Coastal Wetlands

Douglas Wilcox,
U. S. Geological Survey
Laurie Maynard,
Environment Canada

SOLEC '96

Overview of Great Lakes Wetlands

Types of Wetlands

- Aquatic community
- Marshes
- Strand community
- Wet meadows
- Swamps
- Peatlands

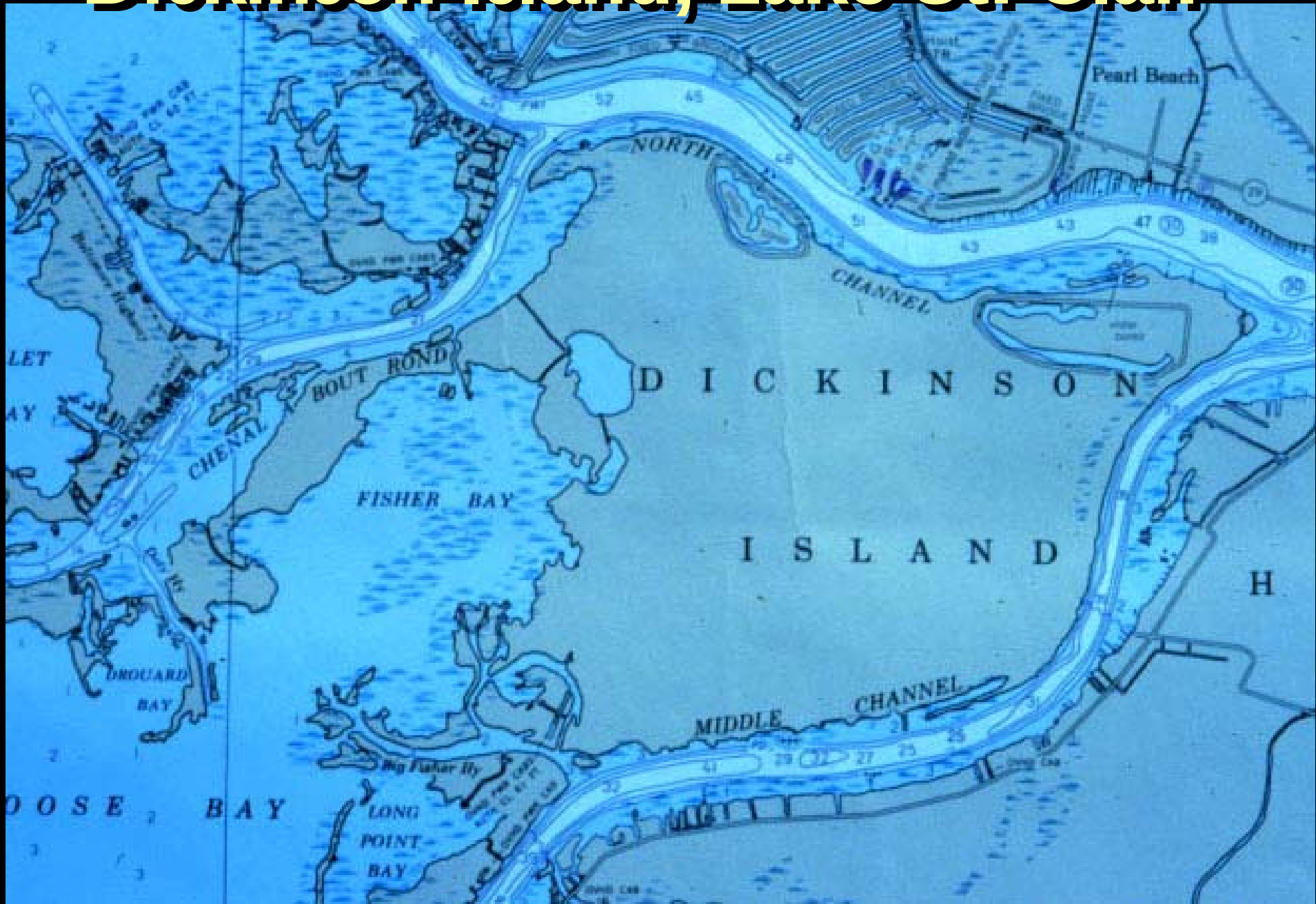
SOLEC '96

Morphological Settings of Great Lakes Wetlands

- Open shoreline wetlands
- Unrestricted bay wetlands
- Shallow sloping beach wetlands
- River delta wetlands
- Drowned river-mouth wetlands
- Lake-connected inland wetlands
- Barrier beach wetlands
- Diked wetlands

Kakagon Sloughs, Lake Superior

Dickinson Island, Lake St. Clair



Cecil Bay Marsh, Lake Michigan

Honest John Lake, Lake Superior

SOLEC '96

Functions of Wetlands

SOLEC '96

Ecological Functions

- Flood storage
- Sediment control
- Water quality improvement
- Shoreline erosion protection
- Habitat for plants, fish and wildlife
- Food web production and export
- Biodiversity reservoir

