and manage use of the Waters and Water-Dependent Natural Resources of the Great Lakes Basin. The agreement(s) will retain authority over the management of the Waters of the Great Lakes Basin and enhance and build upon the existing structure and collective management efforts of the various governmental organizations within the Great Lakes Basin.

DIRECTIVE #2

Develop a broad-based public participation program.

The Governors and Premiers commit to continue a process that ensures ongoing public input in the preparation and implementation of the binding agreement(s) called for in this Annex. Included in this process will be periodic progress reports to the public.

DIRECTIVE #3

Establish a new decision making standard.

The new set of binding agreement(s) will establish a decision making standard that the States and Provinces will utilize to review new proposals to withdraw water from the Great Lakes Basin as well as proposals to increase existing water withdrawals or existing water withdrawal capacity.

The new standard shall be based upon the following principles:

- Preventing or minimizing Basin water loss through return flow and implementation of environmentally sound and economically feasible water conservation measures; and
- No significant adverse individual or cumulative impacts to the quantity or quality of the Waters and Water-Dependent Natural Resources of the Great Lakes Basin; and
- An Improvement to the Waters and Water-Dependent Natural Resources of the Great Lakes Basin; and
- Compliance with the applicable state, provincial, federal, and international laws and treaties.

DIRECTIVE #4

Project review under the Water Resources Development Act of 1986, §1109, 42 U.S.C. §1962d-20 (1986) (amended 2000).

Pending finalization of the agreement(s) as outlined in Directive #1, the Governors of the Great Lakes States will notify and consult with the Premiers of Ontario and Quebec on all proposals subject to the U.S. Water Resources Development Act of 1986, §1109, 42 U.S.C. §1962d-20 (1986) (amended 2000) (WRDA), utilizing the prior notice and consultation process established in the Charter. In doing so, the Governors and

Premiers recognize that the Canadian Provinces are not subject to, or bound by, the WRDA, nor are the Governors statutorily bound by comments from the Premiers on projects subject to the WRDA.

DIRECTIVE #5

Develop a decision support system that ensures the best available information.

The Governors and Premiers call for the design of an information gathering system to be developed by the States and Provinces, with support from appropriate federal government agencies, to implement the Charter, this Annex, and any new agreement(s). This design will include an assessment of available information and existing systems, a complete update of data on existing water uses, an identification of needs, provisions for a better understanding of the role of groundwater, and a plan to implement the ongoing support system.

DIRECTIVE #6

Further commitments.

The Governors and Premiers of the Great Lakes States and Provinces further commit to coordinate the implementation and monitoring of the Charter and this Annex; seek and implement, where necessary, legislation establishing programs to manage and regulate new or increased withdrawals of Waters of the Great Lakes Basin; conduct a planning process for protecting, conserving, restoring, and improving the Waters and Water-Dependent Natural Resources of the Great Lakes Basin; and identify and implement effective mechanisms for decision making and dispute resolution. The Governors and Premiers also commit to develop guidelines regarding the implementation of mutually agreed upon measures to promote the efficient use and conservation of the Waters of the Great Lakes Basin within their jurisdictions and develop a mechanism by which individual and cumulative impacts of water withdrawals will be assessed. Further, the Governors and Premiers commit to improve the sources and applications of scientific information regarding the Waters of the Great Lakes Basin and the impacts of the withdrawals from various locations and water sources on the ecosystem, and better understand the role of groundwater in the Great Lakes Basin by coordinating their data gathering and analysis efforts. Finally, the Governors and Premiers commit to develop in the new binding agreement(s) the water withdrawal rates at which regional evaluations are conducted and criteria to assist in further defining acceptable measures of Improvement to the Waters and Water-Dependent Natural Resources of the Great Lakes Basin.

FINAL PROVISIONS

This Annex shall come into force on the day that all signatures are executed. The Parties have signed the present agreement in duplicate, in English and French, both texts being equally authentic.

DEFINITIONS

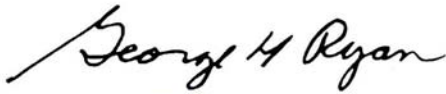
Waters of the Great Lakes Basin (also termed in the Great Lakes Charter as “Water Resources of the Great Lakes Basin”) means the Great Lakes and all streams, rivers, lakes, connecting channels, and other bodies of water, including tributary groundwater, within the Great Lakes Basin.

Water-Dependent Natural Resources means the interacting components of land, water, and living organisms affected by the Waters of the Great Lakes Basin.

Improvement to the Waters and Water-Dependent Natural Resources of the Great Lakes Basin means additional beneficial, restorative effects to the physical, chemical, and biological integrity of the Waters

and Water-Dependent Natural Resources of the Basin, resulting from associated conservation measures, enhancement or restoration measures which include, but are not limited to, such practices as mitigating adverse effects of existing water withdrawals, restoring environmentally sensitive areas or implementing conservation measures in areas or facilities that are not part of the specific proposal undertaken by or on behalf of the withdrawer.

Signed and entered into the 18th day of June 2001.




George H. Ryan
Governor of Illinois



Frank O'Bannon
Governor of Indiana



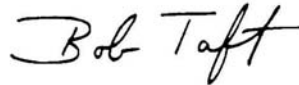
John Engler
Governor of Michigan



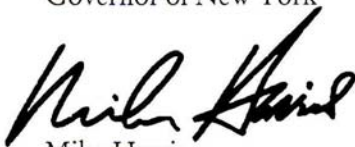
Jesse Ventura
Governor of Minnesota



George E. Pataki
Governor of New York



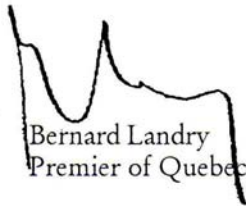
Bob Taft
Governor of Ohio



Mike Harris
Premier of Ontario



Tom Ridge
Governor of Pennsylvania



Bernard Landry
Premier of Quebec



Scott McCallum
Governor of Wisconsin



**Great Lakes—St. Lawrence River
Basin Water Resources Compact**

DECEMBER 13, 2005

**GREAT LAKES—ST. LAWRENCE RIVER BASIN SUSTAINABLE WATER
RESOURCES AGREEMENT**

The State of Illinois,

The State of Indiana,

The State of Michigan,

The State of Minnesota,

The State of New York,

The State of Ohio,

The Province of Ontario,

The Commonwealth of Pennsylvania,

The Government of Québec,

The State of Wisconsin,

Recognizing that,

The Waters of the Basin are a shared public treasure and the States and Provinces as stewards have a shared duty to protect, conserve and manage these renewable but finite Waters;

These Waters are interconnected and form a single hydrologic system;

Protecting, conserving, restoring, and improving these Waters is the foundation of Water resource management in the Basin and essential to maintaining the integrity of the Basin Ecosystem;

Managing to conserve and restore these Waters will improve them as well as the Water Dependent Natural Resources of the Basin;

Continued sustainable, accessible and adequate Water supplies for the people and economy of the Basin are of vital importance;

The States and Provinces must balance economic development, social development and environmental protection as interdependent and mutually reinforcing pillars of sustainable development;

Even though there has been significant progress in restoring and improving the health of the Basin Ecosystem, the Waters and Water Dependent Natural Resources of the Basin remain at risk;

In light of possible variations in climate conditions and the potential cumulative effects of demands that may be placed on the Waters of the Basin, the States and Provinces must act to ensure the protection and conservation of the Waters and Water Dependent Natural Resources of the Basin for future generations;

Where there are threats of serious or irreversible damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation;

Sustainable development and harmony with nature and among neighbours require cooperative arrangements for the development and implementation of watershed protection approaches in the Basin;

Reaffirming,

The principles and findings of the Great Lakes Charter and the commitments and directives of the Great Lakes Charter Annex 2001;

Acknowledging,

Nothing in this Agreement is intended to abrogate or derogate from the protection provided for the existing aboriginal or treaty rights of aboriginal peoples in Ontario and Québec as recognized and affirmed by section 35 of the Constitution Act, 1982 or from the treaty rights or rights held by any Tribe recognized by the federal government of the United States based upon its status as a Tribe recognized by the federal government of the United States, and acknowledging the commitment of these peoples to preserve and protect the waters of the Basin;

The continuing and abiding roles of the United States and Canadian federal governments under the Boundary Waters Treaty of 1909 and other applicable international agreements, that continue unaffected by this agreement, and the valuable contribution of the International Joint Commission;

Effective management is dependent upon all Parties acting in a continuing spirit of comity and mutual cooperation;

Agree as follows:

**CHAPTER 1
GENERAL PROVISIONS**

**ARTICLE 100
OBJECTIVES**

1. The objectives of this Agreement are:
 - a. To act together to protect, conserve and restore the Waters of the Great Lakes— St. Lawrence River Basin because current lack of scientific certainty should not be used as a reason for postponing measures to protect the Basin Ecosystem;
 - b. To facilitate collaborative approaches to Water management across the Basin to protect, conserve, restore, improve and efficiently and effectively manage the Waters and Water Dependent Natural Resources of the Basin;
 - c. To promote co-operation among the Parties by providing common and regional mechanisms to evaluate Proposals to Withdraw Water;
 - d. To create a co-operative arrangement regarding Water management that provides tools for shared future challenges;
 - e. To retain State and Provincial authority within the Basin under appropriate arrangements for intergovernmental cooperation and consultation;
 - f. To facilitate the exchange of data, strengthen the scientific information upon which decisions are made, and engage in consultation on the potential effects of Withdrawals and losses on the Waters and Water Dependent Natural Resources of the Basin;
 - g. To prevent significant adverse impacts of Withdrawals and losses on the Basin Ecosystem and its watersheds; and,
 - h. To promote an Adaptive Management approach to the conservation and management of Basin Water resources, which recognizes, considers and provides adjustments for the uncertainties in, and evolution of, scientific knowledge concerning the Basin's Waters and Water Dependent Natural Resources.
2. The Parties shall interpret and apply the provisions of this Agreement to achieve these objectives.

