



# Lake Erie

## *A Changing Ecosystem*

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*Environment Canada*

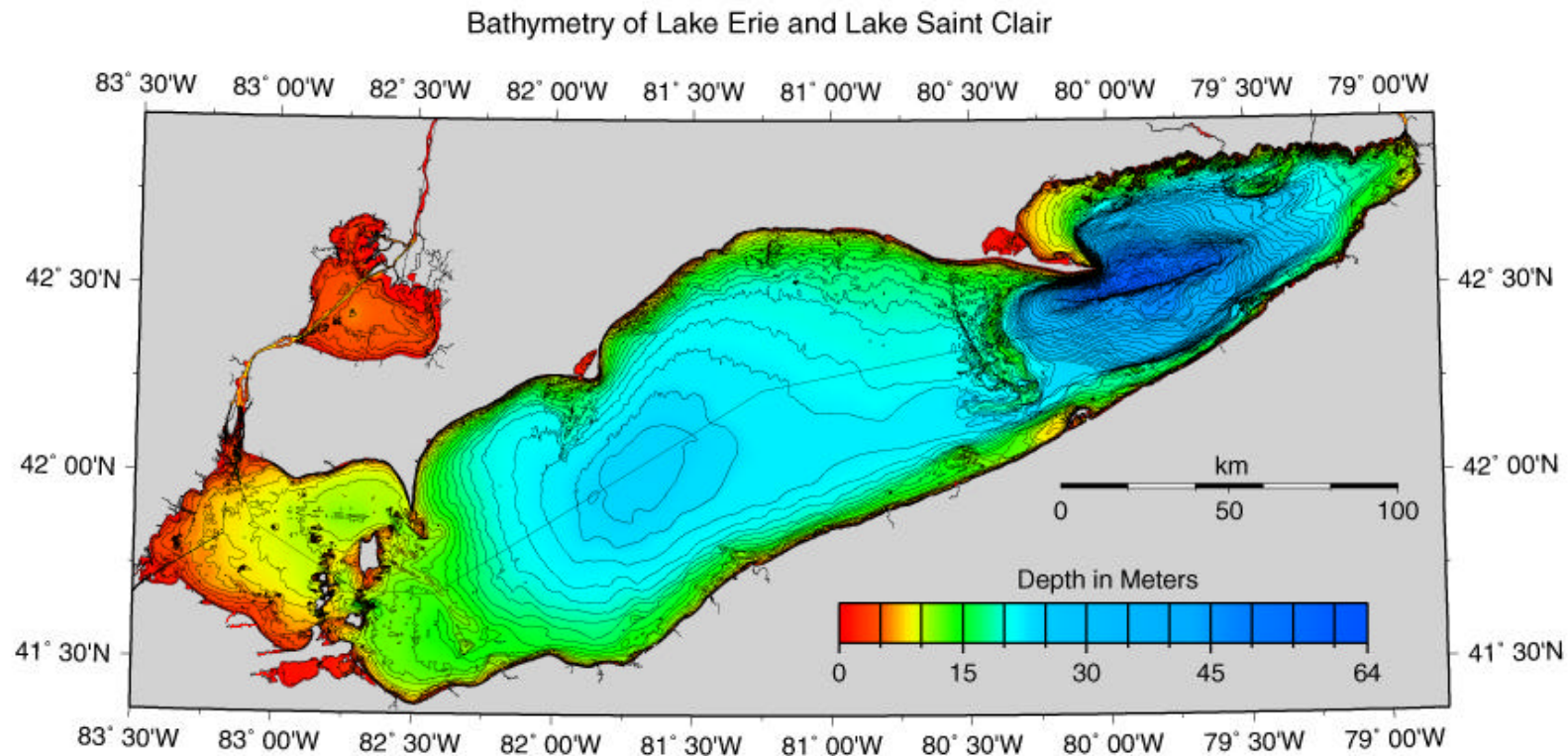
# Significant Features

- One third of total Great Lakes population
- Provides drinking water for 11 million people
- Intensive urbanization and agriculture
- Multiple uses