SOLEC '96

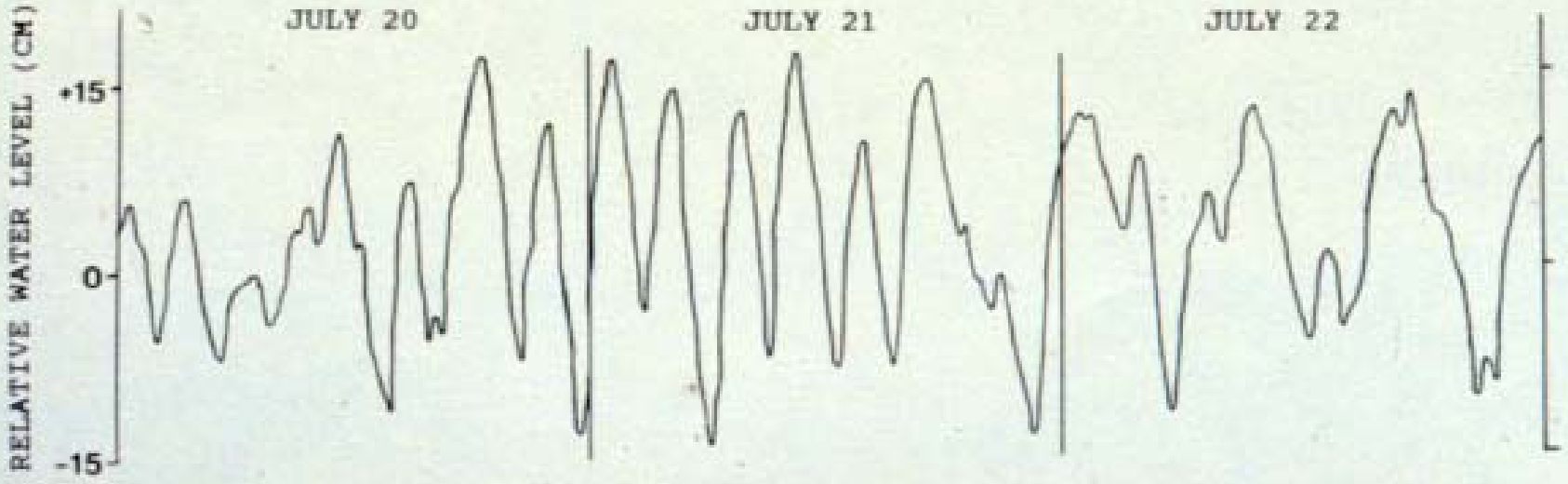
Human-Use Values

- Storm protection
- Nutrient transformation, removal and storage
- Non-consumptive recreation
- Recreational hunting, fishing and trapping
- Commercial fisheries

SOLEC '96

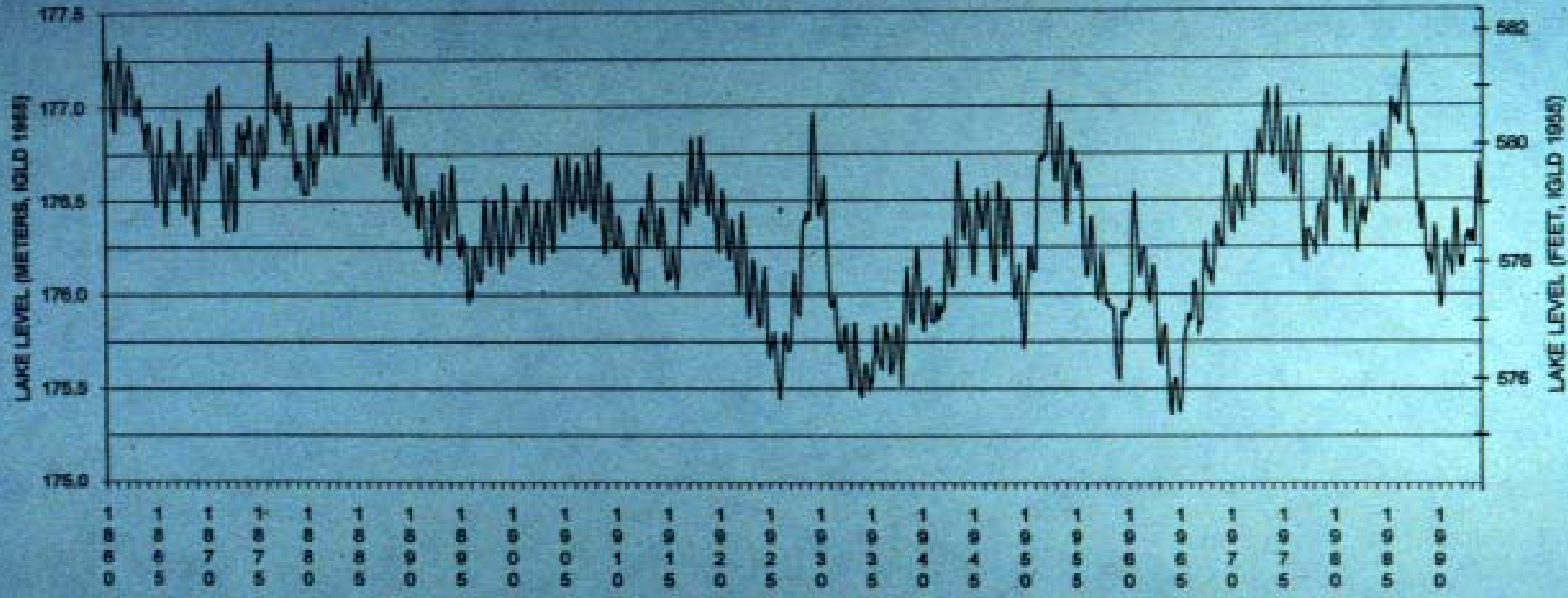
Natural Stressors of Great Lakes Wetlands

