

Lake Erie Millennium Network  
New Investigator's Meeting  
April 2013




# Briefing on U.S. EPA Activities: Great Lakes and Lake Erie

**Russell G. Kreis, Jr.<sup>1</sup>, Paul J. Horvatin<sup>2</sup>,  
Jack Kelly<sup>1</sup>, Daniel O'Riordan<sup>2</sup>, and  
Glenn J. Warren<sup>2</sup>**

**<sup>1</sup>USEPA, Office of Research and Development,  
NHEERL; MED- Duluth, MN; Grosse Ile, MI**

**<sup>2</sup>USEPA, Great Lakes National Program Office,  
Chicago, IL**

A dark blue silhouette map of the Great Lakes basin is centered on a solid blue background. The map shows the outlines of the five Great Lakes (Superior, Michigan, Huron, Erie, and Ontario) and the surrounding landmasses of North America.

**APPENDIX TO THE PROTOCOL AMENDING THE  
AGREEMENT BETWEEN  
CANADA AND THE UNITED STATES OF AMERICA  
ON GREAT LAKES WATER QUALITY, 1978,  
AS AMENDED ON OCTOBER 16, 1983  
AND ON NOVEMBER 18, 1987**

**AGREEMENT BETWEEN CANADA AND  
THE UNITED STATES OF AMERICA  
ON GREAT LAKES WATER QUALITY, 2012**

- Reaffirmation
- New Annexes
- Action- Oriented
- Effective
- Modernized
- Forward-Thinking

