

A satellite map of the Great Lakes region, showing the five Great Lakes (Superior, Michigan, Huron, Erie, and Ontario) and the surrounding land areas. The text is overlaid on the map.

State of the Great Lakes from 2008 to 2011

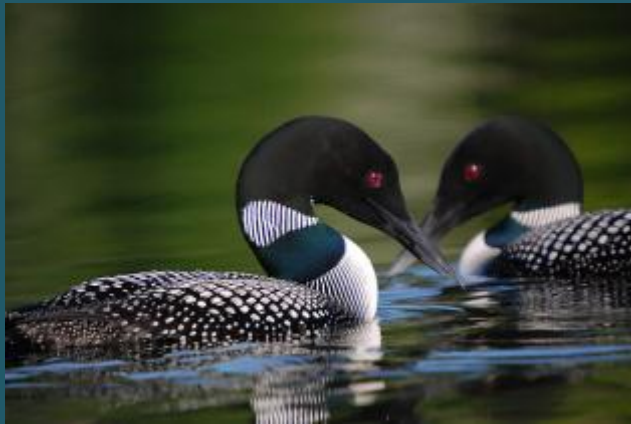
Great Lakes Public Forum
September 9, 2013
Milwaukee, WI

Paul Horvatin, U.S. EPA

Nancy Stadler-Salt, Environment Canada



WATER QUALITY



AQUATIC- DEPENDENT LIFE



LANDSCAPES AND NATURAL PROCESSES

Water Quality is

Status: FAIR

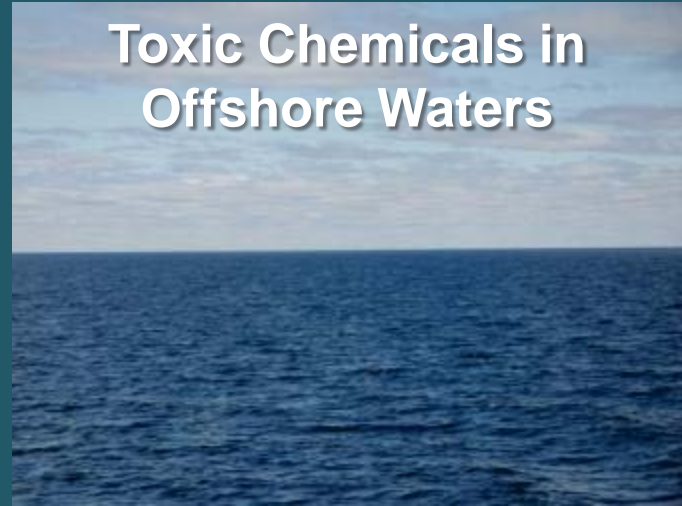
Trend: DETERIORATING

Water Quality Indicators

Nutrients in Lakes



Toxic Chemicals in Offshore Waters



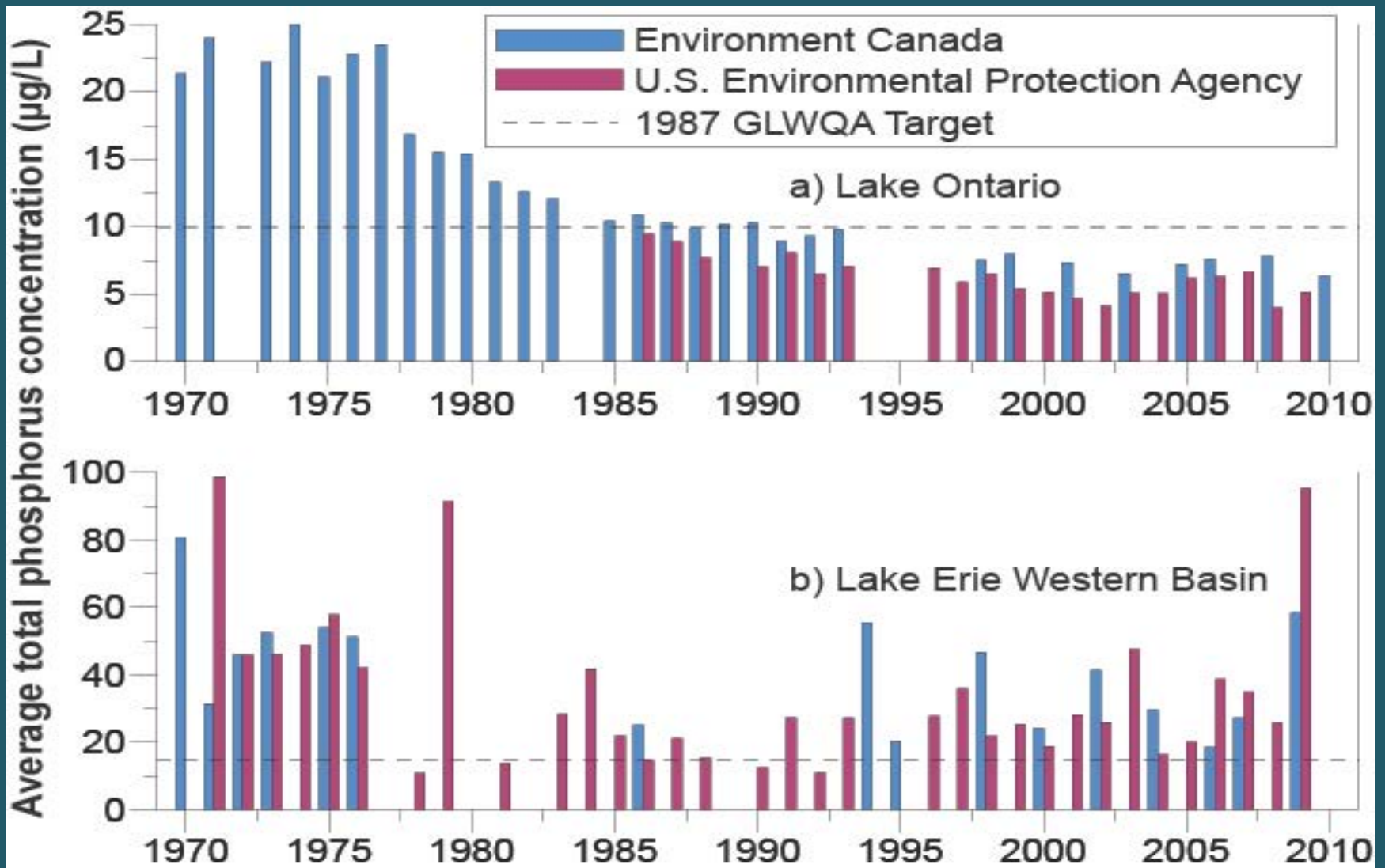
Contaminants in Whole Fish



Contaminants in Waterbirds



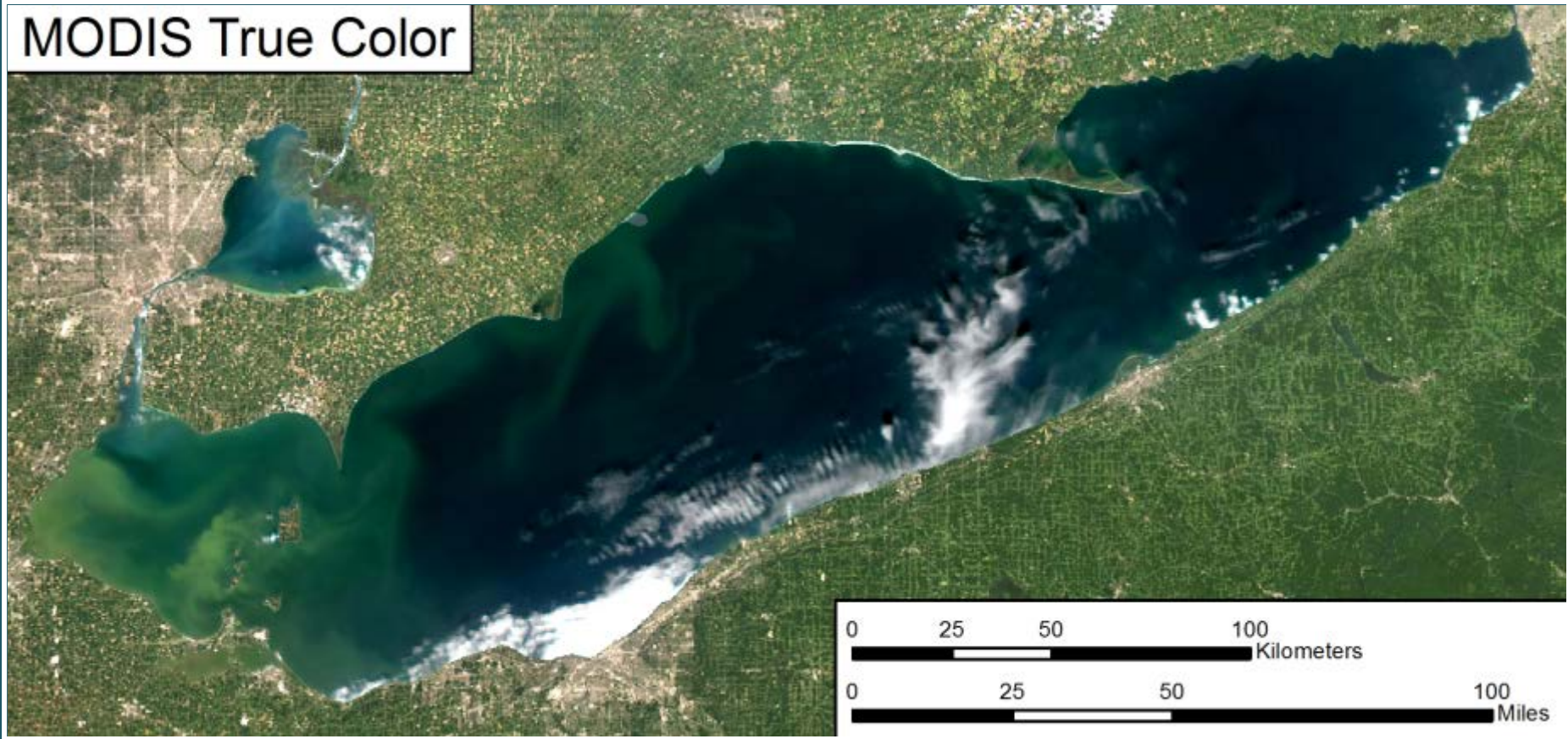
Indicator: Nutrients in Lakes



Source: U.S. EPA and Environment Canada

2013 Harmful Algal Blooms

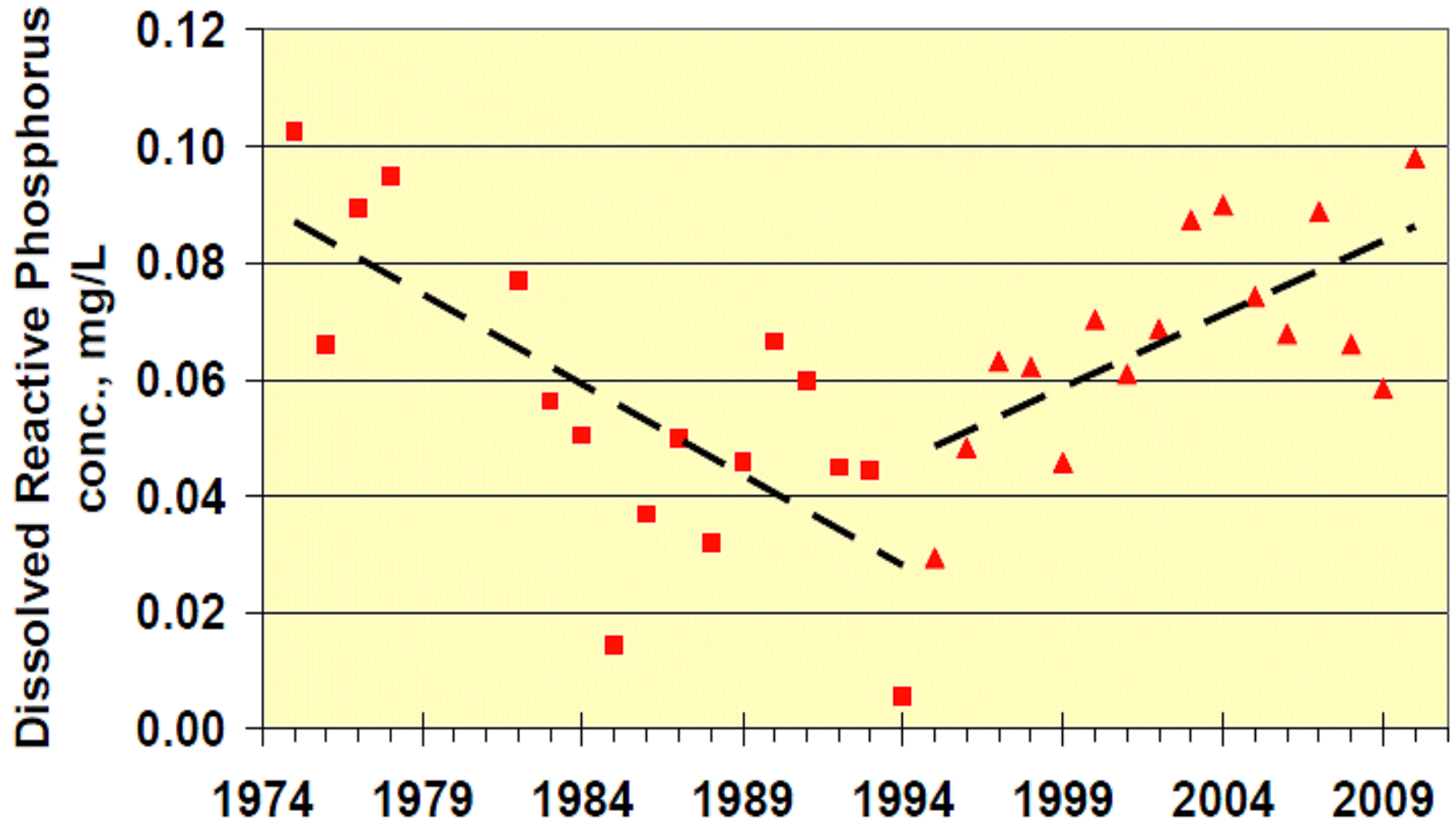
MODIS True Color



August 18, 2013

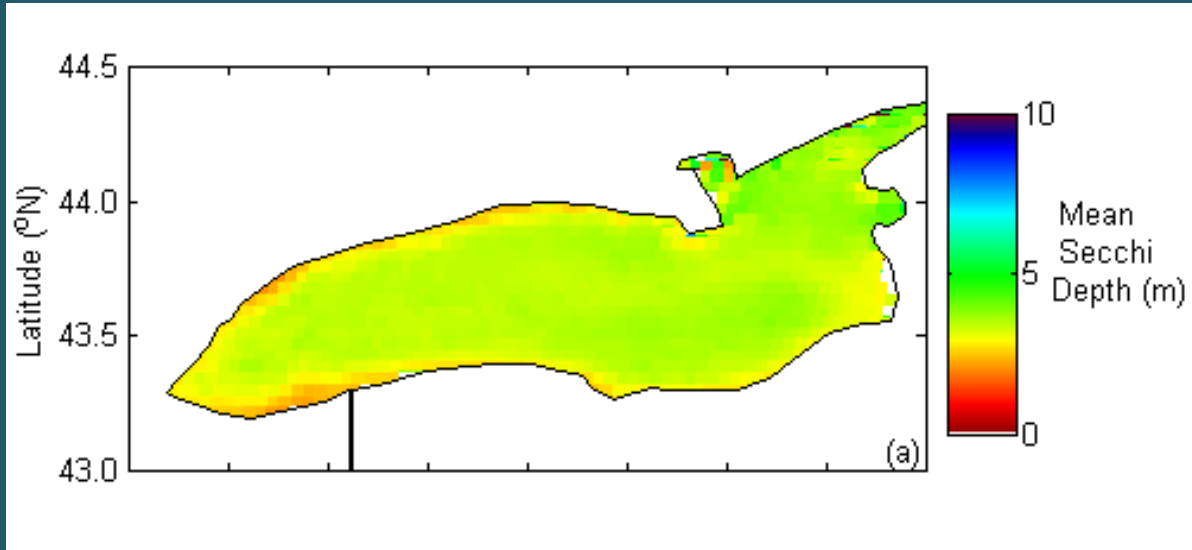
Source: Michigan Tech Research Institute

