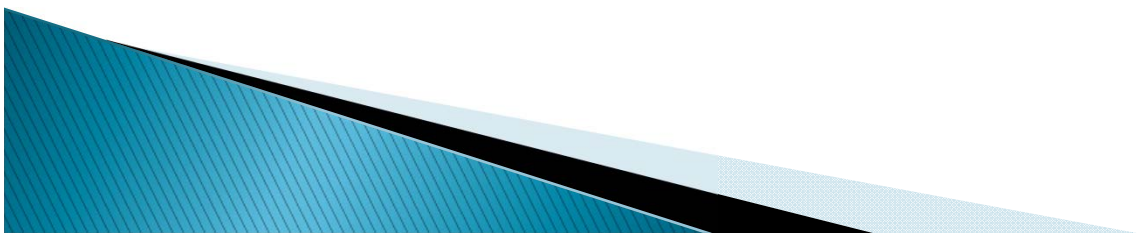
Partnering for Monitoring and Research Across the Great Lakes: The Cooperative Science and Monitoring Initiative.

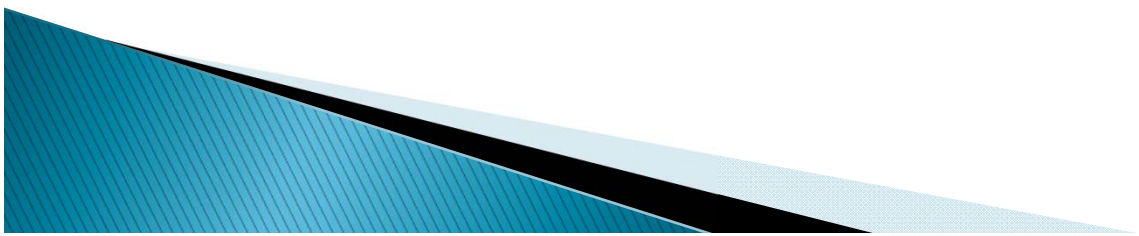
Paul J. Horvatin, Jacqueline Adams

U.S. EPA, Great Lakes National Program Office
77 W. Jackson Blvd., Chicago, IL 60604
312-353-3612



Background

- Cooperative Monitoring Initiative (CMI) started in 2002 to coordinate monitoring
  - Simple premise: focus resources on a few key issues on one lake each year
- Expanded mandate of CMI to include research coordination resulted in CSMI in 2006
- In 2009, connecting channels (including St. Lawrence) were added to CSMI process
  - Connecting channel addressed with downstream lake
  - Only issues that affect downstream lake will be included
- CSMI follows a 5 year rotational cycle
- CSMI does NOT set priorities



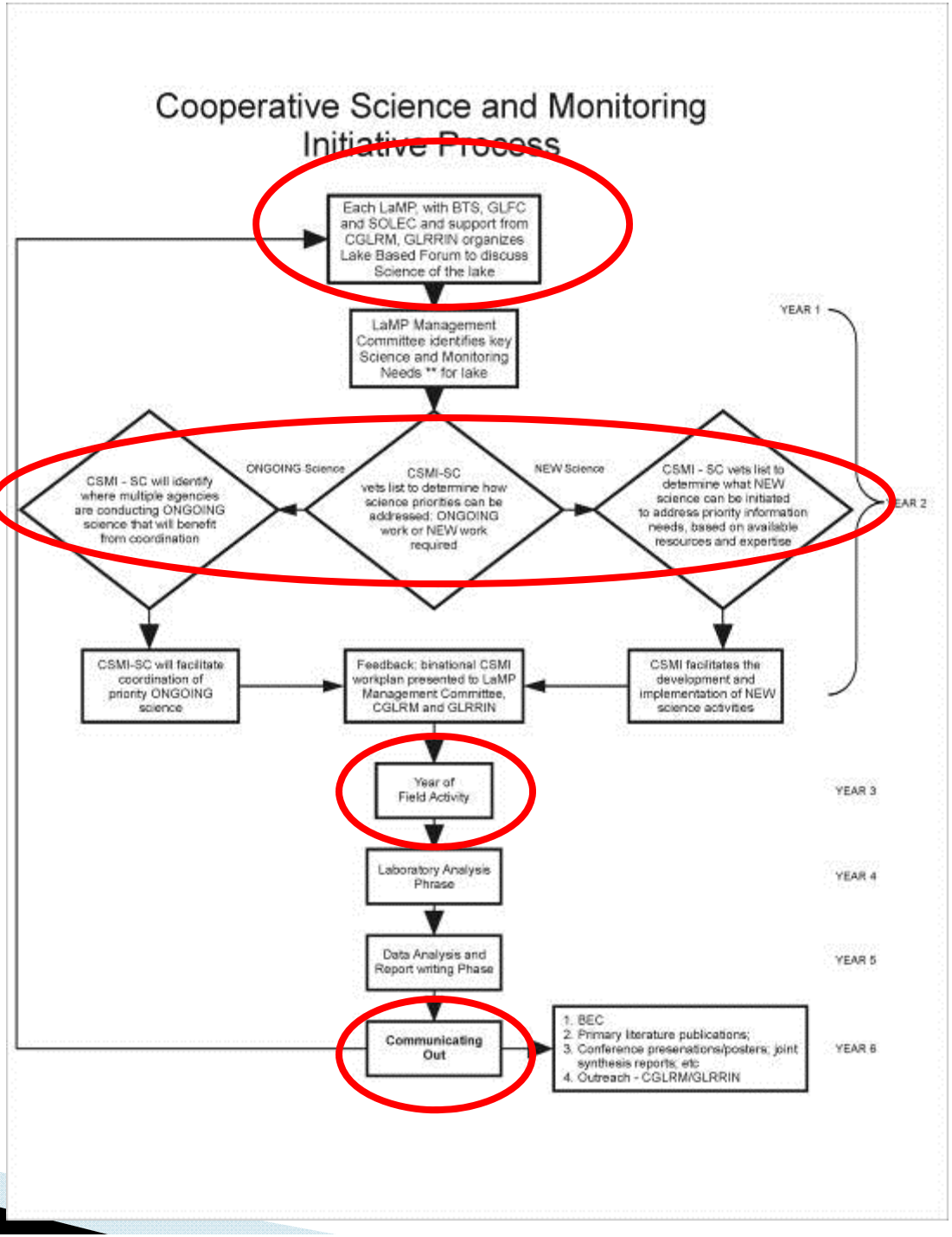
Our Partners

- IJC-CGLRM
- GLRRIN
- Sea Grant
- Industry
- NGO's

- Federal Agencies
- Provincial Agencies
- First Nations
- Regions
- Cities/Towns
- Academics

