

The Thames River: Great Lakes Connections

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Overview

1) Great Lakes (binational)

- Great Lakes and their importance
- GLWQA

2) Lake Erie basin (binational)

- LAMP (and associated strategies)
- Huron-Erie Corridor (LSC Management Plan, DR and SCR AOCs)

3) Lake Erie (domestic)

- Canada-Ontario Agreement
- Ontario Great Lakes Strategy

Why Are the Great Lakes Important to Ontario?

Water Resources

- Contain over 20% of the world's freshwater
- Are a source of water for 80% of Ontarians

Ecosystem Goods & Services

- Great Lakes restoration and protection activities provide a 2:1 return on investment
- Coastal wetlands provide habitat to sustain biodiversity, reduce flooding and erosion, and improve water quality
- Provides spiritual sustenance and recreation opportunities

Biodiversity

- Supports many unique ecosystems and species
- 4000 species of plants, fish and wildlife are found within the Great Lakes Basin

Waste Assimilation

- Great Lakes wetlands naturally filter water
- The Great Lakes absorb our wastewater

Beaches & Boating

- Used by over 1.5 million recreational boaters annually
- 10,000 km of Great Lakes coast – more than all Great Lakes States combined

Power Generation

- Supports more than 80% of Ontario's power generation

Manufacturing

- Supports 75% of Canada's manufacturing sector

Shipping & Trade

- The Great Lakes shipping industry contributes \$2.6 billion to Ontario's annual GDP
- Great Lakes-St. Lawrence River regional economy is the world's 4th largest, with a combined GDP of \$4.7 trillion

Agriculture & Food

- Over 95% of Ontario's agricultural lands are within the Great Lakes Basin
- Supports a \$35 billion/year agri-food industry that provides 700,000 jobs



Tourism

- 70 million annual tourist visits to the Great Lakes region
- Generates \$12.3 billion in spending

Fishing

- Great Lakes recreational anglers contribute over \$600 million annually to Ontario's economy
- Commercial fishing generates \$234 million annually

What Challenges Are the Great Lakes Facing?

Algae and Beach Closures

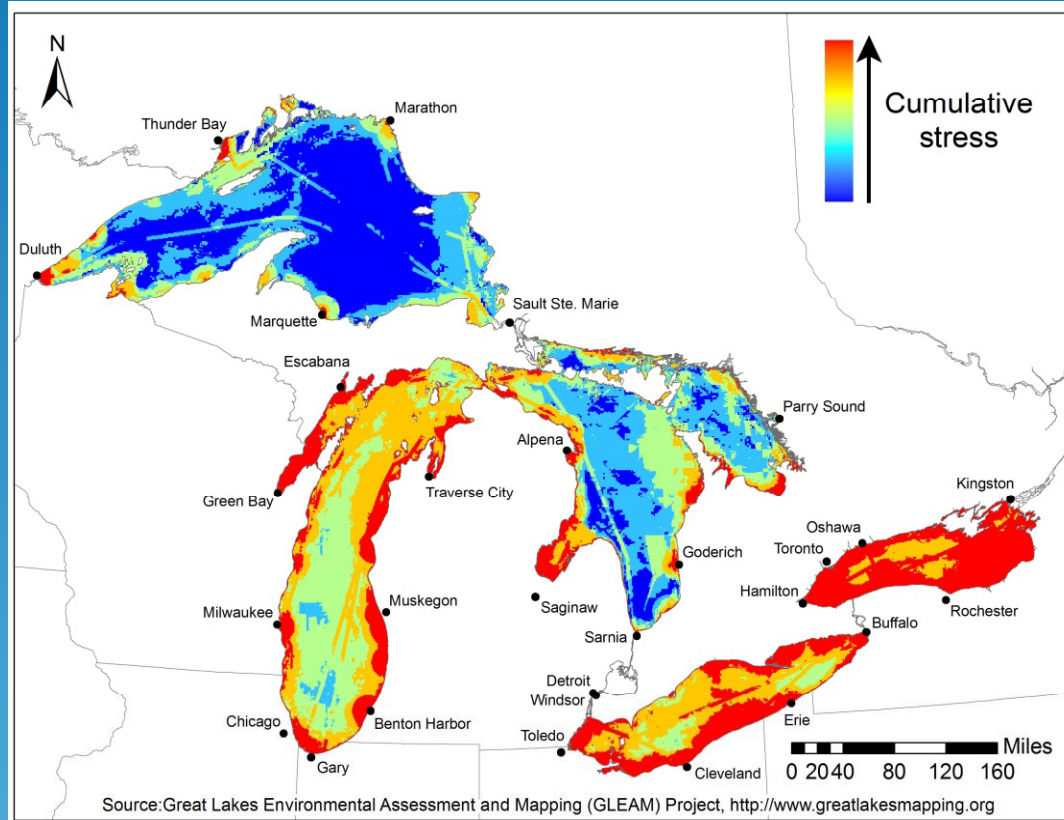
- Degrading shorelines and waterfronts
- Beach postings
- Waterfronts covered in nuisance algae
- Massive blooms of potentially toxic algae

Invasive Species

- Food web changing, decline in fisheries
- Clogged water intakes
- More pathogens
- Risk of new invaders: Asian carp