Dissolved Reactive Phosphorus Concentration

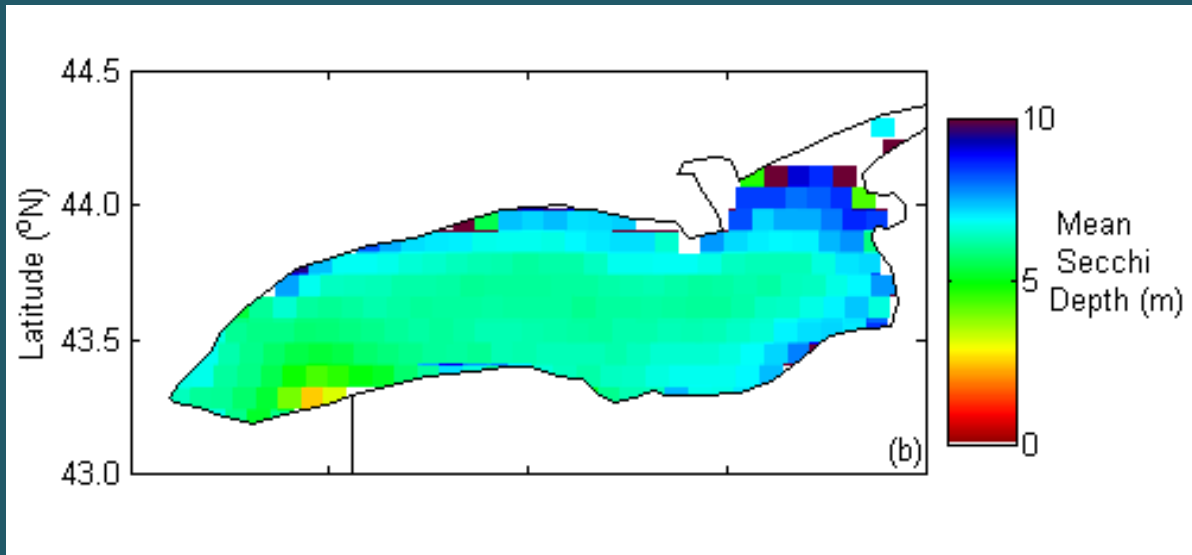


Maumee River at Waterville, Ohio

Supporting Indicator: Water Clarity

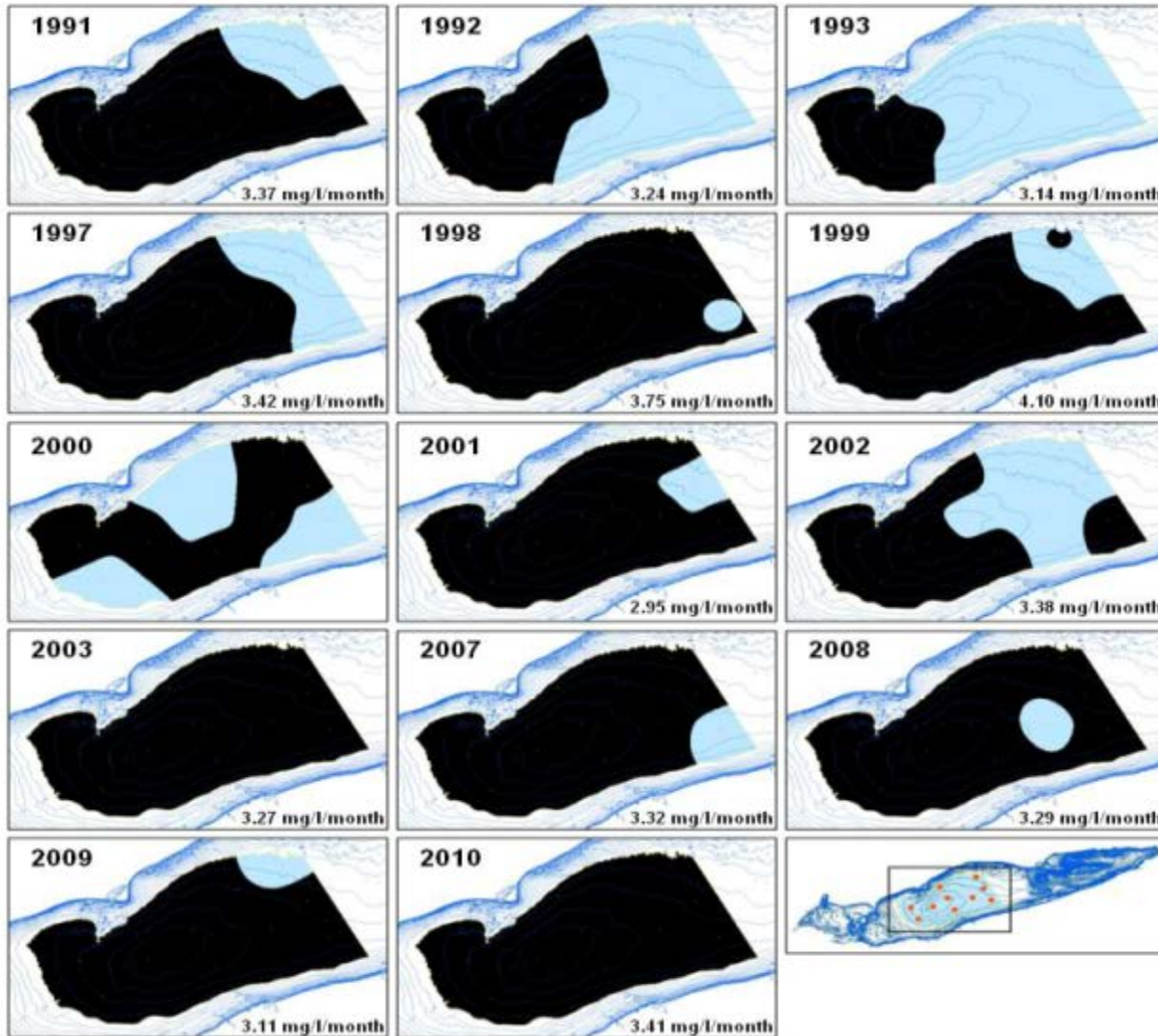


**Secchi Disk Depths
1979-1985**



**Secchi Disk Depths
1998-2005**

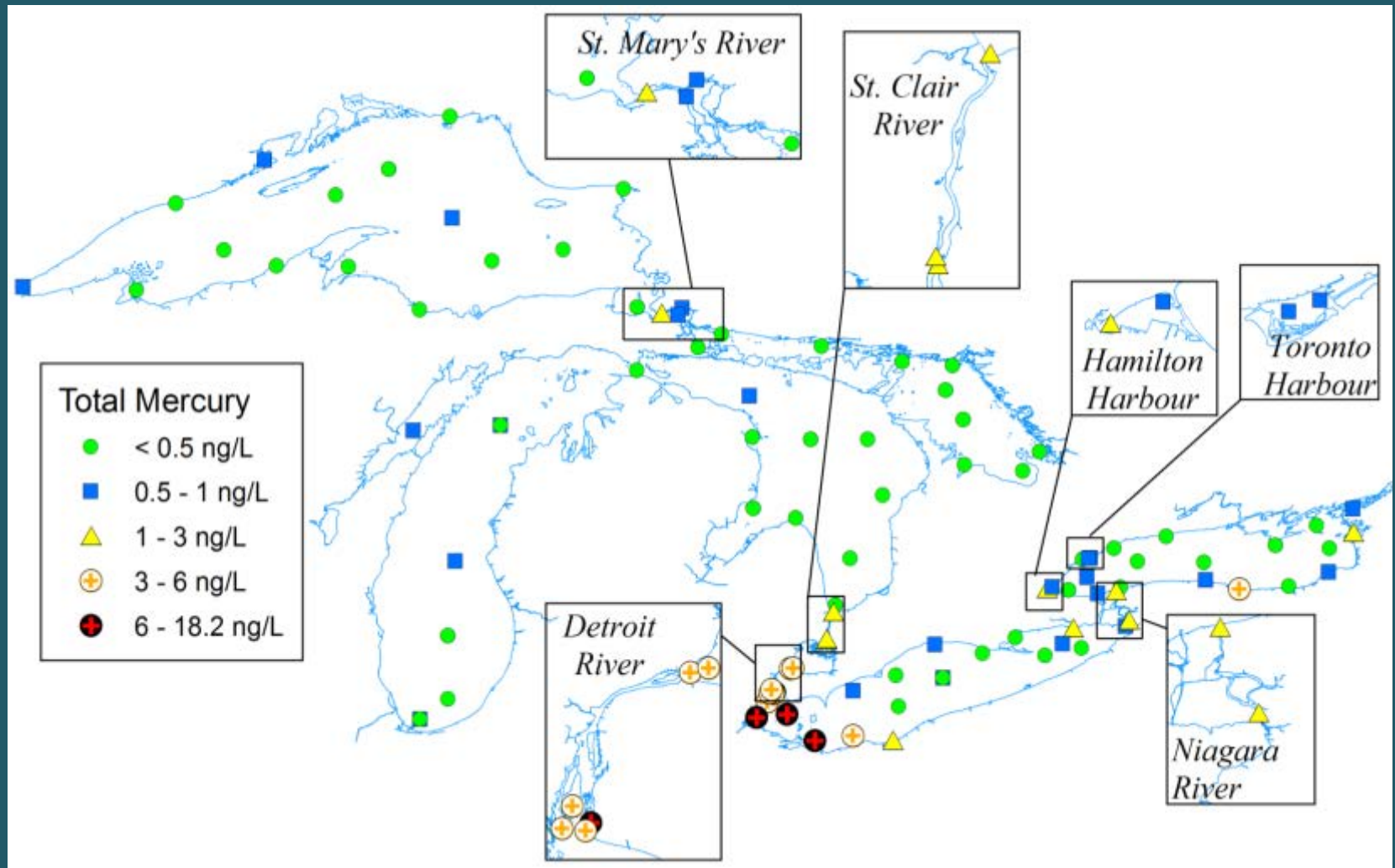
Supporting Indicator: Dissolved Oxygen



Maximum area of anoxia (deficiency of oxygen) measured in the Central Basin of Lake Erie