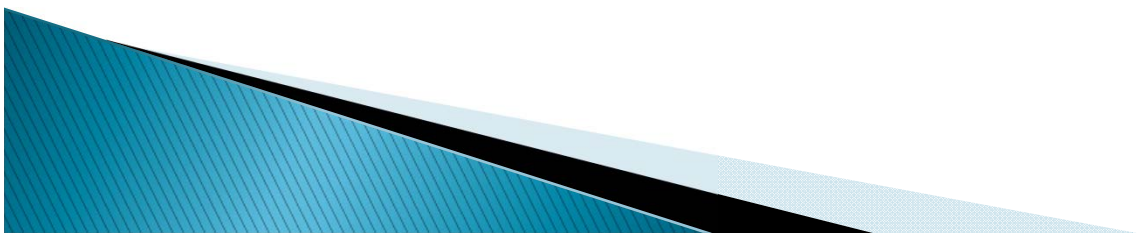
- Federal Agencies
- State Agencies
- Tribes
- Cities/Towns
- Academics

CSMI Process:



What is going on in ONE year?

- **Lake Erie** –Workshop to scope out issues
- **Lake Ontario** – Planning year for field year
- **Lake Huron** – Field Year
- **Lake Superior** – Data being worked up from field year
- **Lake Michigan** – Reporting out



CSMI Steering Committee Membership

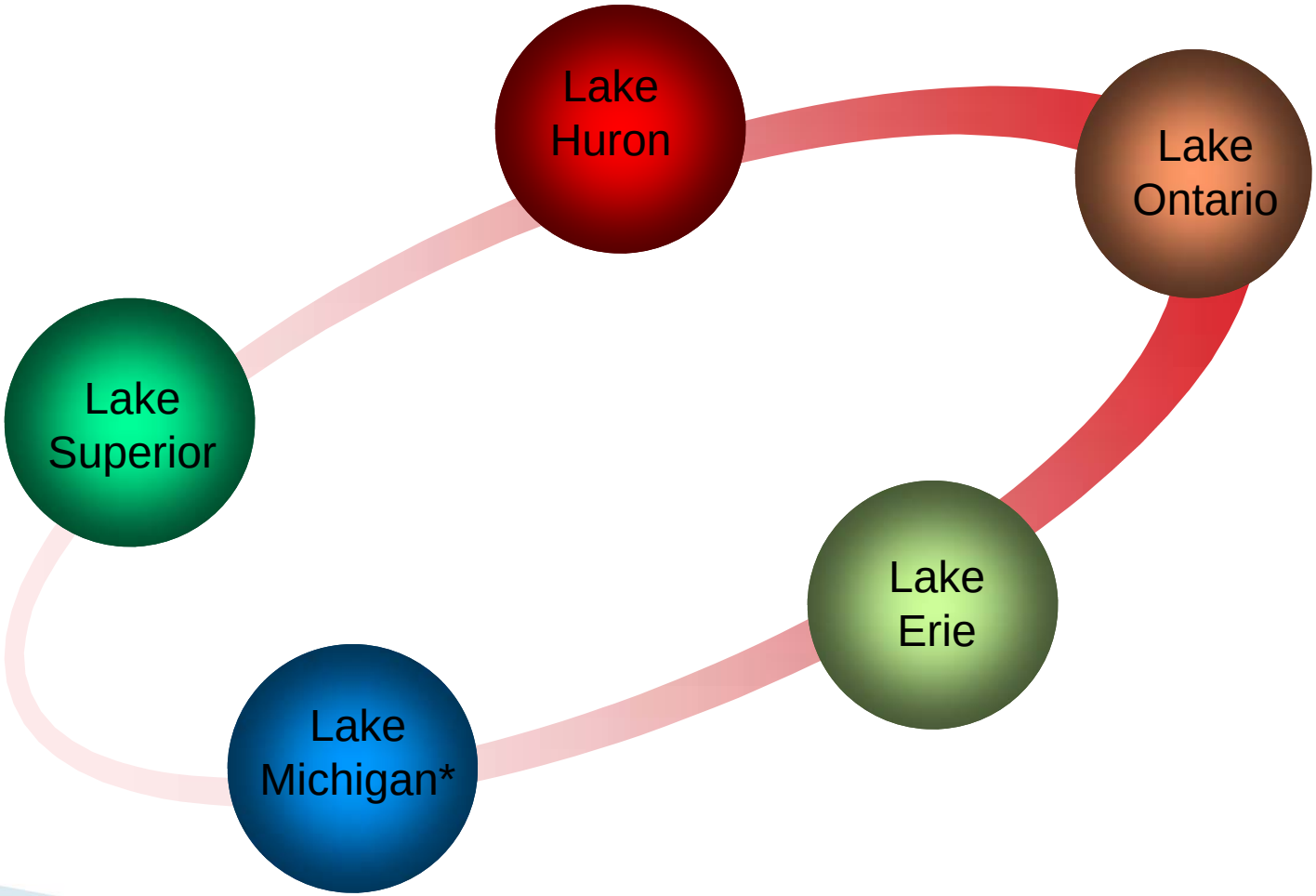
- Co-Chaired by EC and EPA-GLNPO
- Members:
  - DFO
  - MOE
  - MNR
  - EC
  - USGS
  - NOAA
  - USFW
  - EPA-GLNPO
  - EPA-ORD
  - States (as needed)

Cooperative Science and Monitoring Initiative: Where are we?