Population Growth

- Increased stormwater and wastewater, treatment not keeping pace
- Loss of natural cover
- More water consumption



Natural Heritage

- Loss of critical habitat
- Declining coastal health
- More species at risk
- Loss of natural and cultural heritage

Climate Change

May impact:

- Lake level change
- Water availability
- Intensity of storms
- Stressed infrastructure
- Increased flooding

Harmful Pollutants

- Chemicals of emerging concern (e.g. some flame retardants, pharmaceuticals)
- Continued fish consumption restrictions
- Reproductive/ immune impairment in some wildlife
- Potential human health impacts

Great Lakes Water Quality Agreement

- Canada-US agreement first signed in 1972
- New agreement in 1978
 - Adopted broader ecosystem approach
- Amended by protocol in 1987
 - Introduced LaMPs, RAPs
- Amended by protocol in 2012
 - Signed September 2012
 - Took force February 2013



Great Lakes Water Quality Agreement

- 10 annexes dealing with a priority issues facing the GLs:

1- Areas of Concern	6- Aquatic Invasive Species
2- Lakewide Management	7- Habitat and Species
3- Chemicals of Mutual Concern	8- Groundwater
4- Nutrients	9- Climate Change Impacts
5- Discharge from vessels	10- Science (Coordination)

- A binational sub-committee to oversee each annex; task teams reporting to each sub-committee
- The Annexes all report up to the GLEC (replaced the previous BEC)

Great Lakes Water Quality Agreement

Annex 2:

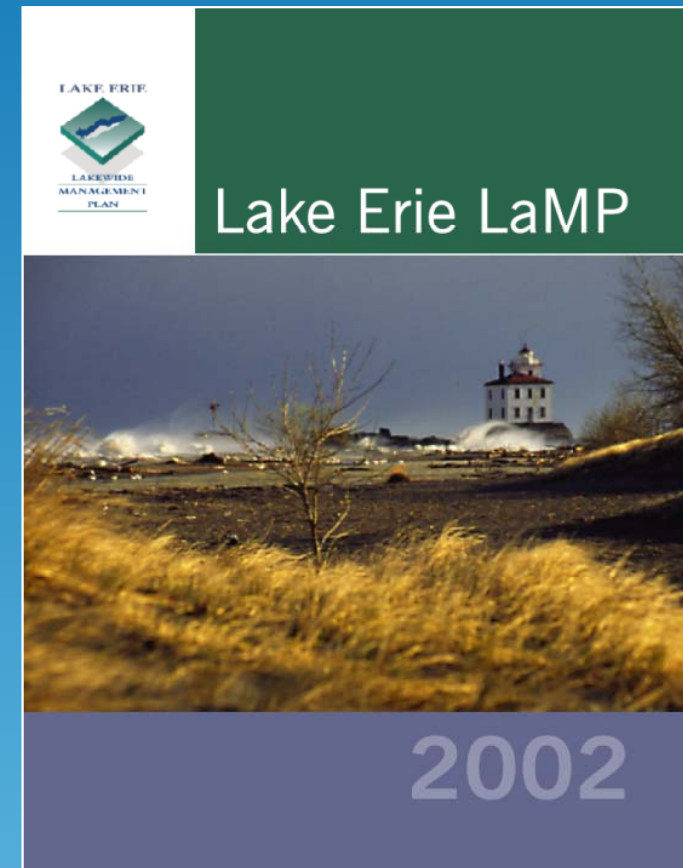
- 1) Develop LEOs for measuring status and trends of each lake (Lake Erie in 2015)
- 2) By 2016 develop nearshore framework to guide management of nearshore areas of the GLs

Annex 4: (near-term focus on Lake Erie)

- 1) By 2016 update the 1987 offshore P concentration objectives for Lake Erie and develop new nearshore P concentration objectives
- 2) By 2016 establish P loadings targets and loadings allocations to achieve the P concentration targets
- 3) By 2018 develop and implement P reduction strategies and domestic action plans
- 4) Assess and identify sources of P and priority watersheds for action

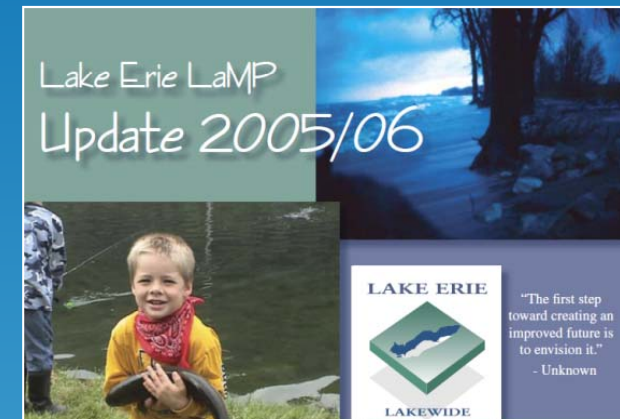
Lake Erie LAMP

- A long term ecosystem-based framework for binational management of Lake Erie
- Goal is the long-term sustainable management of the ecosystem
- Spatial Scope: Lake Erie proper including Huron-Erie Corridor, nearshore areas, embayments and river mouths
- Environmental Influence: May occur anywhere within the watershed or from outside