**ARTICLE 101
SCOPE OF APPLICATION**

This Agreement applies to the Waters of the Basin within the Parties' territorial boundaries.

**ARTICLE 102
GENERAL COMMITMENT**

Each Party to this Agreement shall seek to adopt and implement Measures that may be required to give effect to the commitments embodied within this Agreement.

ARTICLE 103
GENERAL DEFINITIONS

In this Agreement,

“Adaptive Management” means a Water resources management system that provides a systematic process for evaluating, monitoring and learning from the outcomes of operational programs and adjustment of policies, plans and programs based on experience and the evolution of scientific knowledge concerning Water resources and Water Dependent Natural Resources.

“Agreement” means this Agreement.

“Applicant” means a Person who is required to submit a Proposal that is subject to management and regulation under this Agreement. **“Application”** has a corresponding meaning.

“Basin” or **“Great Lakes—St. Lawrence River Basin”** means the watershed of the Great Lakes and the St. Lawrence River upstream from Trois-Rivières, Québec within the jurisdiction of the Parties.

“Basin Ecosystem” or **“Great Lakes—St. Lawrence River Basin Ecosystem”** means the interacting components of air, land, Water and living organisms, including humankind, within the Basin.

“Community within a Straddling County” means any incorporated city, town or the equivalent thereof, that is located outside the Basin but wholly within a County that lies partly within the Basin and that is not a Straddling Community.

“Compact” means the Great Lakes—St. Lawrence River Basin Water Resources Compact.

“Consumptive Use” means that portion of Water Withdrawn or withheld from the Basin that is lost or otherwise not returned to the Basin due to evaporation, incorporation into Products, or other processes.

“County” means the largest territorial division for local government in a State. In Québec, County means a regional county municipality (municipalité régionale de comté - MRC). The County boundaries shall be defined as those boundaries that exist as of the signing date of this Agreement.

“Cumulative Impacts” mean the impact on the Great Lakes—St. Lawrence River Basin Ecosystem that results from incremental effects of all aspects of a Withdrawal, Diversion or Consumptive Use in addition to other past, present, and reasonably foreseeable future Withdrawals, Diversions and Consumptive Uses regardless of who undertakes the other Withdrawals, Diversions and Consumptive Uses. Cumulative Impacts can result from

individually minor but collectively significant Withdrawals, Diversions and Consumptive Uses taking place over a period of time.

“Diversión” means a transfer of Water from the Basin into another watershed, or from the watershed of one of the Great Lakes into that of another by any means of transfer, including but not limited to a pipeline, canal, tunnel, aqueduct, channel, modification of the direction of a watercourse, a tanker ship, tanker truck or rail tanker but does not apply to Water that is used in the Basin or Great Lakes watershed to manufacture or produce a Product that is then transferred out of the Basin or watershed. **“Divert”** has a corresponding meaning.

“Environmentally Sound and Economically Feasible Water Conservation Measures” mean those measures, methods, technologies or practices for efficient water use and for reduction of water loss and waste or for reducing a Withdrawal, Consumptive Use or Diversion that i) are environmentally sound, ii) reflect best practices applicable to the water use sector, iii) are technically feasible and available, iv) are economically feasible and cost effective based on an analysis that considers direct and avoided economic and environmental costs and v) consider the particular facilities and processes involved, taking into account the environmental impact, age of equipment and facilities involved, the processes employed, energy impacts and other appropriate factors.

“Exception” means a transfer of Water that is excepted under Article 201 from the prohibition against Diversions.

“Exception Standard” means the standard to be used for Exceptions that is established under Article 201.

“Intra-Basin Transfer” means the transfer of Water from the watershed of one of the Great Lakes into the watershed of another Great Lake.

“Measures” means any legislation, law, regulation, directive, requirement, guideline, program, policy, administrative practice or other procedure.

“New or Increased Diversion” means a new Diversion, an increase in an existing Diversion, or the alteration of an existing Withdrawal so that it becomes a Diversion.

“New or Increased Withdrawal or Consumptive Use” means a new Withdrawal or Consumptive Use or an increase in an existing Withdrawal or Consumptive Use.

“Originating Party” means the Party within whose jurisdiction an Application is made.

“Party” means a State or Province that enters into this Agreement.

“Person” means a human being or a legal person, including a government or a non-governmental organization, including any scientific, professional, business, non-profit, or

public interest organization or association that is neither affiliated with, nor under the direction of a government.

“Product” means something produced in the Basin by human or mechanical effort or through agricultural processes and used in manufacturing, commercial or other processes or intended for intermediate or end use consumers. (i) Water used as part of the packaging of a Product shall be considered to be part of the Product. (ii) Other than Water used as part of the packaging of a Product, Water that is used primarily to transport materials in or out of the Basin is not a Product or part of a Product. (iii) Except as provided in (i) above, Water which is transferred as part of a public or private supply is not a Product or part of a Product. (iv) Water in its natural state such as in lakes, rivers, reservoirs, aquifers or water basins is not a Product.

“Proposal” means a Withdrawal, Diversion or Consumptive Use of Water that is subject to this Agreement.

“Province” means Ontario or Québec.

“Public Water Supply Purposes” means water distributed to the public through a physically connected system of treatment, storage and distribution facilities serving a group of largely residential customers that may also serve industrial, commercial, and other institutional operators. Water Withdrawn directly from the Basin and not through such a system shall not be considered to be used for Public Water Supply Purposes.

“Regional Body” means the Great Lakes—St. Lawrence River Water Resources Regional Body established by this Agreement.

“Regional Review” means the collective review by all Parties in accordance with this Agreement.

“Source Watershed” means the watershed from which a Withdrawal originates. If Water is Withdrawn directly from a Great Lake or from the St. Lawrence River, then the Source Watershed shall be considered to be the watershed of that Great Lake or the watershed of the St. Lawrence River, respectively. If Water is Withdrawn from the watershed of a stream that is a direct tributary to a Great Lake or a direct tributary to the St. Lawrence River, then the Source Watershed shall be considered to be the watershed of that Great Lake or the watershed of the St. Lawrence River, respectively, with a preference to the direct tributary stream watershed from which it was Withdrawn.

“Standard or Decision-Making Standard” means the Decision-Making Standard for Management and Regulation established by Article 203 of this Agreement.

“State” means one of the states of Illinois, Indiana, Michigan, Minnesota, New York, Ohio or Wisconsin or the Commonwealth of Pennsylvania.

“Straddling Community” means any incorporated city, town or the equivalent thereof, that is either wholly within any County that lies partly or completely within the Basin or partly in two Great Lakes watersheds but entirely within the Basin, whose corporate boundary existing as of the date set forth in paragraph 2 of Article 709, is partly within the Basin or partly within two Great Lakes watersheds.

“Technical Review” means a detailed review conducted to determine whether or not a Proposal that requires Regional Review under this Agreement meets the Exception Standard following procedures and guidelines as set out in this Agreement.

“Water” means ground or surface water contained within the Basin.

“Water Dependent Natural Resources” means the interacting components of land, Water and living organisms affected by the Waters of the Basin.

“Waters of the Basin or Basin Water” means the Great Lakes and all streams, rivers, lakes, connecting channels and other bodies of water, including tributary groundwater, within the Basin.

“Withdrawal” means the taking of water from surface water or groundwater.

“Withdraw” has a corresponding meaning.

CHAPTER 2 PROHIBITION OF DIVERSIONS, EXCEPTIONS AND MANAGEMENT AND REGULATION OF WITHDRAWALS

ARTICLE 200 PROHIBITION OF DIVERSIONS AND MANAGEMENT AND REGULATION OF WITHDRAWALS

1. The Parties shall adopt and implement Measures to prohibit New or Increased Diversions, except as provided for in this Agreement.
2. The Parties shall adopt and implement Measures to manage and regulate Exceptions in accordance with this Agreement.
3. The Parties shall adopt and implement Measures to manage and regulate Withdrawals and Consumptive Uses in accordance with this Agreement.

ARTICLE 201 EXCEPTIONS TO THE PROHIBITION OF DIVERSIONS

Straddling Communities

1. A Proposal to transfer Water to an area within a Straddling Community but outside the Basin or outside the source Great Lake Watershed shall be excepted from the prohibition against Diversions and be managed and regulated by the Originating Party provided that, regardless of the volume of Water transferred, all the Water so

transferred shall be used solely for Public Water Supply Purposes within the Straddling Community, and:

- a. All Water Withdrawn from the Basin shall be returned, either naturally or after use, to the Source Watershed less an allowance for Consumptive Use. No surface water or groundwater from outside the Basin may be used to satisfy any portion of this criterion except if it:
 - i. Is part of a water supply or wastewater treatment system that combines water from inside and outside of the Basin;
 - ii. Is treated to meet applicable water quality discharge standards and to prevent the introduction of invasive species into the Basin;
 - iii. Maximizes the portion of water returned to the Source Watershed as Basin Water and minimizes the surface water or groundwater from outside the Basin;
- b. If the Proposal results from a New or Increased Withdrawal of 100,000 gallons per day (379,000 litres per day) or greater average over any 90-day period, the Proposal shall also meet the Exception Standard; and,
- c. If the Proposal results in a New or Increased Consumptive Use of 5 million gallons per day (19 million litres per day) or greater average over any 90-day period, the Proposal shall also undergo Regional Review.