**LAKE ERIE**



**LAKEWIDE  
MANAGEMENT  
PLAN**



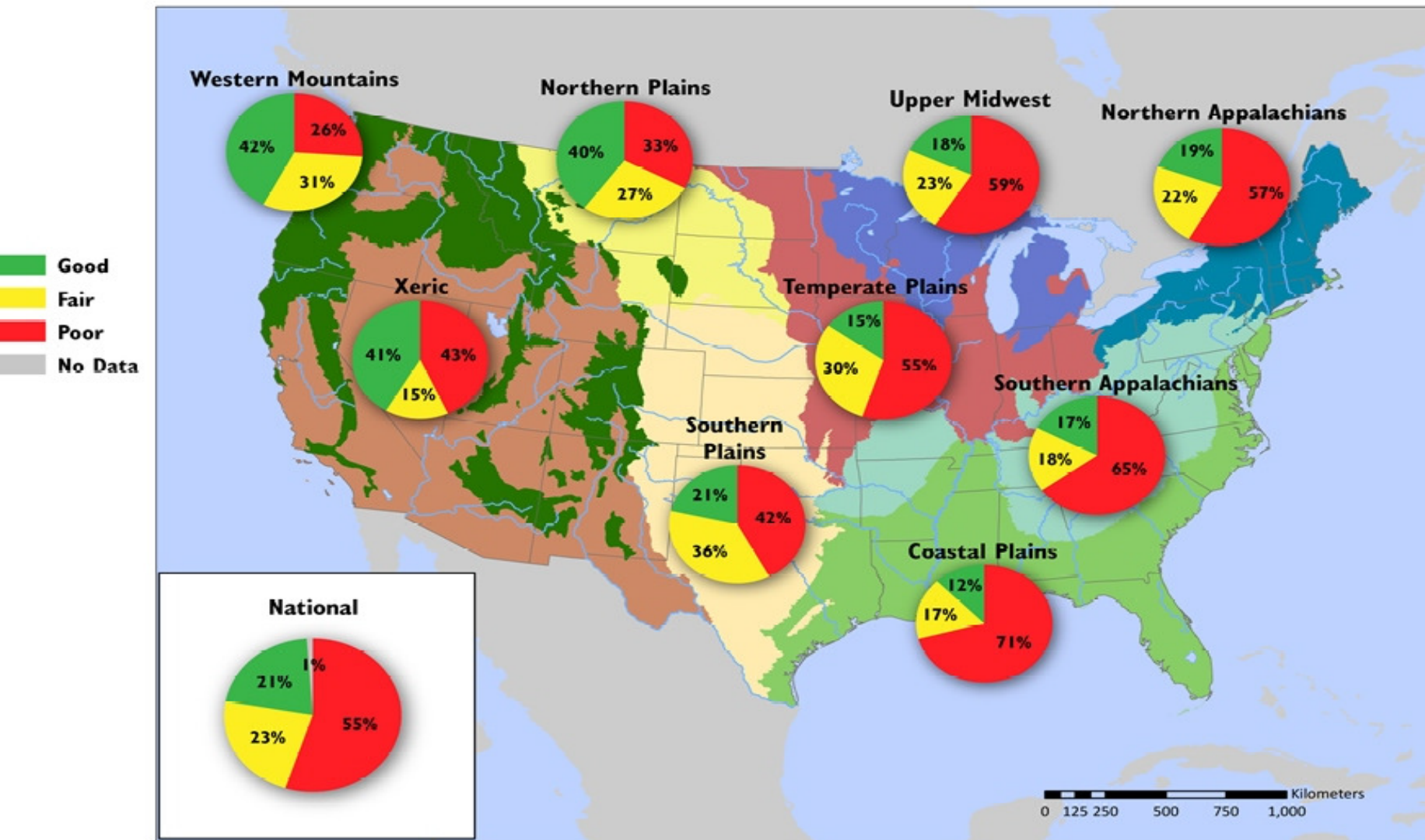
**Contacts:**

Daniel O'Riordan  
USEPA, GLNPO

Luca Cargnelli  
Environment Canada

# National Rivers and Streams Assessment USEPA 2013

## Biological Condition — Macroinvertebrate MMI



# National Coastal Condition Assessment

## Water Quality Index:

- Water Clarity, DO, Chlorophyll *a*, DIN, DIP

## Benthic Index:

- Community Diversity, Pollution Tolerant/Sensitive Species

## Sediment Quality Index:

- Toxicity, Contaminants, TOC

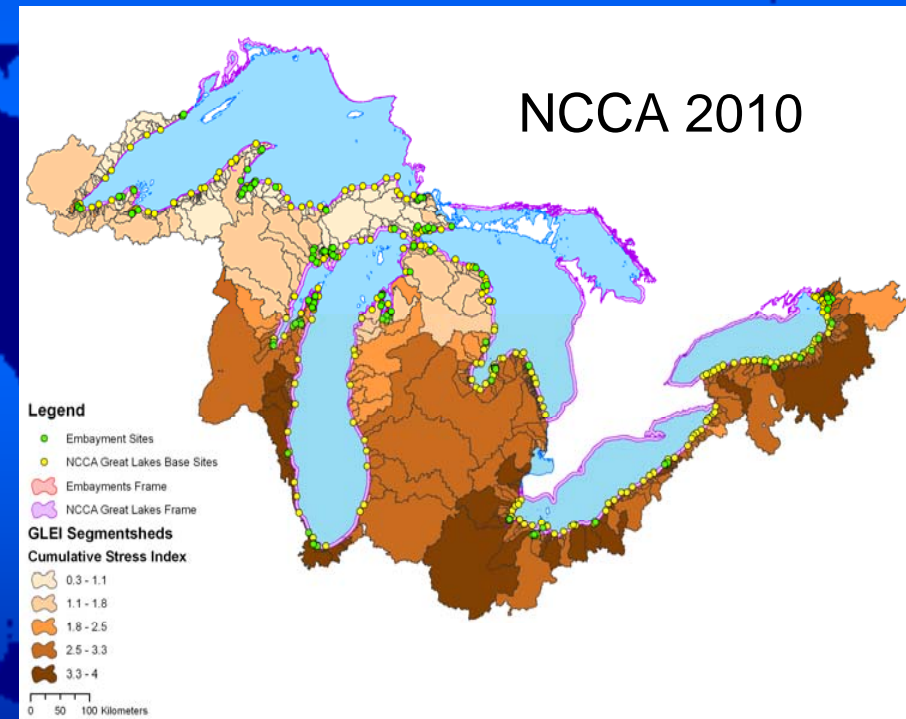
## Fish Tissue Contaminant Index:

- Whole-Fish Contaminant Burden

## Coastal Habitat Index:

- FWS National Wetlands Inventory
- Wetlands Loss Rates

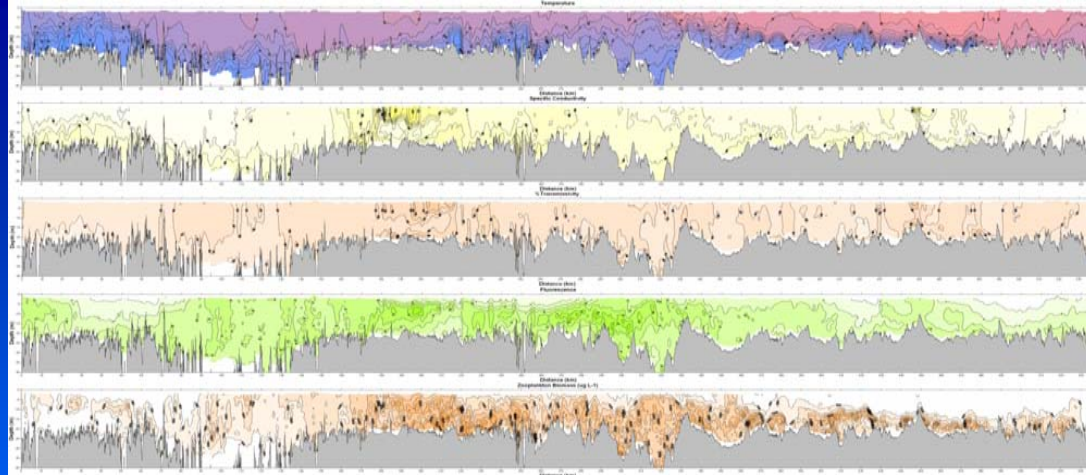
**Expected:  
Spring 2013**



# U.S. Environmental Protection Agency Office of Research and Development National Health and Environmental Effects Research Laboratory



ORD Lab and Office Locations



## Sensors

CTD

Fluorometer

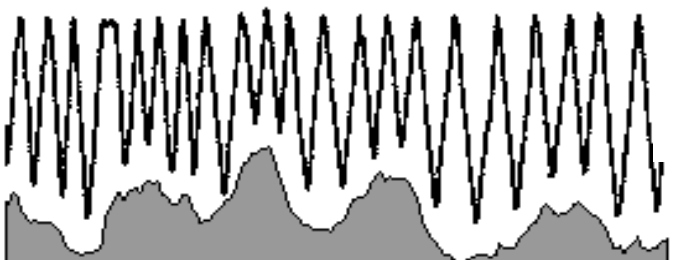
(calibrated to Chl *a*)

