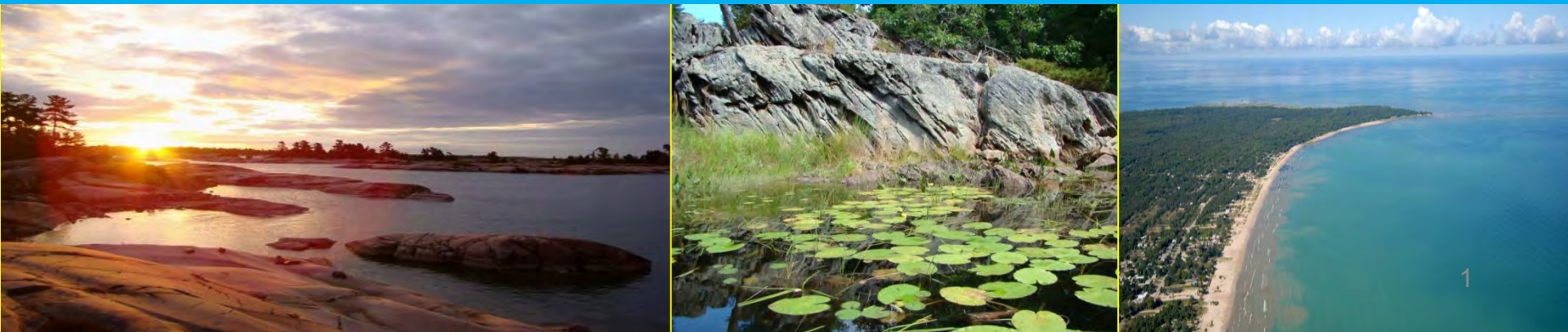




GREAT LAKES / LAKE HURON WATER QUALITY: PROGRAMS AND INITIATIVES

Greg Mayne (ECCC), Ted Briggs (MOECC)
March 17, 2017

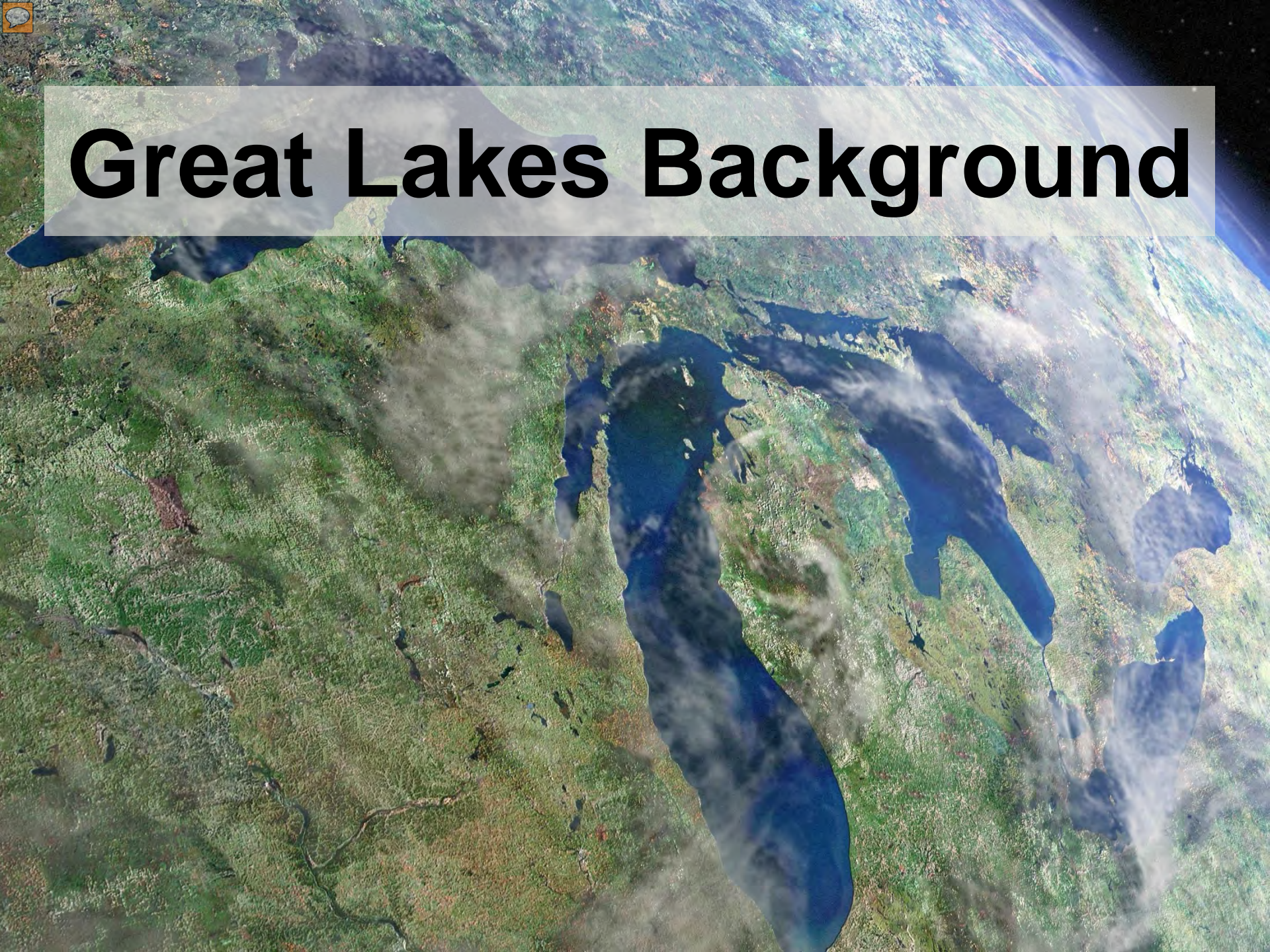


Presentation Overview

- Great Lakes Background / Environmental Issues
- Great Lakes Governance
- Lake Huron Partnership
- Canadian Domestic Initiatives