Intra-Basin Transfers

2. A Proposal for an Intra-Basin Transfer that would be considered a Diversion under this Agreement, and not already excepted pursuant to paragraph 1 of this Article, shall be excepted from the prohibition against Diversions, provided that:
 - a. If the Proposal results from a New or Increased Withdrawal less than 100,000 gallons per day (379,000 litres per day) average over any 90-day period, the Proposal shall be subject to management and regulation at the discretion of the Originating Party;
 - b. If the Proposal results from a New or Increased Withdrawal 100,000 gallons per day (379,000 litres per day) or greater average over any 90-day period and if the Consumptive Use resulting from the Withdrawal is less than 5 million gallons per day (19 million litres per day) average over any 90-day period:
 - i. The Proposal shall meet the Exception Standard and be subject to management and regulation by the Originating Party, except that the Water may be returned to another Great Lake watershed rather than the Source Watershed;
 - ii. The Applicant shall demonstrate that there is no feasible, cost effective and environmentally sound water supply alternative within the Great Lake watershed to which the Water will be transferred, including conservation of existing water supplies; and,
 - iii. The Originating Party shall provide notice to the other Parties prior to making any decision with respect to the Proposal.
 - c. If the Proposal results in a New or Increased Consumptive Use 5 million gallons per day (19 million litres per day) or greater average over any 90-day period:

- i. The Proposal shall be subject to management and regulation by the Originating Party and shall meet the Exception Standard, ensuring that Water Withdrawn shall be returned to the Source Watershed;
- ii. The Applicant shall demonstrate that there is no feasible, cost effective and environmentally sound water supply alternative within the Great Lake watershed to which the Water will be transferred, including conservation of existing water supplies;
- iii. The Proposal undergoes Regional Review; and,
- iv. If the Originating Party is a State, the Proposal is approved pursuant to the Compact.

Straddling Counties

3. A Proposal to transfer Water to a Community within a Straddling County that would be considered a Diversion under this Agreement shall be excepted from the prohibition against Diversions, provided that it satisfies all of the following conditions:
 - a. The Water shall be used solely for the Public Water Supply Purposes of the Community within a Straddling County that is without adequate supplies of potable water.
 - b. The Proposal meets the Exception Standard, with particular emphasis upon ensuring that:
 - i. All Water Withdrawn from the Basin shall be returned, either naturally or after use, to the Source Watershed less an allowance for Consumptive Use;
 - ii. No surface water or groundwater from outside the Basin is used to satisfy any portion of subparagraph (i) above except if it:
 - (a) Is part of a water supply and/or wastewater treatment system that combines water from inside and outside of the Basin;
 - (b) Is treated to meet applicable water quality discharge standards and to prevent the introduction of invasive species into the Basin;
 - (c) Maximizes the portion of water returned to the Source Watershed as Basin Water, and minimizes the surface water or groundwater from outside the Basin;
 - iii. All such Water returned meets all applicable water quality standards.
 - c. The Proposal shall be subject to management and regulation by the Originating Party, regardless of its size;
 - d. There is no reasonable water supply alternative within the basin in which the community is located, including conservation of existing water supplies;
 - e. Caution shall be used in determining whether or not the Proposal meets the conditions for this Exception. This exception should not be authorized unless it can be shown that it will not endanger the integrity of the Basin Ecosystem;
 - f. The Proposal undergoes Regional Review; and,
 - g. If the Originating Party is a State, the Proposal is approved pursuant to the Compact.

A Proposal must satisfy all of the conditions listed above. Further, substantive consideration will also be given to whether or not the Proposal can provide sufficient

scientifically based evidence that the existing water supply is derived from groundwater that is hydrologically interconnected to Waters of the Basin.

Exception Standard

4. The following criteria constitute the Exception Standard:
 - a. The need for all or part of the Exception cannot be reasonably avoided through the efficient use and conservation of existing water supplies;
 - b. The Exception shall be limited to quantities that are considered reasonable for the purposes for which it is proposed;
 - c. All Water Withdrawn shall be returned, either naturally or after use, to the Source Watershed less an allowance for Consumptive Use. No surface water or groundwater from outside the Basin may be used to satisfy any portion of this criterion except if it:
 - i. Is part of a water supply or wastewater treatment system that combines water from inside and outside of the Basin;
 - ii. Is treated to meet applicable water quality discharge standards and to prevent the introduction of invasive species into the Basin;
 - d. The Exception shall be implemented so as to ensure that it shall result in no significant individual or cumulative adverse impacts to the quantity or quality of the Waters and Water Dependent Natural Resources of the Basin with consideration given to the potential Cumulative Impacts of any precedent-setting consequences associated with the Proposal;
 - e. The Exception shall be implemented so as to incorporate Environmentally Sound and Economically Feasible Water Conservation Measures to minimize Water Withdrawals or Consumptive Use;
 - f. The Exception shall be implemented so as to ensure that it is in compliance with all applicable municipal, State, Provincial and federal laws as well as regional interstate, inter-provincial and international agreements, including the Boundary Waters Treaty of 1909;
 - g. All applicable criteria in this Article have also been met.

Review of Article

5. The Parties shall evaluate this Article in the context of the periodic cumulative impact assessment as described in Article 209.

ARTICLE 202 IMPLEMENTATION OF THE STANDARD AND THE EXCEPTION STANDARD

1. The Parties shall seek to adopt and implement Measures establishing the Exception Standard under Article 201 and the Decision-Making Standard for management and regulation of Withdrawals and Consumptive Uses under Article 203. The Standards are one of the means by which the Parties shall together protect, conserve, restore, improve and manage the Waters of the Basin.
2. The Standard and the Exception Standards are minimum standards. The Parties may implement Measures that are more restrictive than the requirements of this Agreement. Although a Proposal may meet the Standard or the Exception Standard,

it may not be approved under the laws of the Originating Party if that Party has implemented more restrictive Measures.

3. When fully implemented, this Agreement shall lead to Water Withdrawal management systems that are consistent in their fundamentals within the Basin.

ARTICLE 203
THE DECISION-MAKING STANDARD FOR
MANAGEMENT OF WITHDRAWALS AND
CONSUMPTIVE USES

The following criteria constitute the Decision-Making Standard for management of new or increased Withdrawals and Consumptive Uses:

1. All Water Withdrawn shall be returned, either naturally or after use, to the Source Watershed less an allowance for Consumptive Use;
2. The Withdrawal or Consumptive Use shall be implemented so as to ensure that the Proposal will result in no significant individual or cumulative adverse impacts to the quantity or quality of the Waters and Water Dependent Natural Resources and the applicable Source Watershed;
3. The Withdrawal or Consumptive Use shall be implemented so as to incorporate Environmentally Sound and Economically Feasible Water Conservation Measures;
4. The Withdrawal or Consumptive Use shall be implemented so as to ensure that it is in compliance with all applicable municipal, State and federal laws as well as regional interstate and international agreements, including the Boundary Waters Treaty of 1909;
5. The proposed use is reasonable, based upon a consideration of the following factors:
 - a. Whether the proposed Withdrawal or Consumptive Use is planned in a fashion that provides for efficient use of the Water, and will avoid or minimize the waste of Water;
 - b. If the Proposal is for an increased Withdrawal or Consumptive Use, whether efficient use is made of existing Water supplies;
 - c. The balance between economic development, social development and environmental protection of the proposed Withdrawal and use and other existing or planned withdrawals and Water uses sharing the water source;
 - d. The supply potential of the Water source, considering quantity, quality, and reliability and safe yield of hydrologically interconnected water sources;
 - e. The probable degree and duration of any adverse impacts caused or expected to be caused by the proposed Withdrawal and use under foreseeable conditions, to other lawful consumptive or non-consumptive uses of water or to the quantity or quality of the Waters and Water Dependent Natural Resources of the Basin, and the proposed plans and arrangements for avoidance or mitigation of such impacts; and,
 - f. If a Proposal includes restoration of hydrologic conditions and functions of the Source Watershed, the Party may consider that.

ARTICLE 204
PROPOSALS SUBJECT TO REGIONAL REVIEW

1. Regional Review as outlined in Chapter 5 applies to a Proposal for any Exception requiring Regional Review under Article 201.
2. The Proposal may be approved by the Originating Party thereafter only if it meets the Exception Standard.

ARTICLE 205
PROPOSALS SUBJECT TO PRIOR NOTICE

1. The Originating Party shall provide all Parties with detailed and timely notice and an opportunity to comment within 90 days on any Proposal for a New or Increased Consumptive Use of 5 million gallons per day (19 million litres per day) or greater average in any 90-day period. Comments shall address whether or not the Proposal is consistent with the Standard established under Article 203. The Originating Party shall provide a response to any such comment received from another Party.
2. A Party may provide notice, an opportunity to comment and a response to comments even if this is not required under paragraph 1 of this Article. Any provision of such notice and opportunity to comment shall be undertaken only after consulting the Applicant.

ARTICLE 206
**MANAGEMENT AND REGULATION OF NEW OR INCREASED
WITHDRAWALS AND CONSUMPTIVE USES**

1. Each Party shall establish a program for the management and regulation of New or Increased Withdrawals and Consumptive Uses by adopting and implementing Measures consistent with the Standard. Each Party, through a considered process, shall set and may modify threshold levels for the regulation of New or Increased Withdrawals in order to assure an effective and efficient Water management program that will ensure that uses overall are reasonable, that Withdrawals overall will not result in significant impacts to the Waters and Water Dependent Natural Resources of the Basin, determined on the basis of significant impacts to the physical, chemical and biological integrity of Source Watersheds, and that other objectives of the Agreement are achieved. Each Party may determine the scope and thresholds of its program, including which New or Increased Withdrawals and Consumptive Uses will be subject to the program.
2. In the event that a Party has not established threshold levels in accordance with paragraph 1 on or before 10 years after paragraphs 1 and 2 of Article 200 come into force, it shall apply a threshold level for management and regulation of all New or Increased Withdrawals of 100,000 gallons per day (379,000 litres per day) or greater average in any 90 day period.
3. The Parties intend programs for New or Increased Withdrawals and Consumptive Uses to evolve as may be necessary to protect Basin Waters. The Regional Body shall periodically assess the Water management programs of the Parties. Such assessments may produce recommendations for the strengthening of the programs including, without limitation, establishing lower thresholds for management and regulation in

accordance with the Standard. The Parties may, by unanimous consent, collectively adopt such thresholds or revisions to their programs.