Transmissometer

Laser Optical Plankton Counter

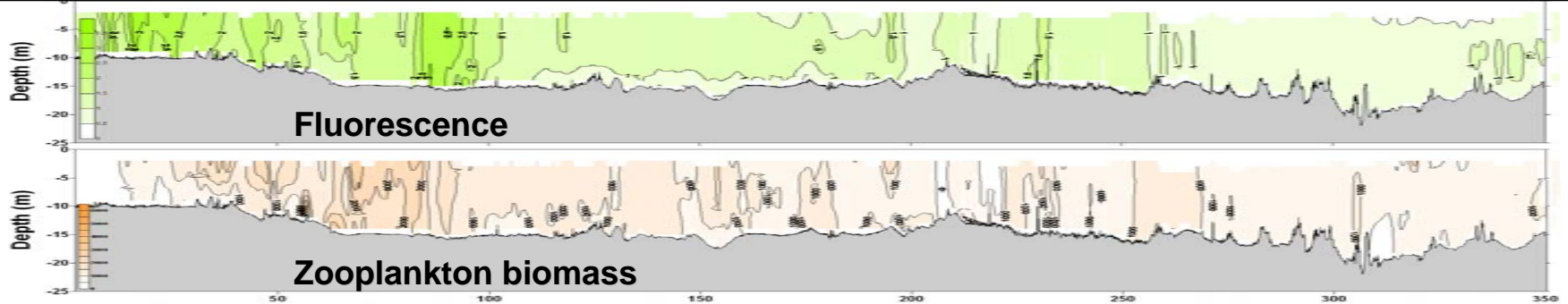
(Zooplankton >150  $\mu\text{m}$ )

High-resolution data along  
500 to 1000 km of shoreline

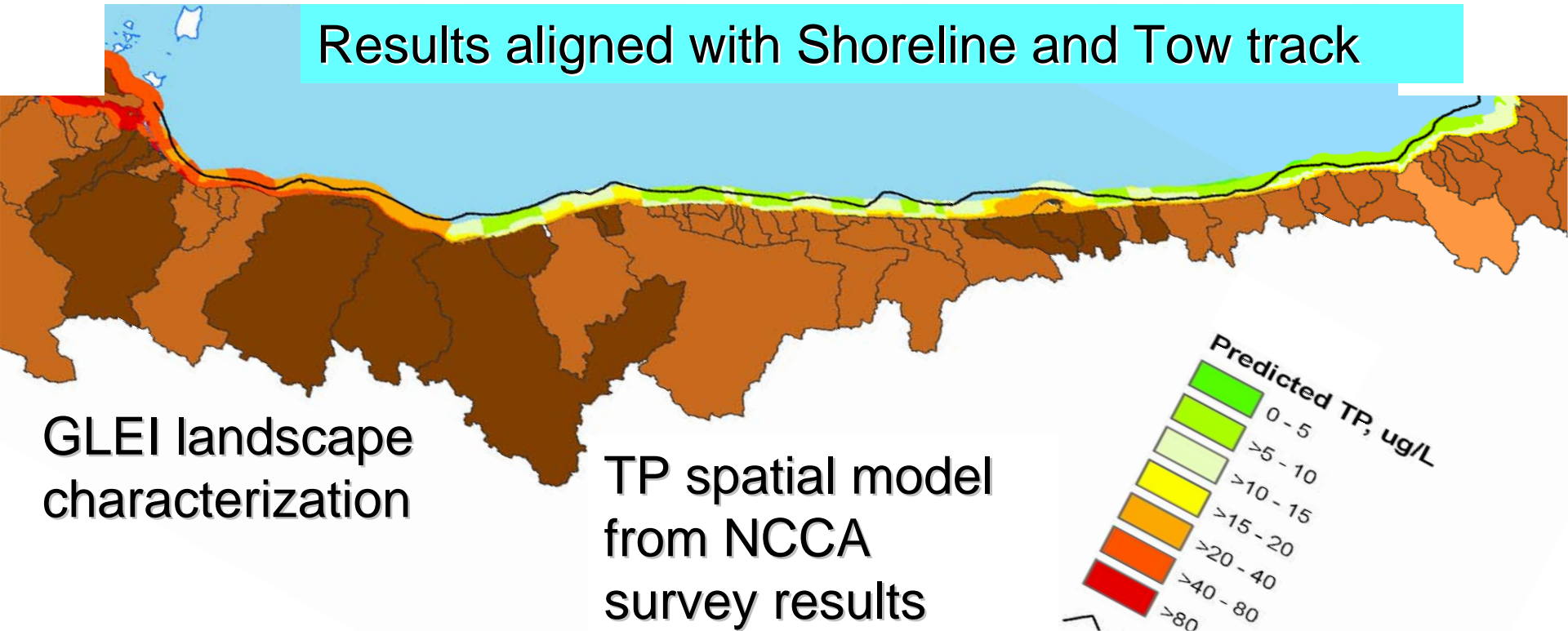


Alongshoreline towing survey strategy  
Evolved to be along constant depth contour