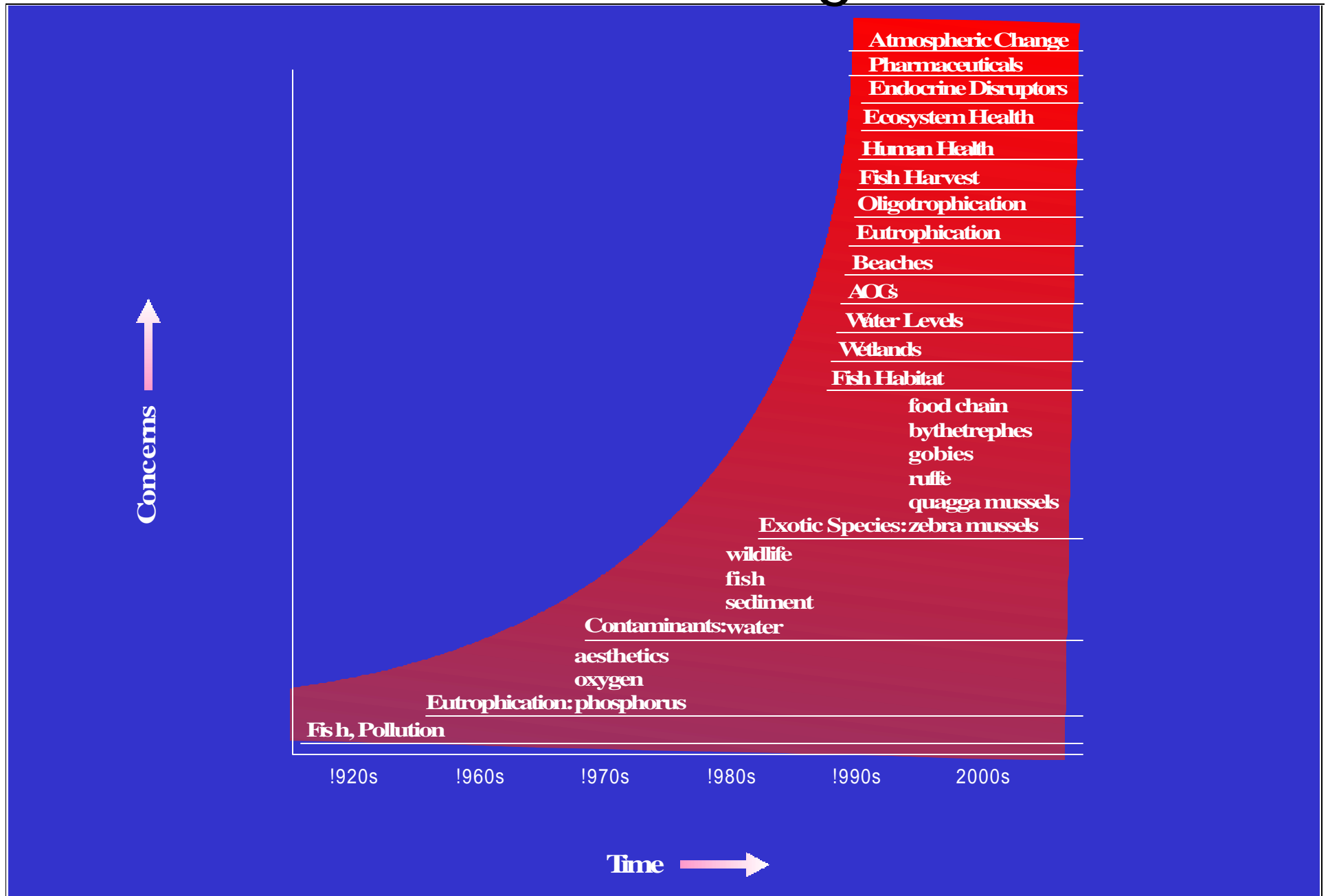


# Physical Characteristics

- 3 basins (west/central/east)
- Shallowest, warmest
- Biologically productive
- 80% inflow Detroit River
- Current and wave patterns very complex
- Average retention time = 2.6 years
- Weather- a significant influence