Lake Erie LAMP

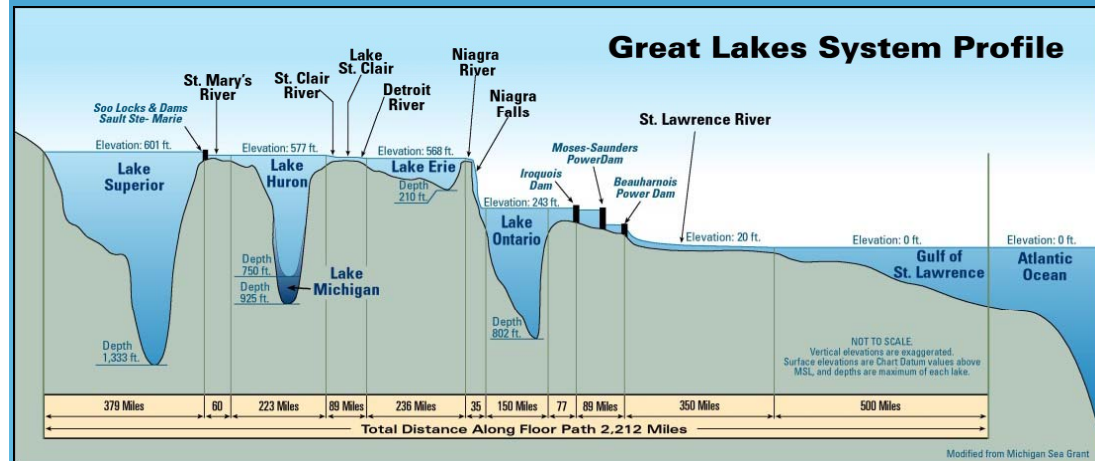
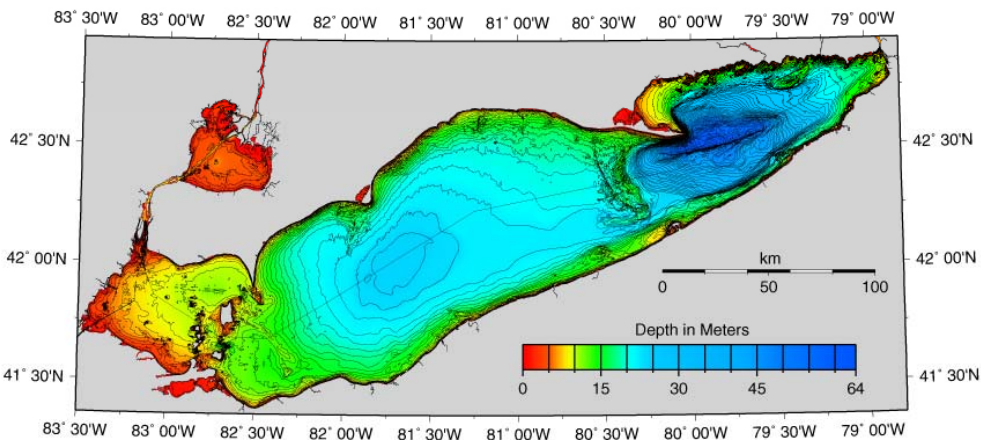
- Binational partnership, collaborative in nature, a forum for ongoing discussion, understanding and resolution
- Representatives from: Federal, Provincial and State Agencies, CAs, NGOs, Academic Community, Public
- Binational science synthesis and reporting, development of binational strategies
- Domestic implementation



Lake Erie

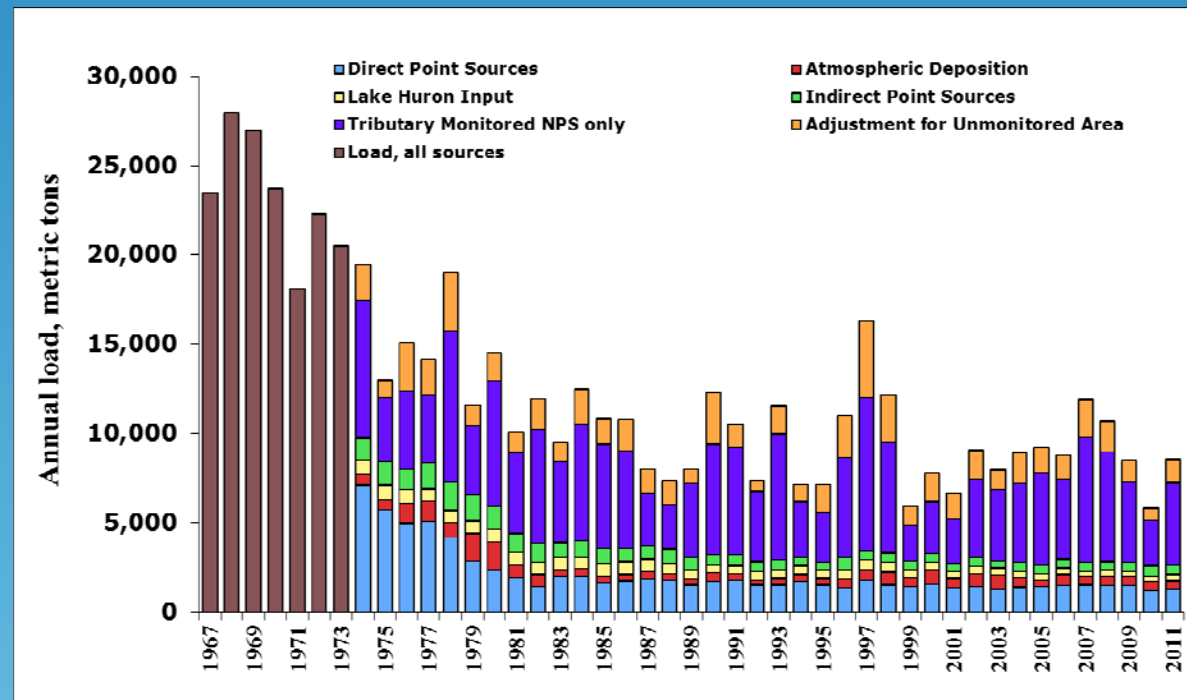
- Lake Erie is the smallest and shallowest Great Lake, the most productive and most biologically diverse
- Watershed is largely agriculture, but some very large urban centres and areas of intense industrial activity
- Three distinct basins – west to east depth, nutrient gradients
- Inflow from the Detroit River (80%), precipitation (11%), tributaries (9%)
- Nutrients are the top issue in Lake Erie: western basin HABs, central basin hypoxia, eastern basin nearshore attached algae