# Integrated Nearshore Observing/Model System

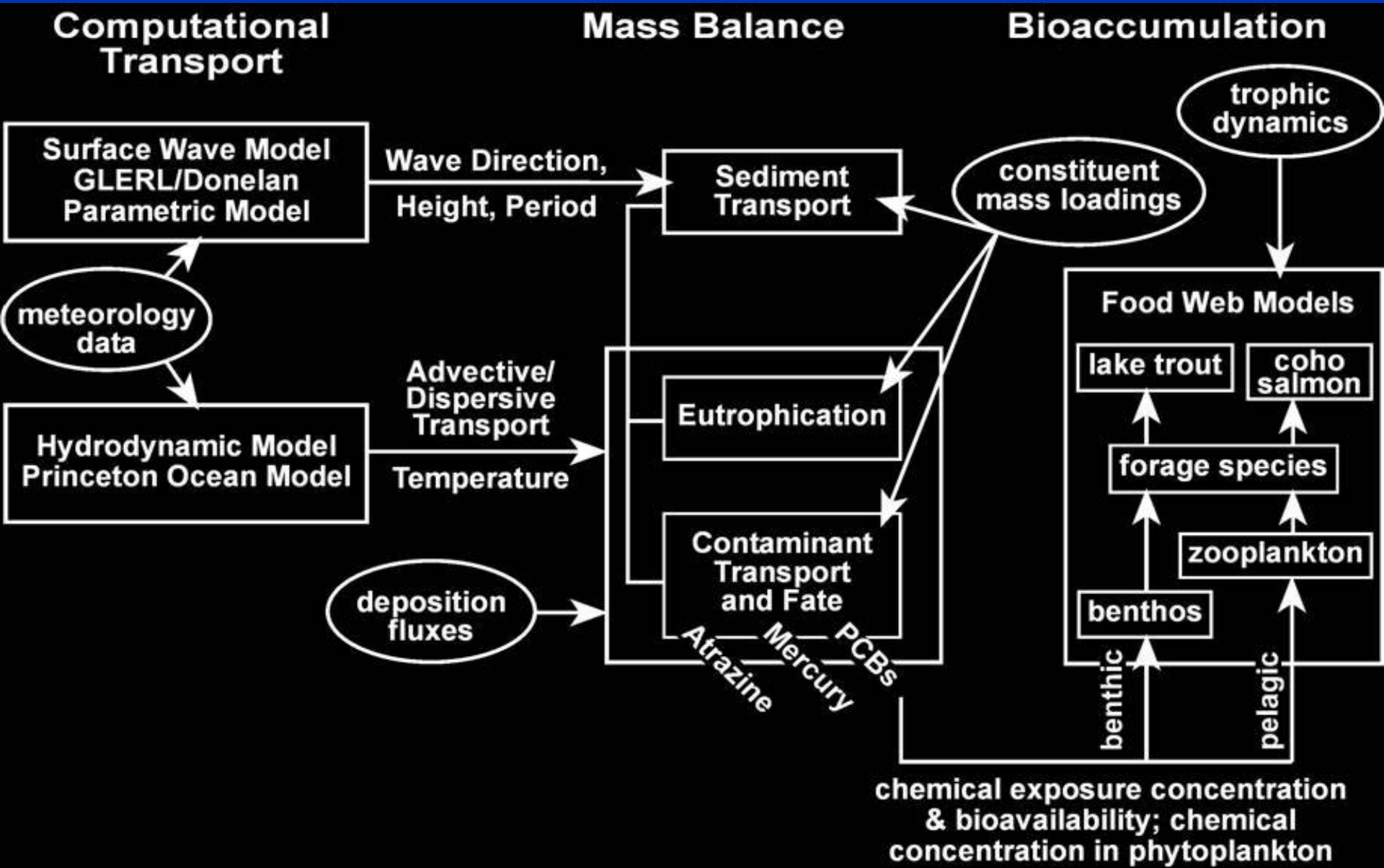


Results aligned with Shoreline and Tow track



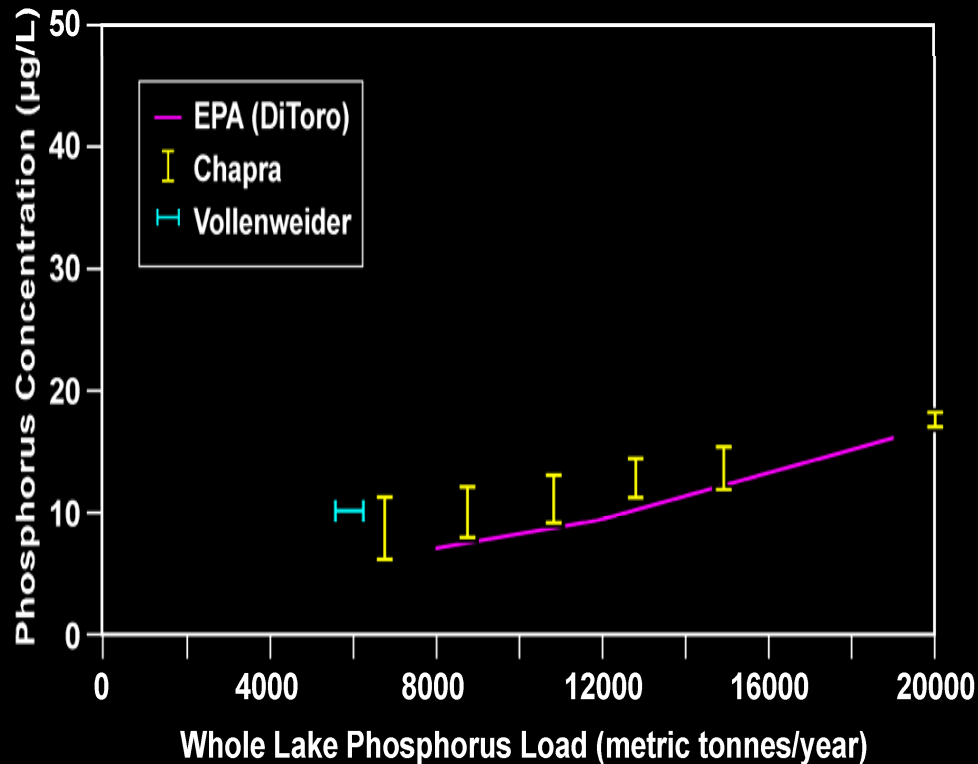


# Multimedia Mass Balance Modeling

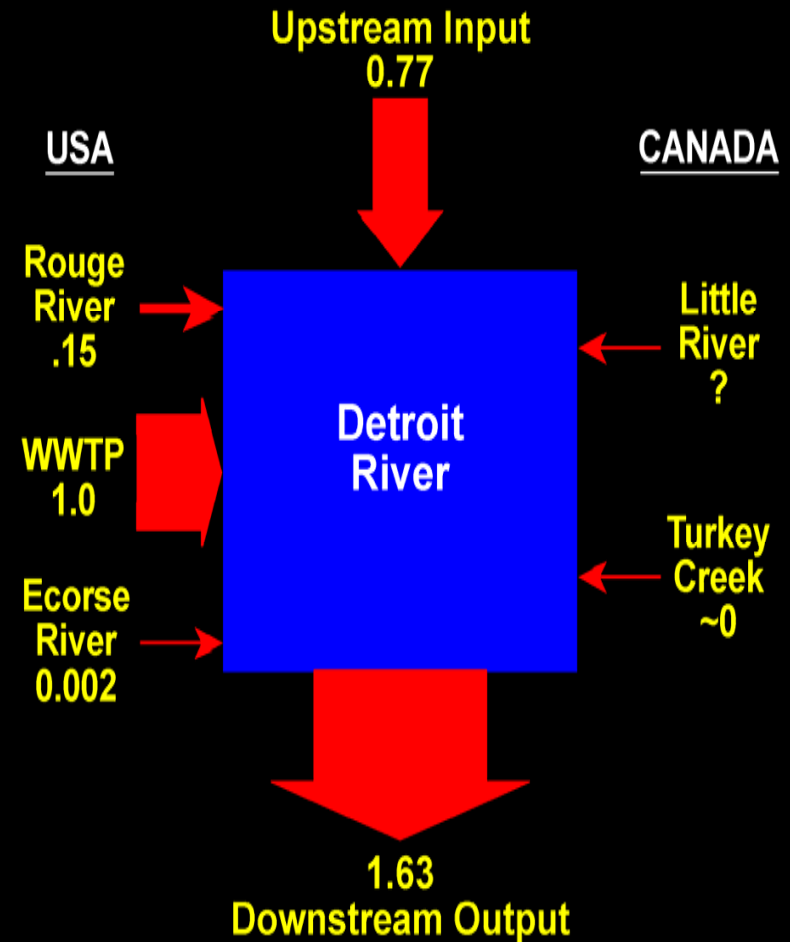