ARTICLE 207 APPLICABILITY

Determining New or Increased Diversions, Consumptive Uses or Withdrawals

1. To establish a baseline for determining a New or Increased Diversion, Consumptive Use or Withdrawal, each Party shall develop either or both of the following lists for their jurisdiction:
 - a. A list of existing Water Withdrawal approvals as of the date this Article comes into force;
 - b. A list of the capacity of existing systems as of the date this Article comes into force. The capacity of the existing systems should be presented in terms of Withdrawal capacity, treatment capacity, distribution capacity, or other capacity limiting factors. The capacity of the existing systems must represent the state of the systems. Existing capacity determinations shall be based upon approval limits or the most restrictive capacity information.

For all purposes of this Agreement, volumes of the Diversions, Consumptive Uses or Withdrawals set forth in the list(s) prepared by each Party in accordance with this Paragraph shall constitute the baseline volume.

The list(s) shall be furnished to the Regional Body within 1 year of the date this Article comes into force.

Timing of Additional Applications

2. Applications for New or Increased Withdrawals, Consumptive Uses or Exceptions shall be considered cumulatively within ten years of any application.

Change of Ownership

3. Unless a new owner proposes a project that will result in a Proposal for a New or Increased Diversion or Consumptive Use subject to Regional Review, the change of ownership in and of itself shall not require Regional Review.

Groundwater

4. The Basin surface water divide shall be used for the purpose of managing and regulating New or Increased Diversions, Consumptive Uses or Withdrawals of surface water and groundwater.

Withdrawal systems

5. The total volume of surface water and groundwater resources that supply a common distribution system shall determine the volume of a Withdrawal, Consumptive Use or Diversion.

Connecting Channels

6. The watershed of each Great Lake shall include its upstream and downstream connecting channels.

Transmission in Water Lines

7. Transmission of Water within a line that extends outside the Basin as it conveys Water from one point to another within the Basin shall not be considered a Diversion if none of the Water is used outside the Basin.

Hydrologic Units

8. The Lake Michigan and Lake Huron watersheds shall be considered to be a single hydrologic unit and watershed.

Bulk Water Transfer

9. A Proposal to Withdraw Water and to remove it from the Basin in any container greater than 5.7 gallons (20 litres) shall be treated under this Agreement in the same manner as a Proposal for a Diversion. Each Party shall have the discretion, within its jurisdiction, to determine the treatment of Proposals to Withdraw Water and to remove it from the Basin in any container of 5.7 gallons (20 litres) or less.

U.S. Supreme Court Decree: Wisconsin et al. v. Illinois et al.

10. Notwithstanding any terms of this Agreement to the contrary, with the exception of Paragraph 14 of this Article, current, New or Increased Withdrawals, Consumptive Uses and Diversions of Basin Water by the State of Illinois shall be governed by the terms of the United States Supreme Court decree in Wisconsin et al. v. Illinois et al. and shall not be subject to the terms of this Agreement nor any rules or regulations promulgated pursuant to this Agreement. This means that, with the exception of Paragraph 14 of this Article, for purposes of this Agreement, current, New or Increased Withdrawals, Consumptive Uses and Diversions of Basin Water within the State of Illinois shall be allowed unless prohibited by the terms of the United States Supreme Court decree in Wisconsin et al. v. Illinois et al.
11. The Parties acknowledge that the United States Supreme Court decree in Wisconsin et al. v. Illinois et al. shall continue in full force and effect, that this Agreement shall not modify any terms thereof, and that this Agreement shall grant the parties no additional rights, obligations, remedies or defenses thereto. The Parties specifically acknowledge that this Agreement shall not prohibit or limit the State of Illinois in any manner from seeking additional Basin Water as allowed under the terms of the United States Supreme Court decree in Wisconsin et al. v. Illinois et al., any other party from objecting to any request by the State of Illinois for additional Basin Water under the terms of said decree, or any party from seeking any other type of modification to said decree. If an application is made by any party to the Supreme Court of the United States to modify said decree, the Parties to this Agreement who are also parties to the decree shall seek formal input from Ontario and Québec, with respect to the proposed modification, use best efforts to facilitate the appropriate participation of said Provinces in the proceedings to modify the decree, and shall not unreasonably impede or restrict such participation.
12. With the exception of Paragraph 14 of this Article, because current, New or Increased Withdrawals, Consumptive Uses and Diversions of Basin Water by the State of Illinois are not subject to the terms of this Agreement, the State of Illinois is

prohibited from using any term of this Agreement, including Article 201, to seek New or Increased Withdrawals, Consumptive Uses or Diversions of Basin Water.

13. With the exception of Paragraph 14 of this Article, Articles 200, 201, 202, 203, 204, 205, 206, 207 (Paragraphs 1, 2, 3, 5 and 9 only), 208 and 210 of this Agreement all relate to current, New or Increased Withdrawals, Consumptive Uses and Diversions of Basin Water and, therefore, do not apply to the State of Illinois. All other provisions of this Agreement not listed in the preceding sentence shall apply to the State of Illinois, including the Water Conservation Programs provision of Article 304.
14. In the event of a Proposal for a Diversion of Basin Water for use outside the territorial boundaries of the Parties to this Agreement, decisions by the State of Illinois regarding such a Proposal would be subject to all terms of this Agreement, except Paragraphs 10, 12 and 13 of this Article.

ARTICLE 208

EXEMPTIONS FROM THE AGREEMENT

This Agreement does not apply to Withdrawals of Basin Water for the following purposes:

1. Supply of vehicles, including vessels and aircraft, whether for the needs of the persons or animals being transported or for ballast or other needs related to the operation of vehicles; or,
2. Use in a non-commercial project on a short-term basis for firefighting, humanitarian or emergency response purposes.

ARTICLE 209

AMENDMENTS TO THE STANDARD AND EXCEPTION STANDARD AND PERIODIC ASSESSMENT OF CUMULATIVE IMPACTS

1. The Standard and the Exception Standard may be amended periodically according to the rules in this Agreement to reflect advancements in science, information and knowledge.
2. The Parties shall co-ordinate the collection and application of scientific information to further develop a mechanism by which individual and Cumulative Impacts of Withdrawals may be assessed.
3. The Parties shall collectively conduct within the Basin, on a Great Lake and St. Lawrence River Basin basis, a periodic assessment of the Cumulative Impacts of Withdrawals, Diversions and Consumptive Uses from the Waters of the Basin. The assessment of the Cumulative Impacts shall be done upon the earlier of:
 - a. Every 5 years;
 - b. Each time the incremental losses to the Basin reach 50,000,000 gallons (190,000,000 litres) per day average in any 90-day period in excess of the quantity at the time of the last assessment; or,
 - c. At the request of one or more of the Parties.
4. The assessment of Cumulative Impacts shall form a basis for the review of the Standard and the Exception Standard and their application. This assessment shall:
 - a. Utilize the most current and appropriate guidelines for such a review, which may include but not be limited to Council on Environmental Quality and Environment Canada guidelines;

- b. Give substantive consideration to climate change or other significant threats to Basin Waters and take into account the current state of scientific knowledge, or uncertainty, and appropriate Measures to exercise caution in cases of uncertainty, if serious damage may result;
 - c. Consider Adaptive Management principles and approaches recognizing, considering and providing adjustments for the uncertainties in, and evolution of, science concerning the Basin's water resources, watersheds and ecosystems including potential changes to Basin-wide processes, such as lake level cycles and climate; and,
 - d. Include the evaluation of Article 201 concerning Exceptions. Based on the results of this assessment, the provisions in that Article may be maintained, made more restrictive or withdrawn.
5. The Parties have the responsibility of conducting this Cumulative Impact assessment. Applicants are not required to participate in this assessment.
 6. Unless required by other statutes, Applicants are not required to conduct a separate cumulative impact assessment in connection with an Application but shall submit information about the potential impacts of a Proposal to the quantity or quality of the Waters and Water Dependent Natural Resources of the applicable Source Watershed. An Applicant may, however, provide an analysis of how their proposal meets the no significant adverse Cumulative Impact provision of the Standards.

ARTICLE 210 JUDICIAL REVIEW

The Parties shall seek to adopt and implement Measures to permit a Party to, in an Originating Party's court of competent jurisdiction, seek judicial review of a decision of the Originating Party with respect to a Withdrawal, Consumptive Use or Exception if that decision is, according to this Agreement, subject to the Standard or the Exception Standard.

CHAPTER 3 PROGRAMS

ARTICLE 300 WATER MANAGEMENT PROGRAM REVIEW

1. The Parties shall protect, conserve, restore and improve the Waters and Water Dependent Natural Resources of the Basin by implementing programs that apply the Standard and the Exception Standard.
2. Each Party shall submit a report to the Regional Body, detailing the Water management and Water conservation and efficiency programs that implement this Agreement in their jurisdiction.
3. The report shall set out the manner in which Water Withdrawals are managed by sector, Water source, quantity or any other means and how the provisions of the Standard, the Exception Standard and Water conservation and efficiency programs are implemented.