Indicator: Toxic Chemicals in Offshore Waters

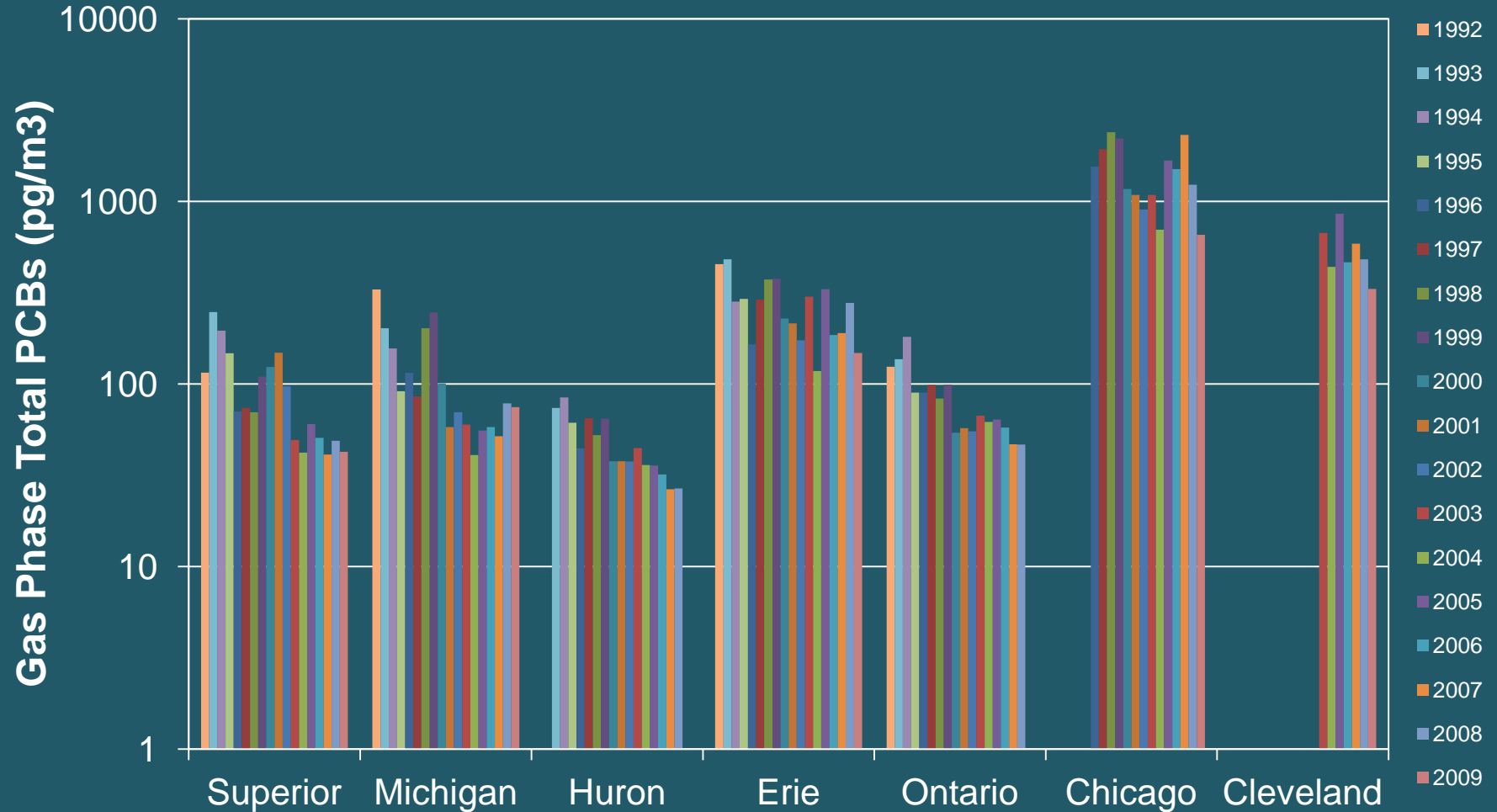
Mercury



Source: Environment Canada

Supporting Indicator: Atmospheric Deposition

Total PCBs (gas phase) at rural and urban atmospheric deposition stations



Source: IADN Steering Committee



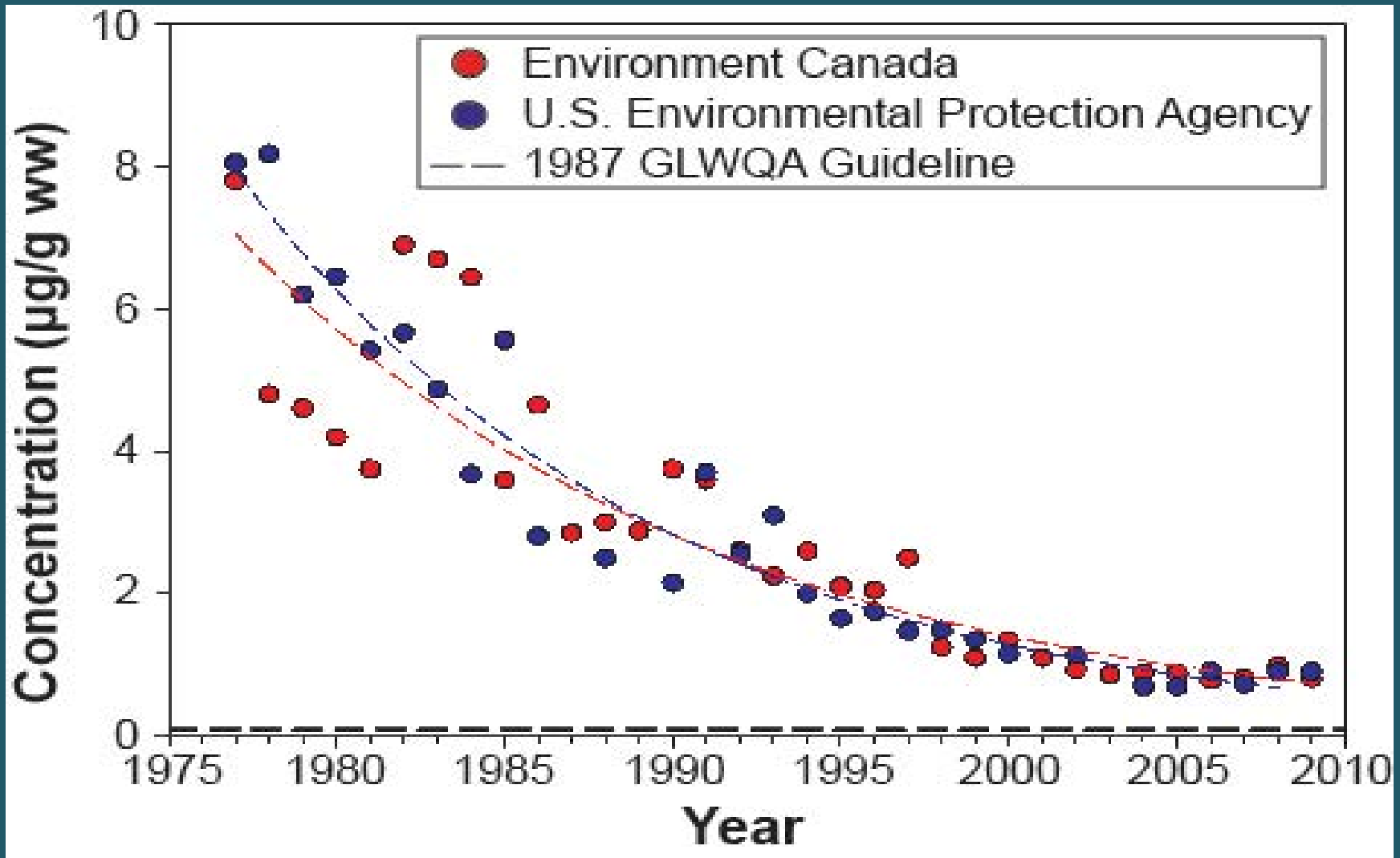
R/V MUDPUPPY II
SAFETY



U.S. EPA "Mud Puppy"