# USEPA ORD Modeling in Lake Erie and the Detroit River

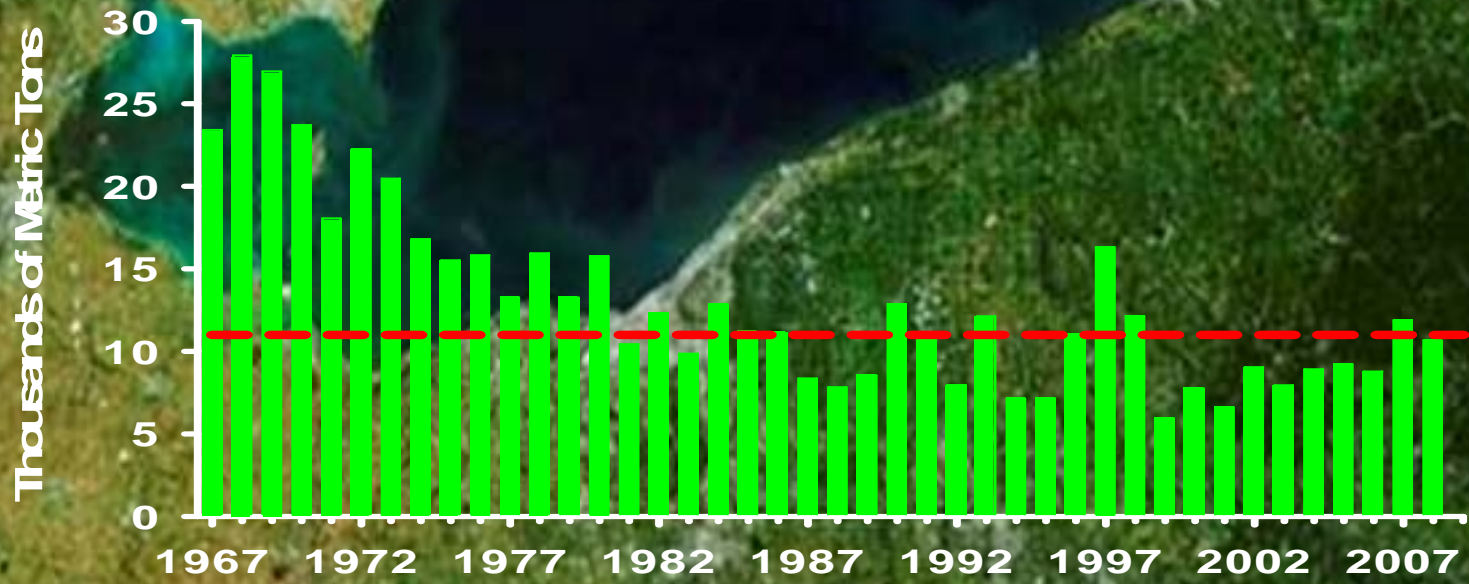
Relationship Between Phosphorus Concentration and Whole Lake Phosphorus Load in the Central Basin of Lake Erie for Three Models