OBJECTIVE: Improve binational coordination of monitoring to achieve:

- ☑ *Greater awareness*
  - ☐ *Sharing of technologies; enhanced networking; continued feedback to LaMP working groups*
- ☑ *Optimization of programs*
  - ☐ *Consensus among experts on project design; evaluation of new technologies; joint work planning and scheduling*
- ☑ *Improved reporting*
  - ☐ *Intercomparison studies (nutrients, trace organics in water and fish); data exchange; joint workshops and reporting*
- ☑ *Efficiencies*
  - ☐ *Extensive piggy-backing on cruises, surveys; sharing of sample extracts*

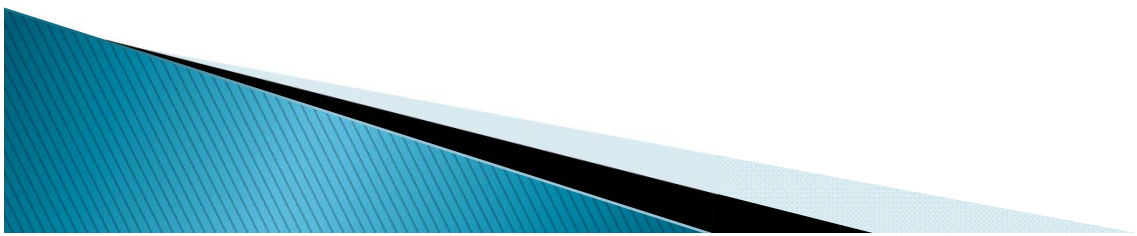
Rotational Cycle



Base annual monitoring supports intensive work

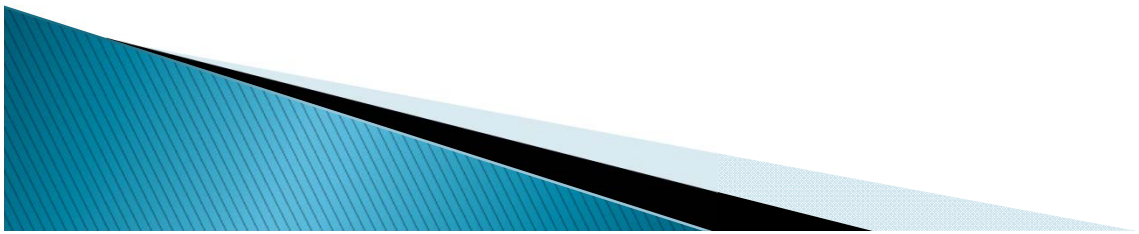
- U.S. EPA – Spring and Summer surveys of all lakes –
  - Nutrients, water chemistry, zooplankton, phytoplankton, benthos
  - Fish contaminants, air contaminants
- Environment Canada – Surveys of 2 lakes per year for nutrients, water chemistry and contaminants in water
- USGS – Annual fish surveys – trawls and acoustics in each lake