# Influences Through Time



# Issues and Concerns

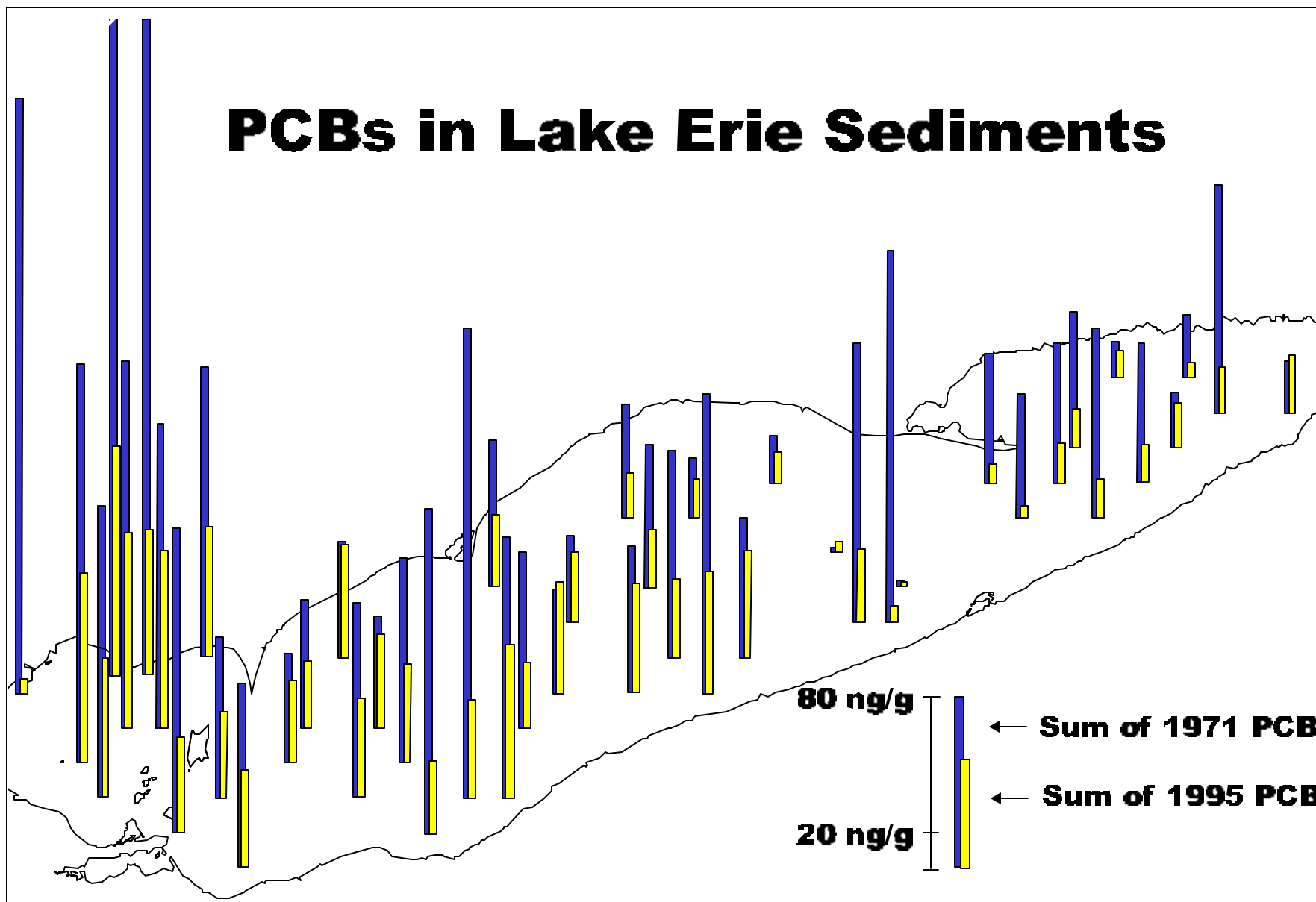




# Chemicals of Concern including Nutrients

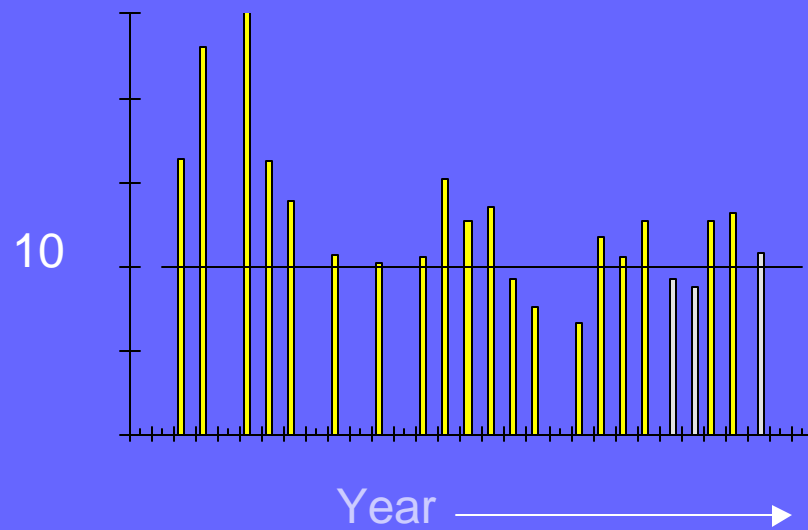
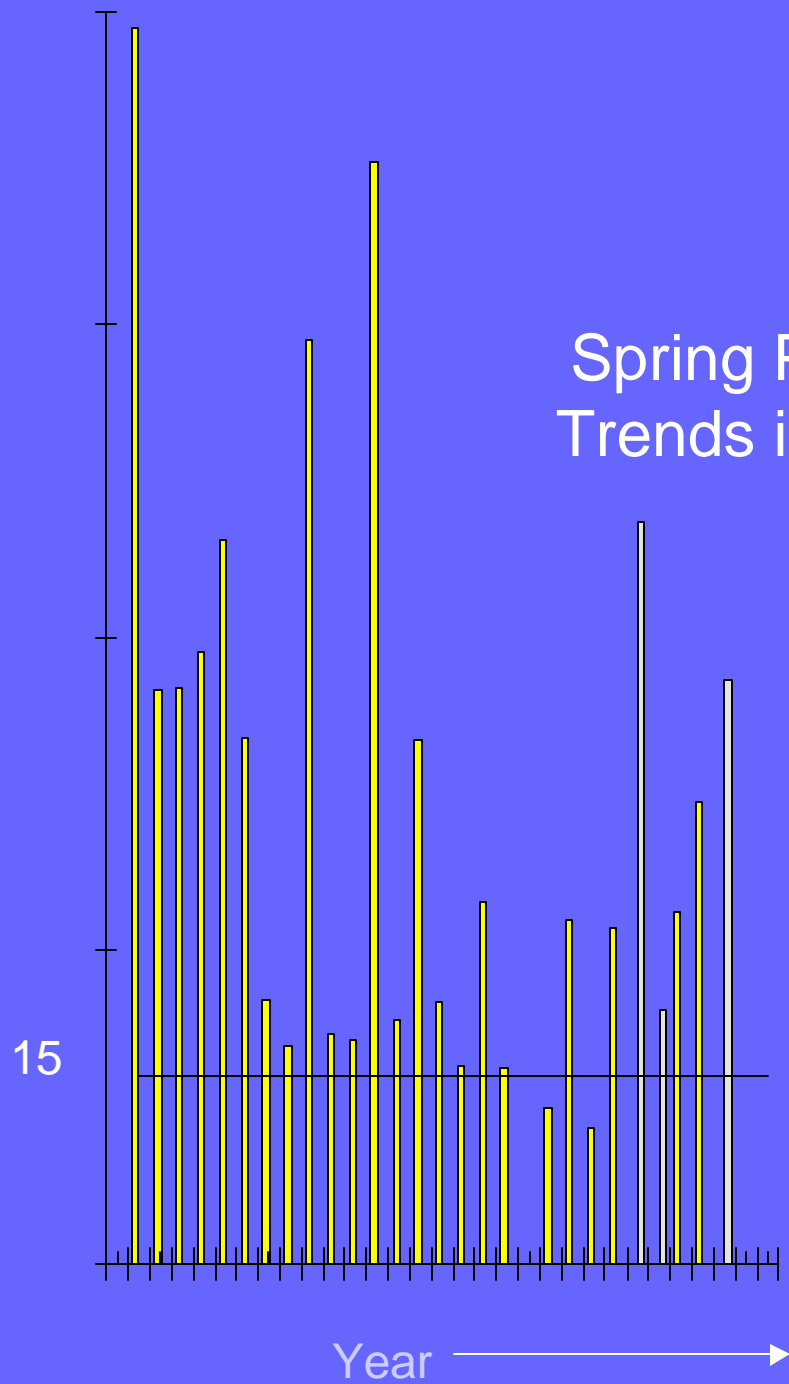
- PCB's\*
- Mercury\*
- Chlordane
- DDT & metabolites
- Lead
- Dioxins
- Dieldrin
- PAH's
- Phosphorus
- Nitrates
- Agricultural Pesticides
- Endocrine disruptors
- Mixtures