4. The first report shall be provided by each jurisdiction one year from the date that this Article comes into force and thereafter every 5 years.
5. The Regional Body shall forward each report to all members and shall give the members at least 30 days to consider it.
6. Following that period, the Regional Body shall consider the reports submitted by each Party.
7. The Regional Body shall issue a Declaration of Finding on whether the programs in place in each Party:
 - a. Meet or exceed the provisions of this Agreement;
 - b. Do not meet the provisions of this Agreement; or,
 - c. Would meet the provisions of this Agreement if certain modifications were made and what options may exist to assist the jurisdiction in meeting the provisions of this Agreement.
8. The Regional Body shall distribute the reports to its members.
9. Any Party may ask the Regional Body to issue a Declaration of Finding respecting the Water management and Water conservation and efficiency programs of any of the Parties, including themselves, to determine whether the programs,
 - a. Meet or exceed the provisions of this Agreement;
 - b. Do not meet the provisions of this Agreement; or,
 - c. Would meet the provisions if certain modifications were made and what options may exist to assist the jurisdiction in meeting the provisions of this Agreement.
10. As one of its duties and responsibilities, the Regional Body may recommend a range of approaches to the Parties with respect to the development, enhancement and application of Water management and Water conservation and efficiency programs to implement the Standard and Exception Standard reflecting improved scientific understanding of the Waters of the Basin, including groundwater, and the impacts of Withdrawals on the Basin Ecosystem.

ARTICLE 301 INFORMATION

1. In order to develop and maintain a compatible base of Water use information, the Parties shall annually gather and share accurate and comparable information on all Withdrawals in excess of 100,000 gallons per day (379,000 litres per day) or greater average in any 30-day period (including Consumptive Uses) and all Diversions, including all Exceptions.
2. The Parties shall report this information to a Great Lakes—St. Lawrence River Water use data base repository and aggregated information shall be available to the public, consistent with the confidentiality requirements in Article 704.
3. Each Party shall require users to report their monthly Withdrawals, Consumptive Uses and Diversions on an annual basis.
4. Information gathered shall be used to improve scientific understanding of the Waters of the Basin, the impacts of Withdrawals from various locations and Water sources on the Basin Ecosystem, understanding of the role of groundwater, and to clarify what groundwater forms part of the Waters of the Basin.

ARTICLE 302
SCIENCE

1. The Parties commit to provide leadership for the development of a collaborative strategy with other regional partners to strengthen the scientific basis for sound Water management decision making under this Agreement.
2. The strategy shall guide the collection and application of scientific information to support:
 - a. An improved understanding of the individual and Cumulative Impacts of Withdrawals from various locations and Water sources on the Basin Ecosystem and to develop a mechanism by which impacts of Water Withdrawals may be assessed;
 - b. The periodic assessment of Cumulative Impacts of Withdrawals, Diversions and Consumptive Uses on a Great Lake and St. Lawrence River watershed basis;
 - c. Improved scientific understanding of the Waters of the Basin;
 - d. Improved understanding of the role of groundwater in Basin Water resources management; and,
 - e. The development, transfer and application of science and research related to Water conservation and Water use efficiency.

ARTICLE 303
AVAILABILITY OF APPLICATIONS AND RECORDS OF DECISION

1. Each Party shall seek to make publicly available all Applications it receives that are subject to management and regulation under this Agreement.
2. Each Party shall seek to make publicly available the record of decision including comments, objections and responses.

ARTICLE 304
WATER CONSERVATION AND EFFICIENCY PROGRAM

1. Within two years of the signing of the Agreement, the Regional Body shall identify Basin-wide Water conservation and efficiency objectives to assist the Parties in developing their Water conservation and efficiency program. These objectives shall be based on the goals of:
 - a. Ensuring improvement of the Waters and Water Dependent Natural Resources;
 - b. Protecting and restoring the hydrologic and ecosystem integrity of the Basin;
 - c. Retaining the quantity of surface water and groundwater in the Basin;
 - d. Ensuring sustainable use of Waters of the Basin; and,
 - e. Promoting the efficiency of use and reducing losses and waste of Water.
2. Within two years after Article 200, paragraphs 1 and 2 come into force (Prohibition of Diversions and Management of Exceptions), each Party shall develop its own Water conservation and efficiency goals and objectives consistent with the Basin-wide goals and objectives, and shall develop and implement a Water conservation and efficiency program, either voluntary or mandatory, within its jurisdiction based on the Party's goals and objectives. Each Party shall thereafter annually assess its programs in meeting the Party's goals and objectives, report to the Regional Body every five years and make this annual assessment available to the public.

3. Beginning five years after Article 200, paragraphs 1 and 2 come into force (Prohibition of Diversions and Management of Exceptions), and every five years thereafter, the Regional Body shall review and modify as appropriate the Basin-wide objectives and the Parties shall have regard for any such modifications in implementing their programs. This assessment shall be based on examining new technologies, new patterns of Water use, new resource demands and threats, and the Cumulative Impact assessment under Article 209.
4. Within two years after Article 200, paragraphs 1 and 2 come into force (Prohibition of Diversions and Management of Exceptions), the Parties commit to promote Environmentally Sound and Economically Feasible Water Conservation Measures such as:
 - a. Measures that promote efficient use of Water;
 - b. Identification and sharing of best management practices and state of the art conservation and efficiency technologies;
 - c. Application of sound planning principles;
 - d. Demand-side and supply-side Measures or incentives; and,
 - e. Development, transfer and application of science and research.
5. Each Party shall implement, in accordance with paragraph 2 above a voluntary or mandatory Water conservation program for all, including existing, Basin Water users. Conservation programs need to adjust to new demands and the potential impacts of cumulative effects and climate change.

CHAPTER 4
GREAT LAKES—ST. LAWRENCE RIVER WATER RESOURCES REGIONAL
BODY

ARTICLE 400
FUNCTIONS OF THE REGIONAL BODY

1. The Regional Body is composed of the Governor or Premier of each of the Parties, or a person designated by each of them.
2. The Regional Body is established to undertake the following duties and responsibilities:
 - a. Ensure, in accordance with this Agreement, a formalized process with respect to Proposals that require Regional Review and thereby provide an opportunity to address concerns within the Basin;
 - b. Declare whether or not a Proposal subject to Regional Review meets the Exception Standard;
 - c. Declare whether a Party's Water management programs meet the provisions of this Agreement;
 - d. Facilitate the development of consensus and the resolution of disputes on matters arising under this Agreement;
 - e. Monitor and report on the implementation of this Agreement by the Parties, including: data collection; the implementation of each Party's program to manage

- and regulate Withdrawals, Consumptive Uses and Diversions; promotion of Water conservation; and, the assessment of Cumulative Impacts;
- f. Establishment of Basin wide goals and objectives for Water conservation and efficiency, the review of those programs and recommendations and declarations in respect of them;
 - g. Periodically review the Standard and Exception Standard and their application including new scientific information relating to groundwater;
 - h. Recommend options to Parties with respect to the development and enhancement of their Water management programs;
 - i. Develop guidance for the implementation of the Standard and the Exception Standard and in particular the review of a Proposal, the preparation of an Application and the review of the Parties' Water management programs;
 - j. Propose amendments to this Agreement; and,
 - k. Perform any other functions or duties necessary to implement this Agreement.

ARTICLE 401

ORGANIZATION AND PROCEDURES OF THE REGIONAL BODY

1. The Regional Body may establish its own administrative practices and procedures.
2. The Regional Body may create a secretariat by the unanimous consent of its members.
3. The Regional Body shall meet:
 - a. At least once annually; and,
 - b. At any other time at the call of the Chair or at the request of two or more Parties.
4. The members shall appoint a Chair and Vice Chair through the following process:
 - a. For the first year, the Chair and Vice Chair shall be members elected by a vote of the members.
 - b. Each subsequent year, until all members have served, the Vice Chair shall be chosen by drawing lots from amongst those members who have not yet served.
 - c. Each member shall serve as Chair immediately after having served as Vice Chair.
 - d. Each member shall serve as Vice Chair and as Chair, each for one year.
 - e. Once all members have served as Vice Chair and Chair, the original order of serving shall be repeated.
5. In the event that an Application for Regional Review is from the Chair's State or Province, the role of the Chair shall be filled by the Vice Chair or another member.
6. Each Party shall bear an equitable share of the costs of the Regional Body to a maximum amount per annum that is agreed upon each year by the Parties.
7. The Parties shall support the Regional Body using existing agency staff and facilities to the greatest extent possible and are encouraged to make additional resources available through partnerships and co-operative arrangements with government agencies, public or private entities, individuals or academic institutions.
8. The Regional Body shall keep a complete public record of documents provided to it or generated by it, including but not limited to:
 - a. Proposals about which it is notified;
 - b. Applications, Technical Reviews and comments provided by the public;
 - c. Comments or objections made in respect of a Proposal by members of the Regional Body;

- d. Declarations of Finding;
 - e. Materials in respect of dispute resolution;
 - f. Water management program reports;
 - g. Cumulative Impact Assessments;
 - h. The science strategy developed under Article 302;
 - i. Reports on Water conservation and efficiency programs; and,
 - j. Amendments to the Agreement agreed to by the Parties.
9. Public access to documents is recognized to be subject to confidentiality obligations set out in this Agreement.
 10. To the greatest extent possible, the Regional Body shall conduct public participation and Regional Review concurrently and jointly with similar processes under the Compact and in the Originating Party's jurisdiction.
 11. The Parties recognize the importance and necessity of public participation in promoting management of the Water resources of the Basin. Consequently, meetings of the Regional Body, at which official action is to be taken, shall be open to the public except when the Regional Body is meeting in executive session.
 12. The minutes of the Regional Body shall be a public record.

CHAPTER 5 REGIONAL REVIEW

ARTICLE 500 REVIEW OF PROPOSALS

1. This Chapter sets out the process for Regional Review.
2. Regional Review provides the Parties an opportunity to address concerns with respect to a Proposal.
3. Unless the Applicant or the Originating Party otherwise requests, it shall be the goal of the Regional Body to conclude its review no later than 90 days after notice under Article 501 of such Proposal is received from the Originating Party.
4. The Parties agree that the protection of the integrity of the Great Lakes-St. Lawrence River Basin Ecosystem shall be the overarching principle for reviewing Proposals subject to Regional Review, recognizing uncertainties with respect to demands that may be placed on Basin Water, including groundwater, levels and flows of the Great Lakes and the St. Lawrence River, future changes in environmental conditions, the reliability of existing data and the extent to which Diversions may harm the integrity of the Basin Ecosystem.
5. The Originating Party shall have lead responsibility for coordinating information for resolution of issues related to evaluation of a Proposal and shall consult with the Applicant throughout the Regional Review Process.