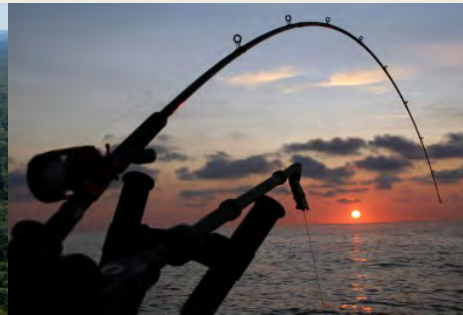
Great Lakes Background

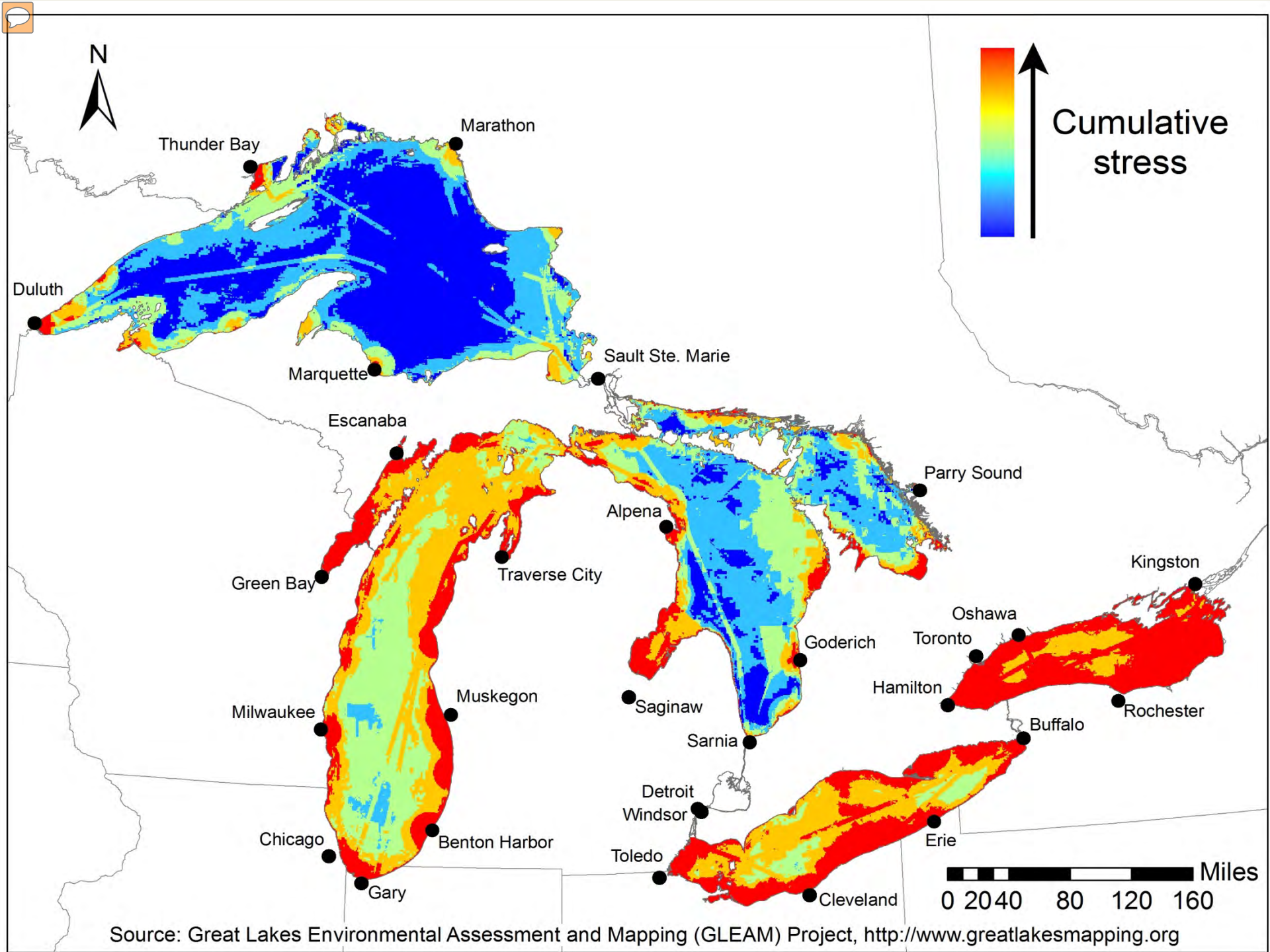




The Great Lakes: A Shared Resource

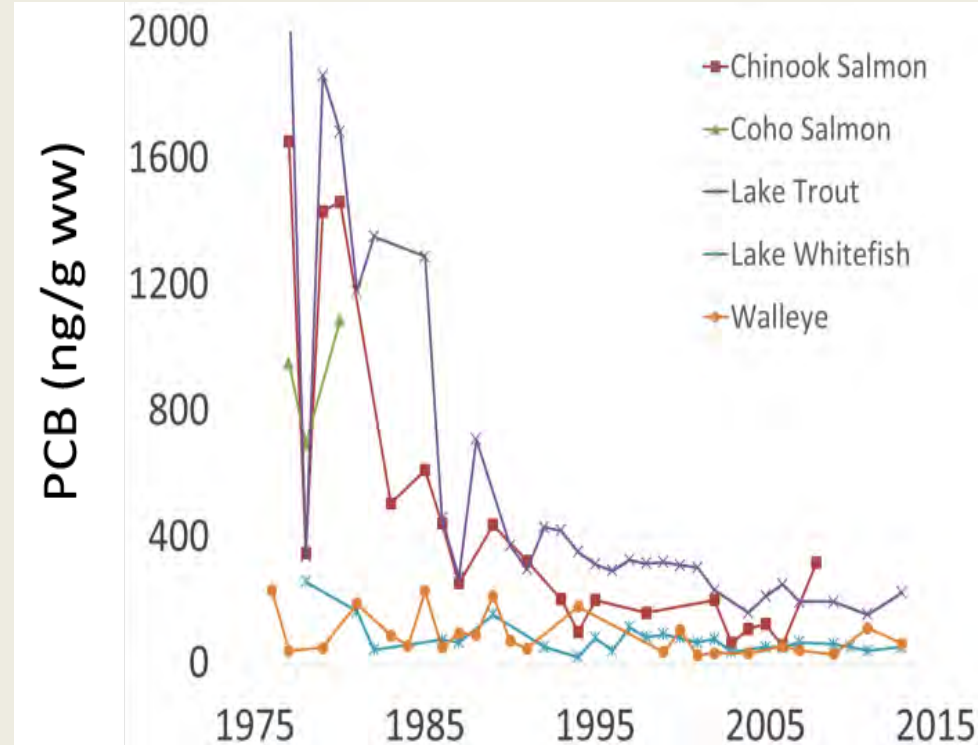
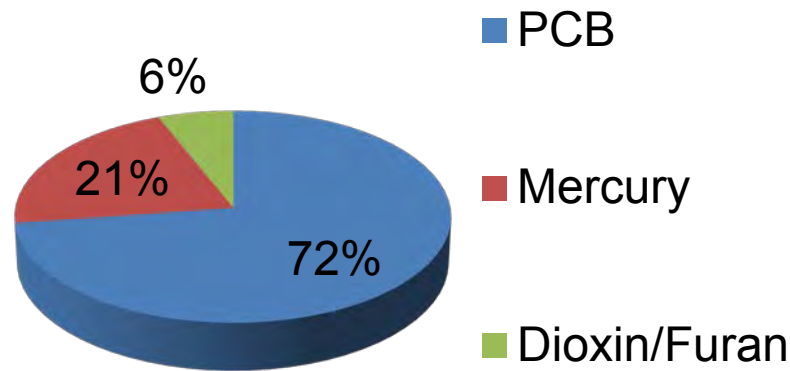
- Regional economy ~ 5.8 trillion U.S.
- Source of drinking water for one in four Canadians
- 250 million tons of cargo shipped; \$2.6 billion/yr
- 60,000 farms in the Great Lakes basin contribute \$53.4 billion GDP
- Commercial and recreational fishing contribute \$8.3 billion to region's economy
- \$7 billion in tourism revenue
- Supports 279 globally rare plants, animals and natural communities; \approx 150 fishes





Source: Great Lakes Environmental Assessment and Mapping (GLEAM) Project, <http://www.greatlakesmapping.org>

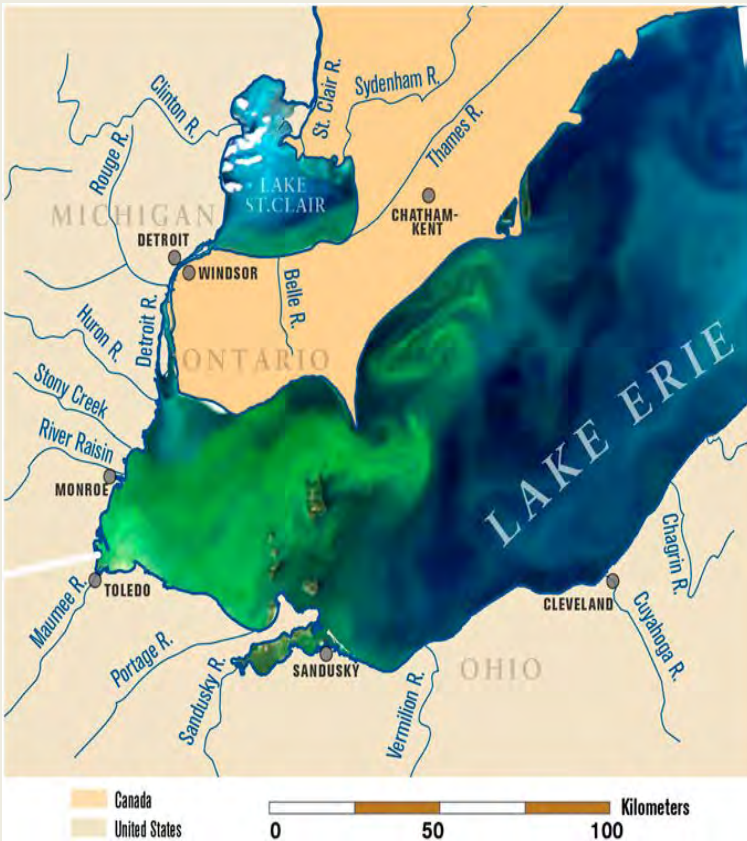
Chemical Contaminants/Fish Consumption Advisories



Percentage of the consumption restrictions caused by PCBs, Hg, and Dioxin contaminants (OMOECC, 2015).

Concentrations of PCB for fish Measurements for 55-65 cm for Chinook and Coho Salmon and Lake Trout, and 45-55 cm for Lake Whitefish and Walleye were used (OMOECC, 2015).

Phosphorus – *addressing harmful and nuisance algae*



Source: Michalak et al. PNAS | April 16, 2013 | vol. 110 | no. 16

Aquatic Invasive Species



Loss of Habitat and Native Species

- Maintain and restore the viability of native plant and animal communities by conserving the habitats and processes that sustain them



Climate Change Impacts

- Coordinate efforts to identify, quantify, understand and predict climate change impacts
- Share information with Great Lakes resource managers