# PCBs in Lake Erie Sediments



# Nutrients

Spring Phosphorus Concentration (ug/g)  
Trends in Western and Eastern Lake Erie  
1970 to 2000







# Non-Native Species



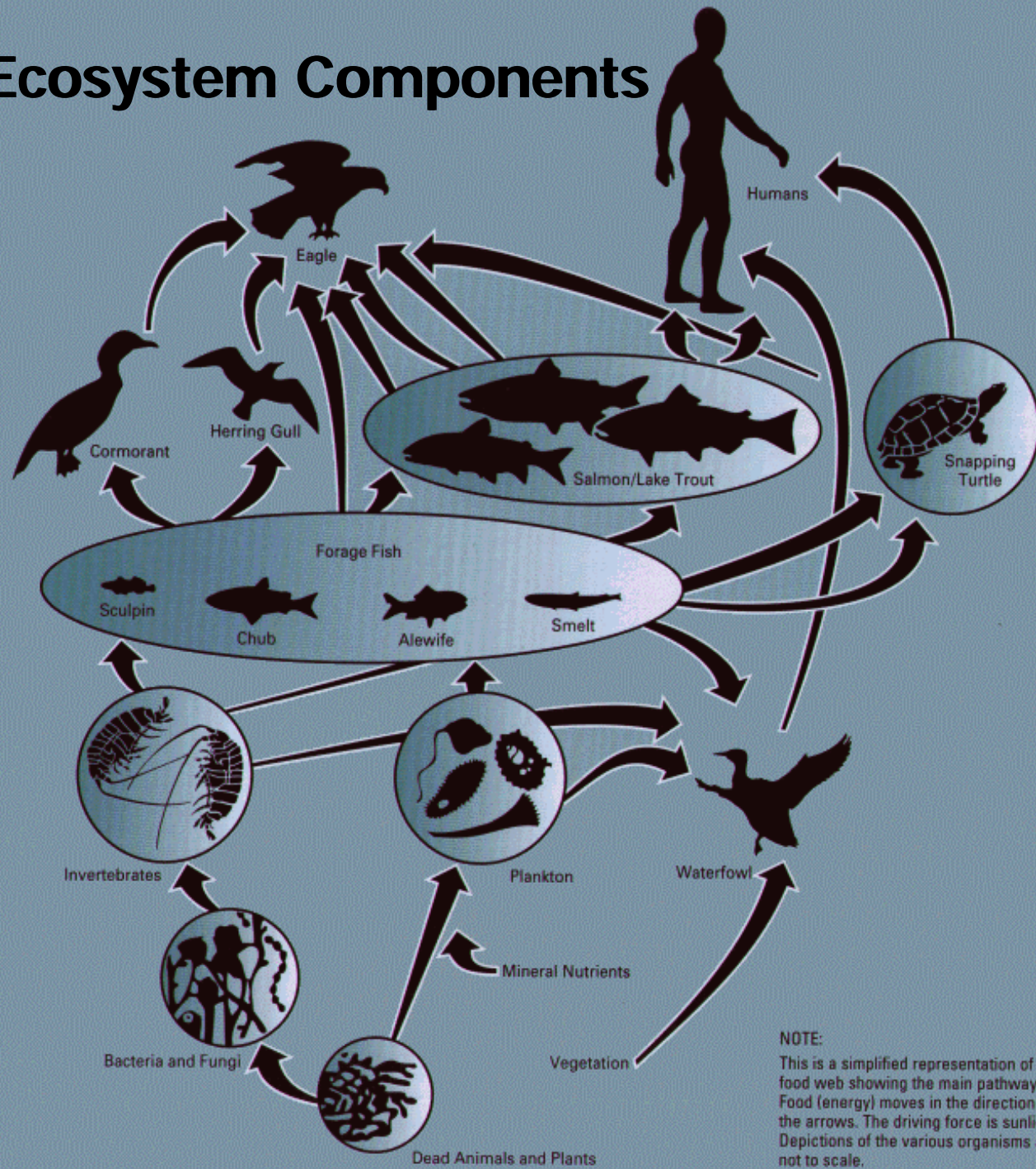
The image is a collage of four nature photographs. The top-left photo shows a waterfall cascading over rocks, surrounded by lush green trees. The top-right photo shows a sandy beach with waves lapping at the shore under a clear blue sky. The bottom-left photo shows a wetland area with tall grasses and water. The bottom-right photo shows a wide expanse of a blue lake under a sky with scattered white clouds.