- Water-level change
- Sediment supply and transport
- Ice and storms
- Natural biological stressors



Water-level changes (seiche) in Kakagon Slough, July 1987.

Lake Michigan-Huron Actual Levels



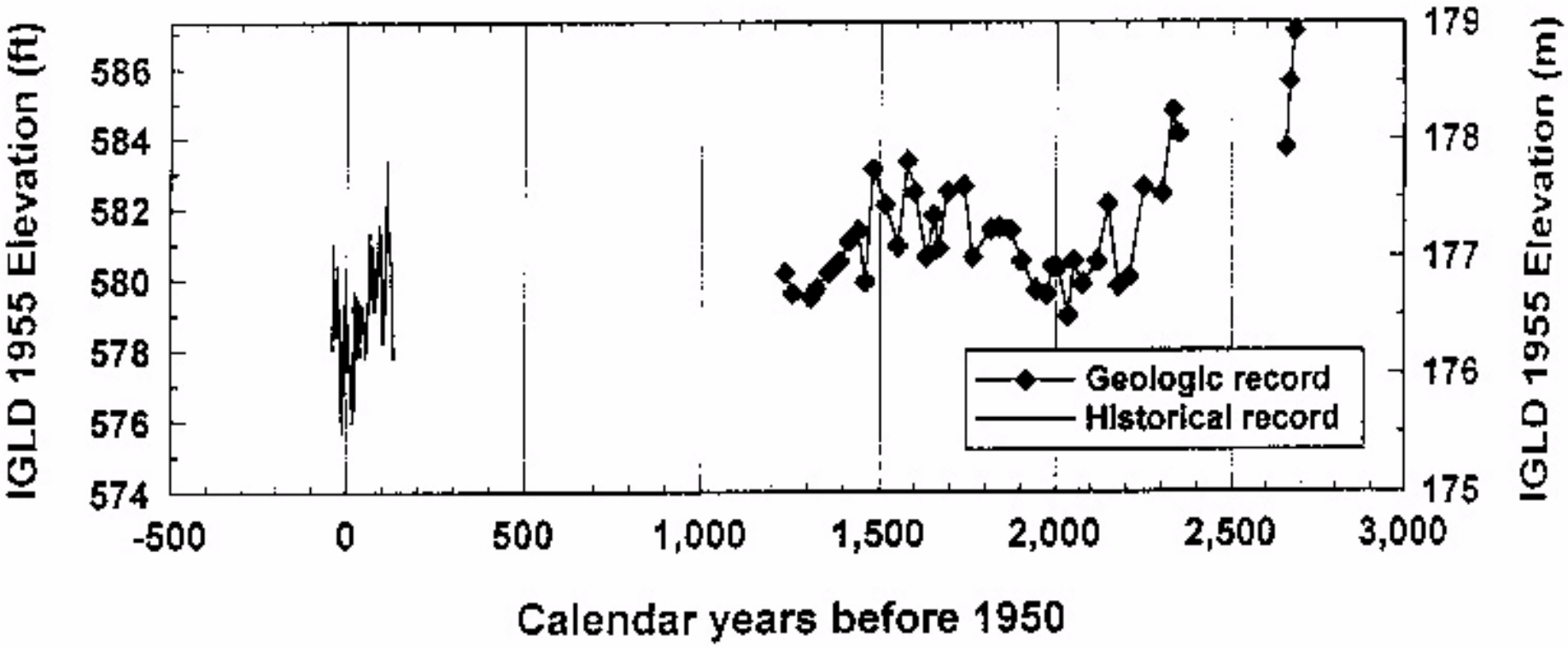


Fig. 3. Late-Holocene relative lake level curve for Lake Michigan-Huron as derived from the internal architecture and timing of beach ridge development in the Platte Lake embayment at Sleeping Bear Dunes National Lakeshore (modified from Baedke & Thompson, 1993).