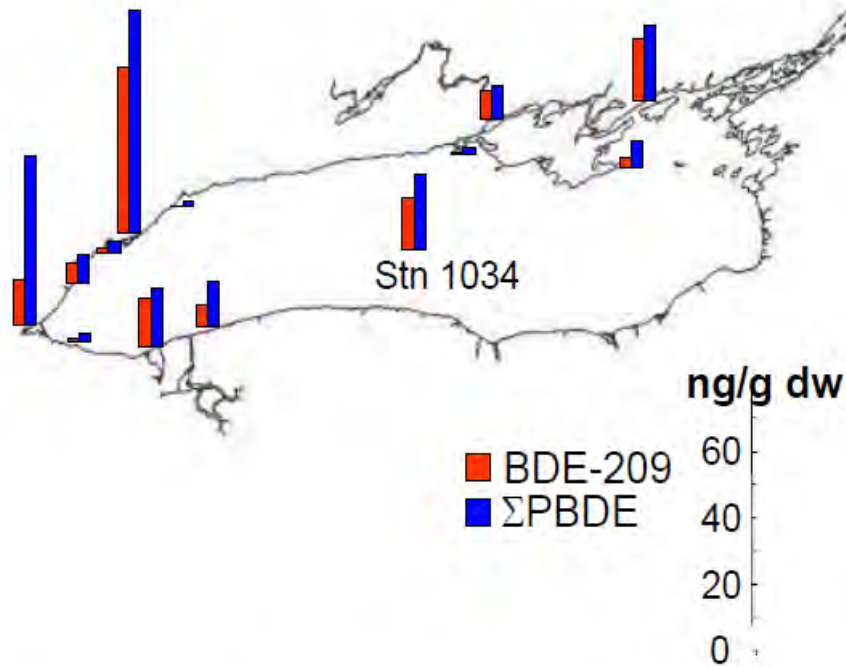
Severe storm event and flooded field



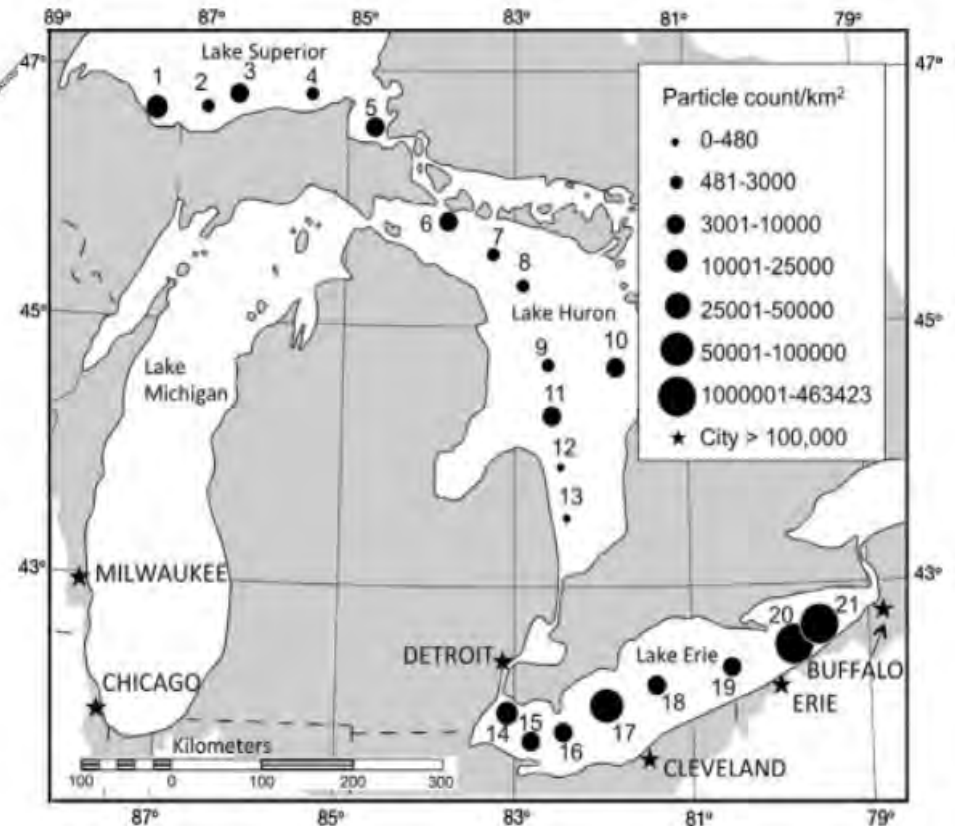
Sustained low water levels.

Other Great Lakes Issues

New and Emerging Chemicals



Distribution of brominated flame retardants in Great Lakes sediments

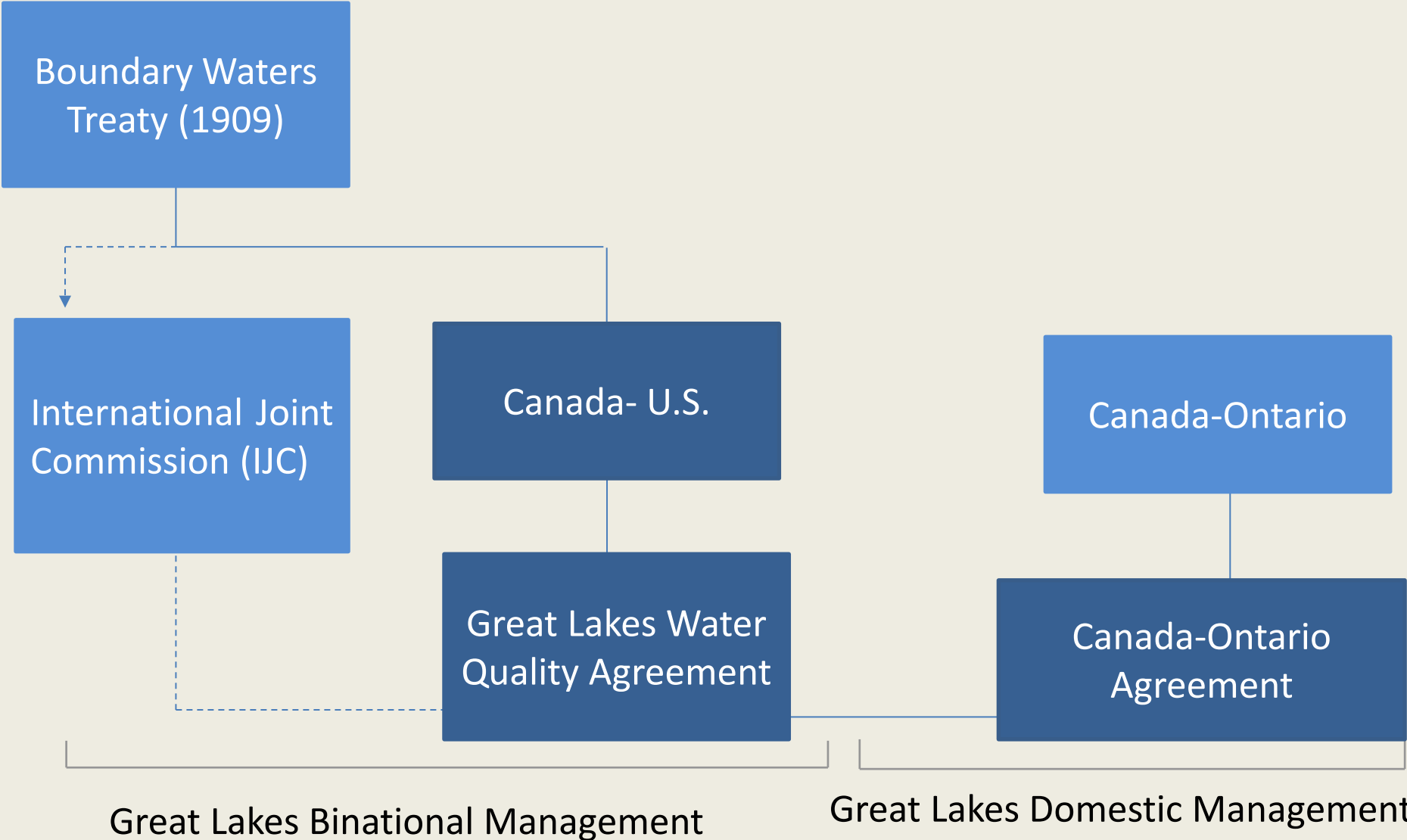


Distribution of plastic particles by count for 21 samples collected in three of the Great Lakes.



Great Lakes Governance

GLWQA and COA



Great Lakes Water Quality Agreement: A Centrepiece of Action

1972

Reduce Phosphorus Loading

Reduction of visible pollution

1978

Persistent Toxic Substances

Ecosystem Approach to management

1983

(Phosphorus Supplement)

Updated Phosphorus reduction targets

1987

Remedial Action Plans for Areas of Concern

Lakewide Management Plans

2012

Chemicals of Concern

Nutrients

Climate Change

Habitats & Species

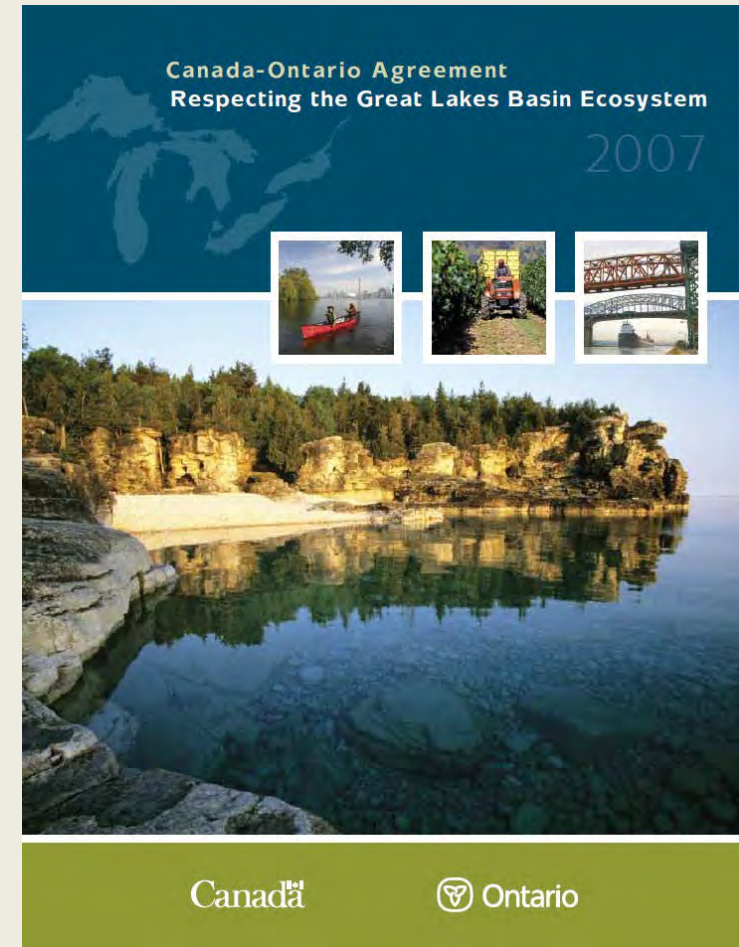
Invasive Species

Science

Groundwater

Canada-Ontario Agreement (COA)

- Defines how Canada and Ontario will cooperate and coordinate efforts to meet Canada's obligations under the GLWQA