Bathymetry of Lake Erie and Lake Saint Clair



Nutrient Issues in Lake Erie

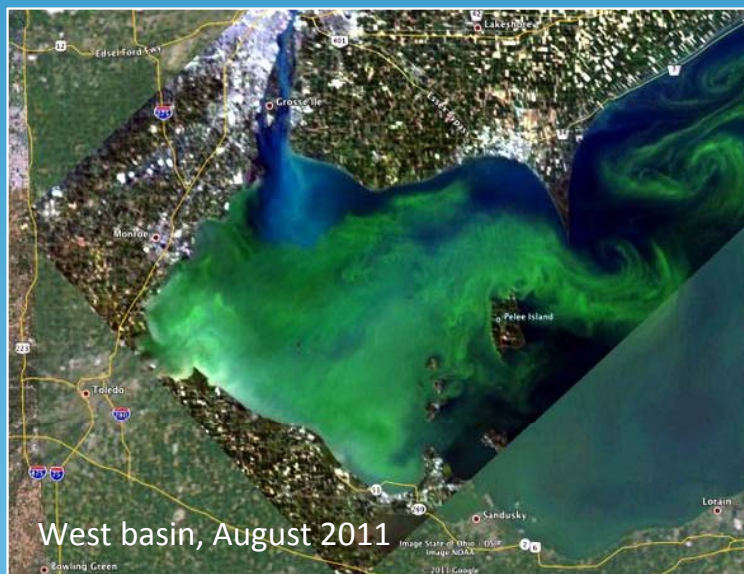
- Annual phosphorus loading to the lake peaked at almost 28,000 metric tonnes in 1968
- The 1972 GLWQA resulted in efforts to reduce TP loading from point sources
 - improvements to STPs
 - reduction of phosphates in laundry soaps and detergents
- By 1981 annual TP loading had reached the GLWQA target load



Scavia et al. 2014

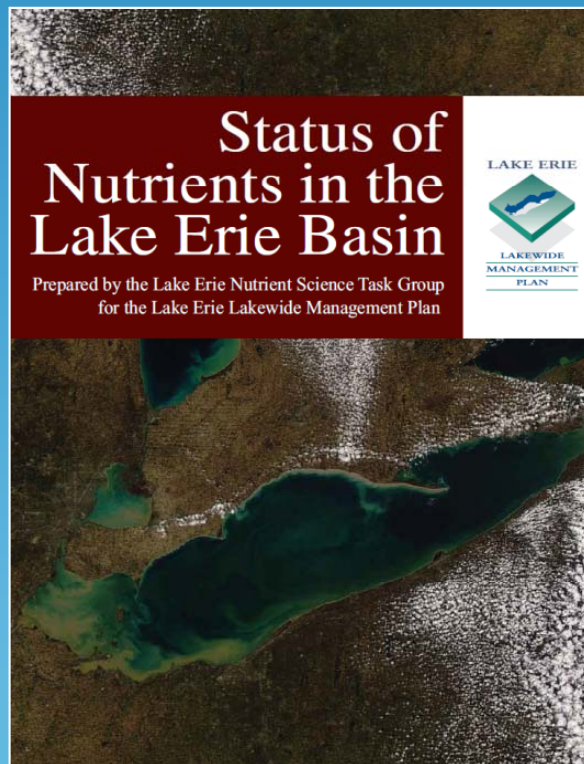
Nutrient Issues in Lake Erie

- Starting in the mid-1990s, Lake Erie once again experiencing significant algal blooms – these escalated through the 2000s
- In the west basin, potentially toxic blooms of blue-green algae (*Microcystis*) have become a regular occurrence
- In the east basin (and throughout much of the lake), *Cladophora* is again fouling nearshore areas



Lake Erie Binational Nutrient Management Strategy

- In 2007 Nutrient Science Task Group formed to assess the status of nutrients in Lake Erie (2009 report)
- The scientific foundation for the *Lake Erie Binational Nutrient Management Strategy* (2012)



Lake Erie Binational Nutrient Management Strategy

Goals:

- Nutrient inputs from both point and non-point sources are managed to ensure that ambient concentrations are within bounds of sustainable watershed management and consistent with the Lake Erie Vision
- A substantial reduction in the present levels of algal biomass to levels below a nuisance condition including bays and other areas where nuisance algal blooms may occur

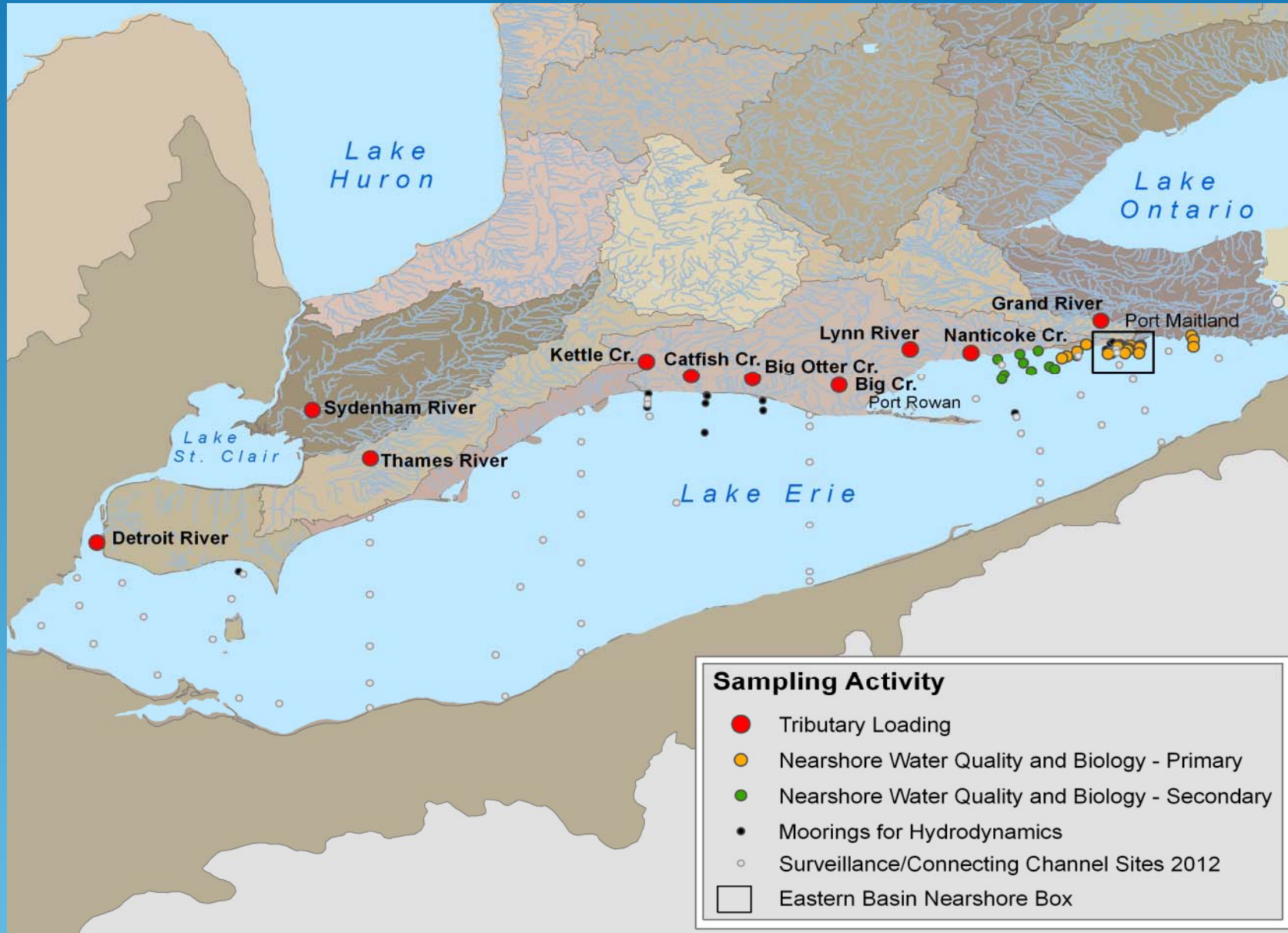
Great Lakes Nutrient Initiative

Objectives:

1. Establish current **nutrient loadings** from selected Canadian tributaries.
2. Enhance knowledge of the **factors that impact tributary and nearshore water quality**, ecosystem health, and algae growth.
3. Establish **binational lake ecosystem objectives**, phosphorus objectives, and phosphorous load reduction targets.
4. Develop **policy options** and strategies to meet phosphorous reduction targets.
5. Develop a binational **nearshore assessment** and management framework.
6. Framework for other lakes



GLNI Research Areas



Lake Huron – Lake Erie Corridor

Annex 2 says ...