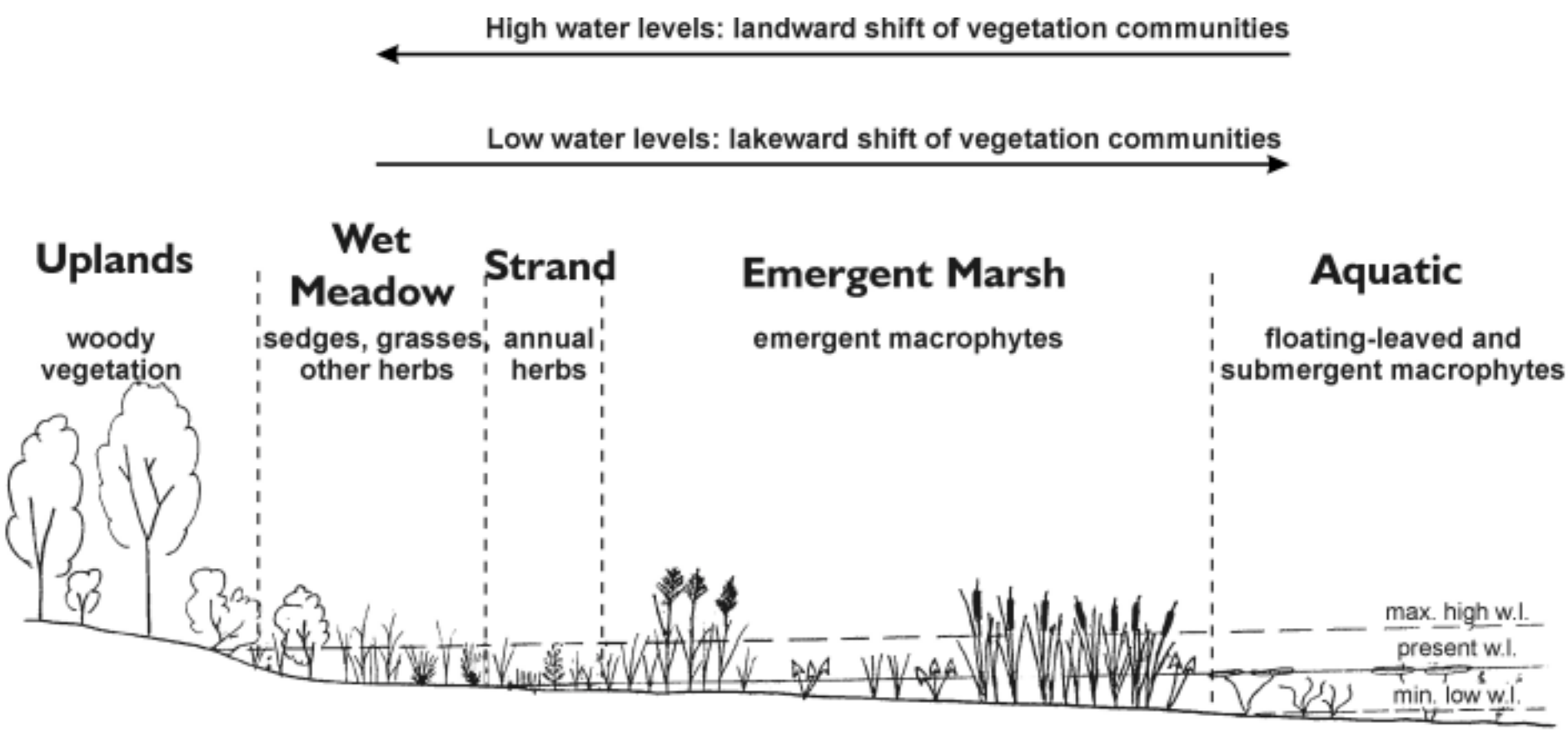


Figure 1: Generalized diagram of Great Lakes coastal marsh communities, showing the influence of fluctuating water levels.