# Habitats

Wetlands  
Forests  
Beaches

Sand Dunes and Barrens  
Open Lake  
Tributaries  
Prairies

# Ecosystem Components



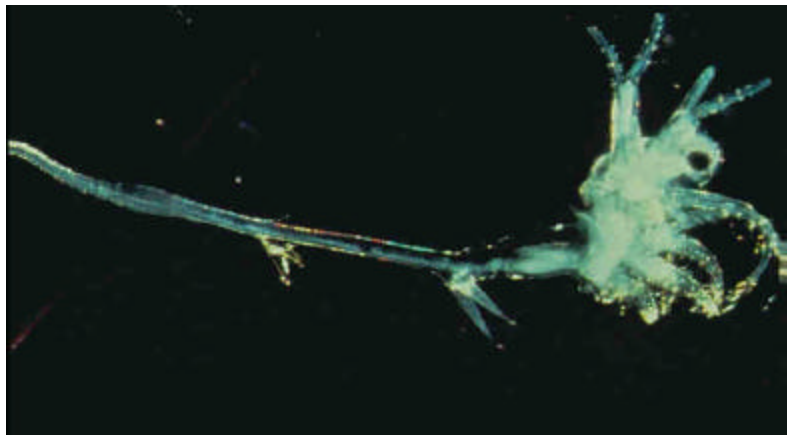
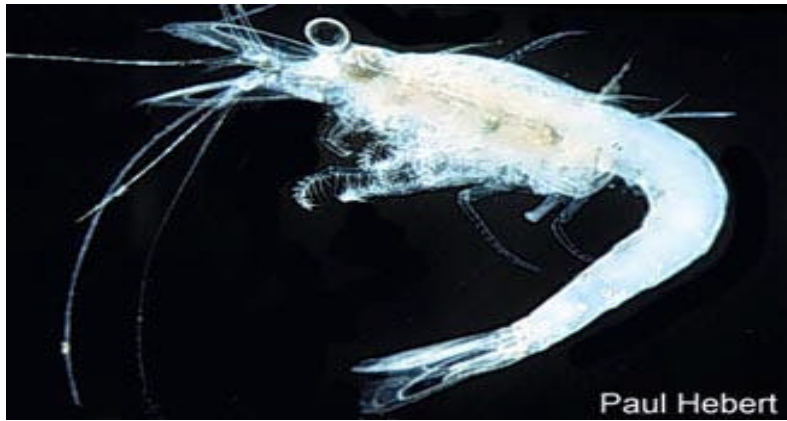
**NOTE:**  
This is a simplified representation of the food web showing the main pathways. Food (energy) moves in the direction of the arrows. The driving force is sunlight. Depictions of the various organisms are not to scale.