## SMB1 PCB, Total (Kg/d)



# Lake Erie Annual Phosphorus Loads (Thousands of Metric Tons/Year – MTA)

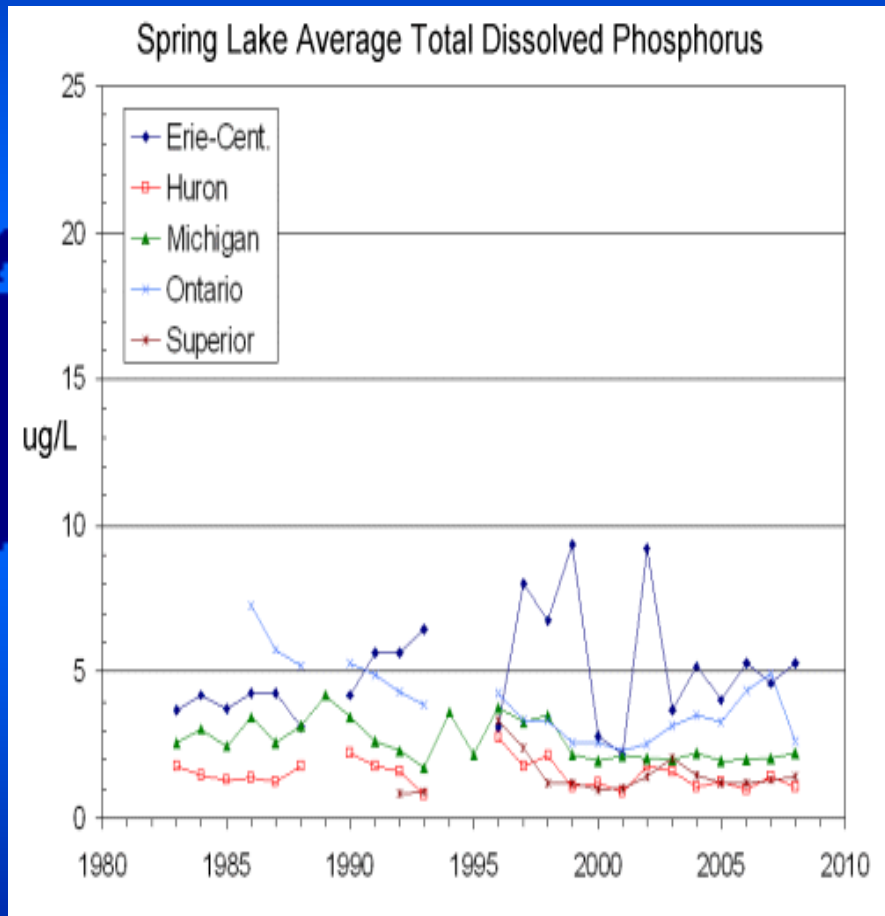
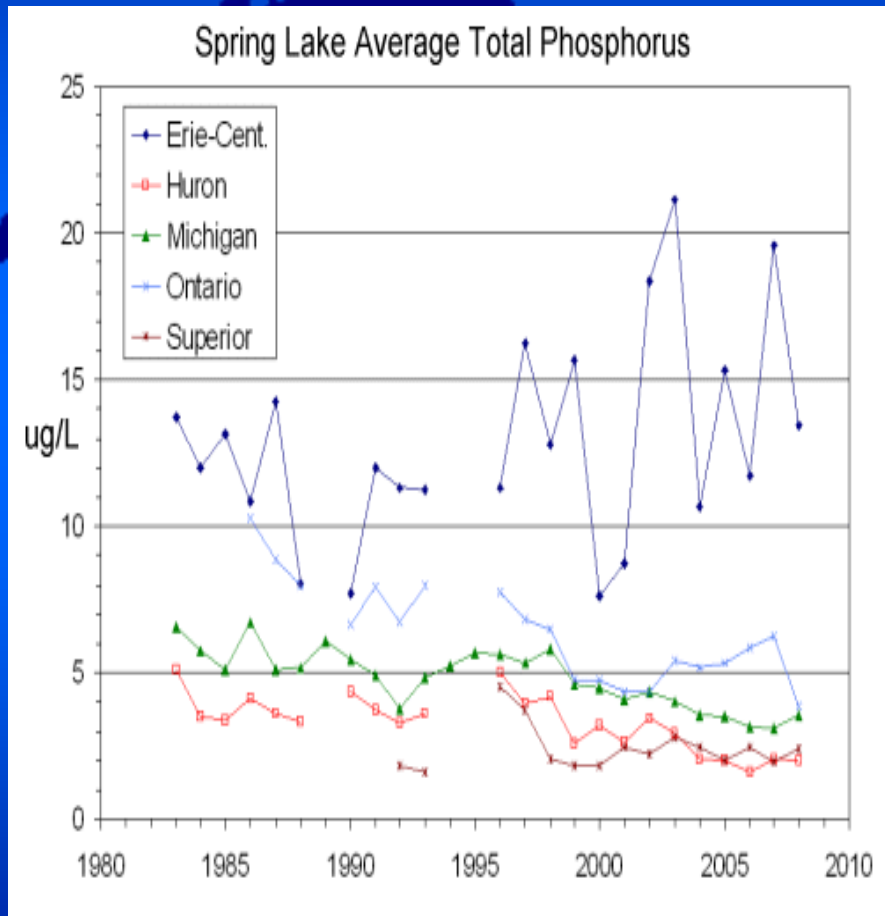