The Parties shall document and coordinate management actions through the development of Lakewide Action & Management Plans (LAMP) for each Great Lake as follows:

Lake Erie, and the St. Clair River,
Lake St. Clair, and the Detroit
River



Lake St. Clair

2005

Canadian
Technical
Report

2006

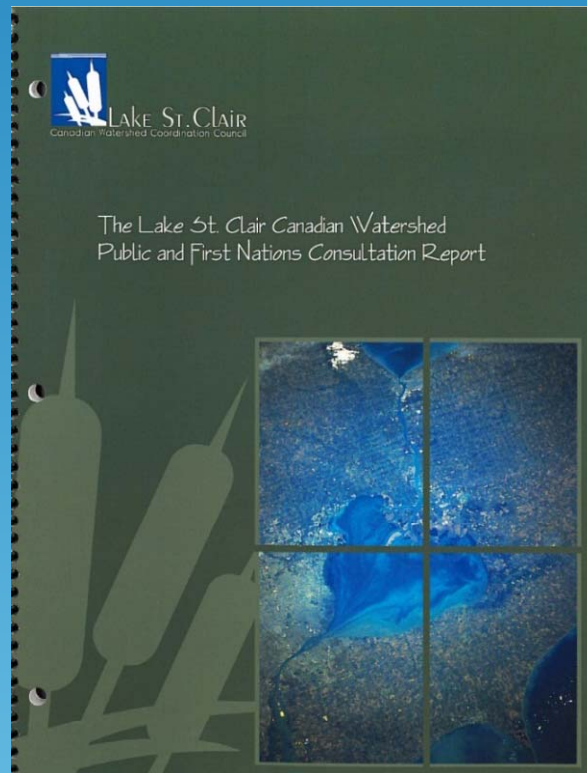
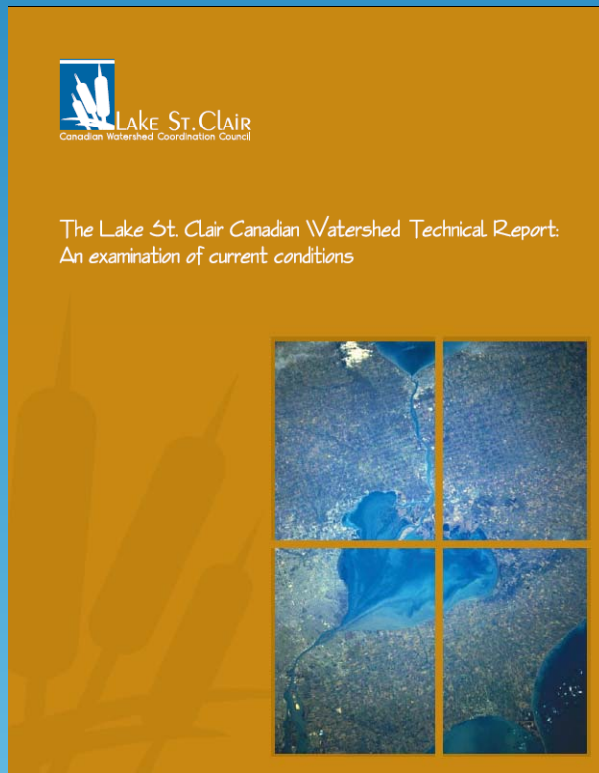
Consultation
Report