Indicator: Contaminants in Whole Fish

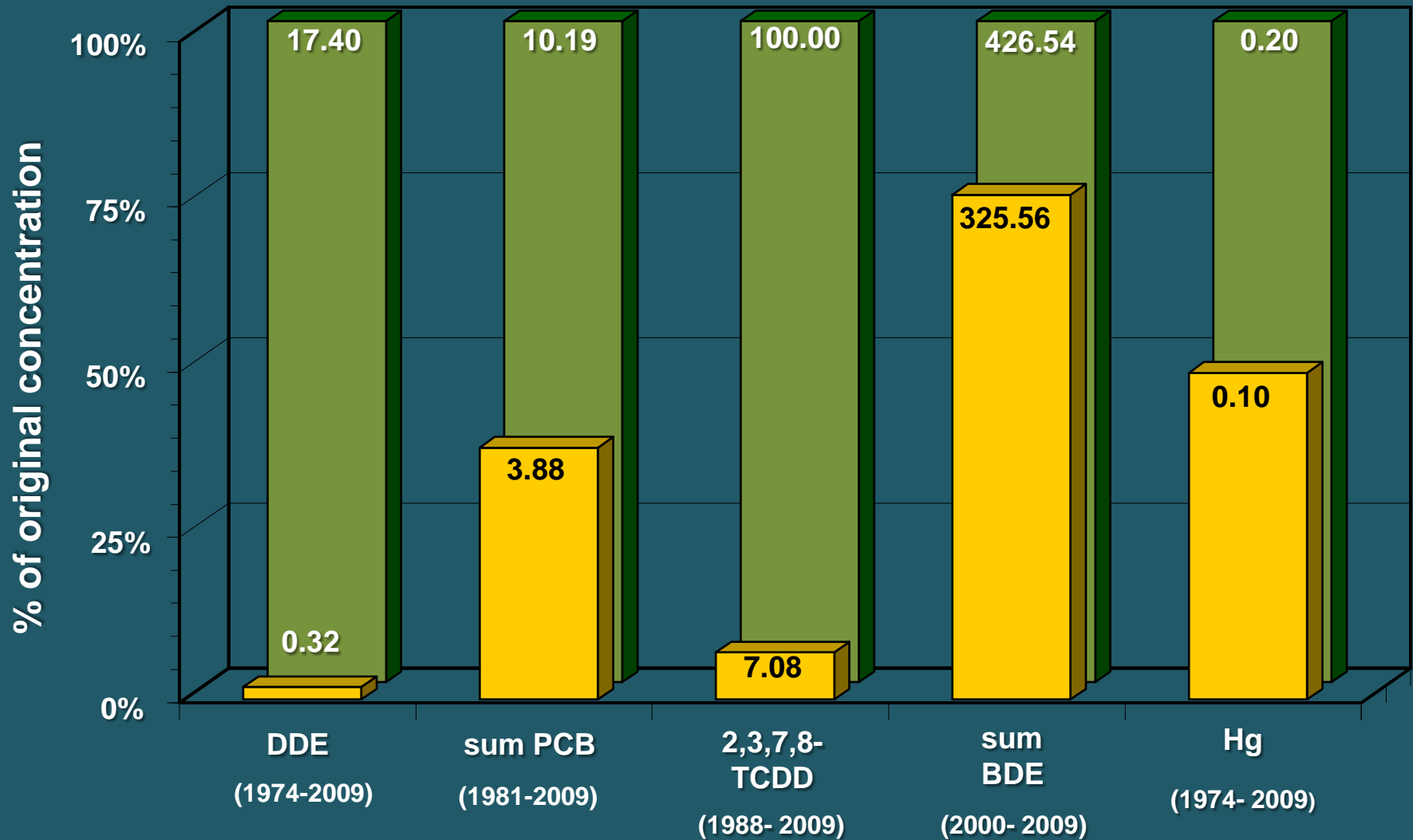
PCBs



Source: Environment Canada and U.S. EPA

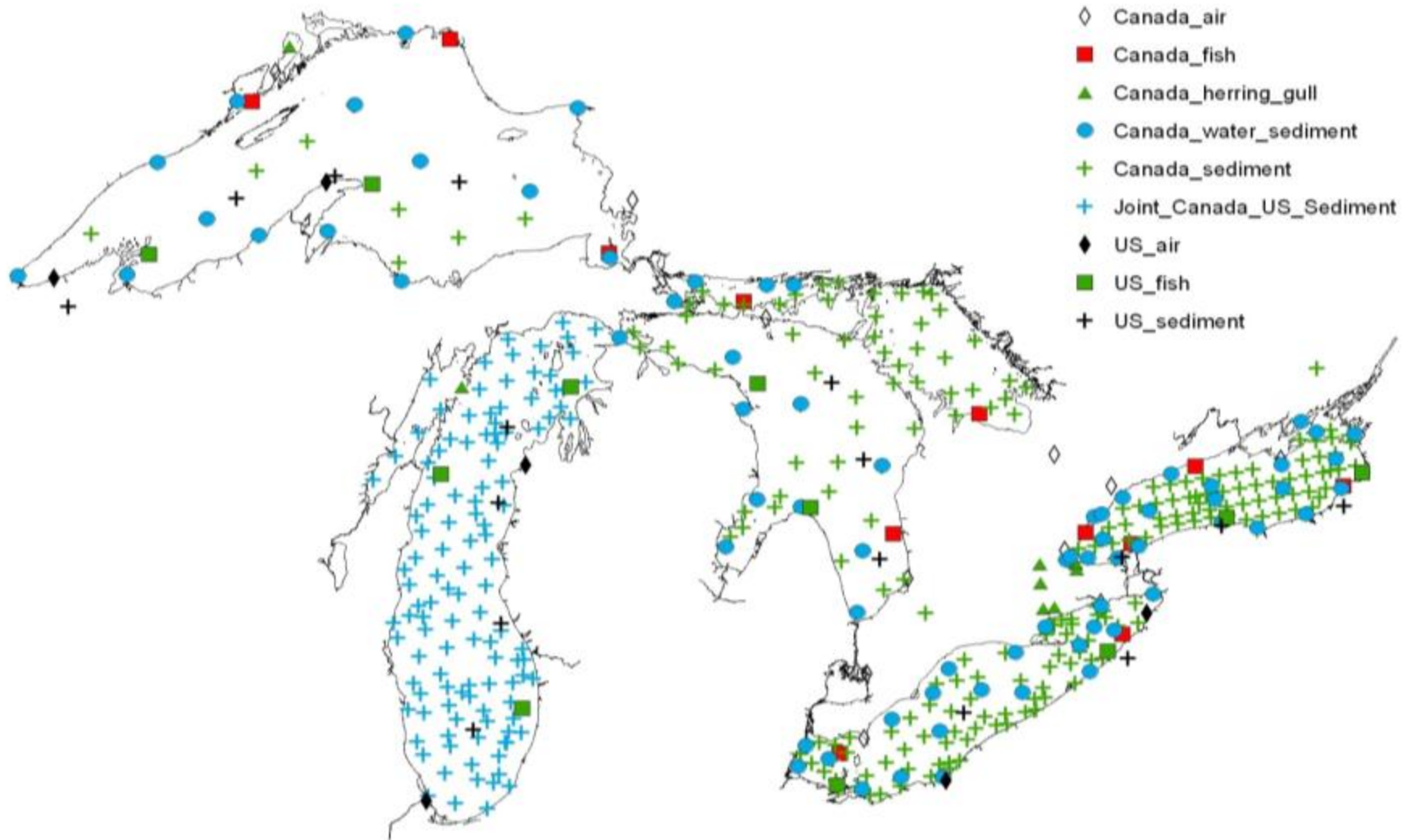
Indicator: Contaminants in Waterbirds

Lake Huron



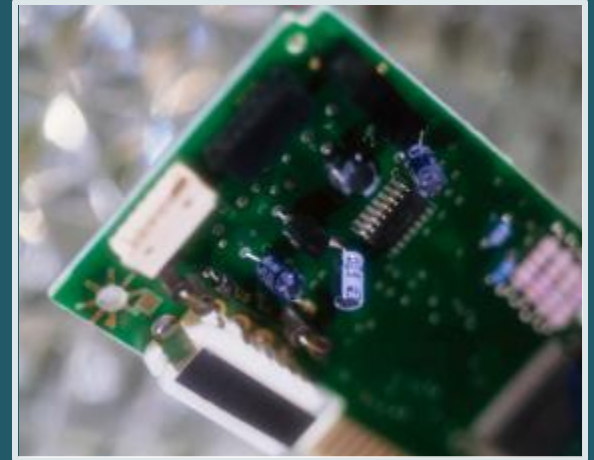
Source: Canadian Wildlife Service

Chemical Monitoring Stations

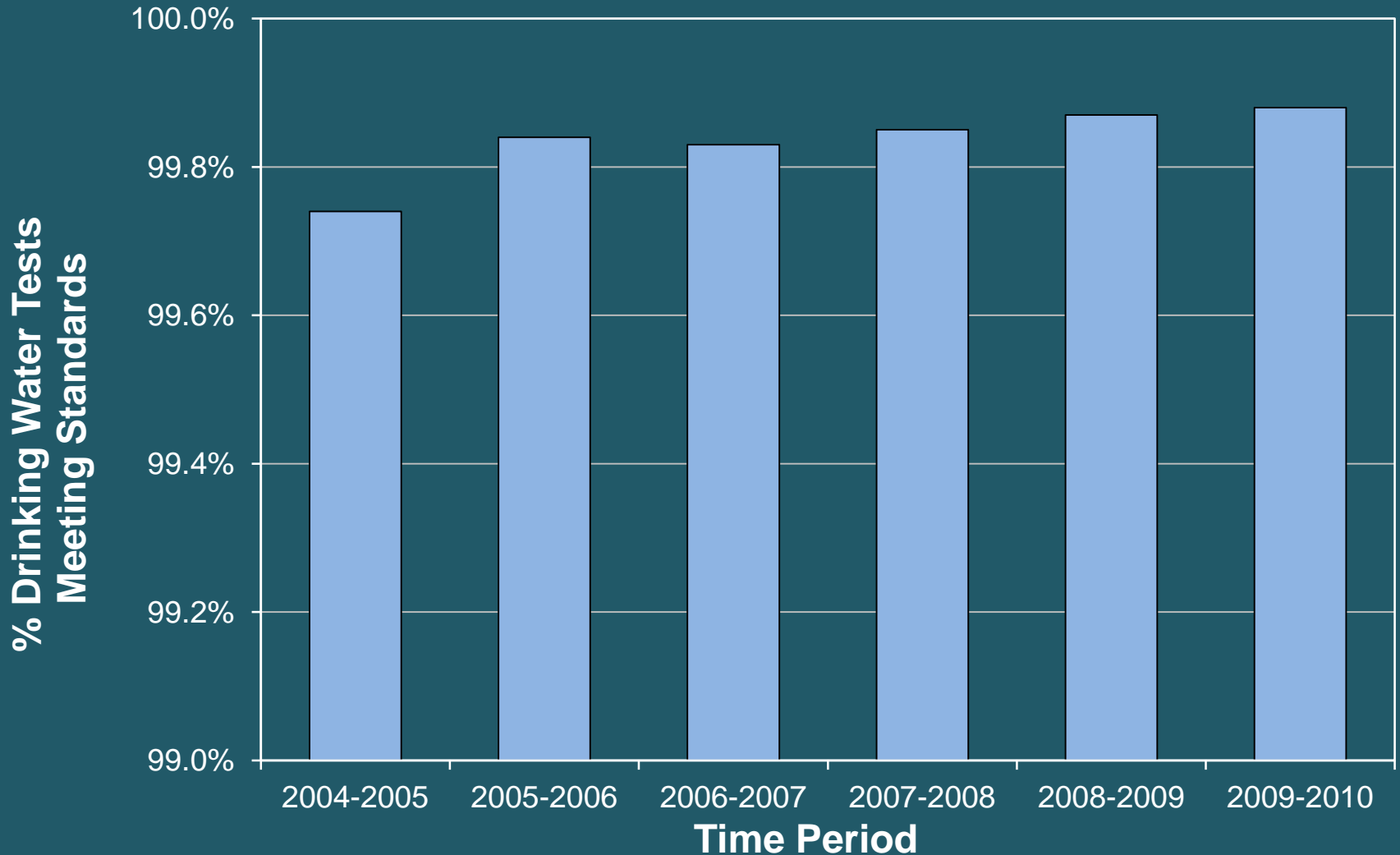


Source: Environment Canada and U.S. EPA

Emerging Chemicals



Indicator: Drinking Great Lakes Water Canada



Source: Ontario Ministry of the Environment

Indicator: Eating Great Lakes Fish

Contaminants Responsible for Advisories*

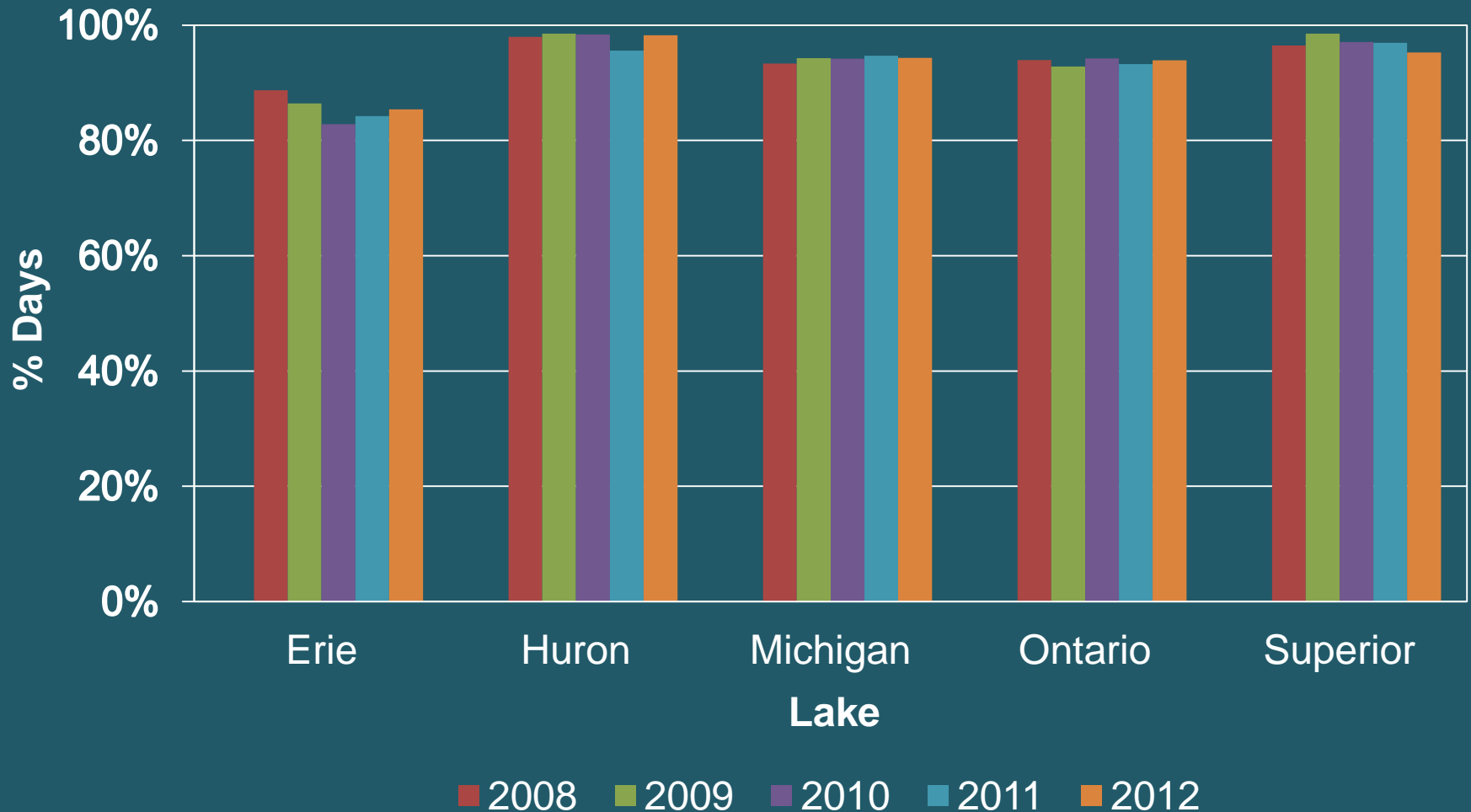
Lake	State/Province	PCB	Dioxin	Mercury	Chlordane	Mirex	Toxaphene
Superior	Michigan	X	X	X	X		
	Wisconsin	X		X			
	Minnesota	X		X			
	Ontario	X	X	X			X
Huron	Michigan	X	X	X			
	Ontario	X	X	X			
Erie	New York	X					
	Ohio	X		X			
	Pennsylvania	X					
	Michigan	X	X	X			
	Ontario	X	X	X			
Ontario	New York	X	X			X	
	Ontario	X	X	X			
Michigan	Illinois	X			X		
	Michigan	X	X	X	X		
	Indiana	X		X			
	Wisconsin	X		X			

*Not all states/provinces issue advisories for all of the listed contaminants

Source: Great Lakes states and Ontario Ministry of the Environment

Indicator: Swimming at Great Lakes Beaches

Percentage of Days that U.S. Great Lakes Beaches are Open and Safe for Swimming



Source: U.S. EPA

Water Quality Summary

Water quality is in fair condition and the trend is deteriorating

- Nutrients are impacting human and ecosystem health and algal trends are worsening
- Contaminants in water, sediments and air are declining however new substances of concern are being detected
- Contaminants in biota are declining but still exceed guidelines in some fish and waterbirds. Mercury levels have been slowly increasing since 1990
- Treated Great Lakes water is safe to drink; fish are safe to eat overall if advisories are followed; and, most Great Lakes beaches are safe for swimming most of the time

Aquatic-Dependent Life is



Status: FAIR

Trend: DETERIORATING

Aquatic-Dependent Life Indicators



Diporeia



Walleye



Lake Sturgeon



Lake Trout



**Benthos Diversity
and Abundance**



Preyfish Populations



**Coastal Wetland
Amphibians**



**Coastal Wetland
Birds**

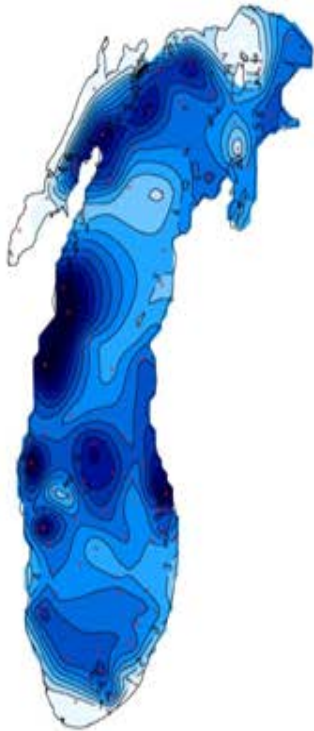


**Coastal Wetland
Plant Communities**

Indicator: *Diporeia*

Lake Michigan

1994/95

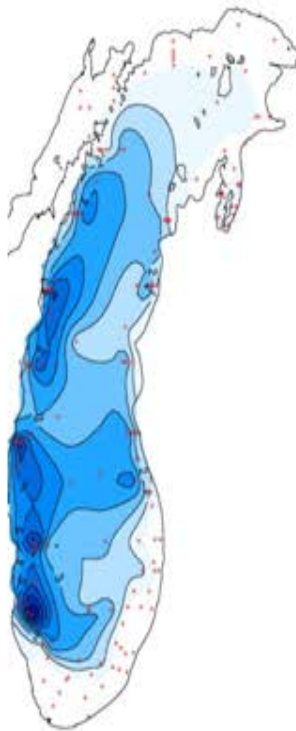


0 3 6 9 12 15



Density (No. $m^2 \times 10^3$)

2000

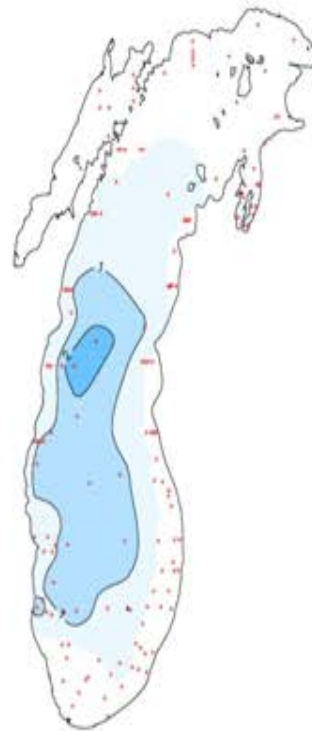


0 3 6 9 12 15



Density (No. $m^2 \times 10^3$)

2005

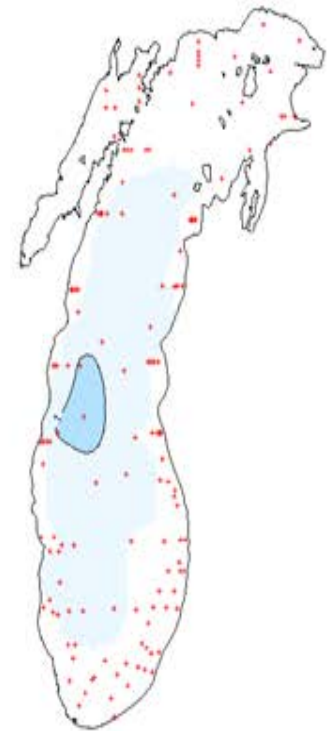


0 3 6 9 12 15



Density (No. $m^2 \times 10^3$)