ARTICLE 501
NOTICE FROM ORIGINATING PARTY
TO THE REGIONAL BODY AND THE PUBLIC

1. The Originating Party shall determine if an Application is subject to Regional Review.
2. If so, the Originating Party shall provide timely notice to the Regional Body, the Parties to this Agreement, and the public.
3. Such notice shall not be given unless and until all information, documents and the Originating Party's Technical Review needed to evaluate whether the Proposal meets the Exception Standard have been provided.

ARTICLE 502
OTHER NOTICE

1. An Originating Party may:
 - a. Provide notice to the Regional Body of an Application, even if notification is not required under this Agreement; or,
 - b. Request Regional Review of an application, even if Regional Review is not required under this Agreement.
2. A majority of the members of the Regional Body may request Regional Review of a regionally significant or potentially precedent setting Proposal.
3. Any such Regional Review shall be undertaken only after consulting the Applicant.
4. An Originating Party may provide preliminary notice of a potential Application.

ARTICLE 503
PUBLIC PARTICIPATION

1. To ensure adequate public participation, the Regional Body shall adopt procedures for the review of Proposals that are subject to Regional Review in accordance with this Article.
2. The Regional Body shall provide notice to the public of a Proposal undergoing Regional Review. Such notice shall indicate that the public has an opportunity to comment in writing to the Regional Body on whether the Proposal meets the Exception Standard.
3. The Regional Body shall hold a public meeting in the State or Province of the Originating Party in order to receive public comment on the issue of whether the Proposal under consideration meets the Exception Standard.
4. The Regional Body shall consider the comments received before issuing a Declaration of Finding.
5. The Regional Body shall forward the comments it receives to the Originating Party.

ARTICLE 504
FIRST NATIONS AND TRIBES CONSULTATION

1. In respect of a Proposal, appropriate consultation shall occur with First Nations or federally recognized Tribes in the Originating Party in the manner suitable to the individual Proposal and the laws and policies of the Originating Party.

2. The Regional Body shall:
 - a. Provide notice to the First Nations and federally recognized Tribes within the Basin of a Proposal undergoing Regional Review and an opportunity to comment in writing to the Regional Body on whether the Proposal meets the Exception Standard;
 - b. Inform the First Nations and federally recognized Tribes of public meetings and invite them to attend;
 - c. Forward the comments that it receives from the First Nations and federally recognized Tribes under this Article to the Originating Party for its consideration before issuing a Declaration of Finding; and,
 - d. Consider the comments that it receives from the First Nations and federally recognized Tribes under this Article before issuing a Declaration of Finding.
3. In addition to the specific consultation mechanisms described above, the Regional Body shall seek to establish mutually agreed upon mechanisms or processes to facilitate dialogue with, and input from First Nations and federally recognized Tribes on matters to be dealt with by the Regional Body; and, the Regional Body or the appropriate Parties shall seek to establish mutually agreed upon mechanisms to facilitate on-going scientific and technical interaction and data exchange regarding matters falling within the scope of this Agreement.

ARTICLE 505 TECHNICAL REVIEW

Originating Party's Technical Review

1. The Originating Party shall provide the Regional Body with its Technical Review of the Proposal under consideration.
2. The Technical Review shall thoroughly analyze the Proposal and provide an evaluation of the Proposal sufficient for a determination of whether the Proposal meets the Exception Standard.

Independent Technical Review

3. Any Party may undertake an independent Technical Review of a Proposal and the Originating Party shall assist by providing additional information as may be required.
4. At the request of the majority of its members, the Regional Body shall make such arrangements as it considers appropriate for an independent Technical Review of a Proposal.
5. All Parties shall exercise their best efforts to ensure that a Technical Review undertaken under paragraphs 3 or 4 does not unnecessarily delay the decision by the Originating Party on the Application. Unless the Applicant or the Originating Party otherwise requests, all Technical Reviews shall be completed no later than 60 days after the date the notice of the Proposal was given to the Regional Body.

ARTICLE 506 DECLARATION OF FINDING

1. The Regional Body shall meet to consider a Proposal. The Applicant shall be provided with an opportunity to present the Proposal to the Regional Body at such time.

2. The Regional Body, having considered the notice, the Originating Party's Technical Review, any other independent Technical Review that is made, any comments or objections including the analysis of comments made by the public, First Nations and federally recognized Tribes, and any other information that is provided under this Agreement shall issue a Declaration of Finding that the Proposal under consideration:
 - a. Meets the Exception Standard;
 - b. Does not meet the Exception Standard; or,
 - c. Would meet the Exception Standard if certain conditions were met.
3. An Originating Party may decline to participate in a Declaration of Finding made by the Regional Body.
4. The Parties recognize and affirm that it is preferable for all members of the Regional Body to agree whether the Proposal meets the Exception Standard.
5. If the members of the Regional Body who participate in the Declaration of Finding all agree, they shall issue a written Declaration of Finding with consensus.
6. In the event that the members cannot agree, the Regional Body shall make every reasonable effort to achieve consensus within 25 days.
7. Should consensus not be achieved, the Regional Body may issue a Declaration of Finding that presents different points of view and indicates each Party's conclusions.
8. The Regional Body shall release the Declarations of Finding to the public.
9. The Originating Party shall consider the Declaration of Finding before it makes a decision on the Proposal.

CHAPTER 6 DISPUTE RESOLUTION

ARTICLE 600 GENERAL

1. The Parties undertake to resolve any disputes under this Agreement in a conciliatory, co-operative and harmonious manner.
2. Where dispute resolution is required, the Parties undertake to use the dispute resolution mechanisms provided for in this Chapter to arrive at a mutually satisfactory resolution.
3. The provisions of this Chapter shall not be used to dispute a Declaration of Finding on a Proposal that is subject to Regional Review.
4. A Person who is not a Party to this Agreement may not seek dispute resolution under this Agreement.

ARTICLE 601 PROCEDURE FOR DISPUTE RESOLUTION

Initial Steps

1. A Party may provide detailed written notice to another Party and to the Regional Body of a dispute that in its opinion requires resolution under this Chapter.

Measures to Settle Disputes

2. If the dispute is not resolved informally, the Chair shall initiate the most appropriate measures to resolve the dispute. These measures may include:
 - a. The appointment of a panel to hear the Parties to the dispute;
 - b. Consultation with experts;
 - c. Establishment of a working or fact-finding group; or,
 - d. The use of dispute resolution mechanisms such as conciliation or mediation.
3. After resolution is attempted by one of the means suggested in paragraph 2, recommendations shall be made in accordance with directions given by the Chair at the time the mean was adopted. The disputing Parties shall consider the recommendations and exercise their best efforts to settle their dispute.

Reference to Regional Body

4. If the disputing Parties, having considered the recommendations, fail to settle the dispute, any one of them may refer the matter to the Regional Body. In this case, the Chair shall, in consultation with the other members who are not involved in the dispute, direct the Regional Body to take such further steps as he or she considers advisable in the circumstances to resolve the dispute.
5. When those steps have been taken, the Regional Body shall issue its recommendations regarding the resolution of the dispute.
6. The disputing Parties shall consider the recommendations and shall exercise their best efforts to settle.

Role of the Chair

7. In the event that a dispute involves the Party of the Chair, the role of the Chair set out in this Chapter shall be filled by the Vice Chair or failing him or her, another member who is not a Party to the dispute.

CHAPTER 7 FINAL PROVISIONS

ARTICLE 700 REAFFIRMATION OF CONSTITUTIONAL POWERS AND RESPONSIBILITIES

1. Nothing in this Agreement alters the legislative or other authority of Parliament or of the Provincial legislatures or of the federal Government of Canada or of the Provincial governments or the rights of any of them with respect to the exercise of their legislative or other authorities under the Constitution of Canada.
2. This Agreement is not intended to infringe upon the treaty power of the United States of America, nor shall any term hereof be construed to alter or amend any treaty or term thereof that has been or may hereafter be executed by the United States of America.

ARTICLE 701

RELATIONSHIP TO AGREEMENTS CONCLUDED BY CANADA OR THE UNITED STATES OF AMERICA

1. Nothing in this Agreement is intended to provide nor shall be construed to provide, directly or indirectly, to any Person any right, claim or remedy under any treaty or international agreement nor is it intended to derogate any right, claim, or remedy that already exists under any treaty or international agreement.
2. Nothing in this Agreement is intended to affect the application of the Boundary Waters Treaty of 1909 whose requirements continue to apply in addition to the requirements of this Agreement.

ARTICLE 702

RELATIONSHIP TO FIRST NATIONS AND TRIBES

1. Nothing in this Agreement is intended to abrogate or derogate from treaty rights or rights held by any Tribe recognized by the federal government of the United States based upon its status as a Tribe recognized by the federal government of the United States.
2. Nothing in this Agreement is intended to abrogate or derogate from the protection provided for the existing aboriginal or treaty rights of aboriginal peoples in Ontario and Québec as recognized and affirmed by section 35 of the Constitution Act, 1982.

ARTICLE 703

RELATIONSHIP TO OTHER AGREEMENTS AMONG THE PARTIES

1. The Parties assert that by this Agreement they are fulfilling their existing commitments with respect to each other under the Great Lakes Charter and the Great Lakes Charter Annex.
2. The obligations of this Agreement shall be co-ordinated with any obligations set out in other environmental and conservation agreements between or among the Parties.