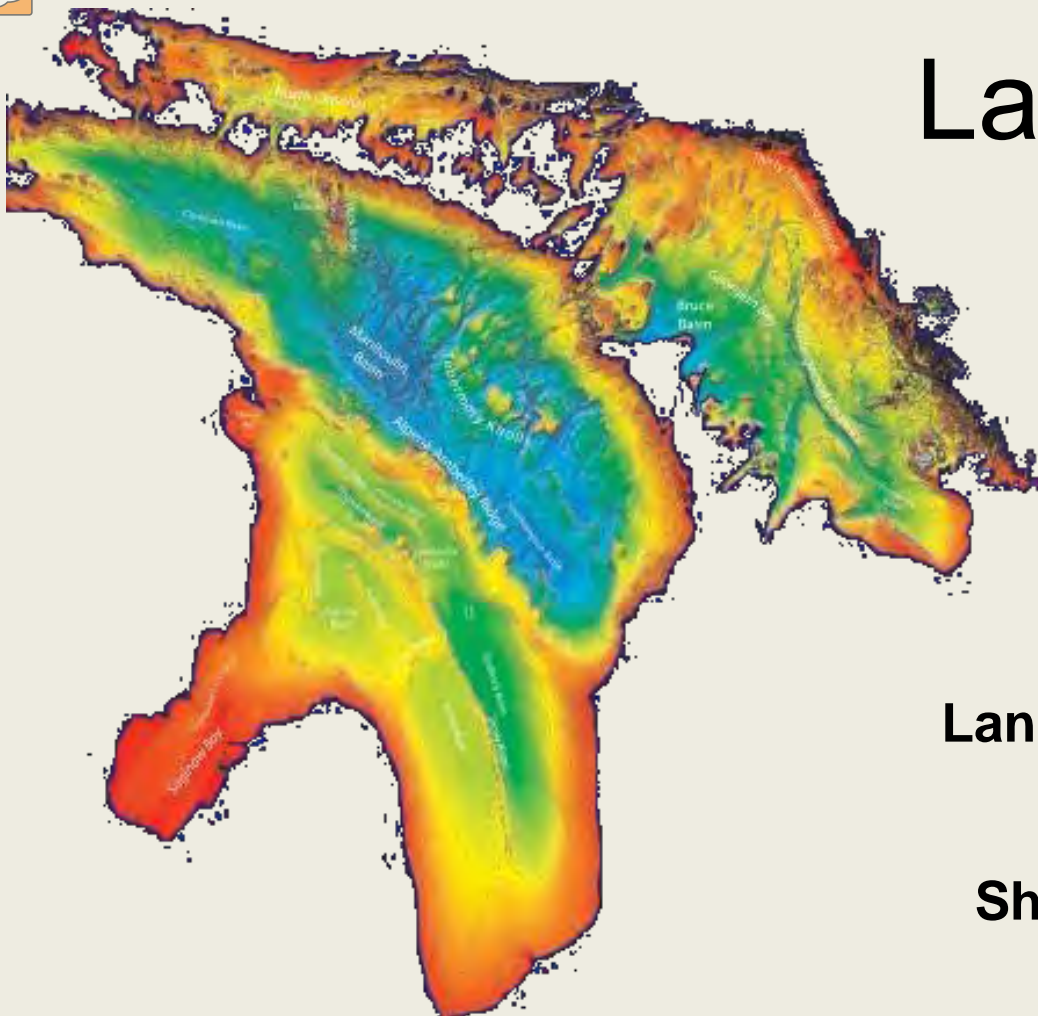


Taking Action on a Lakewide Scale: Lake Huron





Lake Huron Facts



Volume 850 cu. mi.
3,540 cu. km.

Water Area 23,000 sq. mi.
59,600 sq. km.

Land Drainage Area 51,700 sq. mi.
134,100 sq. km.

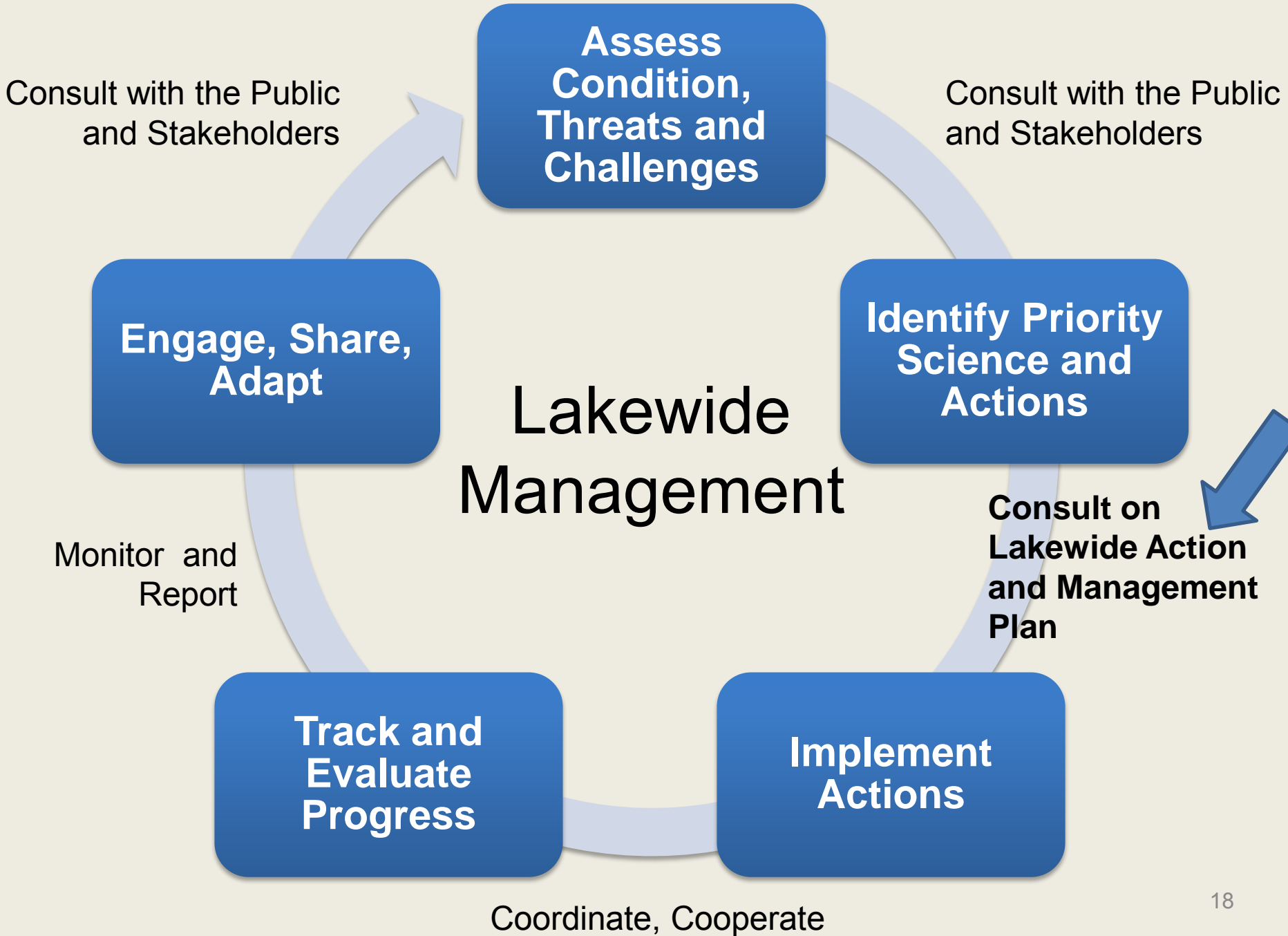
Shoreline Length 3,827 mi.
6,157 km.

Population Roughly 3 million

Retention Time 22 years

Average Depth 195 ft
59 m

Maximum Depth 750 ft
229 m



The Lake Huron Partnership



Environment and
Climate Change Canada

Environnement et
Changement climatique Canada



Fisheries and Oceans
Canada

Pêches et Océans
Canada



Ministry of the Environment and Climate Change



Ministry of Natural Resources and Forestry

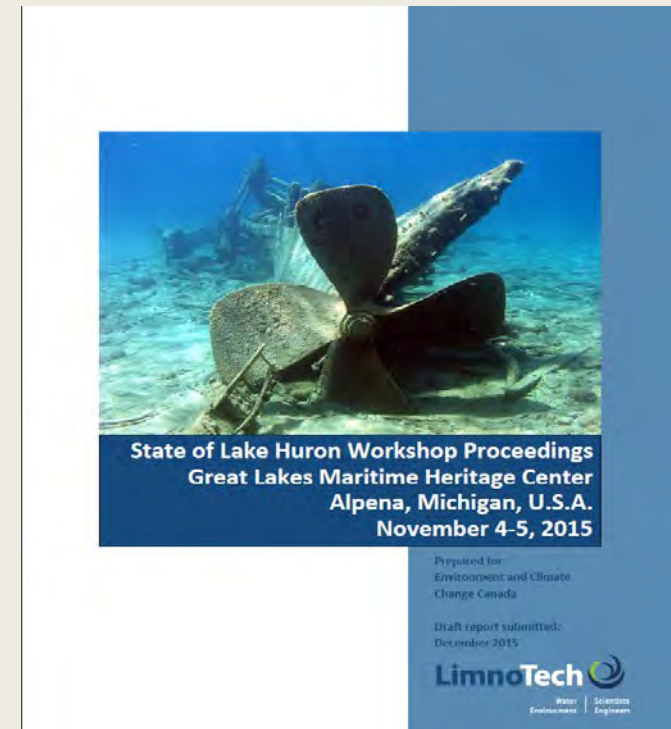
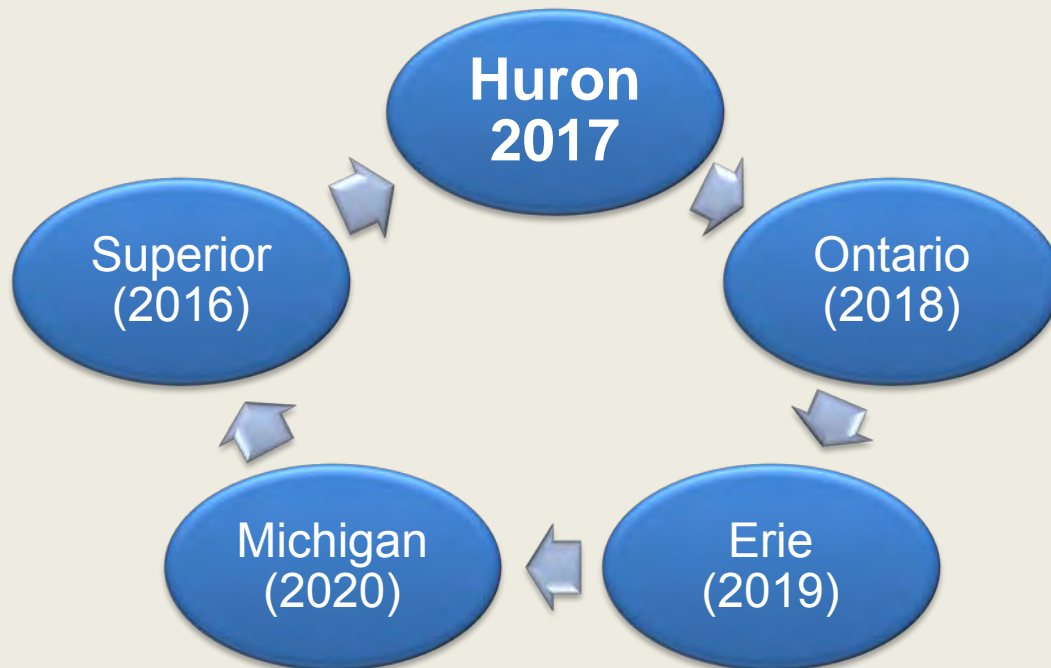