Raspberry Bay, Lake Superior

Pinconning Point, Saginaw Bay, Lake Huron

SOLEC '96

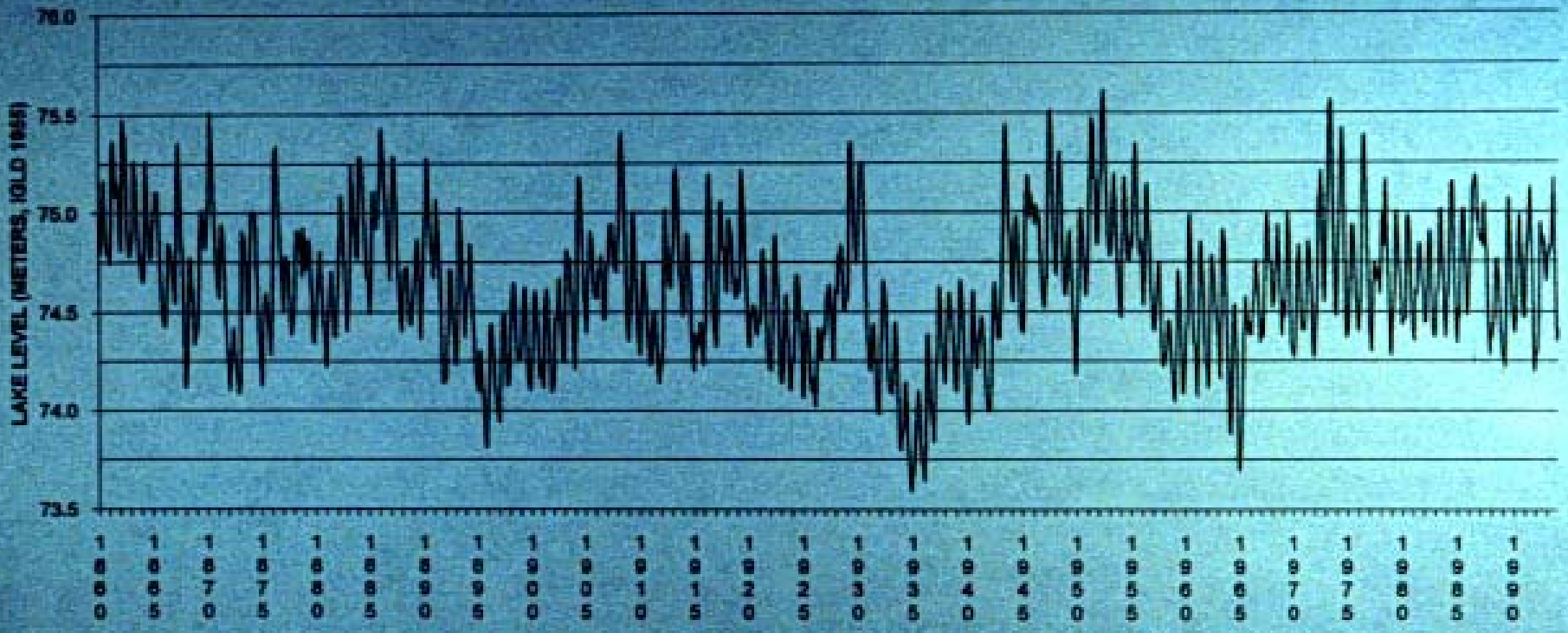
Human-Induced Stressors of Great Lakes Wetlands