ARTICLE 704

CONFIDENTIALITY

1. Nothing in this Agreement requires a Party to breach confidentiality obligations or requirements prohibiting disclosure that it has under its own laws, to compromise security or a person's commercially sensitive or proprietary information.
2. A Party may take steps, including but not limited to deletion and redaction, deemed necessary to protect any confidential, proprietary or commercially sensitive information when distributing information to other Parties. The Party shall summarize or paraphrase any such information in a manner sufficient for the Regional Body to exercise its authorities contained in this Agreement.

ARTICLE 705

MEASURES SUBJECT TO TRANSITIONAL PROVISIONS

Each Party shall, from the date of execution of this Agreement, exercise its best efforts to refrain from taking any action that would defeat the objectives of this Agreement.

**ARTICLE 706
AMENDMENTS**

1. The Parties may agree in writing to amend this Agreement.
2. An amendment to this Agreement requires the consent of all Parties to the Agreement.
3. When so agreed, and approved in accordance with the applicable legal procedures of each Party, an amendment shall constitute an integral part of this Agreement from the date of its entry into force.

**ARTICLE 707
WITHDRAWAL AND TERMINATION PROCEDURE**

1. Twelve months after it gives written notice to all other Parties, a Party may withdraw from this Agreement.
2. If a Party withdraws, the Agreement shall remain in force among the remaining Parties.
3. This Agreement shall be terminated when all Parties, or all remaining Parties, agree in writing.

**ARTICLE 708
ENTIRE AGREEMENT**

The Parties consider this Agreement to be a complete and integral whole. Each provision is material and any change or amendment made must be agreed to by all Parties.

**ARTICLE 709
ENTRY INTO FORCE**

Parts of this Agreement come into force at different times. Except as otherwise provided in this Agreement, if in any part of the Agreement set out below the parties agree to adopt or implement measures or undertake any other action, this shall be done as expeditiously as possible and in any event no later than the earliest date specified for the part in this Article.

The following are the dates that the parts of this Agreement come into force:

1. On the day the Agreement is signed by all Parties:
 - a. Preamble;
 - b. Chapter 1 (General Provisions);
 - c. Article 202 (Implementation of the Standard and the Exception Standard);
 - d. Article 208 (Exemptions from the Agreement);
 - e. Article 302 (Science);
 - f. Article 303 (Availability of Applications and Records of Decisions);
 - g. Article 304, paragraph 1 (Water Conservation Objectives);
 - h. Chapter 4 (Great Lakes—St. Lawrence River Water Resources Regional Body);
 - i. Chapter 6 (Dispute Resolution); and,
 - j. Chapter 7 (Final Provisions).

2. 60 days after the last Party has notified the others that it has completed the Measures necessary to implement the following parts of this Agreement:
 - a. Article 200, paragraphs 1 and 2 (Prohibition of Diversions and Management and Regulation of Exceptions);
 - b. Article 201 (Exceptions to Prohibition of Diversions);
 - c. Article 203 (The Standard for management of Withdrawals and Consumptive Uses);
 - d. Article 204 (Proposals Subject to Regional Review);
 - e. Article 207 (Applicability);
 - f. Article 209 (Amendments to the Standard and Exception Standard and Periodic Assessment of Cumulative Impacts);
 - g. Article 210 (Judicial Review);
 - h. Article 300 (Water Management Program Review);
 - i. Article 304, except for paragraph 1 (Implementation of Water Conservation Programs of the Parties); and,
 - j. Chapter 5 (Regional Review).
3. 5 years after the date paragraph 2 of this Article comes into force or 60 days after the last Party has notified the others that it has completed the Measure necessary to implement it, whichever is first:
 - a. Article 200, paragraph 3 (Management of Withdrawals and Consumptive Uses);
 - b. Article 205 (Proposals Subject to Prior Notice);
 - c. Article 206 (Management and Regulation of New or Increased Withdrawals and Consumptive Uses); and,
 - d. Article 301 (Information).
4. Except as otherwise set out in this Agreement, 60 days following the date that the last Party has notified the others that it has completed the necessary legal procedures, any remaining parts of this Agreement shall come into force.
5. The terms, agreements, and review processes contained in the Great Lakes Charter of 1985 (“Charter”) shall remain in full force and effect unless and until the Parties to the Charter certify in writing that it has been replaced by the terms of this Agreement. Until the coming into force of Chapter 5 of this Agreement, the Regional Body as described in Chapter 4 shall be used for all prior notice and consultation activities as described in the Charter.

ARTICLE 710
LANGUAGE

This Agreement has been made and executed in English and French and both versions are equally authoritative.

Signed this 13th day of December, 2005.

Governor of Illinois

Governor of Indiana

Governor of Michigan

Governor of Minnesota

Governor of New York

Governor of Ohio

Premier of Ontario

Governor of Pennsylvania

Premier of Québec

Governor of Wisconsin



Great Lakes Glossary

Source: Great Lakes Report to Congress 1994 (EPA-905-R-94-004)

A

Acute Toxicity: The ability of a substance to cause poisonous effects that result in severe biological harm or death soon after a single exposure or dose. (See chronic toxicity.)

Administrative Order: A legal document signed by EPA directing an individual, business, or other entity to take corrective action or refrain from an activity. The order describes the violations and actions to be taken and can be enforced in court. Such orders may be issued, for example, as a result of an administrative complaint whereby the respondent is ordered to pay a penalty for violations of a statute.

Adsorption: The adhesion of molecules of gas, liquid, or dissolved solids to a surface.

Advisory: A nonregulatory document that communicates risk information.

Air Pollutant: Any substance in air that could, if in high enough concentration, harm living things.

Algae: Simple rootless plants that grow in sunlit waters in relative proportion to the amounts of light and nutrients available. They are food for fish and small aquatic animals.

Antidegradation Policies: Part of Federal air quality and water quality requirements prohibiting environmental deterioration.

Areas of Concern: A geographic area that fails to meet the general or specific objectives of the Great Lakes Water Quality Agreement where such failure has caused or is likely to cause impairment of beneficial use or of the area's ability to support aquatic life. In general, these are bays, harbors, and river mouths with damaged fish and wildlife populations, contaminated bottom sediments, and past or continuing loadings of toxic and bacterial pollutants.

Atmospheric Deposition: Pollution from the atmosphere associated with dry deposition in the form of dust, wet deposition in the form of rain and snow, or as a result of vapor exchanges.

B

Bacteria: A group of universally distributed, rigid, essentially unicellular microscopic organisms lacking chlorophyll. Some bacteria can aid in pollution control by consuming or breaking down organic matter in sewage or by similarly acting on oil spills or other water pollutants. Bacteria in soil, water, or air can also cause human, animal, and plant health problems.

Benthic Organism (benthos): A form of aquatic plant or animal life that is found near the bottom of a stream, lake, or ocean. Benthic populations are often indicative of sediment quality. The benthos comprise:

1. Sessile animals, such as sponges, some worms and many attached algae
2. Creeping forms, such as snails and flatworms
3. Burrowing forms, which include most clams, worms, mayflies and midges.

Benthic Region: The bottom layer of a body of water.

Bioaccumulative Substances: Substances that increase in concentration in living organisms (that are very slowly metabolized or excreted) as they breathe contaminated air or water, drink contaminated water, or eat contaminated food. (See biological magnification.)

Bioassay: An evaluation using organisms to measure the effect of a substance, factor, or condition by comparing before and after data.

Biological Magnification: Refers to the process whereby certain substances become more concentrated in tissues at each successive stage up the food web. (See bioaccumulative substances.)

Biomass: All the living material in a given area: often refers to vegetation. Algal biomass is often indicative of the trophic status of a water body.

Byproduct: Material, other than the principal product, that is generated as a consequence of an industrial process.

C

Carcinogen: Any substance that can cause or contribute to the production of cancer.

Chlorophyll-a: The photosynthetic pigment found in most algae. Chlorophyll-a is used to measure the rate of photosynthesis in a body of water.

Chronic Toxicity: The capacity of a substance to cause poisonous effects in an organism after long-term exposure. (See acute toxicity).

Combined Sewers: A sewer system that carries both sewage and stormwater runoff. Normally, its entire flow goes to a waste treatment plant, but during a heavy storm, the stormwater volume may be so great as to cause overflows (combined sewer overflow). When this happens, untreated mixtures of stormwater and sewage may flow into receiving waters. Stormwater runoff may also carry toxic chemicals from industrial areas or streets into the sewer system.

Consent Decree: A legal document, approved by a judge, that formalizes an agreement reached between EPA and Potentially Responsible Parties (PRPs) through which PRPs will conduct all or part of a cleanup action at a Superfund site, cease or correct actions or processes that are polluting the environment, or otherwise comply with regulations where the PRP's failure to comply caused EPA to initiate regulatory enforcement actions. The consent decree describes the actions PRPs will take and may be subject to a public comment period.

Conventional Pollutants: Such contaminants as organic waste, sediment, acid, bacteria and viruses, nutrients, oil and grease, or heat.

D

Decay: The breakdown of organic matter by bacteria and fungi.

Dissolved Oxygen (DO): The oxygen freely available in water. Dissolved oxygen is vital to fish and other aquatic life. Traditionally, the level of dissolved oxygen has been accepted as the single most important indicator of a water body's ability to support desirable aquatic life.

Drainage Basin: A water body and the land area drained by it.

Dredging: Removal of sediment from the bottom of a water body.

E

Ecosystem: The interacting system of a biological community and its environmental surroundings.

Effluent: Wastewater--treated or untreated--that flows from a treatment plant, sewer, or industrial outfall. Generally refers to discharges into surface waters.

Emission: Discharges into the atmosphere from such sources as smokestacks, residential chimneys, motor vehicles, locomotives, and aircraft.

Erosion: The wearing away of land surface by wind or water. Erosion occurs naturally but can be caused by farming, residential or industrial development, mining, or timber-cutting.