Natural Resources Conservation Service



Cooperative Science and Monitoring Initiative (CSMI)

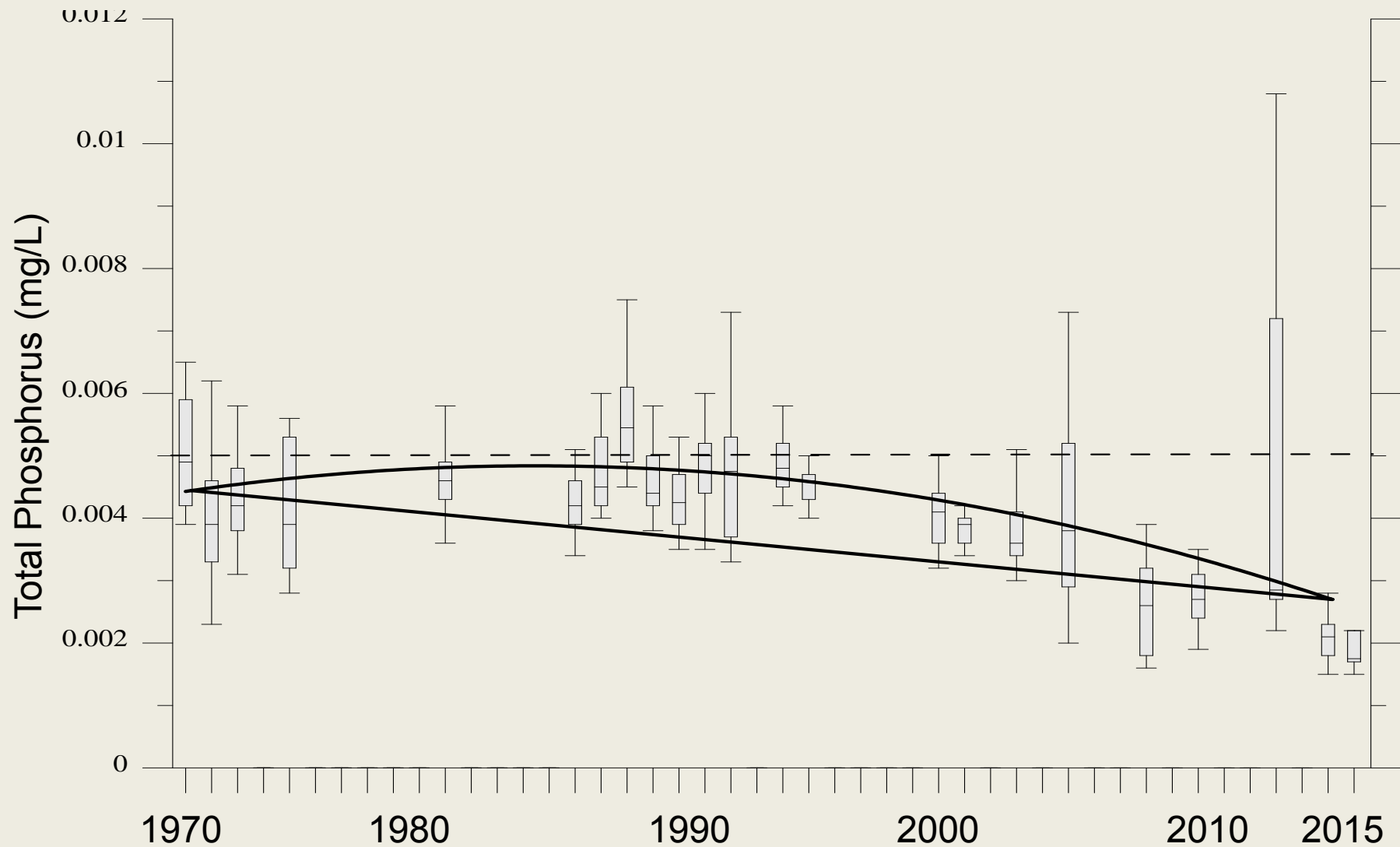
- Five year cycle
- Facilitates coordination of existing research and monitoring
- Focuses federal, provincial, state resources on priorities



Proceedings available - lakehuroncommunityaction.ca



Spring Total Phosphorus 1970-2015



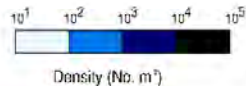
Quagga Mussels



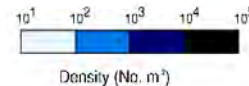
Comparison of quagga (left) and zebra (right) mussel. Michigan Sea Grant.

Source: Thomas F. Nalepa
Water Center, Graham Institute, University
of Michigan

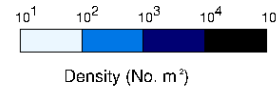
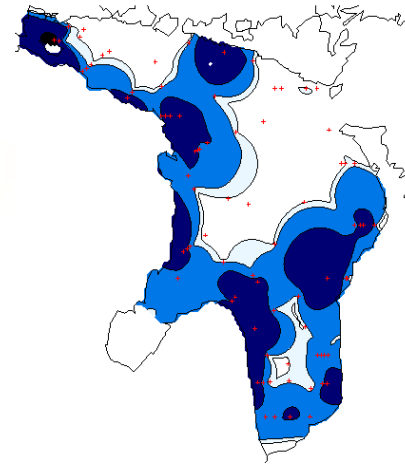
2000



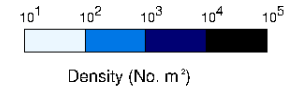
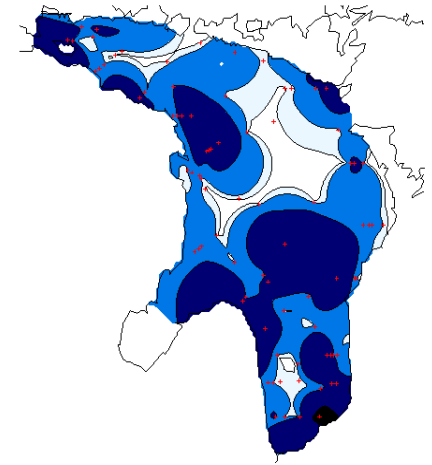
2003



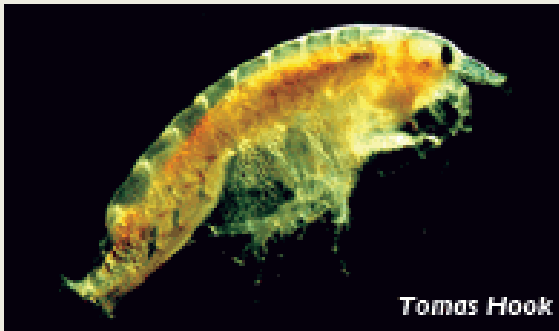
2007



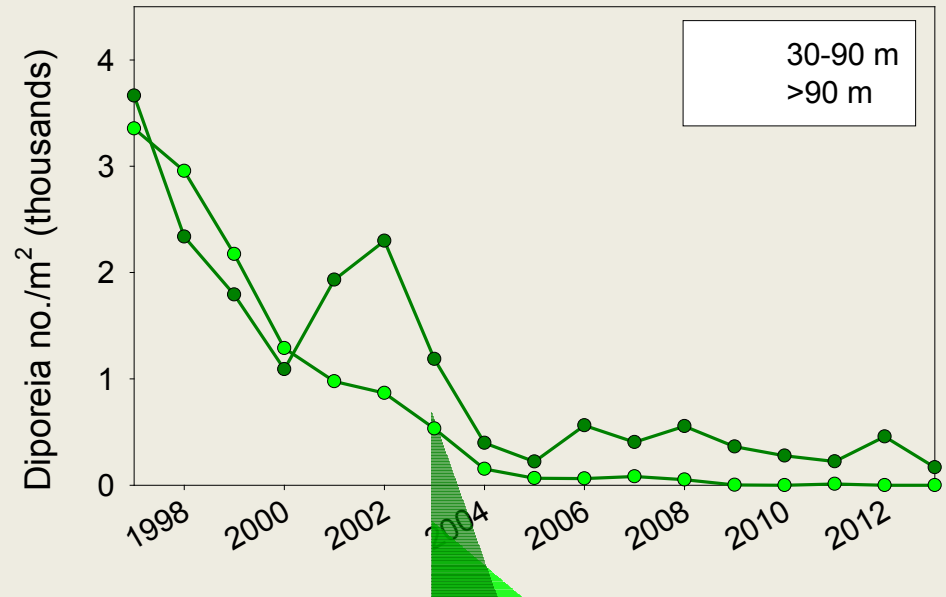
2012



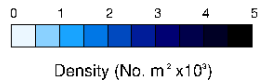
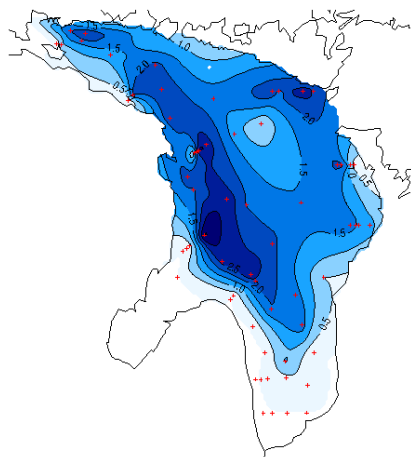
Diporeia