2008

Canadian
Management
Plan

2011

Canadian
Work Plan

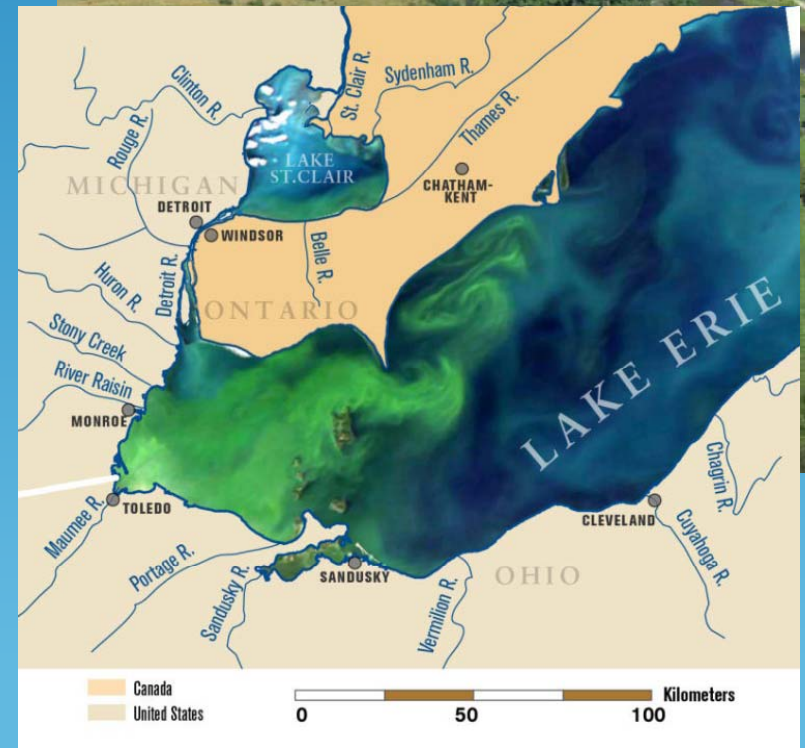


Lake St. Clair

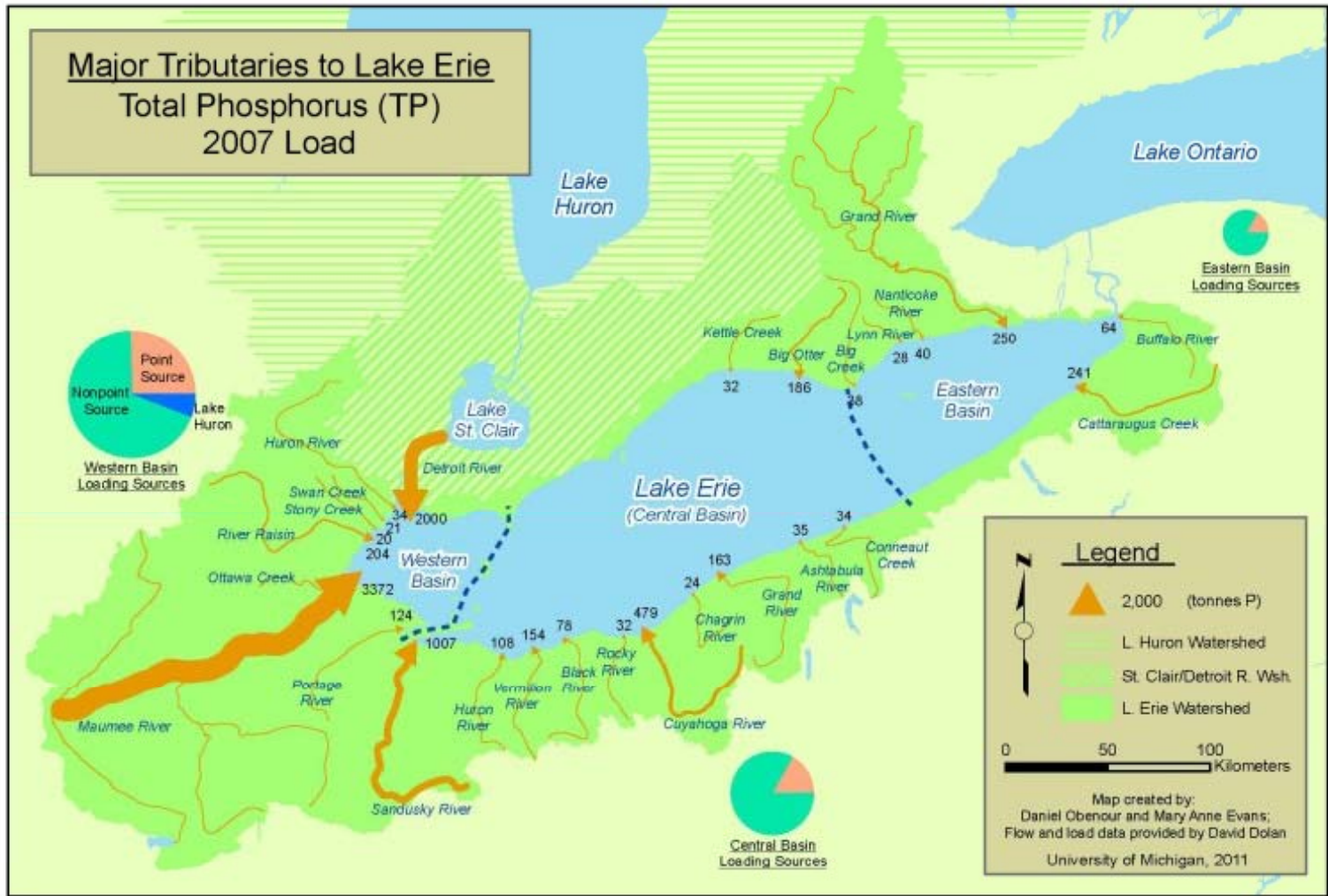
- Work plan organized using the same categories as technical report:
 - commercial navigation and recreational boating
 - sources of pollution
 - human health
 - habitat and biodiversity
 - fishing and hunting
 - land use management
 - monitoring, scientific studies and data management

Priority Watershed - Thames River

- The second largest Canadian watershed in the Lake Erie basin (5,285 km²; 279 km)
- A priority watershed of the **Lake St. Clair Canadian Watershed Management Plan**
- A priority area under the **LAMP Habitat Strategy**
- A priority watershed under the **LAMP Binational Nutrient Management Strategy**
 - Major load to Lake St. Clair, implicated in HABs
 - Influences the nearshore of Lake St. Clair and the Detroit River