Information needs are different for each lake



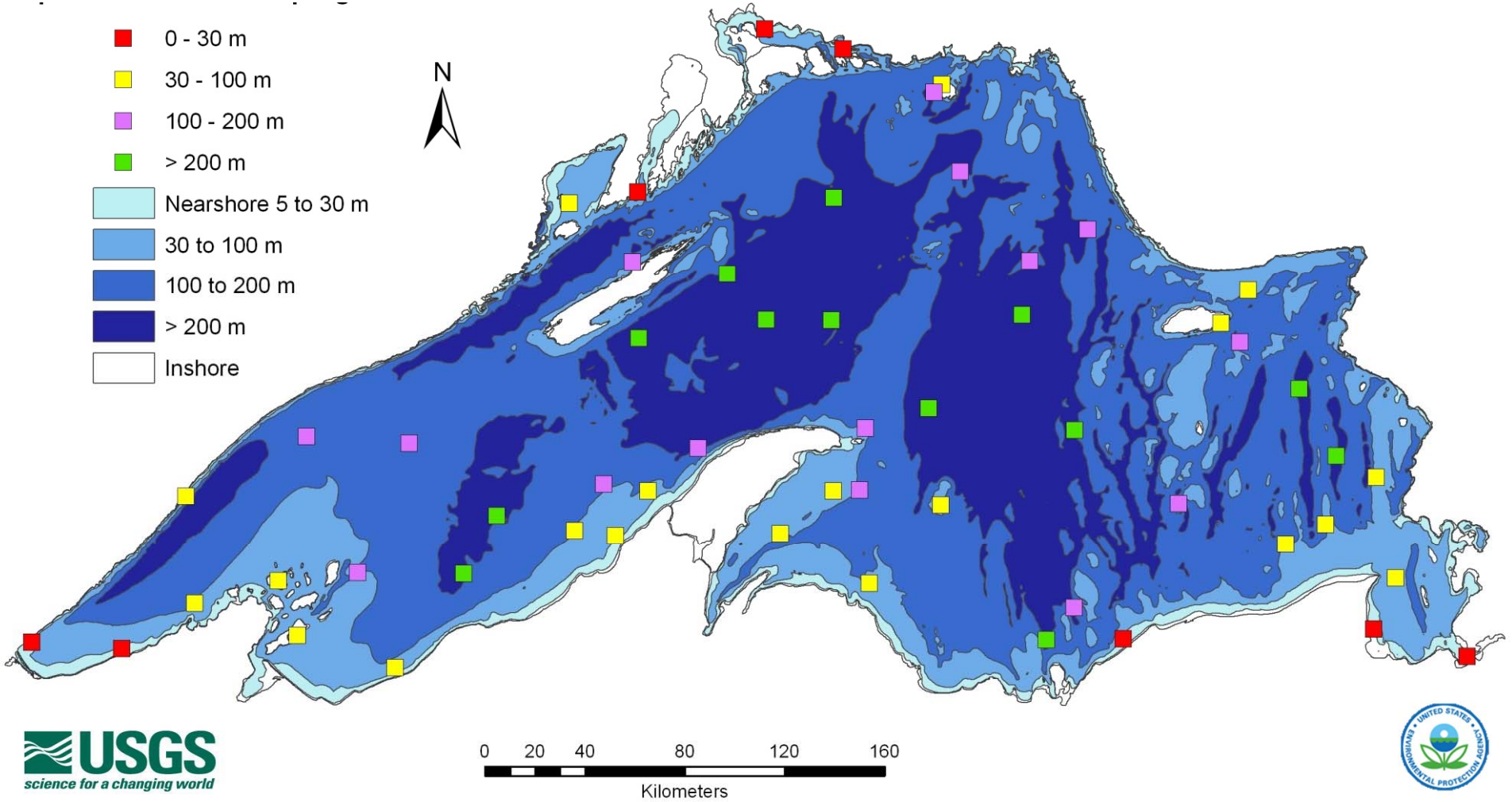
Lake Superior

- Basic lower food web information
- Contaminant measurements



2011 Coordinated Science and Monitoring Initiative (CSMI) lakewide survey for Lake Superior

2010 – Lake Michigan, 2012 – Lake Huron, 2013 – Lake Ontario

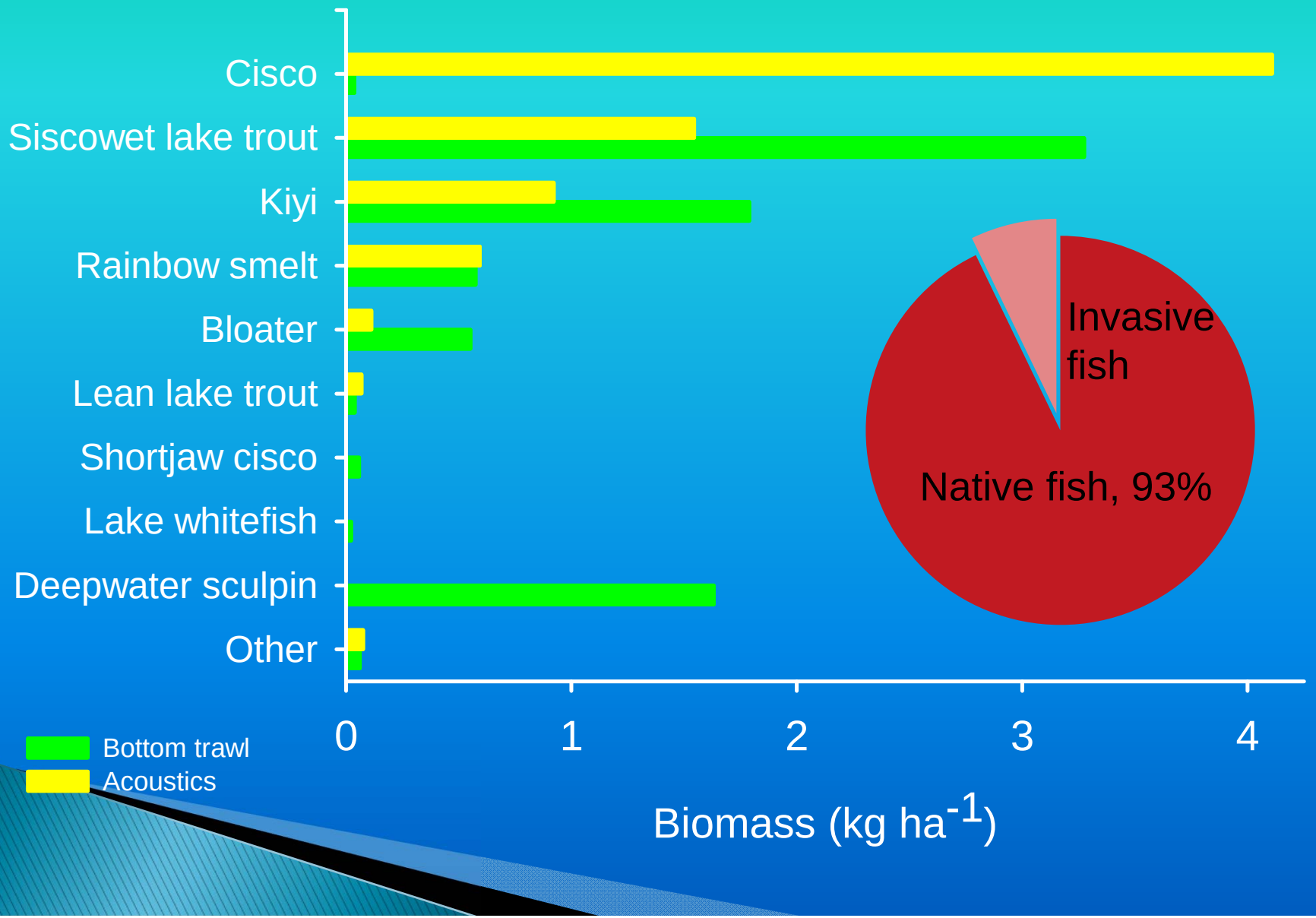


USGS science for a changing world

2011 Effort

1. Benthic fish sampled with bottom trawls at 54 of 56 planned locations during the last week of June and all of July.
    - 20 min trawls, 0.8 – 0.9 km, on-contour
2. Pelagic fish sampled with hydroacoustics and mid-water trawls at 52 of 56 planned locations during August and September.
    - ~3 km acoustic transects, 20 – 30 minute mid-water trawls at 2 or 3 depths
3. Mysis, zooplankton, benthos, and nutrients sampled at 50 to 54 of 56 planned locations.