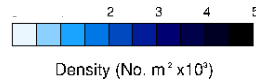
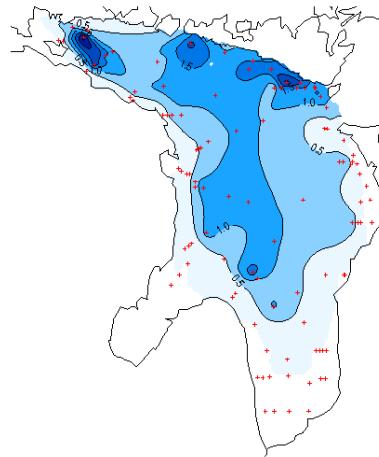
Source: Thomas F. Nalepa,
Graham institute, University of Michigan



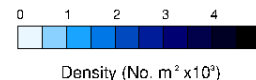
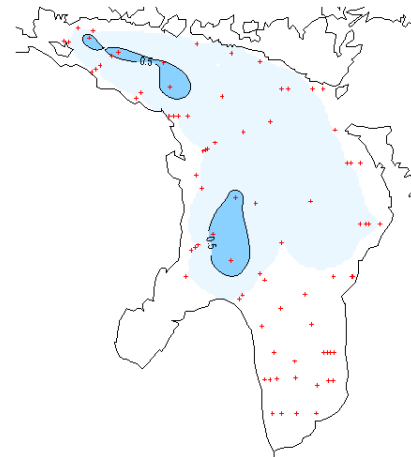
2000



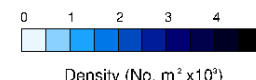
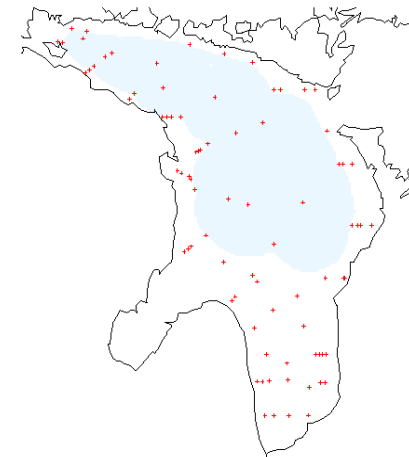
2003



2007



2012



Lakewide Action and Management Plan

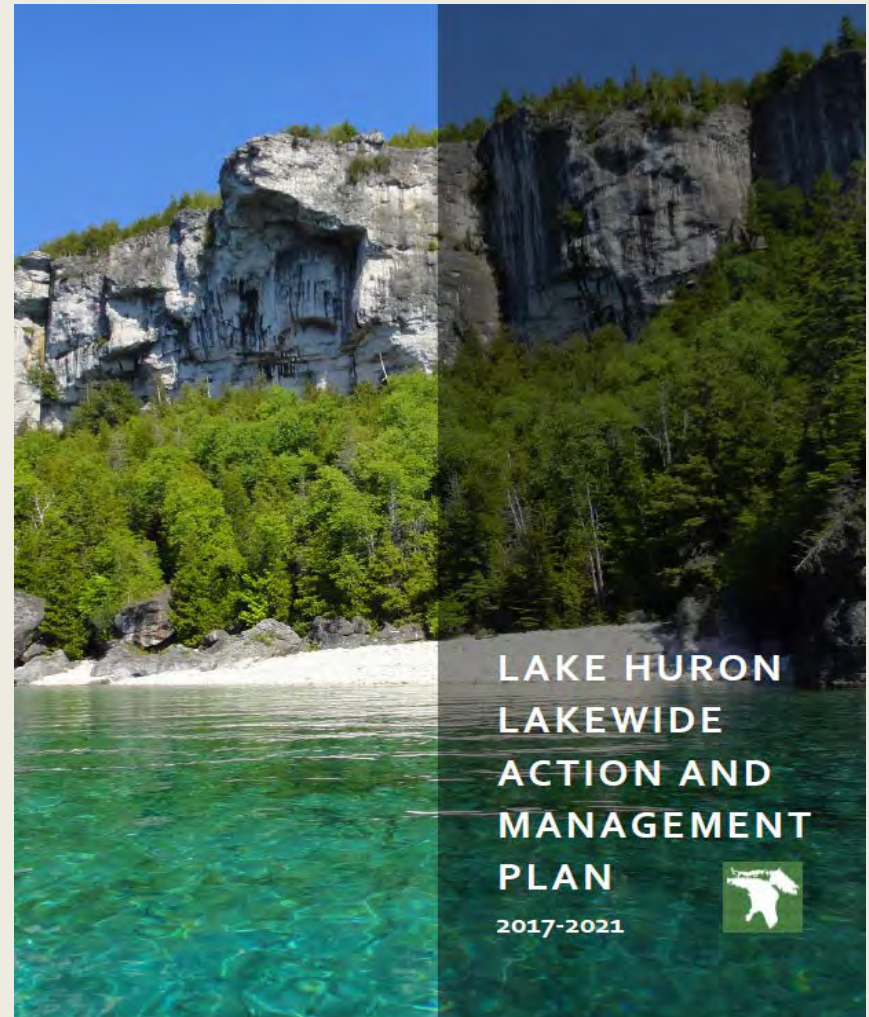
A collaborative, science-based process that answers three questions:

- How is the lake doing?
- What is stressing the lake?
- What additional actions are necessary?

A mechanism to help coordinate and facilitate:

- Taking action
- Tracking progress
- Report

Available for review soon at binational.net



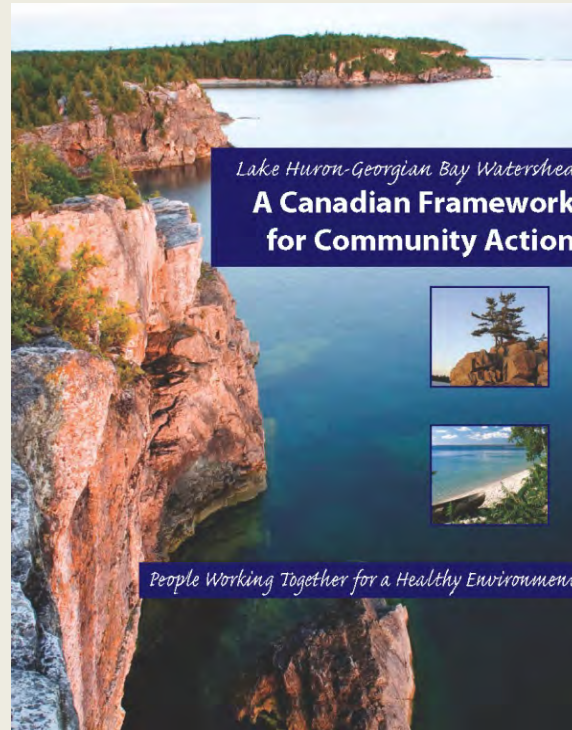
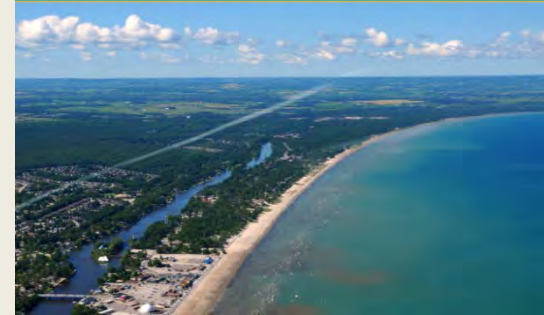


Taking Action Through Domestic Initiatives

Domestic Initiatives



Southern Georgian Bay SHORELINE STEWARDSHIP GUIDE





Lake Simcoe/South-eastern Georgian Bay Clean-Up Fund

The 2012-2017 \$29-million Lake Simcoe/South-eastern Georgian Bay Clean-Up Fund supports community-based projects that are focused on priorities:

Goals

- Reduce inputs of excess nutrients
- Conserve critical aquatic habitat and native species
- Improved monitoring, science and assessment

Objective	Total Projects	Total Funding
Research & Monitoring	43	\$6,264,073
Aquatic Habitat Restoration	27	\$5,867,369
Non-point Source P Reduction	30	\$6,886,888
Point-source P Reduction	6	\$2,724,729
Grand Total	106	\$21,743,059



Clean-Up Fund Results to Date

- **9,674 kg** of phosphorus (estimated) diverted from Lake Simcoe / Georgian Bay
- **115 ha** vegetated buffer strips
- **87.2 ha** wetlands constructed/restored
- **17.13 ha** streambank stabilized
- **2,641** cattle restricted from streams
- **25** project workshops
- **33** media reports/presentations
- **25** academic/technical reports
- **35** maps or models



Website: <https://www.ec.gc.ca/eau-water/>

Pine River Restoration NVCA



Lake Huron - Georgian Bay Watershed

A Canadian Framework for Community Action

Purpose

- Encourage active participation
- Promotes environmentally responsible *decisions*
- Establishes a shared network
- Promotes local restoration and protection initiatives



Thank you to our funding partners who have made this project possible and to the many businesses, townships, organizations, and volunteers that have invested in the *State of the Bay* program.