# *R/V Lake Guardian Specifications*



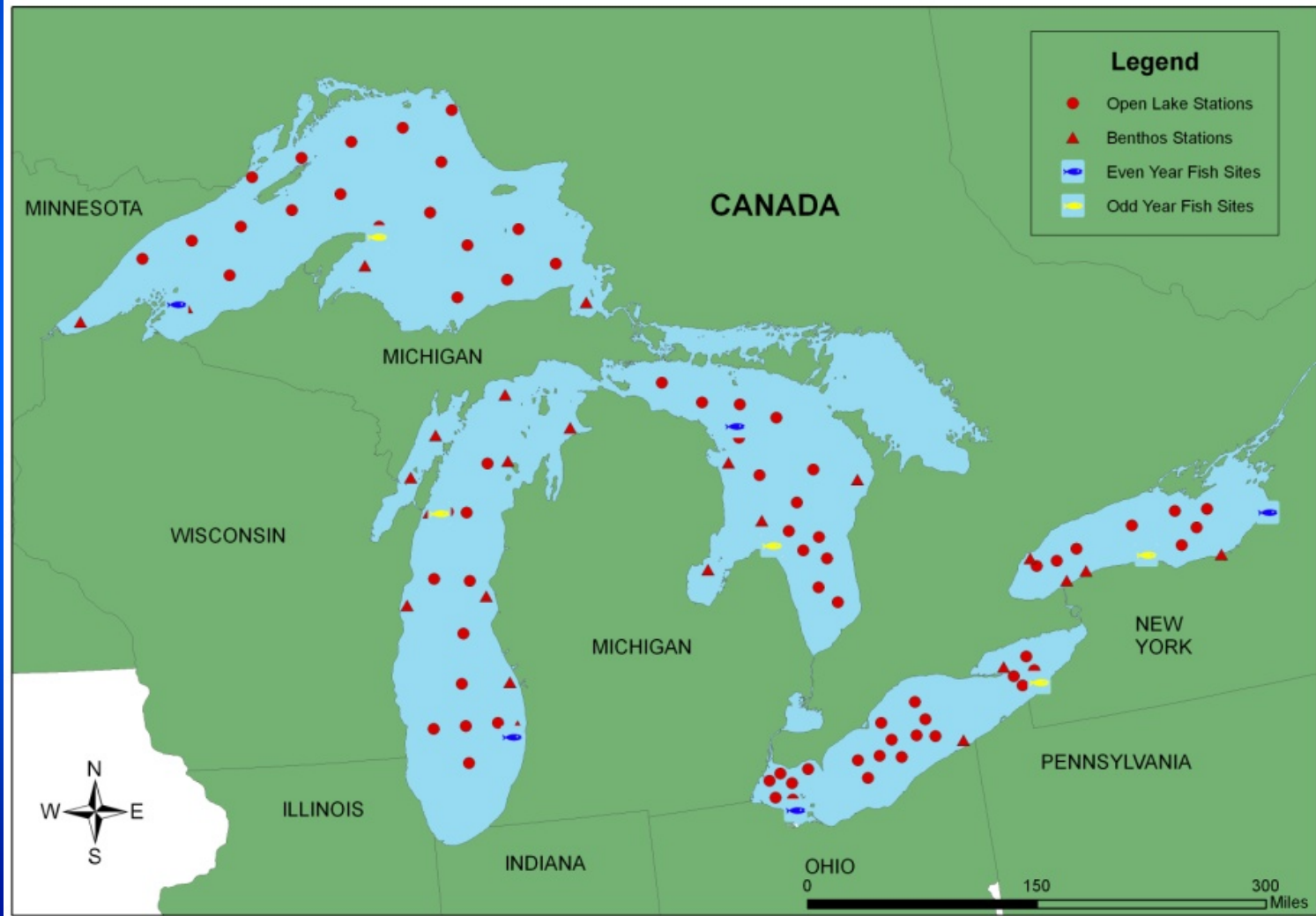
- 180 feet long
- 11 knot cruising speed
- Bunks for 27 scientists & 13 crew members
- 3 laboratories
- Sampling gear