Lakewide mean biomass



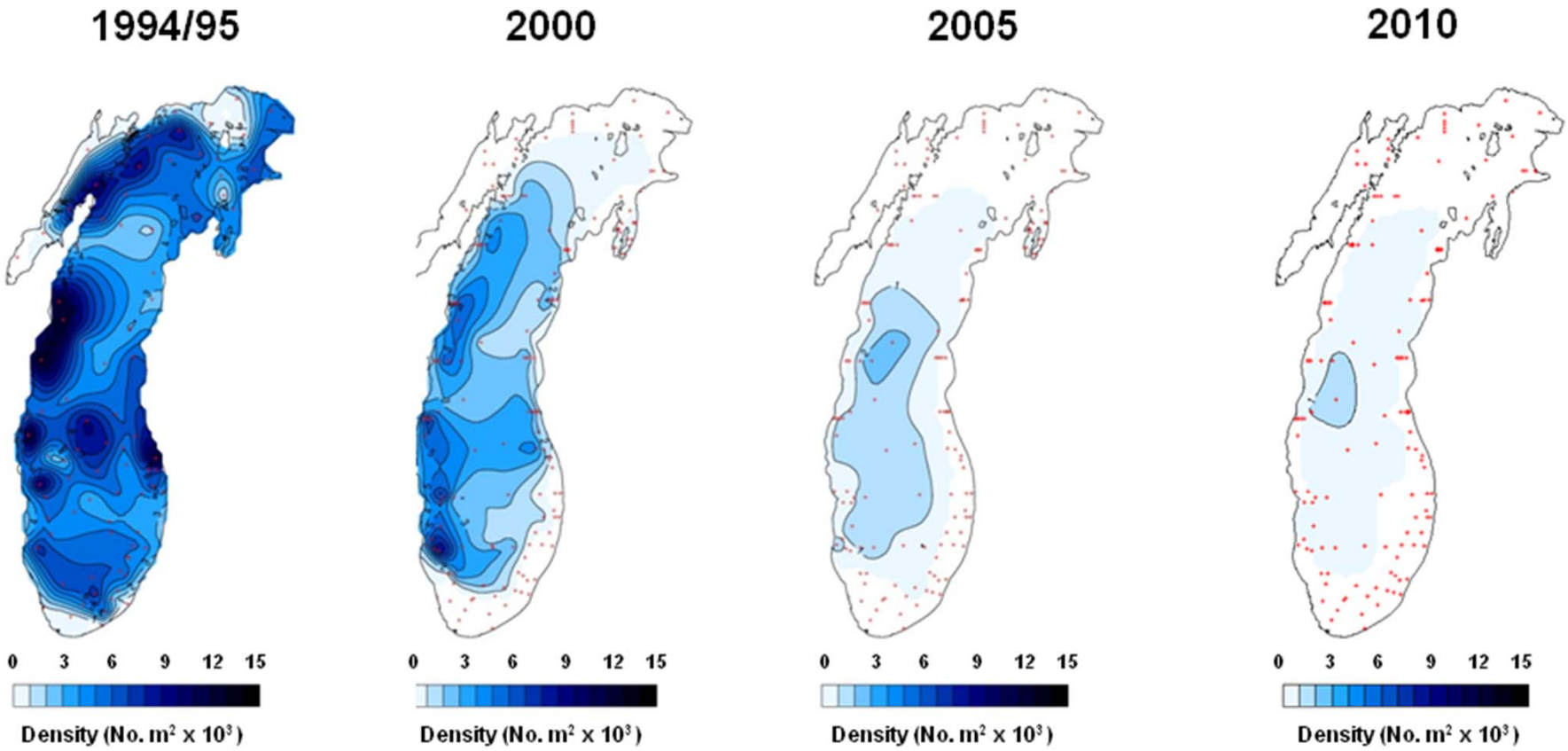
Lake Michigan

- Nutrient input information – impact on nearshore cladophora
- Food web information for fisheries bioenergetics models
- Benthic survey – focused on loss of Diporeia and dreissenid mussel (quagga mussel) increase