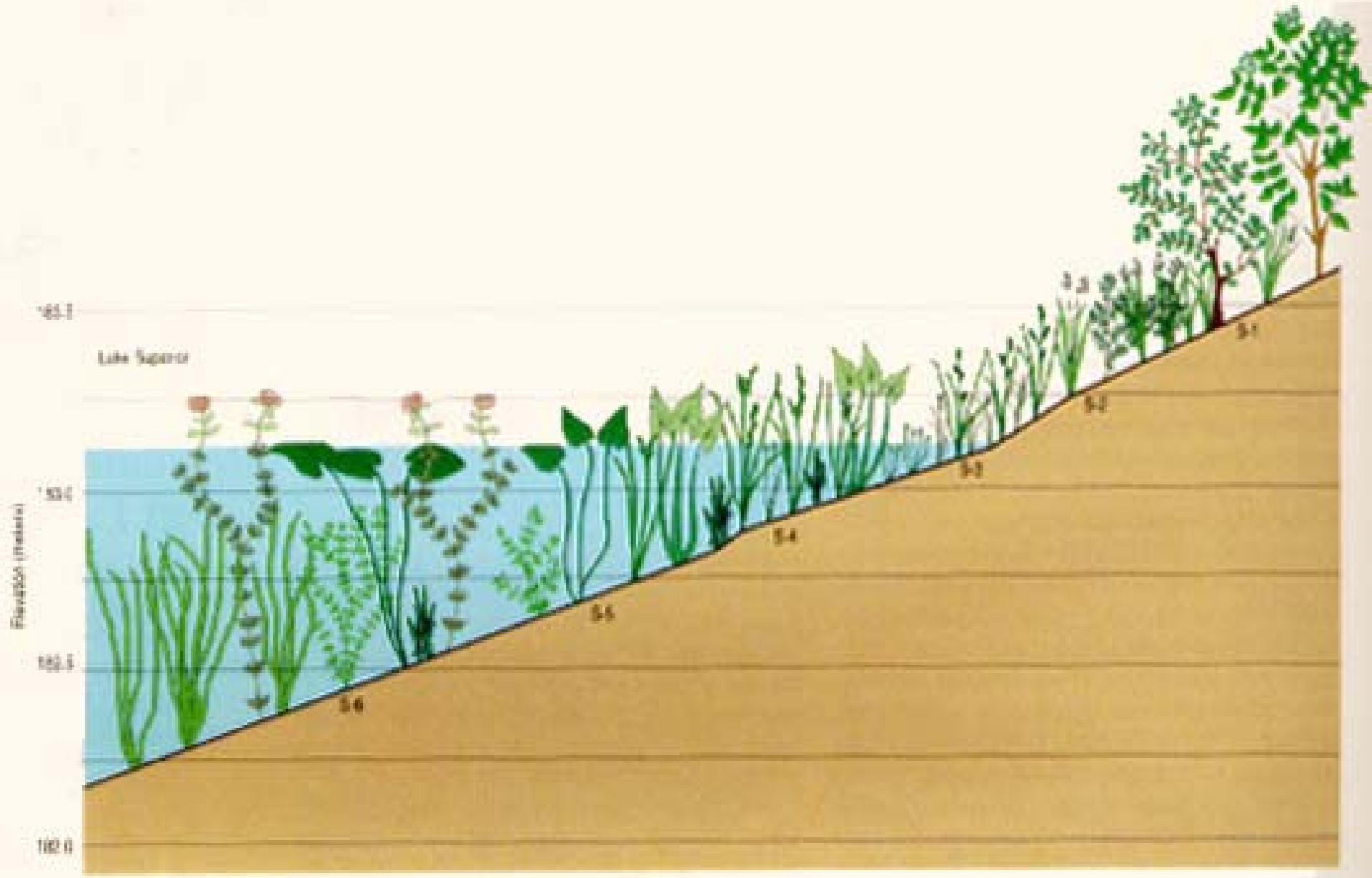
- Drainage
- Filling and dredging
- Shoreline modification
- Water-level regulation
- Changes in sediment budgets

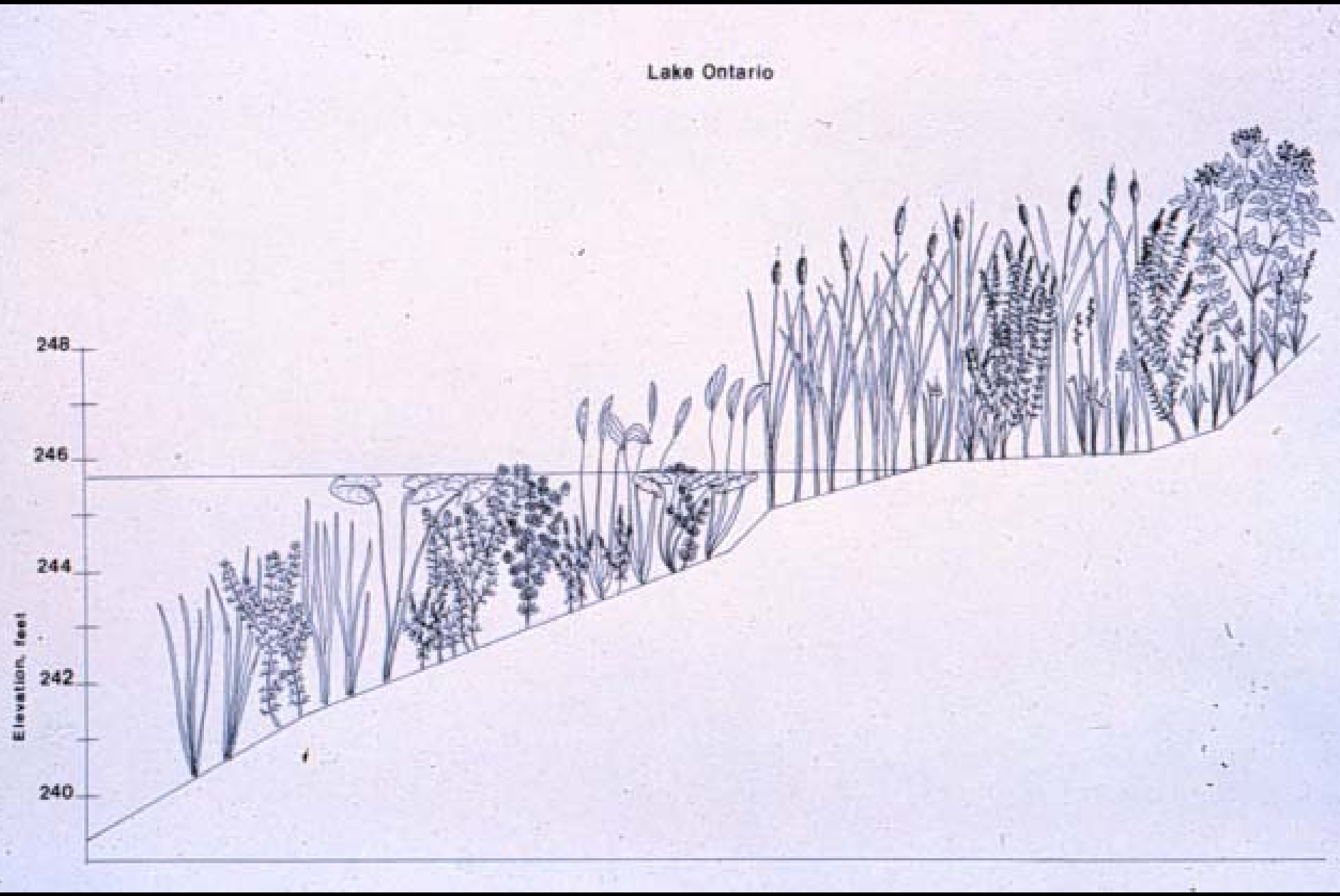
Human-Induced Stressors of Great Lakes Wetlands