# Phytoplankton

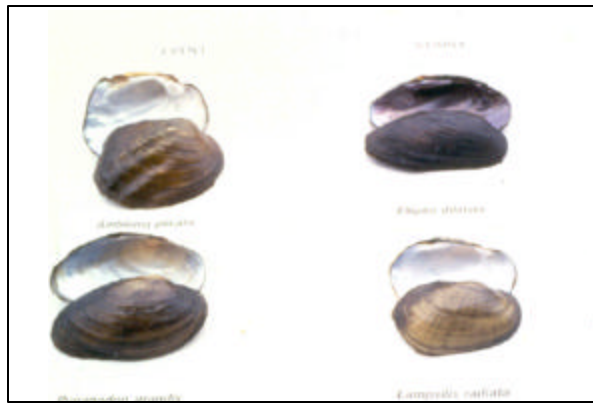
- Eutrophic conditions of the 1960's gone
- Significant changes in the 1990's likely due to zebra mussels
- Biomass in the east basin is less than predicted from phosphorus loadings
- Diatom biomass very low with some species lost
- Microcystis blooms in west basin
- Reduced energy input to phytoplankton is having an impact on higher levels in the pelagic foodweb

# Zooplankton



- Populations of large cold water species reduced
- Changes most profound in eastern Basin
- *Dreissena veligers*, *Bythotrephes*
- Dreissenids grazing appears to be altering community structure
- Mean size of individual <.8mm

# Benthos



# Mayflies



# Fish Community





# Forage Fish

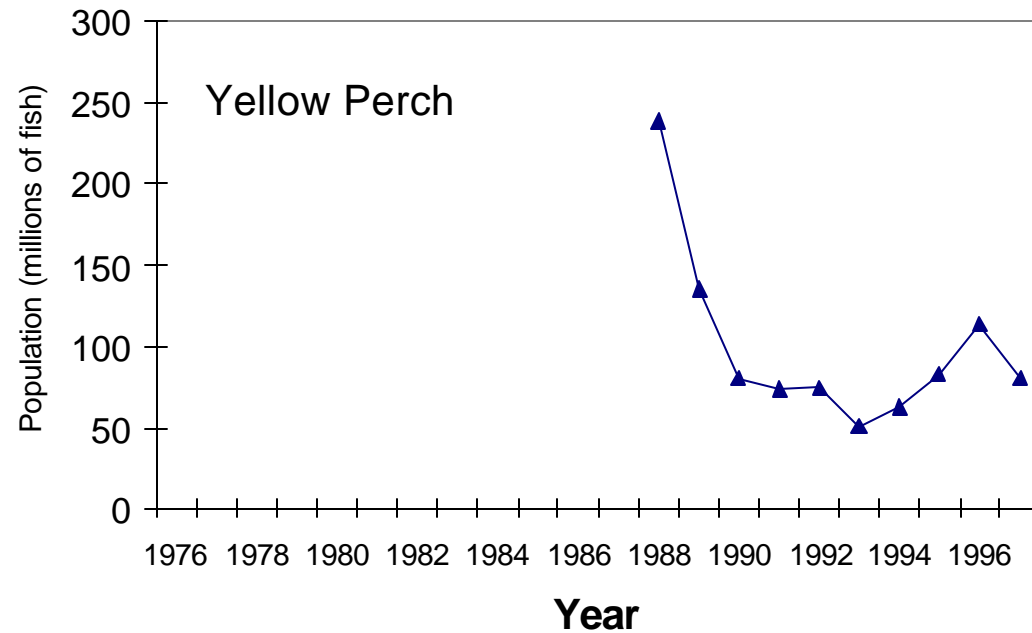
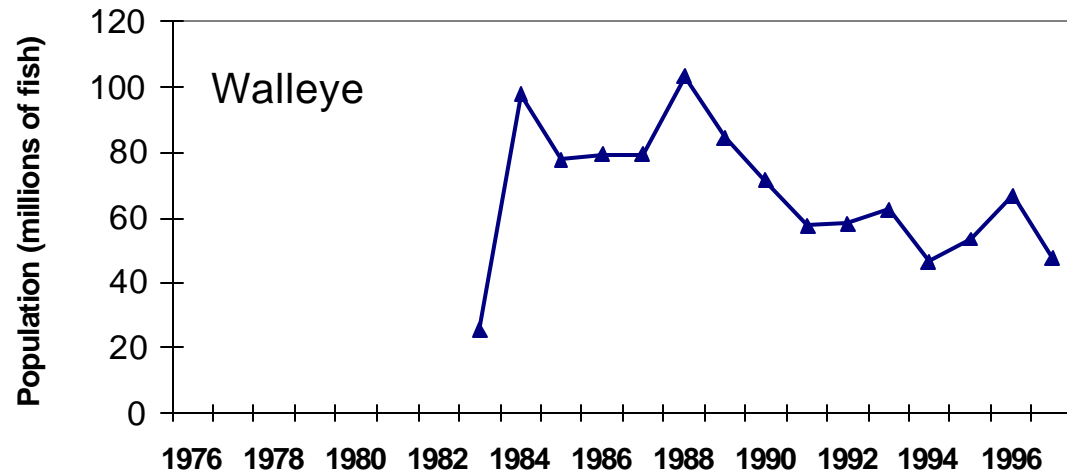