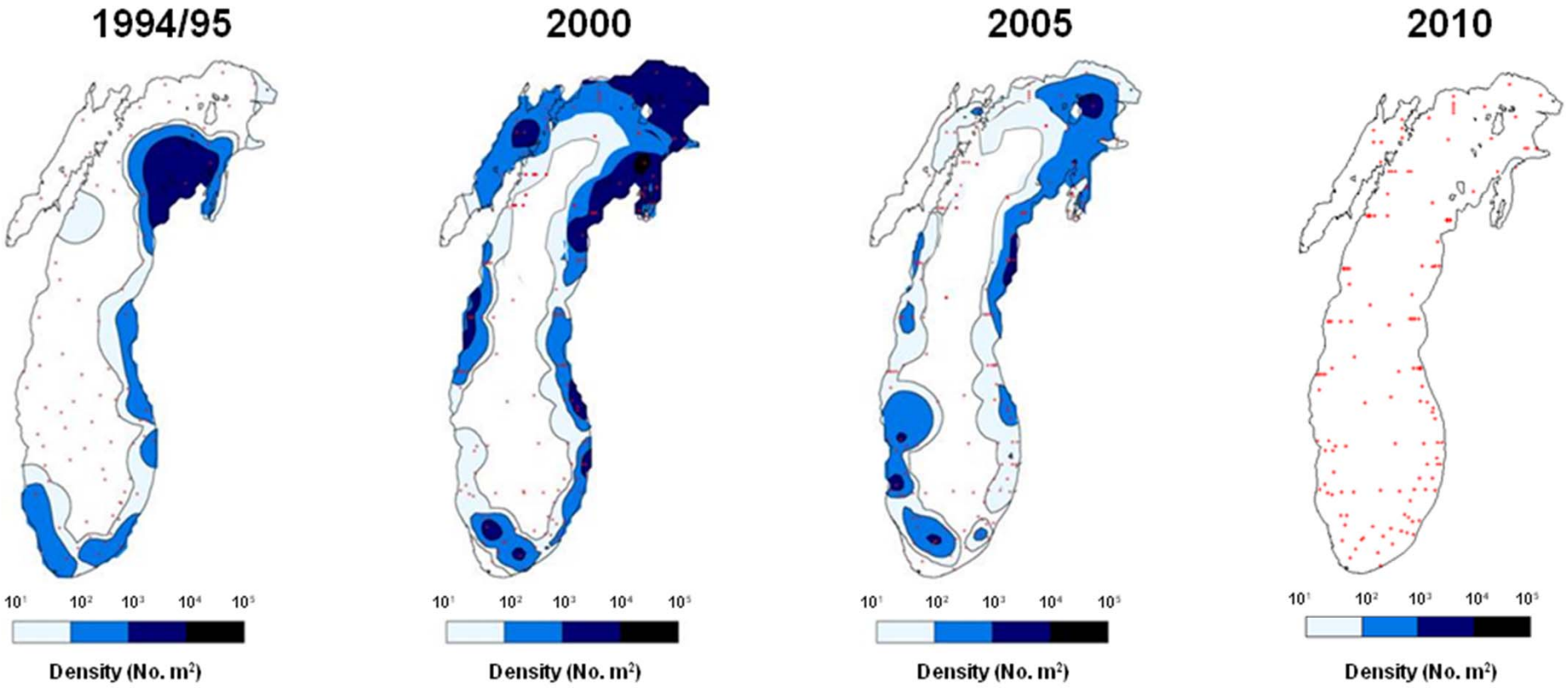
Projects

- USGS and NOAA – nearshore to offshore transects for lower food web and fish
- EPA – tow of Triaxus (towed sensors) at 20 m depth contour
- Development of nutrient/Cladophora/quagga mussel interaction model
- Measurement of nutrient input from tributaries

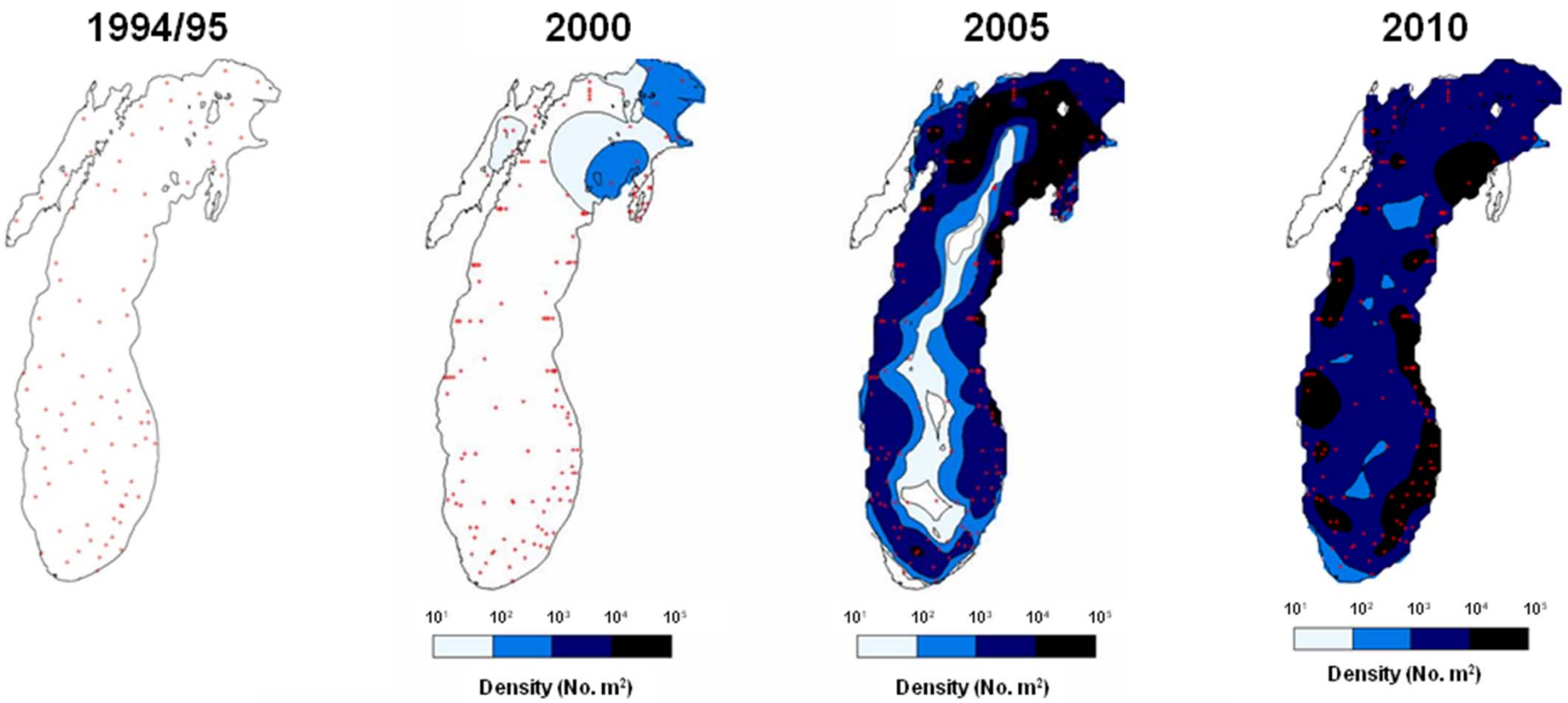
Diporeia spp.