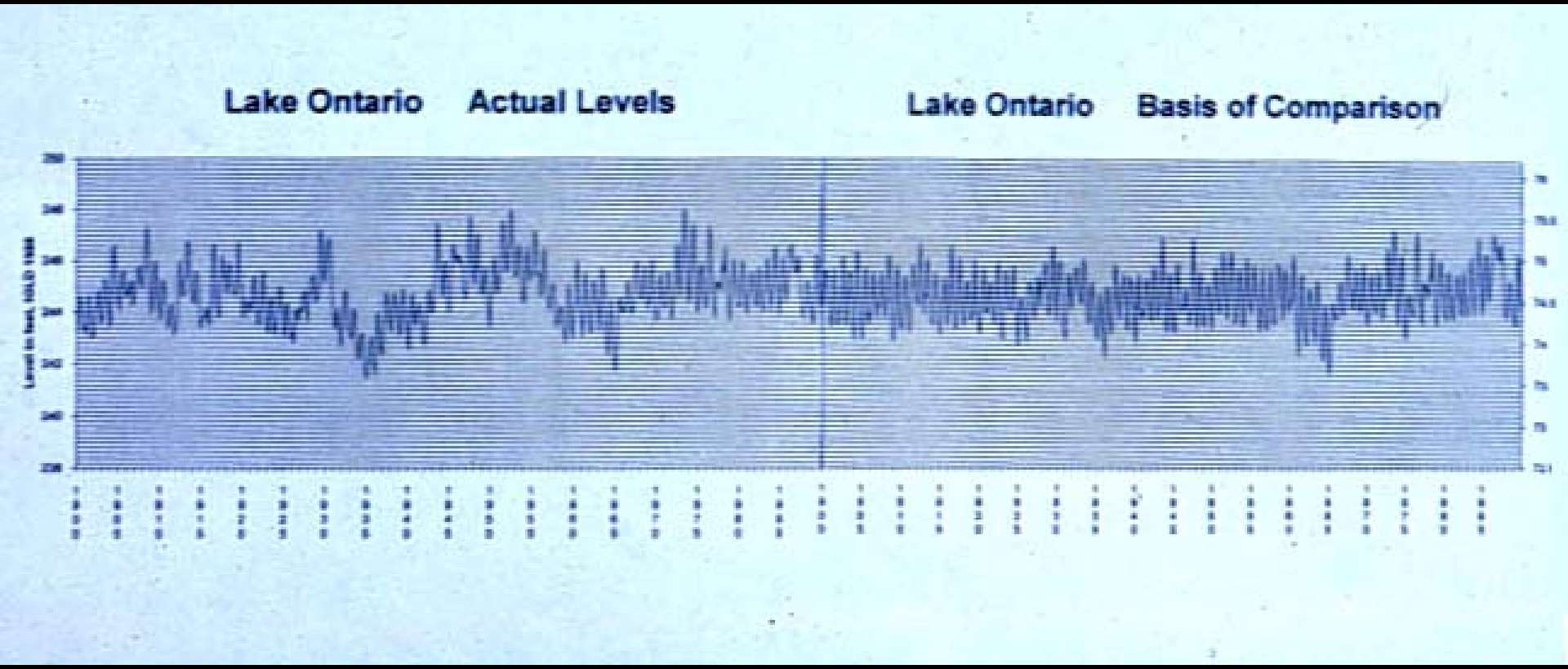
- Nutrient enrichment
- Toxic chemicals
- Non-native species
- Climate change
- Diking of wetlands
- Road crossings