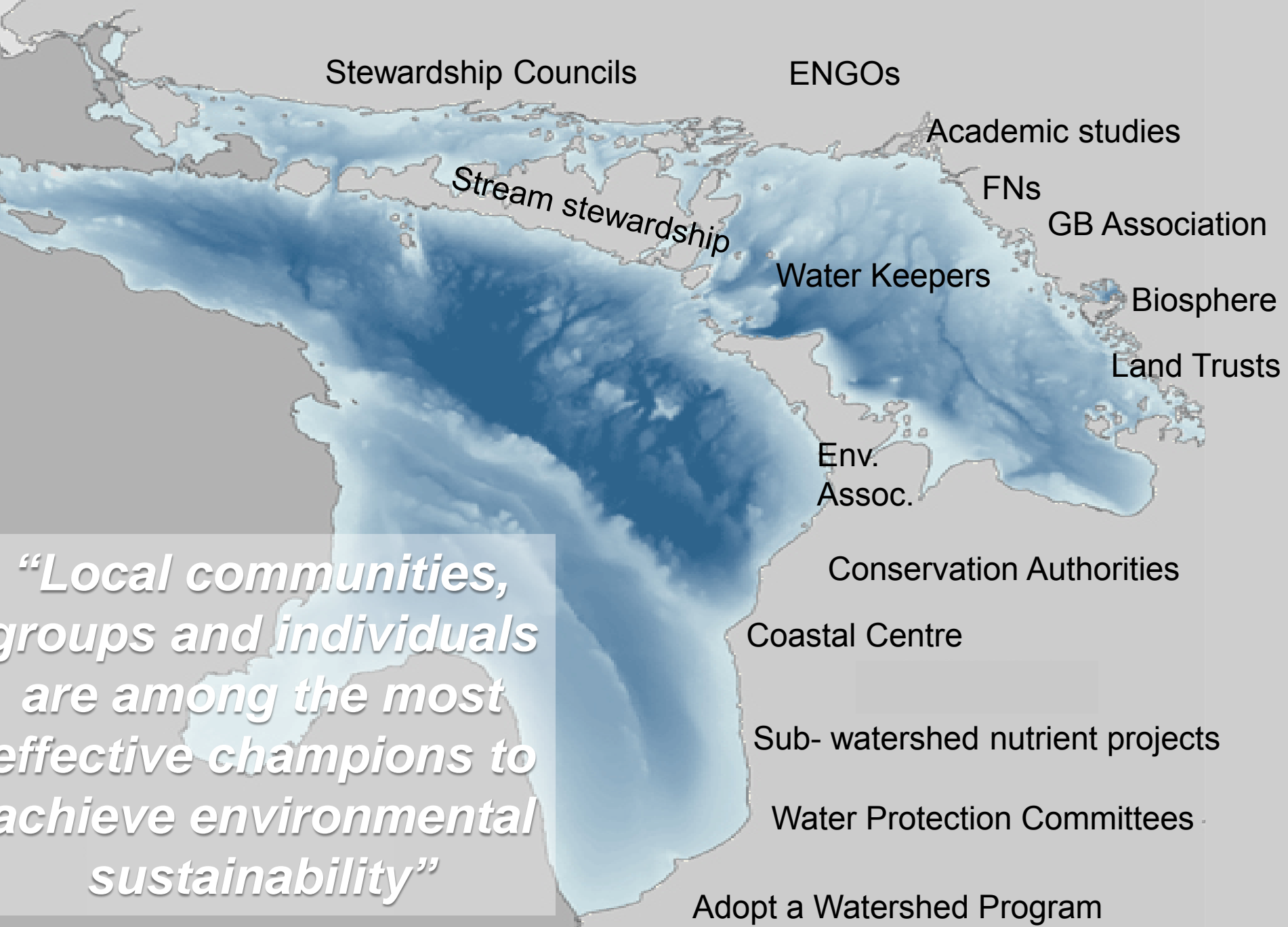


To explore your region, learn more, donate or get involved, go to: stateofthebay.gbbr.ca



Environment and Climate Change Canada

Environnement et Changement climatique Canada



Stewardship Councils

ENGOS

Academic studies

Stream stewardship

FNs

GB Association

Water Keepers

Biosphere

Land Trusts

Env.
Assoc.

Conservation Authorities

Coastal Centre

Sub- watershed nutrient projects

Water Protection Committees

Adopt a Watershed Program

*“Local communities,
groups and individuals
are among the most
effective champions to
achieve environmental
sustainability”*

Bruce Peninsula Biosphere Association: Six Streams Restoration Project



A five year initiative addressing:

- sub-watershed plans
- stream water quality
- riparian habitat
- cattle access to streams
- residential septic systems
- agricultural BMP's
- Conservation and Stewardship

Funders:



Ontario

Canada

Canada



Lake Huron - Georgian Bay Watershed
A Canadian Framework for Community Action



Ontario

Ontario
Trillium
Foundation



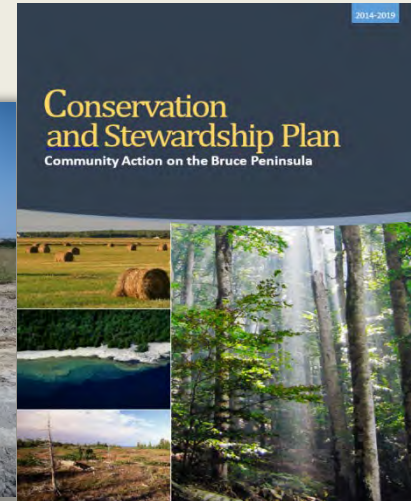
Fondation
Trillium
de l'Ontario



Six Streams Restoration Project

Results to date:

- 60 alternate water systems and fencing projects
- Over 4000 cattle excluded from three streams
- Alternate drainage systems installed at 3 farms
- Septic surveys, workshops, inspections and replacements
- Water quality monitoring conducted by certified volunteers
- Subwatershed planning
- Strong engagement of farming community
- Bruce Peninsula Conservation and Stewardship Plan





In-Stream and Riparian Restoration and Nutrient Reduction



State of the Bay Outcomes

- Partnership & Expertise
- GBA, GBF, GBLT, EGBSC, MWC
- Vision for a 5-year *State of the Bay* report card cycle
- 13 workshops delivered to ~455 participants
- Data gaps and research needs identified
- Partnerships created to get funding for these gaps/needs
- 15,000 copies distributed to 200 locations
- 6,000+ online reads, 1,200 downloads
- Social media reach 1,200 weekly
- Funding received in 2014 for water quality and fish habitat restoration projects



stateofthebay.gbbr.ca



2016 Framework Achievements

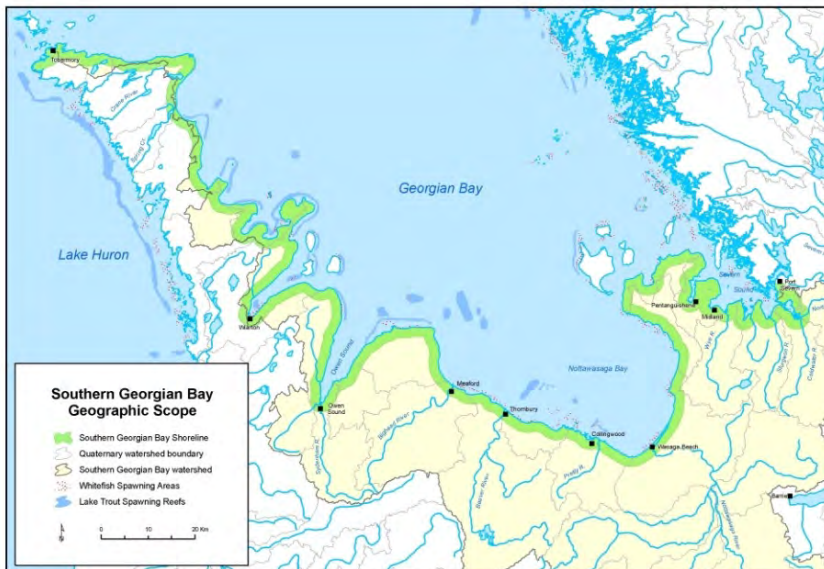
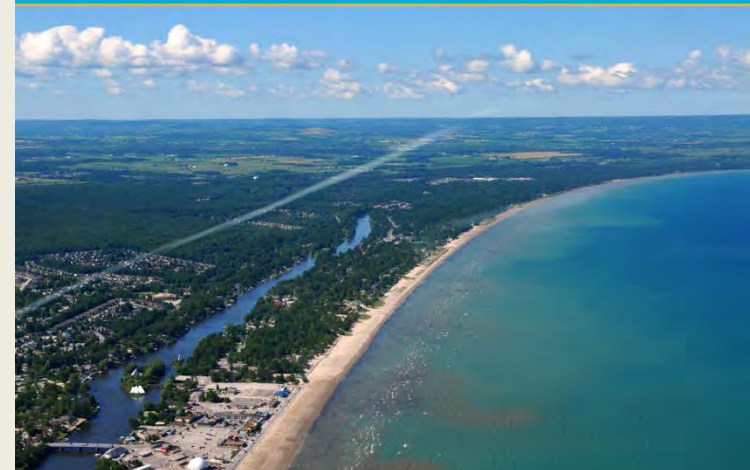
Hydrologic assessment / modeling projects initiated or completed	4
Nutrient and/or water quality monitoring projects	6
Septic systems inspected, serviced, or replaced	41
BMP demonstration sites constructed and monitored	27
Properties implementing agricultural Best Management Practices	42
Berms constructed or restored to manage stormwater	5
Buffer strips planted	2.7km ²
Properties enhanced with cattle exclusion fencing	15
Wetland restoration or construction projects completed	9
Total length of stream habitat restored	12.2km
Tree planting events	15
Community events, tours, public meetings and demonstrations hosted	37

Southern Georgian Bay Shoreline Initiative

Multi-stakeholder partnership help to coordinate measures to protect, restore or enhance tributary, coastal and nearshore ecosystems and the natural processes that maintain them.