2010

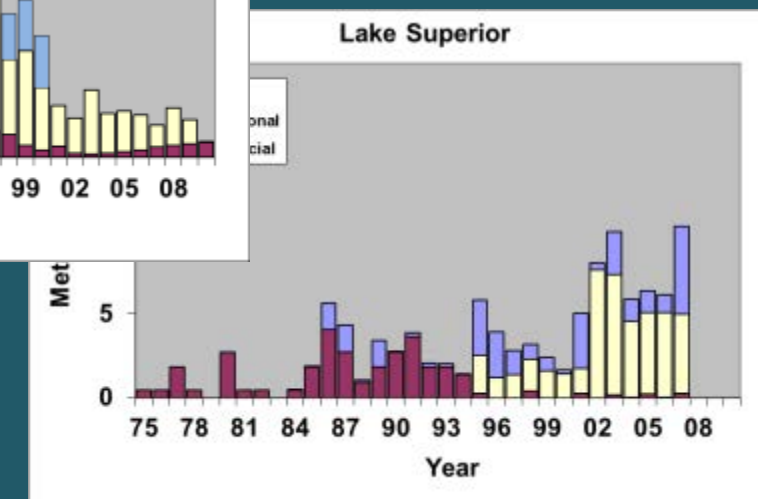
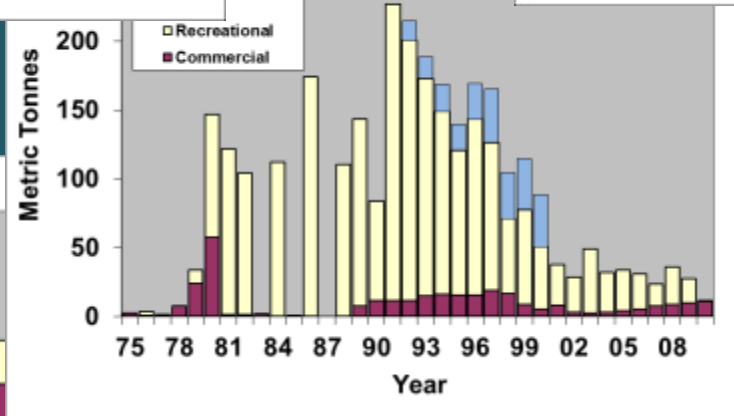
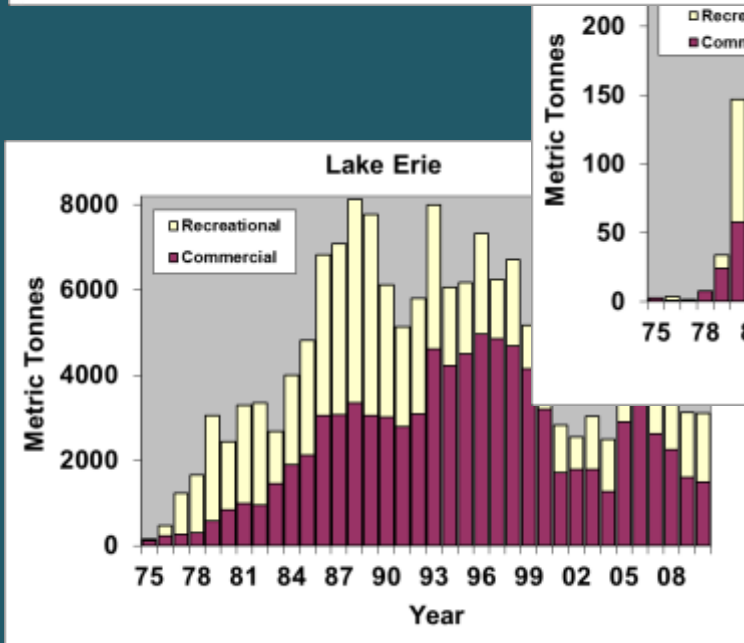
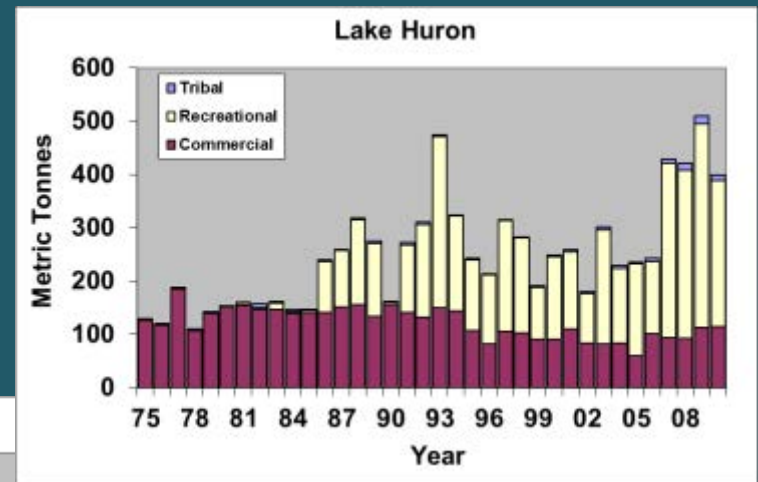
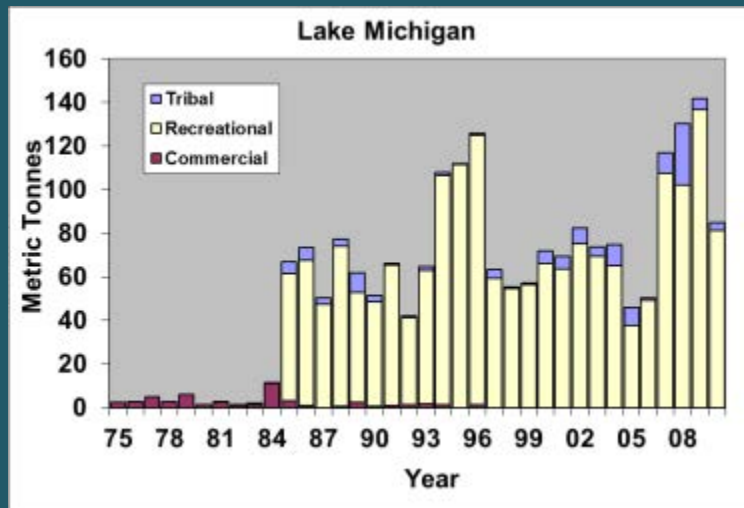


0 3 6 9 12 15



Density (No. $m^2 \times 10^3$)

Indicator: Walleye



Source: Ohio Department of Natural Resources and Ontario Ministry of Natural Resources

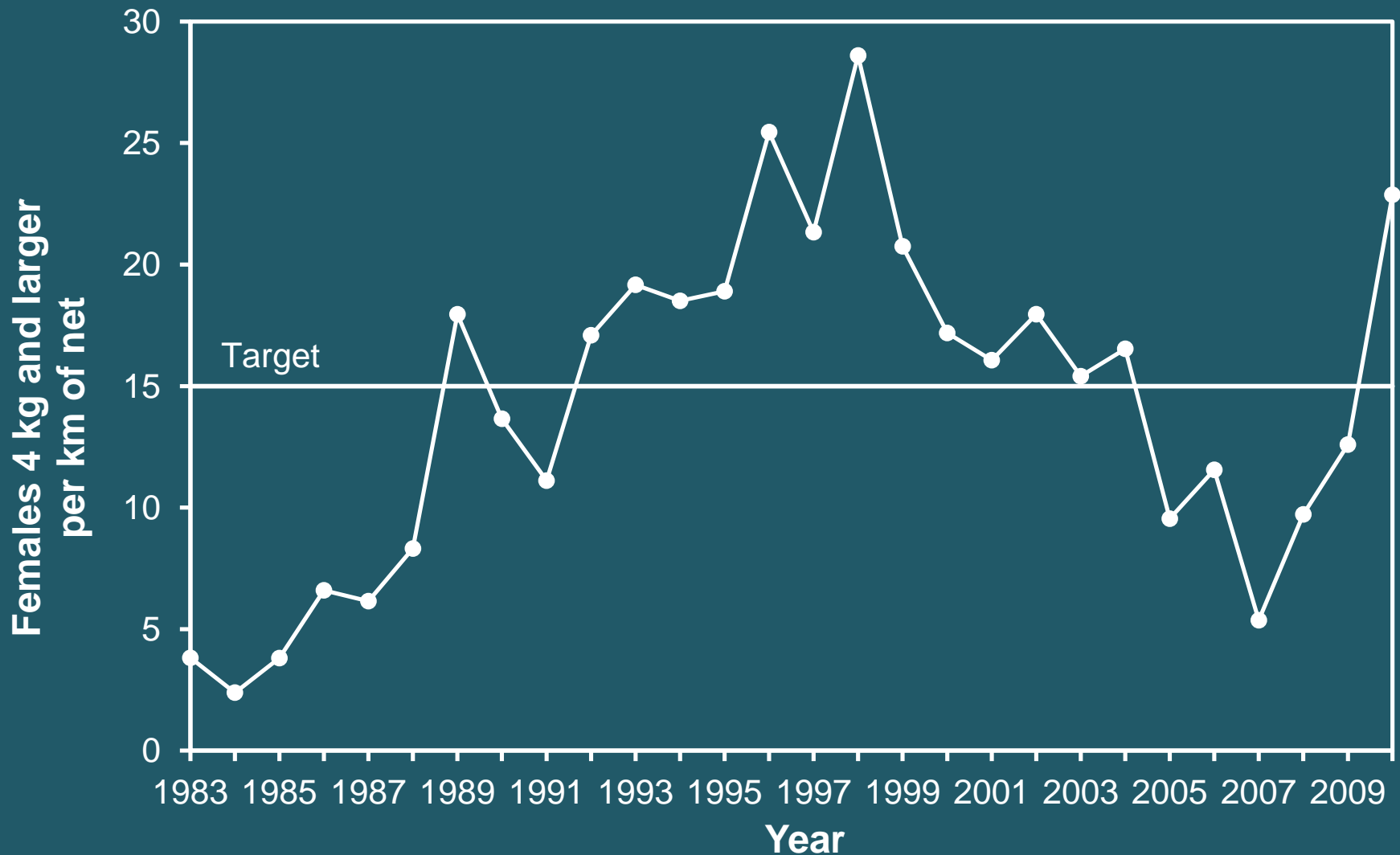
Indicator: Lake Sturgeon



Source: U.S. Fish and Wildlife Service

Indicator: Lake Trout

Lake Ontario

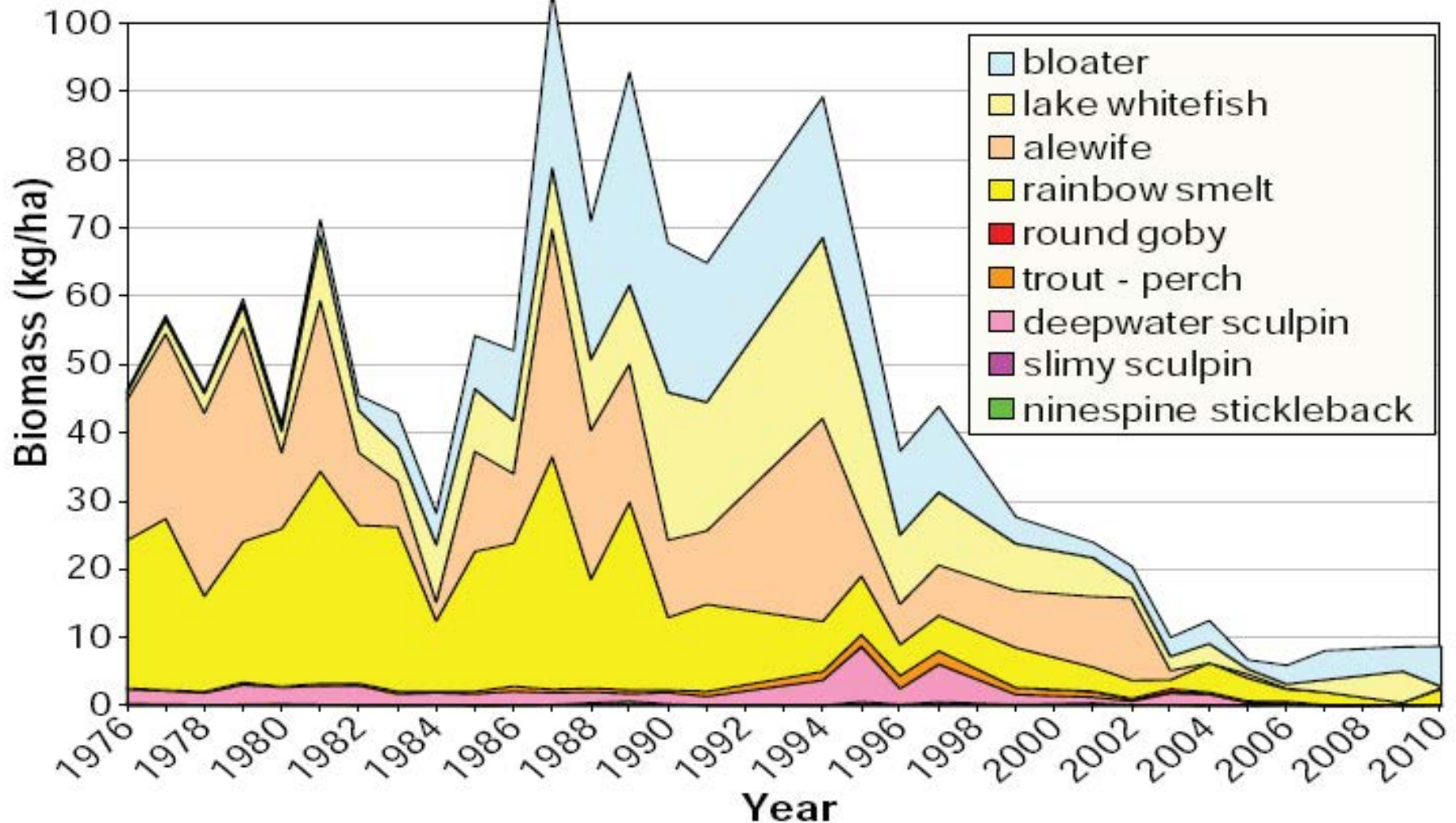


Source: New York Department of Environmental Conservation, Ontario Ministry of Natural Resources and U.S. Geological Survey