- Native species
  - Lake Herring
  - Sculpins
  - Emerald Shiners
  - Spottail Shiners

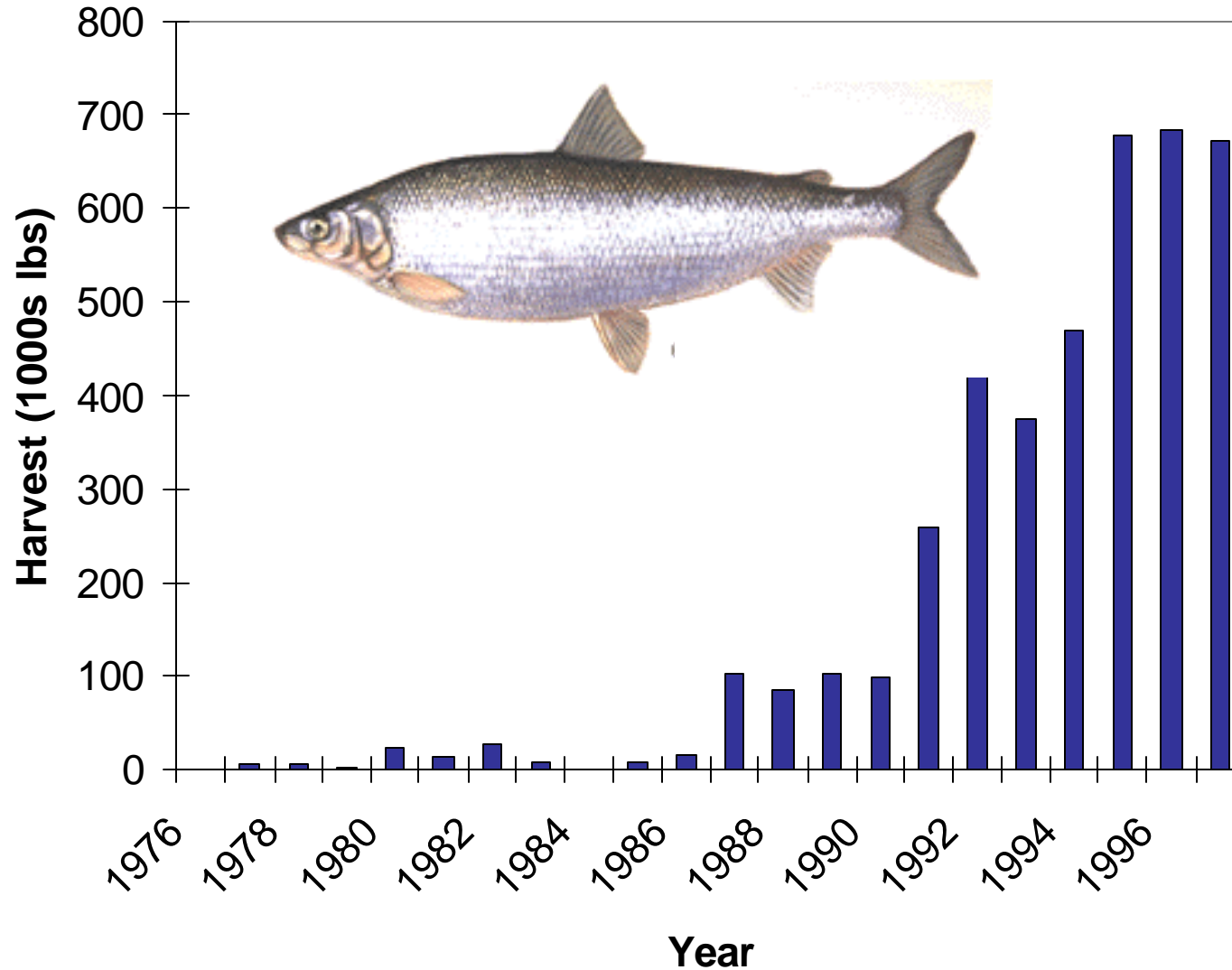


- Non- Native species
  - Alewife
  - Gizzard Shad
  - Gobies
  - Smelt

# Trends In Walleye and Yellow Perch



# Trends in Lake Whitefish

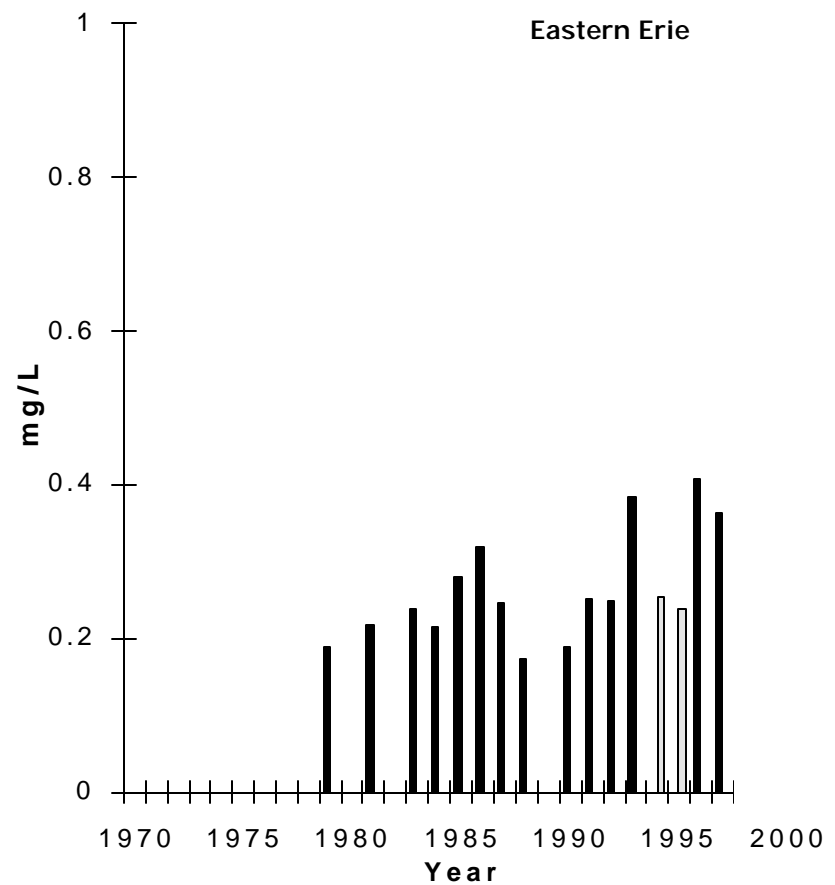
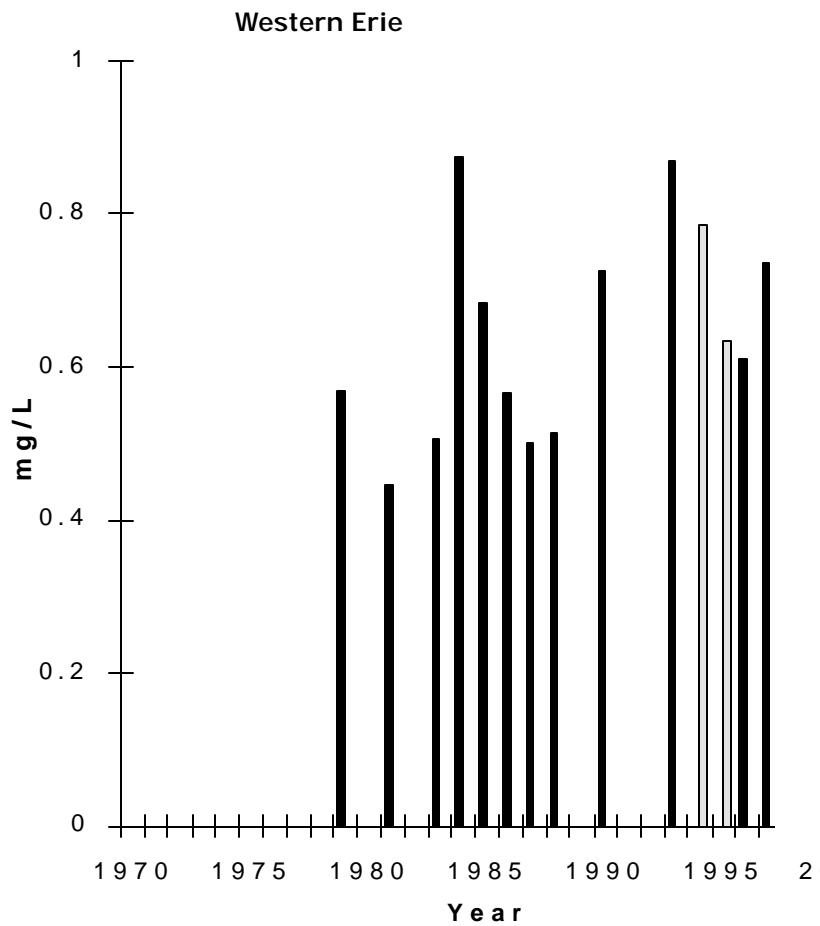




# Amphibians and Reptiles



## Nitrates



# Birds



- Bald Eagles
- Colonial Waterbirds
- Some populations declining despite gains in contaminants
- Habitat loss: major concern
- Non-native species

A sunset scene with a bright sun low on the horizon, casting a warm orange and red glow across the sky. The foreground is dark, showing the silhouettes of trees and a treeline.

# Summary

- Non-native species are a major influence on the Lake Erie ecosystem
- Habitat loss/alteration is a major concern
- Contaminants
- Emerging issues such as climate change will add to existing problems
- Population Growth
- Ability to monitor and track changes diminished
- Research
- SOLEC rating - mixed to mixed deteriorating