Southern Georgian Bay SHORELINE STEWARDSHIP GUIDE



Healthy Lake Huron: Clean Water, Clean Beaches Initiative

HLH is a place-based approach to improving near-shore and tributary water quality along the Southeast Shores of Lake Huron is currently underway.

The Challenge: Persistent near shore problems with *E. coli*, nutrients and algae despite years of community and agency effort. Wide range of inputs causing the problem, including agriculture, cottage development, urban inputs, wildlife.



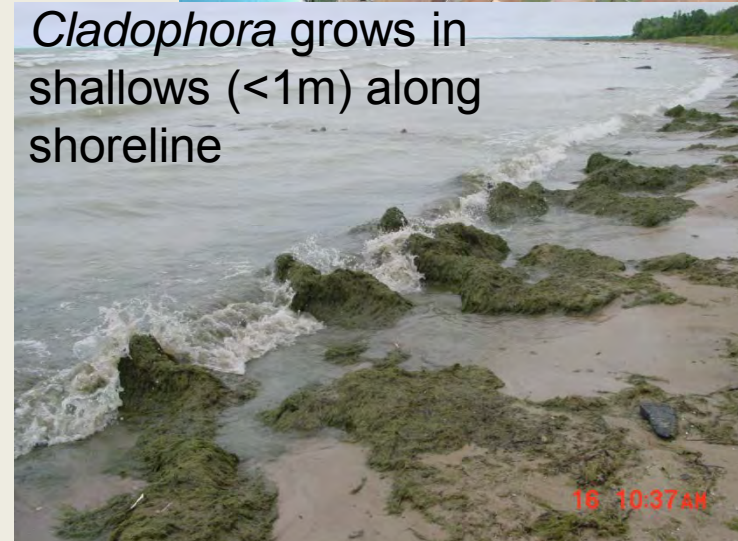
Multiple Non-Point Stressors on a Rural Landscape

A mix of factors drive nearshore water quality problems:

- Nutrient & fecal pollution from tributaries
- High density of shoreline properties serviced by septic systems
- Changing ecology of nearshore due to invasive species
- Geomorphic features of area exacerbate problems
- Poor understanding of scope for improvement or actions that might best achieve change in incidence of shore fouling by algae



Cladophora grows in shallows (<1m) along shoreline



Healthy Lake Huron Approaches

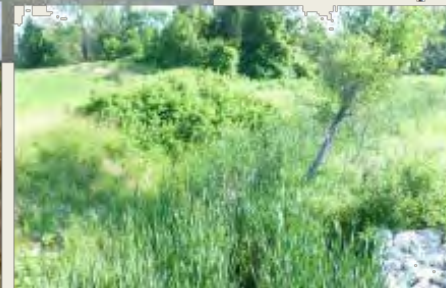


Winter Sampling

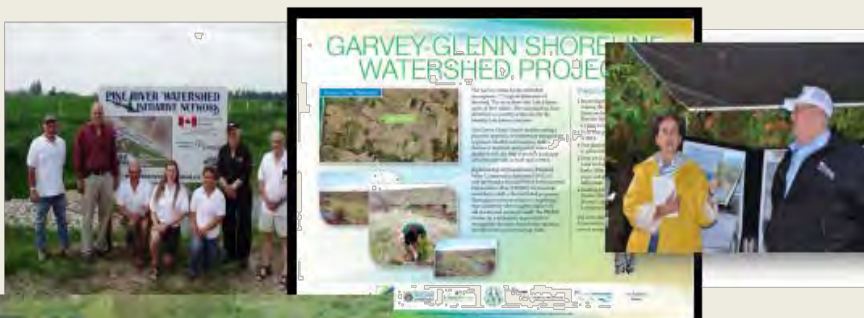
Event Sampling



Summer Sampling



Develop targets, monitoring, and watershed plans and coordinate proposals to existing funding programs.



Stewardship promotion, BMPs, inspections/regulatory compliance and link to municipal official plans.





How to Get Involved?

- Lake Huron Annual LAMP Reports (binational.net)
- Review and provide input on the development of Lakewide Action and Management Plan
- Attend a State of the Lake Huron meeting
- Attend one of the meetings or summits hosted by the multi-agency domestic initiatives
- Learn about all the Great Lakes issues and events on <http://www.great-lakes.net/>



THANK YOU



Lake Huron

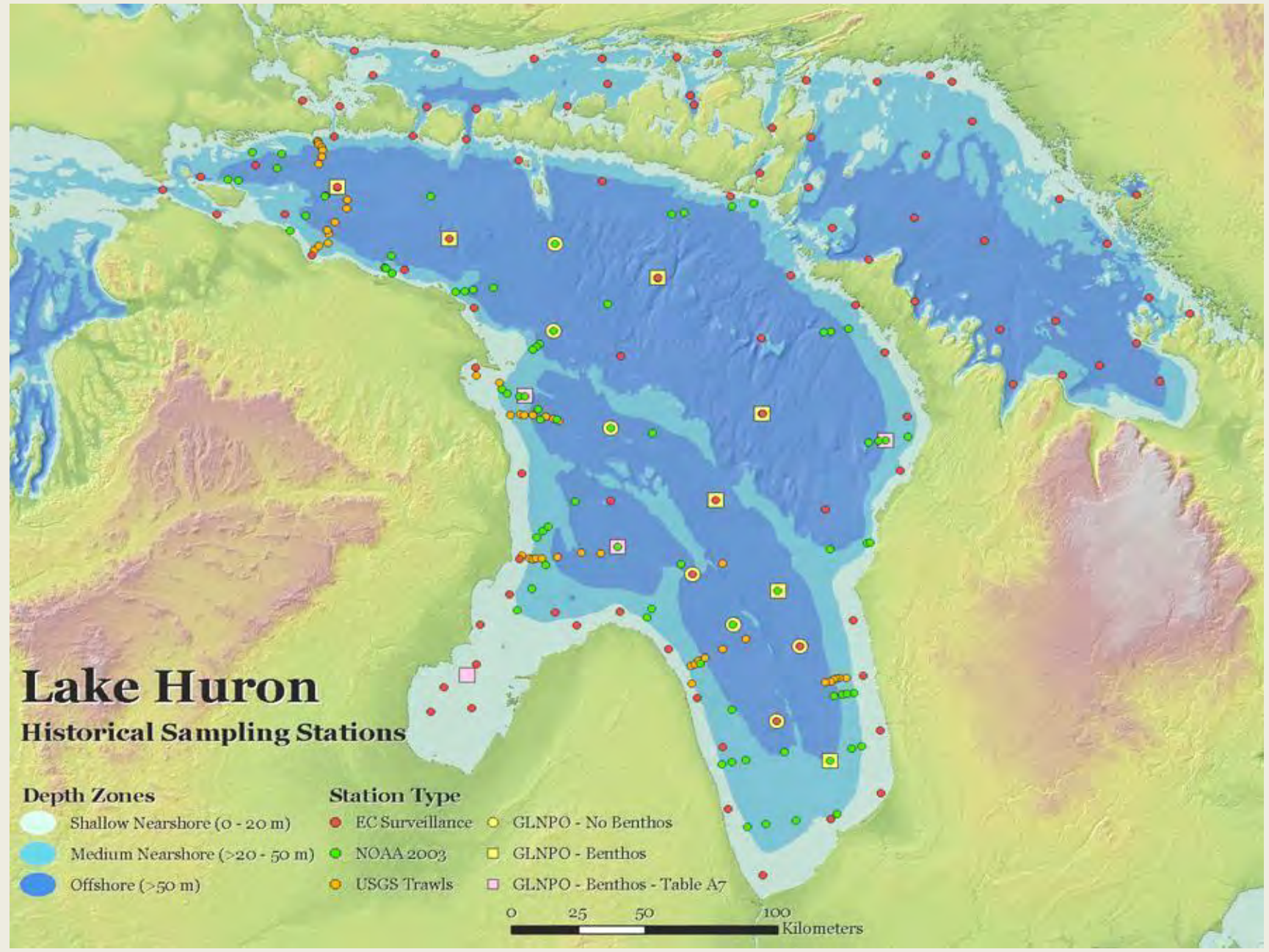
Historical Sampling Stations

Depth Zones

- Shallow Nearshore (0 - 20 m)
- Medium Nearshore (>20 - 50 m)
- Offshore (>50 m)

Station Type

- EC Surveillance
- NOAA 2003
- USGS Trawls
- GLNPO - No Benthos
- GLNPO - Benthos
- GLNPO - Benthos - Table A7





Key Accomplishments

Started in 2009 support from local municipalities, provincial and federal agencies:

- Shoreline Alteration Inventory (2010, 2014, 2017)
- Shoreline Permit Checklist (Physical Process Study)
- Stewardship Guide (2013) (Planner's Workshop)
- Oblique Imagery (2014) (Report on Shoreline Alteration)