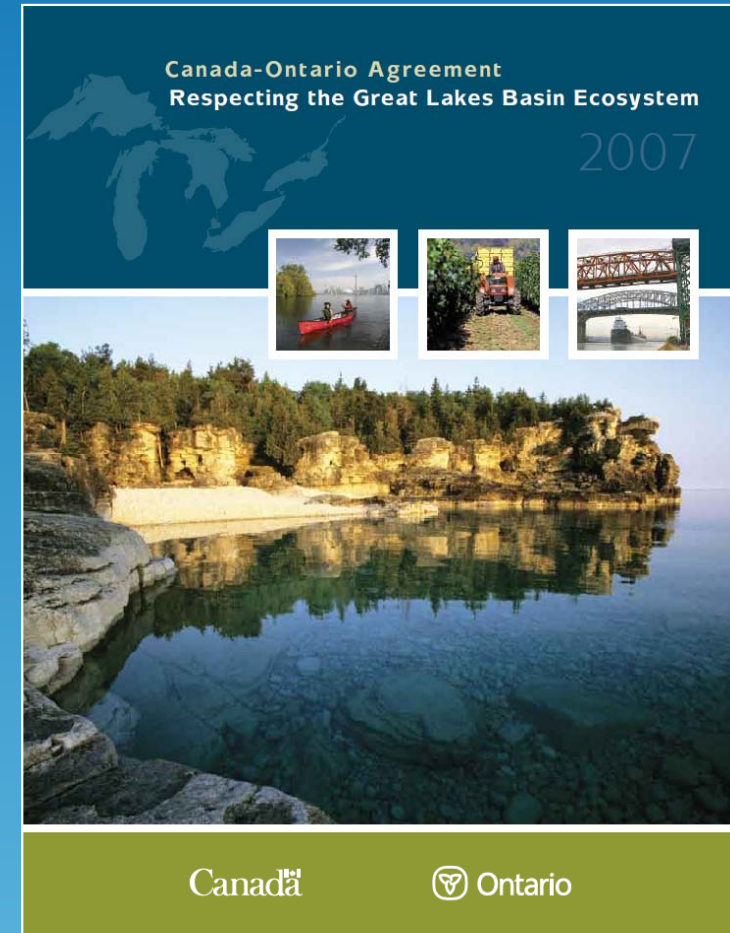


**Major Tributaries to Lake Erie
Total Phosphorus (TP)
2007 Load**

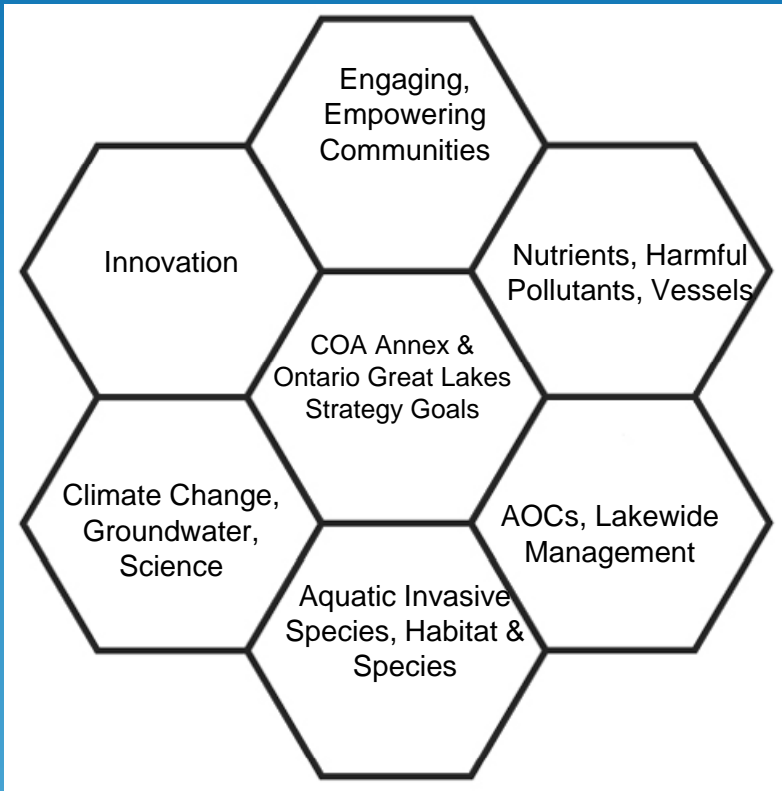


Canada-Ontario Agreement (COA)

- Canada-Ontario Agreement Respecting the Great Lakes Basin first signed in 1971
- How Canada and Ontario will cooperate and coordinate efforts to meet Canada's obligations under the GLWQA
- Renewed numerous times (last in 2007)
- New agreement has been drafted and expected to take force in 2015



Annex/Strategy Committees



Annex Leads:
 Provincial Strategy and COA leads to provide advice and leadership in implementation of Strategy, COA Annexes and GLWQA, as necessary.

GL Strategy Goals	COA Annexes	GLWQA Annexes
1. Engaging and Empowering Communities	Engaging Communities, First Nations and Métis	<i>No specific Annex</i>
2. Protecting Water for Human and Ecological Health	Nutrients	Nutrients
	Harmful Pollutants	Chemicals of Mutual Concern
3. Improving Wetlands, Beaches and Coastal Areas	Discharges from Vessels	Discharges from Vessels
	Areas of Concern	Areas of Concern
	Lakewide Management	Lakewide Management
4. Protecting Habitats and Species	Aquatic Invasive Species	Aquatic Invasive Species
	Habitat and Species	Habitat and Species
5. Enhancing Understanding and Adaptation	Groundwater	Groundwater
	Climate Change Impacts	Climate Change Impacts
	Science	Science
6. Ensuring Environ. Sust. Econ. Oppor. & Innovation	Innovation	<i>No specific Annex</i>

Canada-Ontario Agreement: AOCs and LAMPs

- Agreement articulates detailed activities to protect and improve the quality of the Great Lakes in the 14 Annexes
- Annex 4 identifies Areas of Concern and the activities required to develop Remedial Action Plans (RAPs) to restore Beneficial Use Impairments (BUIs)
- Annex 5 identifies Lakewide Action Management Plans (LAMPs)
- Agreement supports the key priorities outlined in Ontario's Great Lakes Strategy, and international commitments outlined in the Great Lakes Water Quality Agreement)