Indicator: Benthos Diversity and Abundance



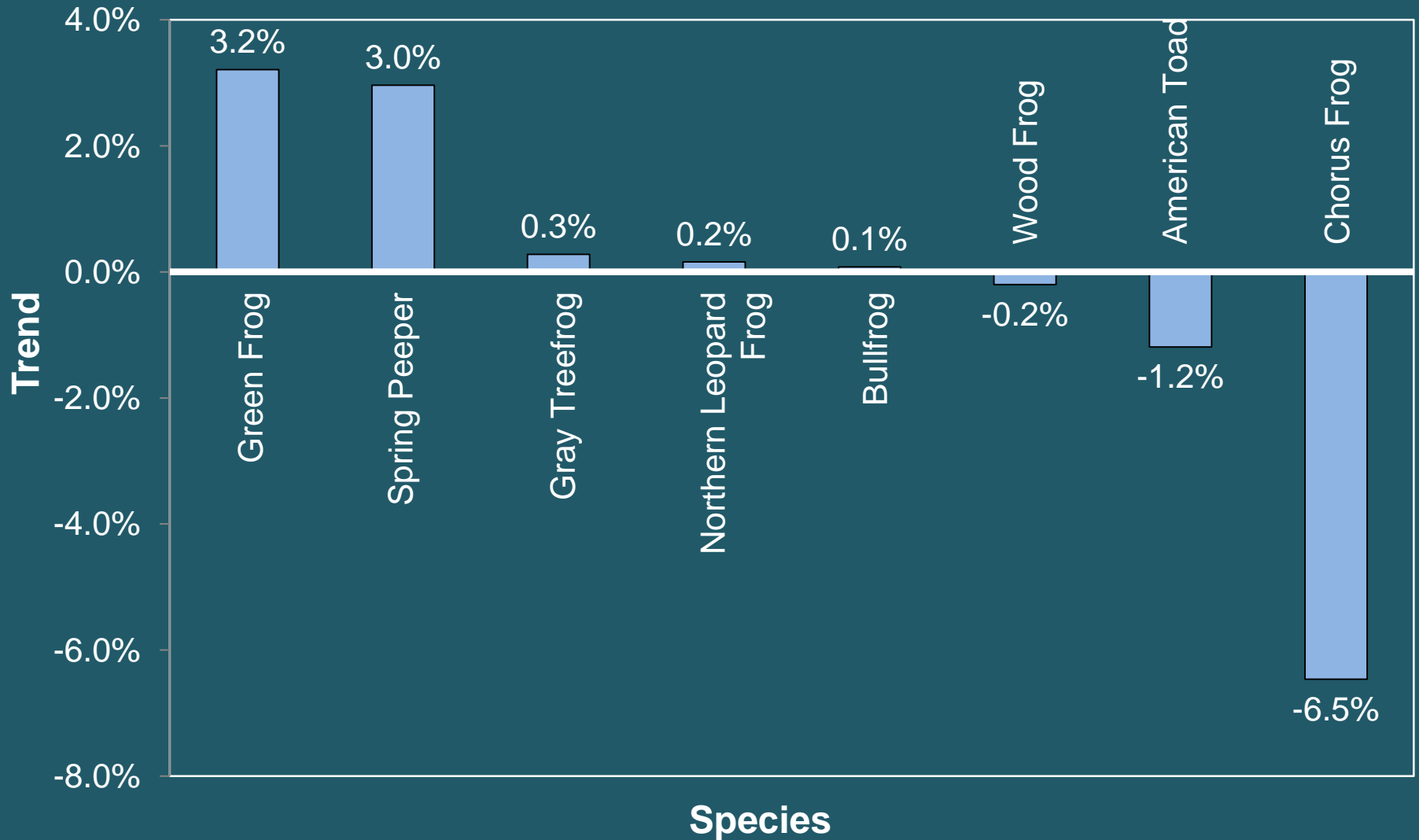
Indicator: Preyfish Lake Huron



Coastal Wetlands

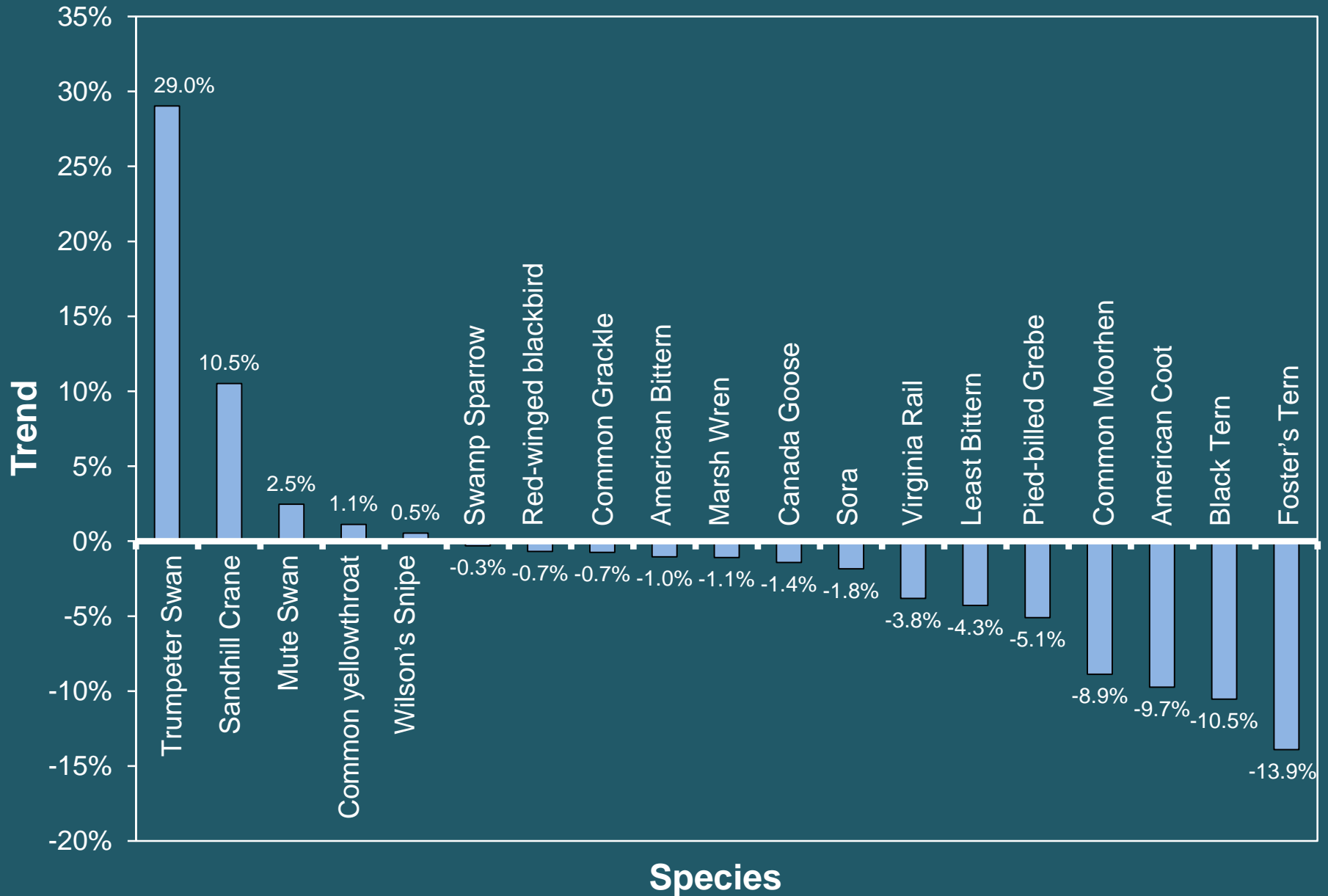


Indicator: Coastal Wetland Amphibians



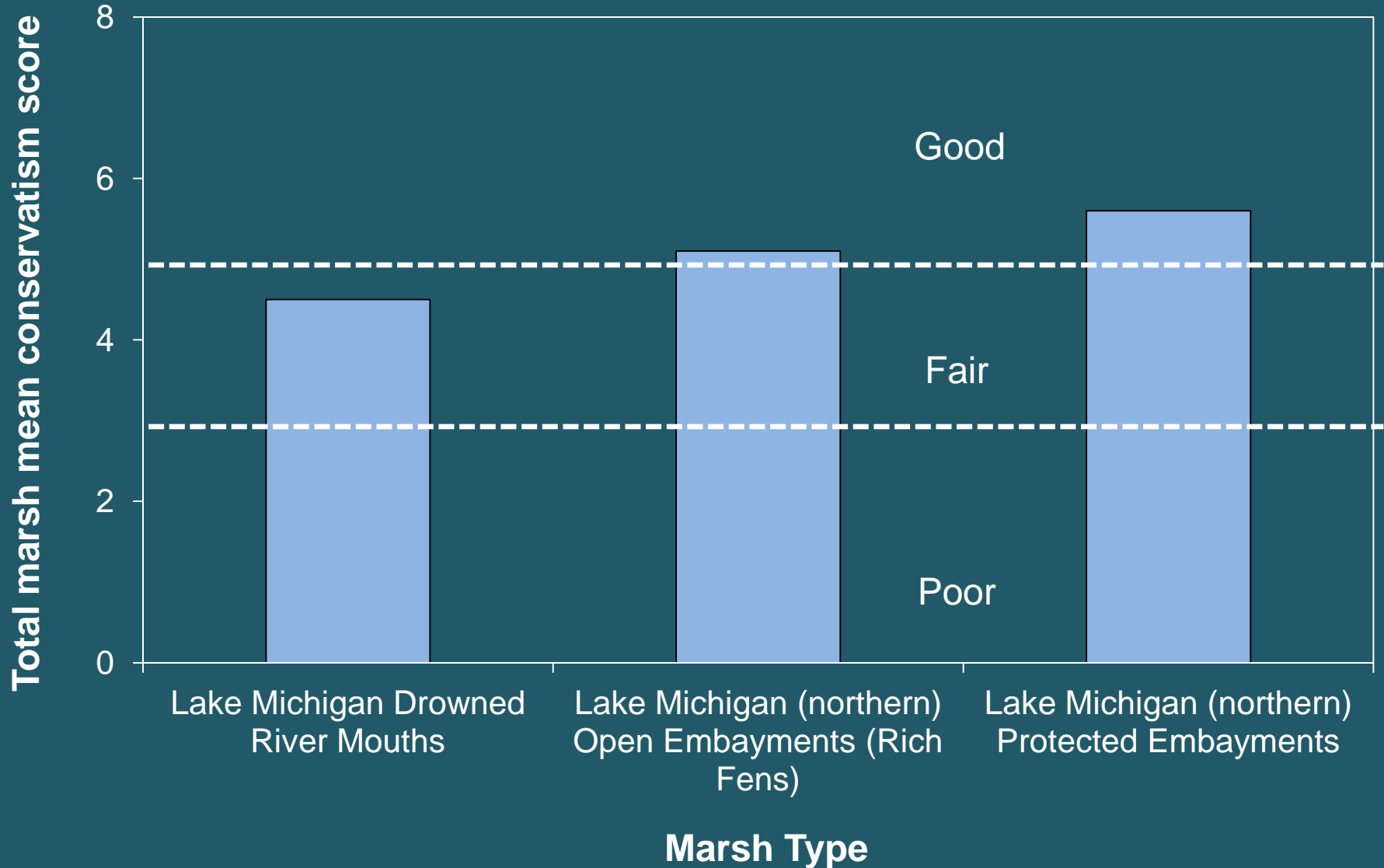
Source: Marsh Monitoring Program

Indicator: Coastal Wetland Birds



Source: Marsh Monitoring Program

Indicator: Coastal Wetland Plant Communities



Source: Central Michigan University and Oregon State University

Supporting Indicator: Aquatic Invasive Species

A large, silver fish, likely a muskie, is captured mid-jump, leaping out of a blue lake. The fish is angled towards the right, with its body arched and its mouth open. The background shows a dense line of green trees along the shoreline under a clear blue sky. The water in the foreground is dark blue with some white foam from the fish's jump.

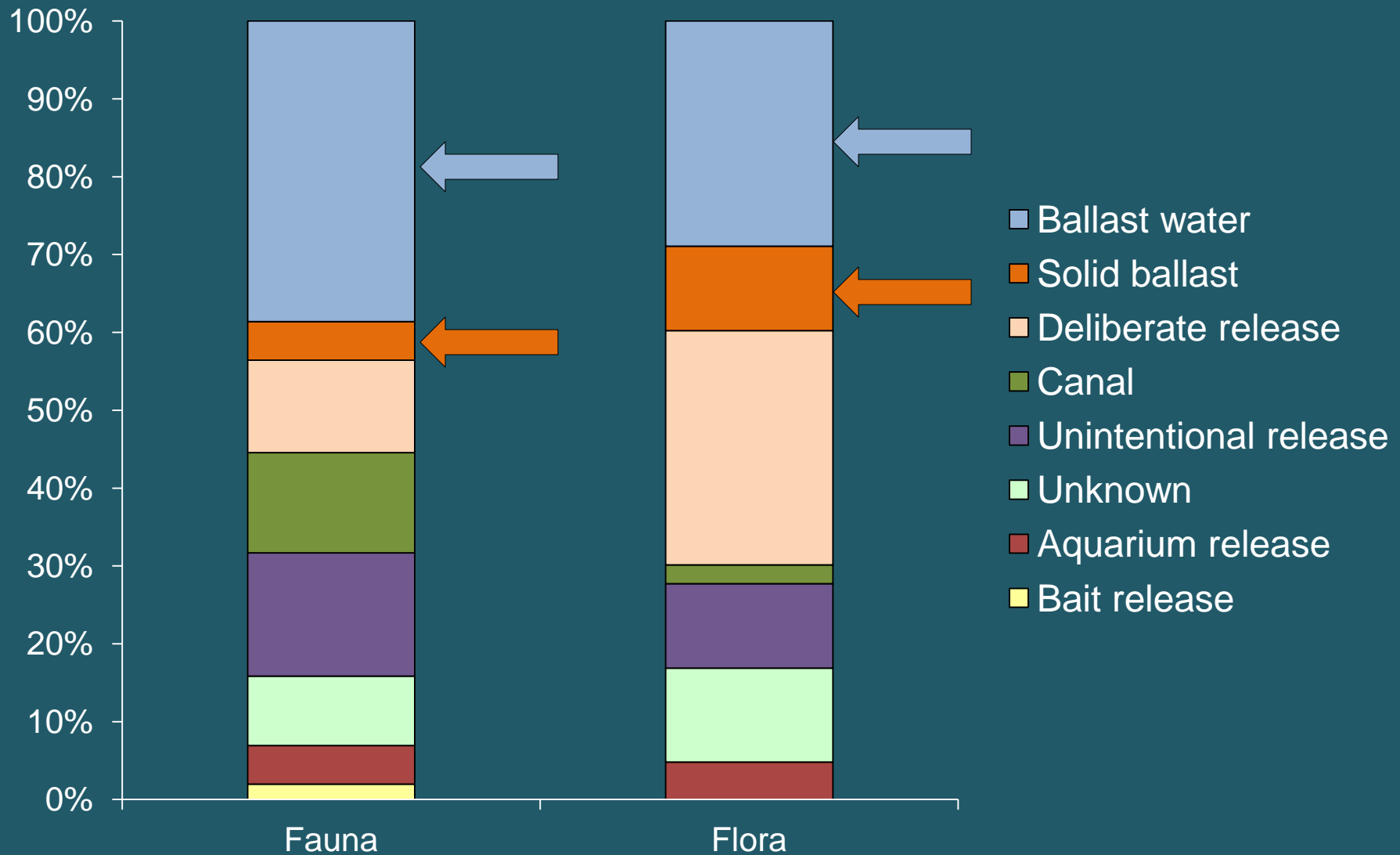
Of the **184** Non-Native Species,

10%

are **INVASIVE**

Supporting Indicator: Aquatic Invasive Species

Primary Release Mechanism



Source: Great Lakes Aquatic Nonindigenous Species Information System

Aquatic Dependent Life Changes to the Food Web



Cladoceran



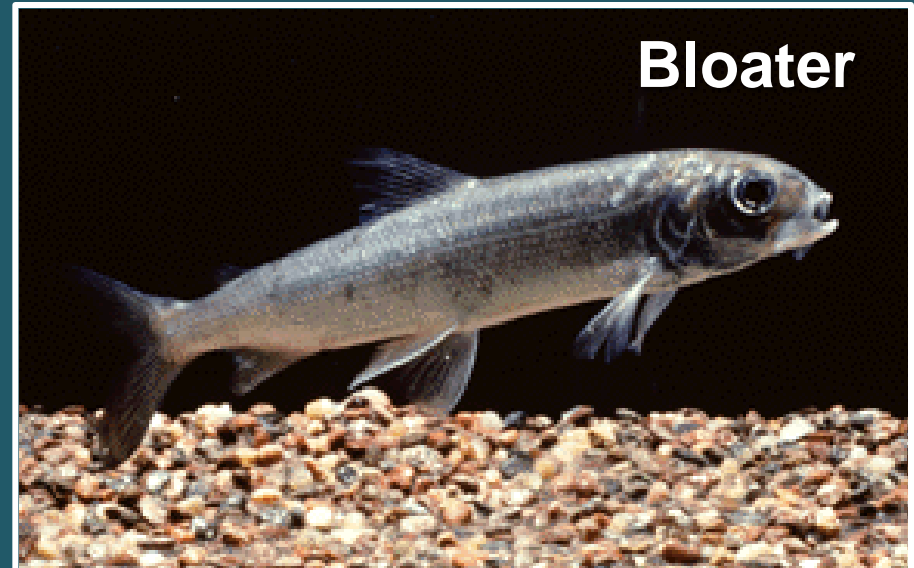
Daphnia



Diporeia



Lake Herring



Bloater

Aquatic Dependent Life Summary

Aquatic-dependent life is in fair condition and the trend is deteriorating

- In some areas, native species are struggling to survive.
- Coastal wetland plant and animal communities are diminishing due to loss of habitat; however, protection and restoration of wetland habitats have begun.
- No new non-native species have been detected in the lakes since 2006.
- The food web has changed due to impacts to habitats and species.