Zebra Mussel

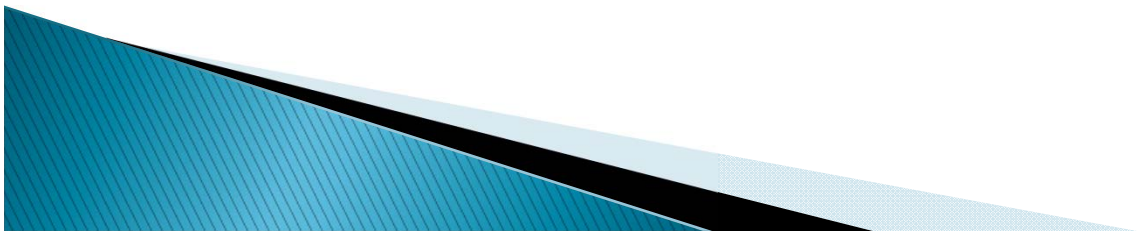


Quagga Mussel



Lake Ontario

- Lower food web survey
- Nearshore to offshore nutrient movement
- Lake trout survey
- Benthic survey



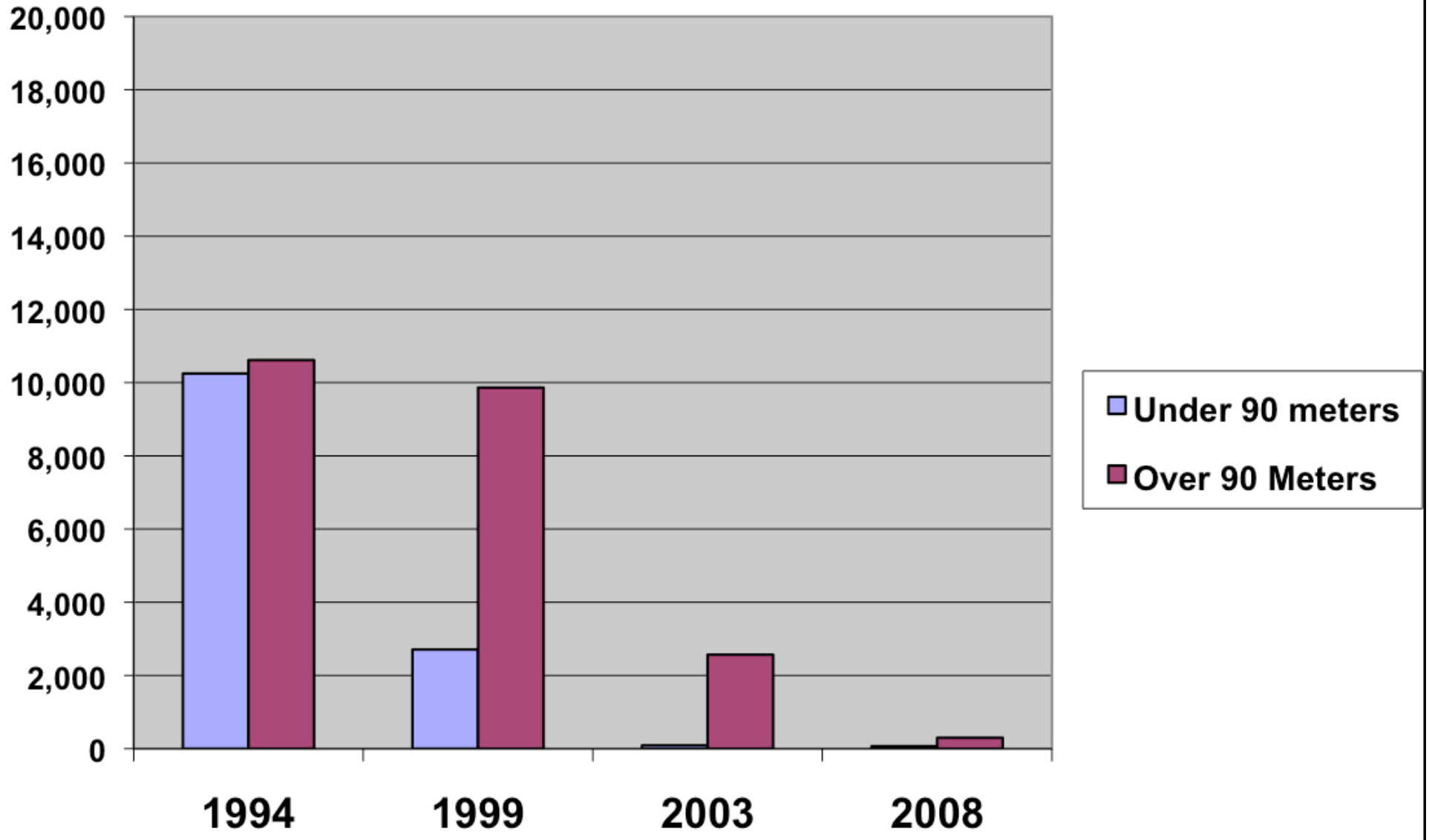


Figure 3. Biomass of Diporeia in Lake Ontario

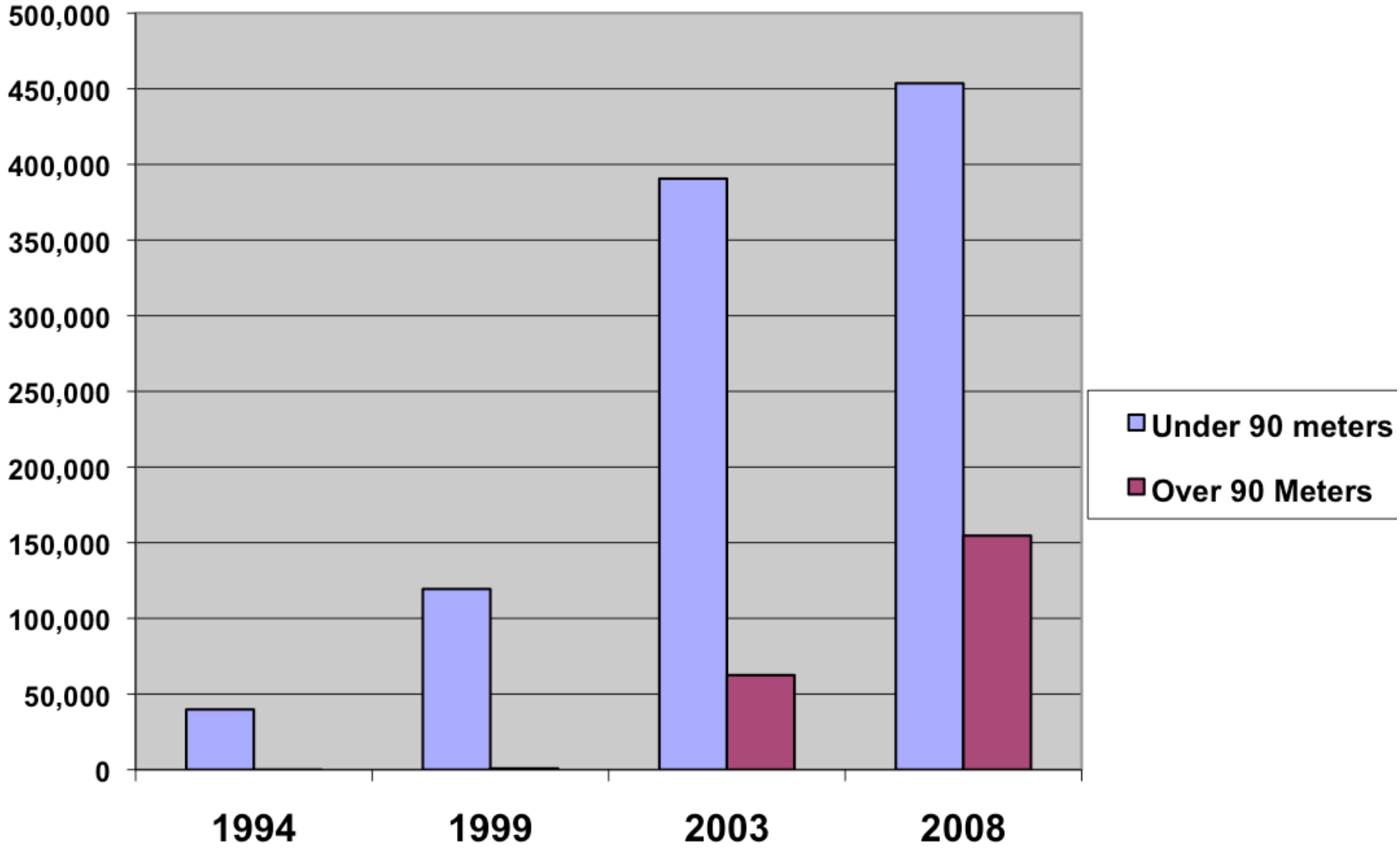


Figure 4. Biomass of *Dreissenia* in Lake Ontario

Lake Huron

- 2012 field year

Project Description	Cooperators	Types of Samples	Questions Addressed	Time and Space Scales
Food Web Spatial Structure Projects	USGS, NOAA, Dept. Fish. Oceans Canada, EPA	Nutrients, phytoplankton, zooplankton, benthic invertebrates, larval fish, prey fish, stable isotopes, primary productivity, continuous (towed instruments)	Spatial and temporal distribution of nutrients, pelagic and benthic food webs, productivity and processes for: understanding of changing spatial distribution of production and biomass - for model updates and fisheries	Monthly - weekly sampling along transects off Alpena, MI, Port Sanilac, MI and Goderich, Ontario
Nearshore Project	Michigan DNR	Fish - bottom trawls, beach seining, gill netting (large and small mesh), trap netting	Distribution, growth and survival of fish	Transects between 3 m and 18 m depth
Tributary Monitoring	USGS	Contaminants - PCBs, Hg, chemicals of emerging concern, sediment loads, nutrients, bacteria, protozoa and viruses, turbidity, conductivity	Loads of various chemicals, USGS methodology studies	Automated sampling - continuous, year round