# Great Lakes Spring Total and Dissolved Phosphorus Trends, 1983-2008 (USEPA-GLNPO)



# Open Lake Sampling Stations

## GLNPO'S Water Quality Survey Sampling Stations



# GLNPO Open Lake Monitoring Program

## When?

### Annual Monitoring Program - Surveys Biannually

- Spring - begins in late March/early April
- Summer - begins early August
- Approximately 1 Hour per Station

## Typical Sequence:

Lakes Michigan, Huron, Erie, Ontario, Superior

**Contact:** Dr. Glenn Warren  
[warren.glenn@epa.gov](mailto:warren.glenn@epa.gov)

# Water Quality/Biological Metrics

## Nutrients

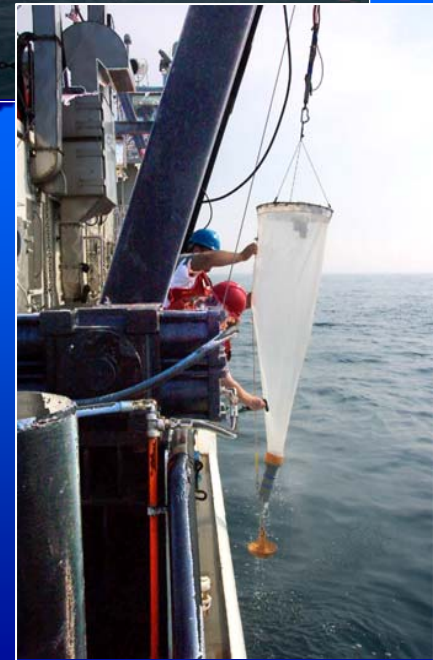
- Total, Dissolved, and Soluble Reactive Phosphorus
- Nitrite + Nitrate
- Soluble Reactive Silica
- Particulate C,N,P (Master Stations)

## Conventionals

- pH, turbidity, alkalinity,
- specific conductance

## Biological

- Phytoplankton, zooplankton and benthos



# Additional Capabilities and Equipment



**Air  
Sampling**



**Epibenthic Sled**

**Box Corer**



**ROV**

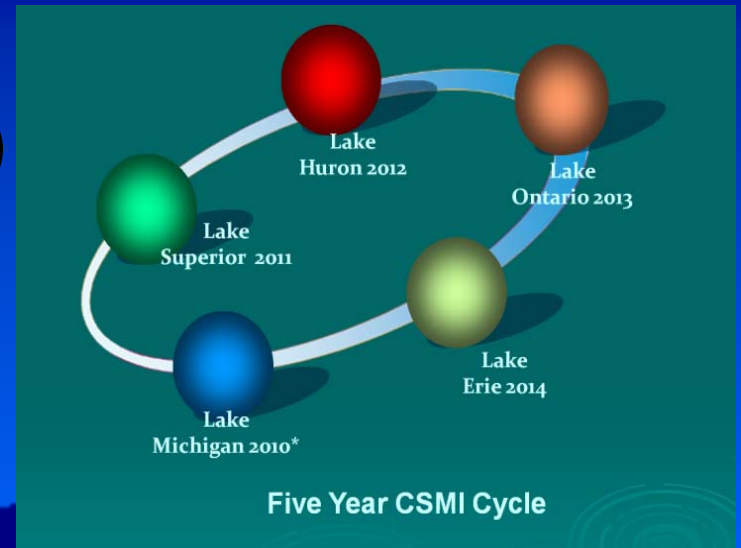


**Triaxus  
Towed Device**

# Cooperative Science and Monitoring Initiative (CSMI)

## 5-Year Cycle

- 2013 Lake Ontario
- 2014 Lake Erie



Sampling approximately monthly for 3-5 days each

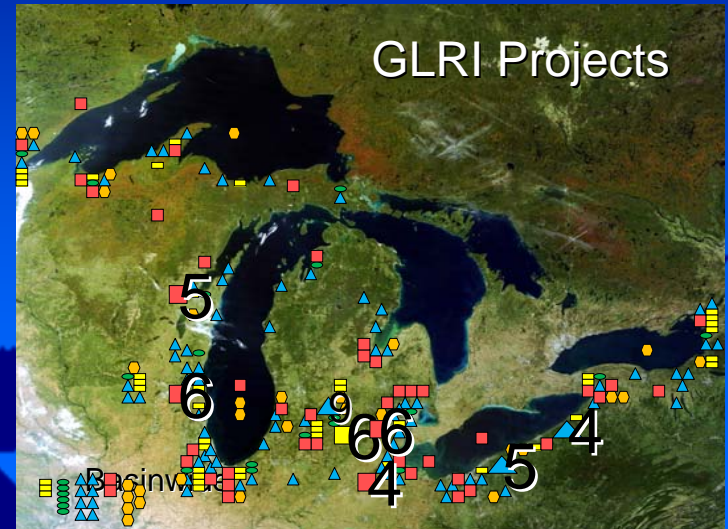
## Supporting:

- Federal, Academic Groups and Education
- GLNPO Contractors and Grantees
- Great Lakes Restoration Initiative (GLRI) Cooperators

**Contact:** Dr. Glenn Warren  
[warren.glenn@epa.gov](mailto:warren.glenn@epa.gov)

# USEPA Opportunities

**Great Lakes Restoration  
Initiative  
USEPA, GLNPO  
<http://epa.gov/greatlakes>**



**Science to Achieve Results (STAR)  
ORD-National Center for Environmental  
Research  
<http://epa.gov/ncer/rfa>**