Landscapes and Natural Processes are



Status: FAIR
Trend: IMPROVING

Landscapes and Natural Processes Indicators



**Aquatic Habitat
Connectivity**



**Forest Cover -
Watershed**

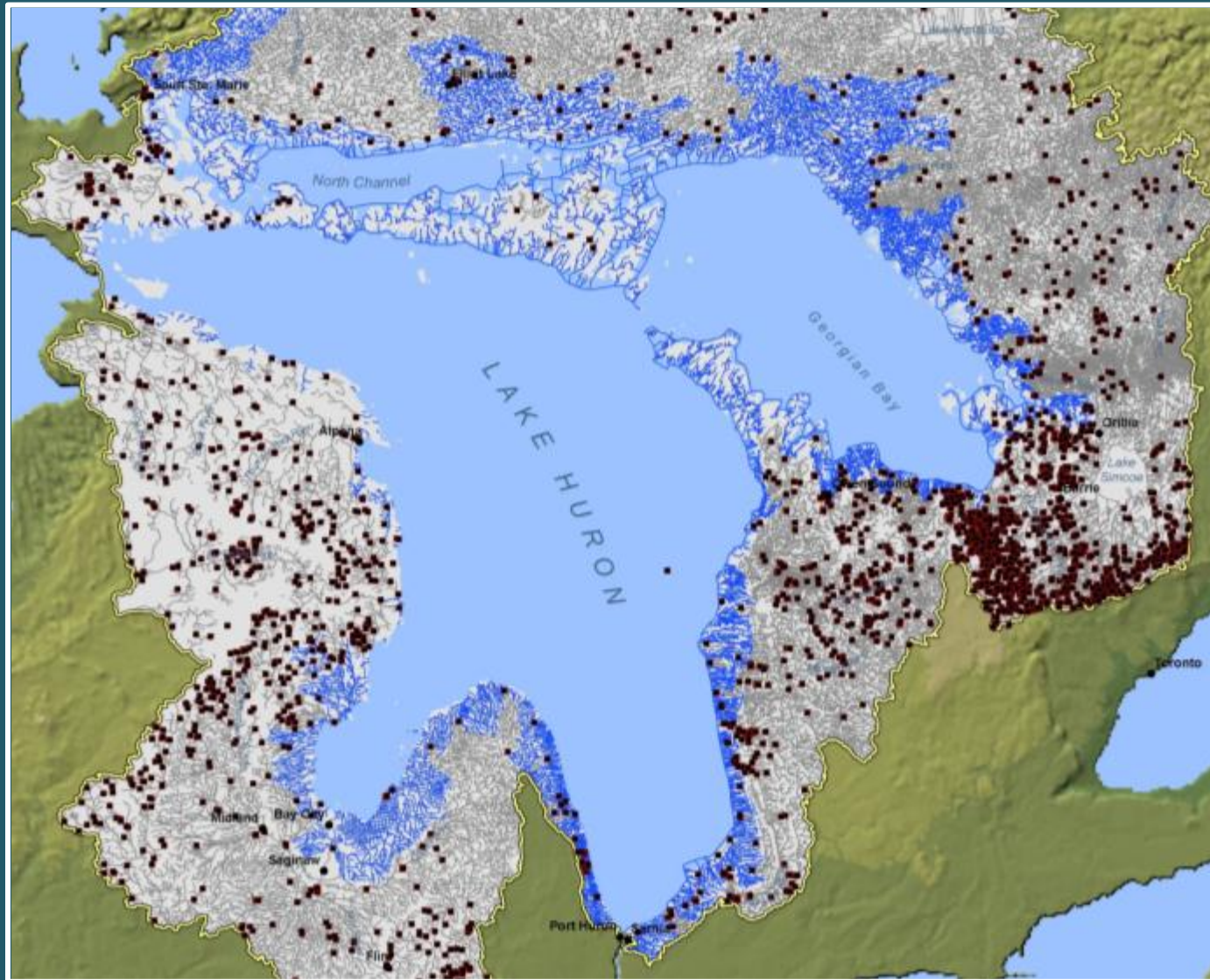


Forest Cover - Riparian



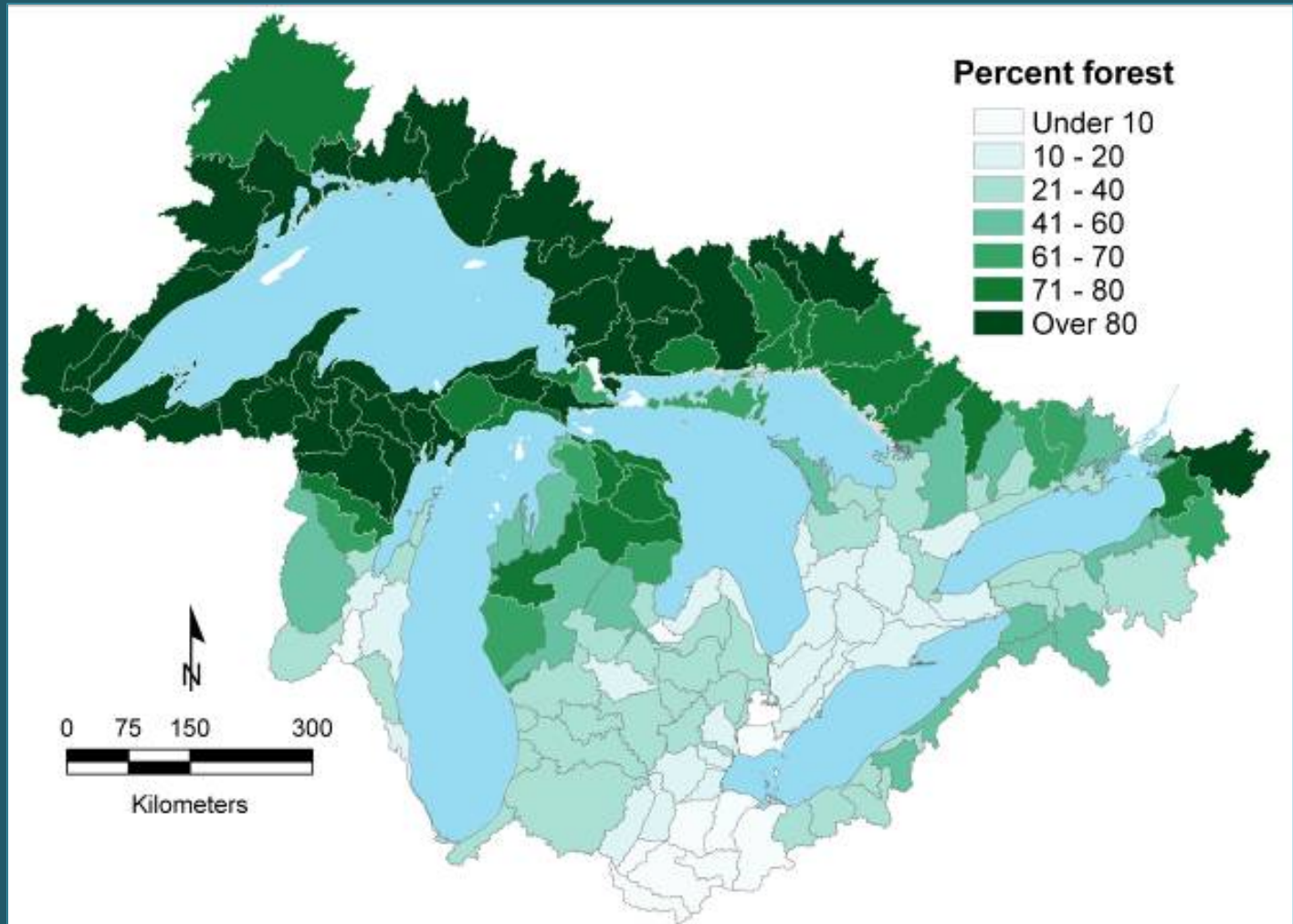
Tributary Flashiness

Indicator: Aquatic Habitat Connectivity



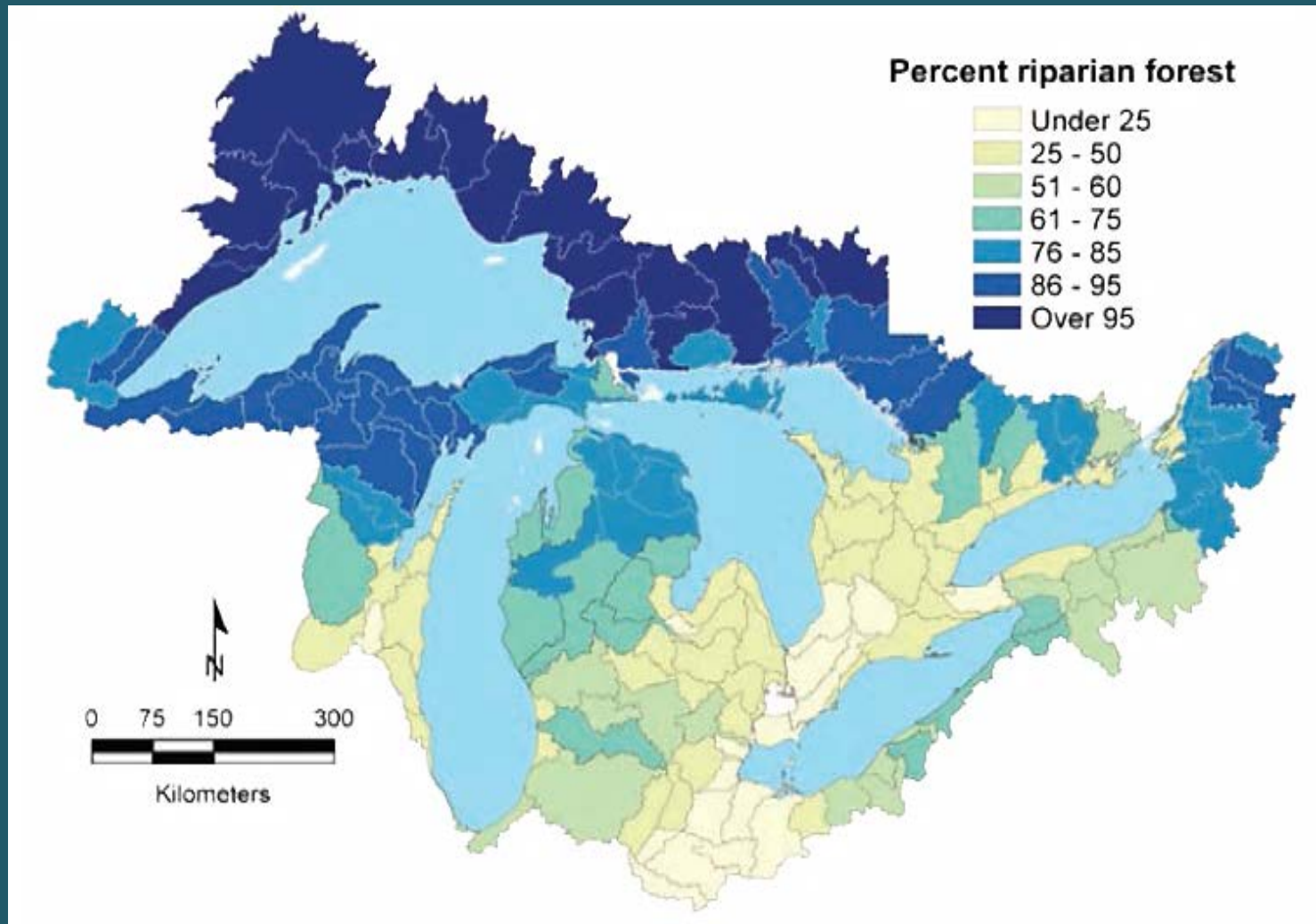
Source: *Sweetwater Sea, An International Biodiversity Strategy for Lake Huron*