River Mouth Project	USGS, EPA, MDNR, NOAA Marine Sanctuary	Water velocity and direction, tracer chemicals, water levels, water quality, sediments, wetland plants, benthos, larval fish	Quantify nutrient dynamics in river (reservoirs), water movement, hydrodynamic model data	Thunder Bay River - lower river, river mouth and nearshore. Frequency?
Benthos assessment	NOAA, EPA, EC, OMNR	Benthic grab samples for invertebrates	Five-year assessment of benthic community at 80 stations throughout Lake Huron	Late July
Nearshore Assessment	EPA	Triaxus towed sensor survey- plankton, chlorophyll, chemistry	Assessment of nearshore of Lake Huron - at 20 meter depth contour	Summer

Lake Erie

- Hazardous algal blooms
- Eutrophication
- Low D.O. in central basin

Lake Erie Algal Bloom

Nutrient management

- **Finding**: Sampling in the Maumee River and the Sandusky River began in April and high concentrations of Microcystis were already present in the rivers and in sediments within the river and lake.
- **Implication**: Sediment movement, from the river to the Lake during storms and
- dredging activities, may be one source of "seed" for algal blooms in the Lake.

Nutrient management

- **Finding**: During storm runoff events in the Maumee River, dissolved nutrients from the watershed (predominantly cropland), such as dissolved reactive phosphorus and nitrate, are present at high concentrations and are carried with the storm runoff water
- **Implication**: Management efforts to reduce phosphorus loading to Lake Erie should focus primarily on reducing dissolved phosphorus loading.


Keep 'Em Great!