Eutrophication: The process of fertilization that causes high productivity and biomass in an aquatic ecosystem. Eutrophication can be a natural process or it can be a cultural process accelerated by an increase of nutrient loading to a lake by human activity.

Exotic Species: Species that are not native to the Great Lakes and that have been intentionally introduced to or have inadvertently infiltrated the system. Exotics prey upon native species and compete with them for food or habitat.

F

Fertilizer: Materials, including nitrogen and phosphorus, that provide nutrients for plants.

Food Chain: A sequence of organisms, each of which uses the next, lower member of the sequence as a food source. Members of a chain are interdependent so that a disturbance to one species can disrupt the entire hierarchy.

Food Web: The complex feeding network occurring within and between food chains in an ecosystem, whereby members of one food chain may belong to one or more other food chains.

G

Game Fish: Fish species caught for sport, such as trout, salmon, or bass.

Groundwater: The supply of fresh or saline water found beneath the Earth's surface, usually in aquifers, often supplying wells and springs.

H

Habitat: The place where a population (e.g., human, animal, plant, micro-organism) lives and its surroundings.

Heavy Metals: Metallic elements with high atomic weights (e.g., mercury, chromium, cadmium, arsenic, and lead) that tend to be toxic and bioaccumulate.

Herbicide: A chemical pesticide designed to control or destroy plants, weeds, or grasses.

I

Indicator: An organism, species, or community whose characteristics show the presence of specific environmental conditions.

Insecticide: A chemical specifically used to kill or control the growth of insects.

International Joint Commission (IJC): A binational commission, established by the 1909 Boundary Waters Treaty, with responsibility for decisions regarding obstruction or diversion of U.S./Canadian boundary waters. In 1972 the Commission was tasked with monitoring implementation of the Great Lakes Water Quality Agreement.

J, K, L

Lampricide: A chemical used to kill sea lamprey.

Landfills: 1. Land disposal sites for nonhazardous solid wastes at which the waste is spread in layers, compacted to the smallest practical volume, and covered with material applied at the end of each operating day. 2. Land disposal sites for hazardous waste designed to minimize the chance of release of hazardous substances into the environment.

Loading: The addition of a substance to a water body.

M

Marsh: A type of wetland that does not accumulate appreciable peat deposits and is dominated by herbaceous vegetation. Marshes may be either freshwater or saltwater and tidal or nontidal. (See wetland.)

Mass Balance Approach: An analytic method, based on conservation of mass, used to assess the quantity and cycling of contaminants throughout a water system.

Metabolite: A substance that is the product of biological changes to a chemical.

Monitoring: A scientifically designed system of continuing standardized measurements and observations and the evaluation thereof.

N

National Pollutant Discharge Elimination System (NPDES): The national program for controlling discharges of pollutants from point sources (e.g., municipal sewage treatment plants, industrial facilities) into the waters of the United States.

National Priorities List (NPL): EPA's list of the most serious uncontrolled or abandoned hazardous waste sites identified for long-term remedial action under Superfund. A site must be on the NPL to receive money from the Trust Fund for remedial action. This list is based primarily on the score a site receives from the Hazard Ranking System. EPA updates the NPL at least once a year.

Navigable Waters: Waters sufficiently deep and wide for navigation by all or by specified sizes of vessels. Maintenance of navigation is a Federal responsibility carried out by the Army Corps of Engineers.

Nitrate: A compound containing nitrogen and oxygen that can exist in the atmosphere or in water and that can have harmful effects on humans and animals at high concentrations.

Nonpoint Source: Pollution sources that are diffuse and do not have a single point of origin or are not introduced into a receiving stream from a specific outlet. The pollutants are generally carried off land by stormwater runoff. Commonly used categories for nonpoint sources are agriculture, forestry, urban, mining, construction, dams and channels, and land disposal.

Nutrient: Any substance assimilated by living organisms that promotes growth. The term is generally applied to nitrogen and phosphorous, but is also applied to other essential trace elements.

O , P , Q

Permit: An authorization, license, or equivalent control document issued by EPA or a State agency to implement the requirements of an environmental regulation (e.g., a permit to operate a wastewater treatment plant or to operate a facility that may generate harmful emissions).

Pesticide: A substance intended for preventing, destroying, repelling, or mitigating any pest. Also, any substance or mixture of substances intended for use as a plant regulator, defoliant, or desiccant.

Phosphorus: An essential chemical food element that can contribute to the eutrophication of lakes and other water bodies.

Photosynthesis: A process occurring in the cells of green plants and some micro-organisms in which solar energy is transformed into stored chemical energy.

Phytoplankton: That portion of the plankton community comprising tiny plants (e.g., algae, diatoms).

Plankton: Microscopic plants and animals that live in water.

Point Source: A stationary facility from which pollutants are discharged or emitted. Also, any single identifiable source of pollution (e.g., a pipe, ditch, ship, ore pit, factory smokestack).

Pollutant: Any substance introduced into the environment that adversely affects the usefulness of a resource.

Pollution Prevention: Measures taken to reduce the generation of a substance that could be harmful to living organisms if released to the environment. Pollution prevention can be achieved in many ways.

Potentially Responsible Party (PRP): Any individual or company, including owners, operators, transporters, or generators, potentially responsible for, or contributing to, the contamination problems at a Superfund site. Whenever possible, EPA requires PRPs, through administrative and legal actions, to clean up hazardous waste sites that they may have created.

Predator: Any organism that lives by capturing and feeding on another animal.

Pretreatment: Processes used to reduce, eliminate, or alter pollutants from nonresidential sources before they are discharged into publicly owned sewage treatment systems.

Primary Waste Treatment: This treatment consists of the first steps in wastewater treatment during which screens and sedimentation tanks are used to remove most materials that float or will settle. Primary treatment results in the removal of about 30 percent of carbonaceous biochemical oxygen demand from domestic sewage.

Publicly Owned Treatment Work (POTW): A waste treatment facility owned by a State, unit of local government, or Indian tribe.

R

Record of Decision (ROD): A public document that explains which cleanup alternative(s) will be used at Superfund National Priorities List sites.

Remedial Action Plans (RAPs): Environmental plans aimed at restoring all beneficial uses to Great Lakes Areas of Concern.

Resuspension (of sediment): The remixing of sediment particles and pollutants back into the water by storms, currents, organisms, and human activities, such as dredging.

Retention Time: The time it takes for the volume of water in a lake to exit through its outlet (i.e., total volume/outlet flow = retention time).

Risk Assessment: qualitative and quantitative evaluation to define the hazards posed to human health and/or the environment.

Run-Off: That part of precipitation, snow melt, or irrigation water that drains off land into surface water. It can carry sediments and pollutants into the receiving waters.

S

Secondary Waste Treatment: The second step in most waste treatment systems in which bacteria consume the organic parts of the waste. It is accomplished by bringing together waste, bacteria, and oxygen in trickling filters or in the activated sludge process. This removes floating and settleable solids and about 90 percent of the oxygen-demanding substances and suspended solids. Disinfection is the final stage of secondary treatment. (See primary, tertiary waste treatment.)

Sediments: Soil, sand, and minerals eroded from land by water or air. Sediments settle to the bottom of surface water.

Sewage: The waste and wastewater discharged into sewers from homes and industry.

Sewer: A channel or conduit that carries wastewater and stormwater runoff from its source to a treatment plant or receiving stream. Sanitary sewers carry household, industrial, and commercial waste; storm sewers carry runoff from rain or snow; and combined sewers carry both.

Stratification (or layering): The tendency in deep water bodies for distinct layers of water to form as a result of vertical change in temperature and, therefore, in the density of water. During stratification, dissolved oxygen, nutrients, and other parameters of water chemistry do not mix well between layers, establishing chemical as well as thermal gradients.

Superfund: The program under the legislative authority of CERCLA and SARA that carries out EPA's solid waste emergency and long-term remedial activities. These activities include establishing a National Priorities List of the nation's most hazardous inactive waste sites and conducting remedial actions. Sites are cleaned up by potentially responsible parties whenever this can be arranged.

Surface Water: All water open to the atmosphere (e.g., rivers, lakes, reservoirs, streams, impoundments, seas, estuaries) and all springs, wells, or other collectors that are directly influenced by surface water.

Swamp: A type of wetland that is dominated by woody vegetation and that does not accumulate appreciable peat deposits. Swamps may be freshwater or saltwater and tidal or nontidal. (See wetland.)

T

Toxic Substance (or toxicant): A substance that can cause death, disease, behavioral abnormalities, cancer, genetic mutations, physiological or reproductive malfunctions, or physical deformities in any organism or its offspring. The quantities and length of exposure necessary to cause these effects can vary widely.

U

Urban Runoff: Stormwater from city streets and adjacent domestic or commercial properties that may pickup terrestrial contamination and carry pollutants of various kinds into sewer systems and/or receiving waters.

V

Vaporization: The change of a substance from a liquid to a gas.

Volatile Substance: A substance that evaporates readily.

W

Waste Treatment Plant: A facility containing a series of tanks, screens, filters, and other processes by which pollutants are removed from water.

Wastewater: The spent or used water from individual homes, a community, a farm, or an industry that often contains dissolved or suspended matter.

Watershed: The land area that drains into a river, stream, or lake.

Water Table: The level of groundwater.

Water Quality Standards: State-adopted and EPA-approved standards for water bodies. Standards are developed considering the uses of the water body and the water quality criteria that must be met to protect the designated uses.

Wetland: An area that is regularly saturated by surface water or groundwater and is characterized by a prevalence of vegetation that is adapted for life in saturated soil conditions (e.g., swamps, bogs, fens, marshes, and estuaries).

Wildlife Refuge: An area designated for the protection of wild animals, within which hunting and fishing are either prohibited or strictly controlled.

X, Y, Z Zooplankton: Microscopic aquatic animals.