Indicator: Forest Cover within a Watershed



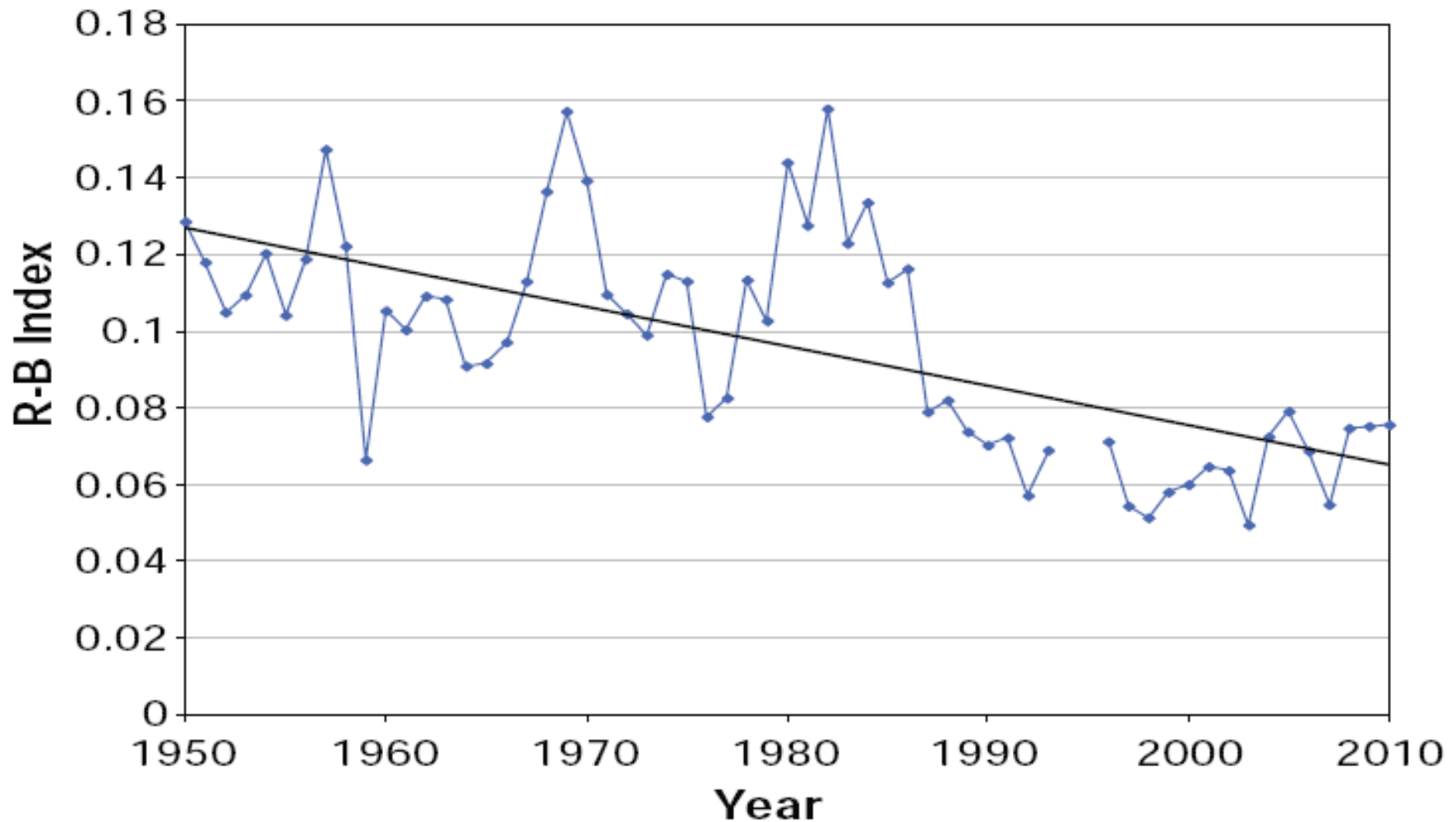
Source: US National Land Cover Database 2006 and Ontario LandCover 2008

Indicator: Forest Cover within Riparian Zones



Source: US National Land Cover Database 2006 and Ontario LandCover 2008

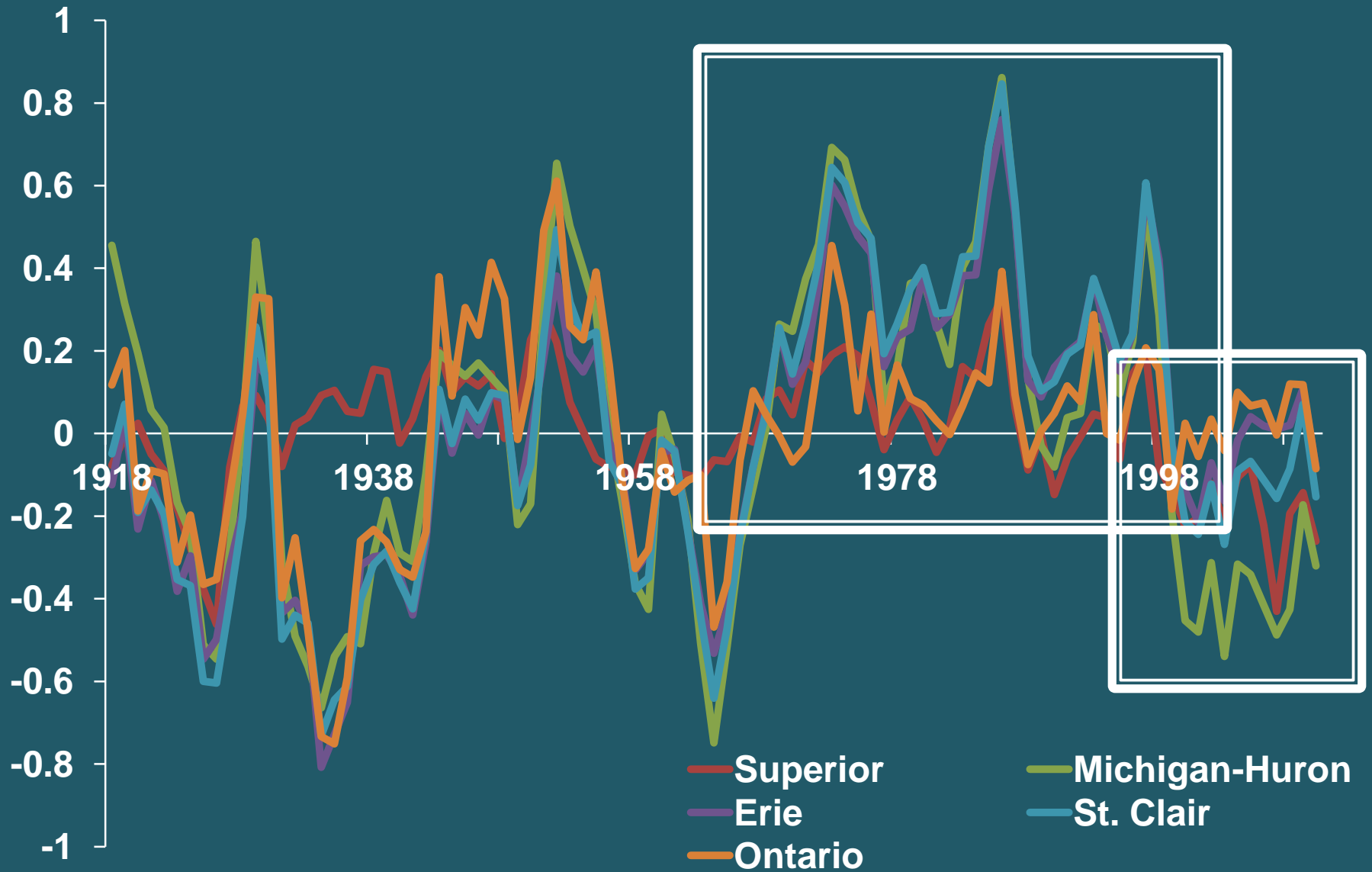
Indicator: Tributary Flashiness



Muskegon River, Lake Michigan basin

Source: Heidelberg University

Supporting Indicator: Water Levels



Source: U.S. Army Corps of Engineers

Impacts of Changing Lake Levels



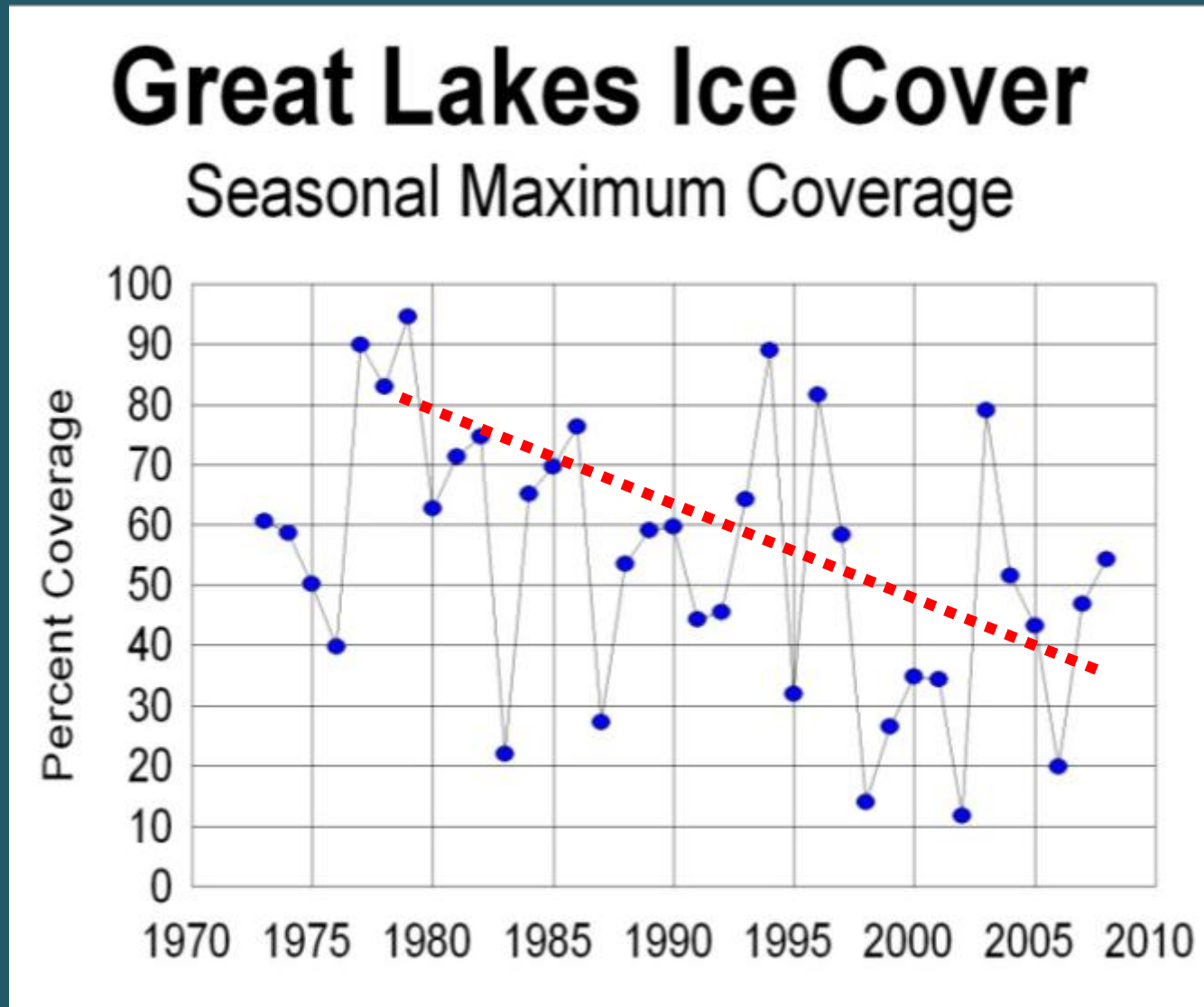
Too Low



Too High

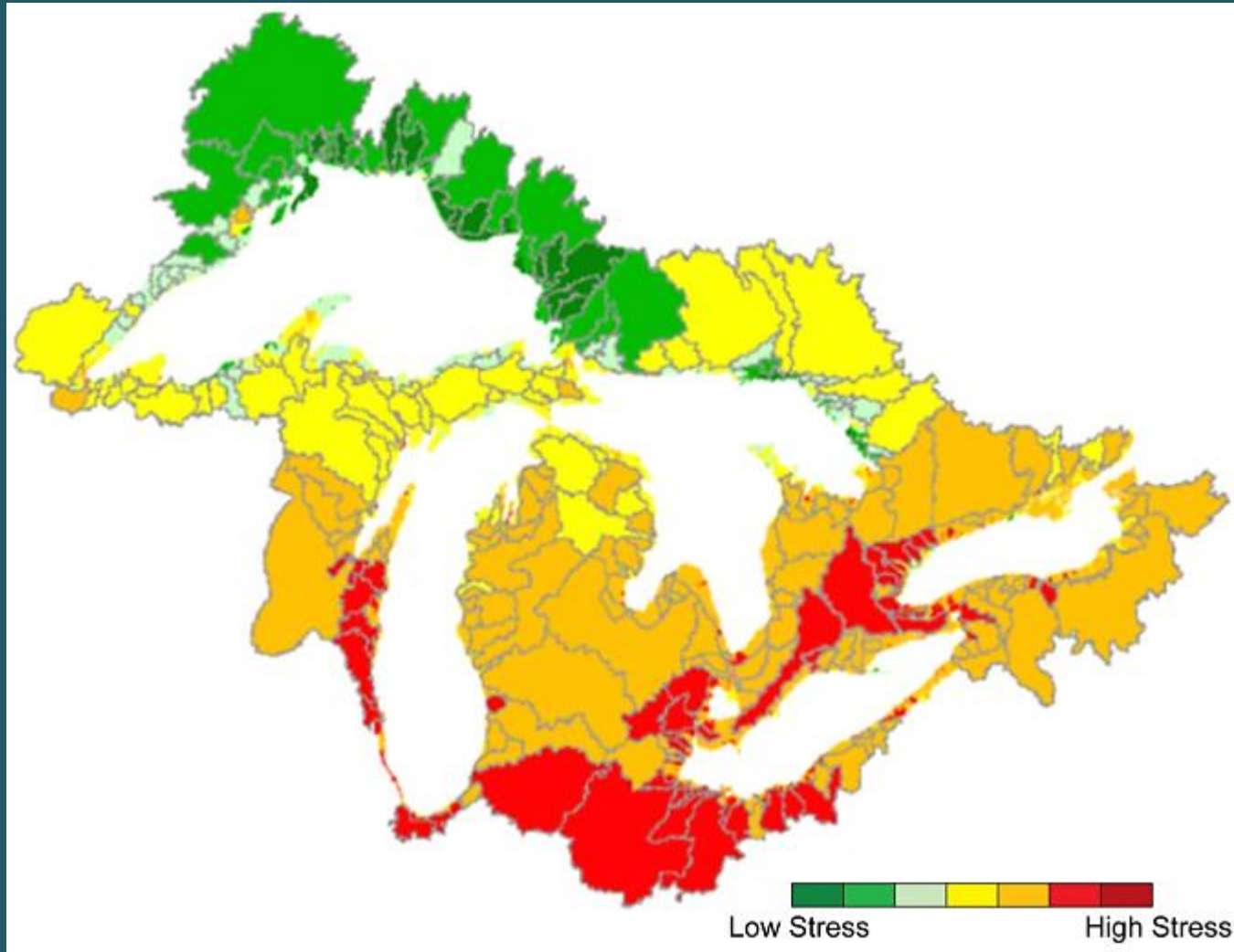


Supporting Indicator: Ice Duration



Source: J. Magnuson, R. Assel, J. Wang and Great Lakes Ice Atlas

Supporting Indicator: Watershed Stress Index



Source: University of Windsor and University of Minnesota-Duluth

Landscapes and Natural Processes

Summary

The landscapes (and landscape-related natural processes) that influence the Great Lakes are in fair condition and are improving

- Fish passage is being restored to numerous streams
- Human uses that transform watersheds are being assessed and natural processes restored.
- Forests are marginally increasing and land is better managed
- Water levels in the upper lakes have been below average since the 1990s, and there are concerns that climate change will cause greater fluctuations

Looking Ahead

- Next state of the Great Lakes conference
- Next Forum
- Next State of the Great Lakes report
- For more information, please visit:
 - www.ec.gc.ca/greatlakes
 - www.epa.gov/greatlakes
 - www.binational.net