Lake Ontario Actual Levels



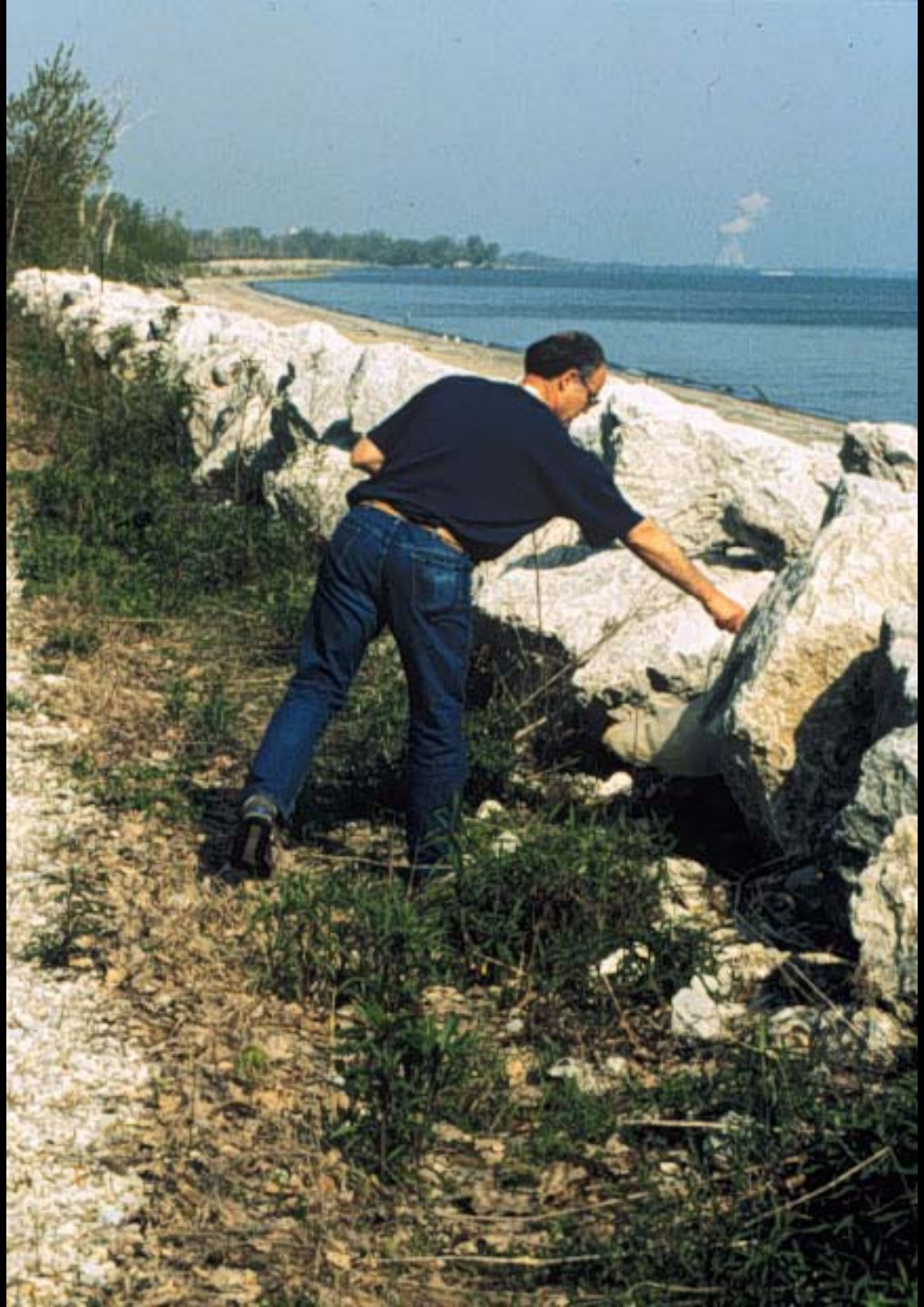

Lake Superior


Lake Ontario
248
246
244
242
240
Elevation, feet


Lake Ontario Actual Levels
Lake Ontario Basis of Comparison

Lake Erie Diked Wetlands

Superior Harbor,
Lake Superior



Cedar Point, Lake Erie

Pentwater Marsh,
Lake Michigan

Indicators of Wetland Health and Degradation

SOLEC '96

Landscape Indicators

- Road density in watershed
- Extent of shoreline modification
- Status of barrier beaches and spits
- Proximity to navigable channels and recreational boating
- Hydrologic connectivity with lake (dikes)
- Changes in vegetated area

SOLEC '96

Trophic and Environmental Indicators

- Water-level changes
- Sediment supply in littoral drift
- Concentration of nutrients and toxic substances in sediments
- Water quality parameters

Habitat Indicators

- Changes in vegetation types
- Interspersion of vegetated and open wetland
- Plant species richness
- Plant species dominance
- Plant growth form
- Sensitive plant species
- Invasive or exotic plant species

SOLEC '96

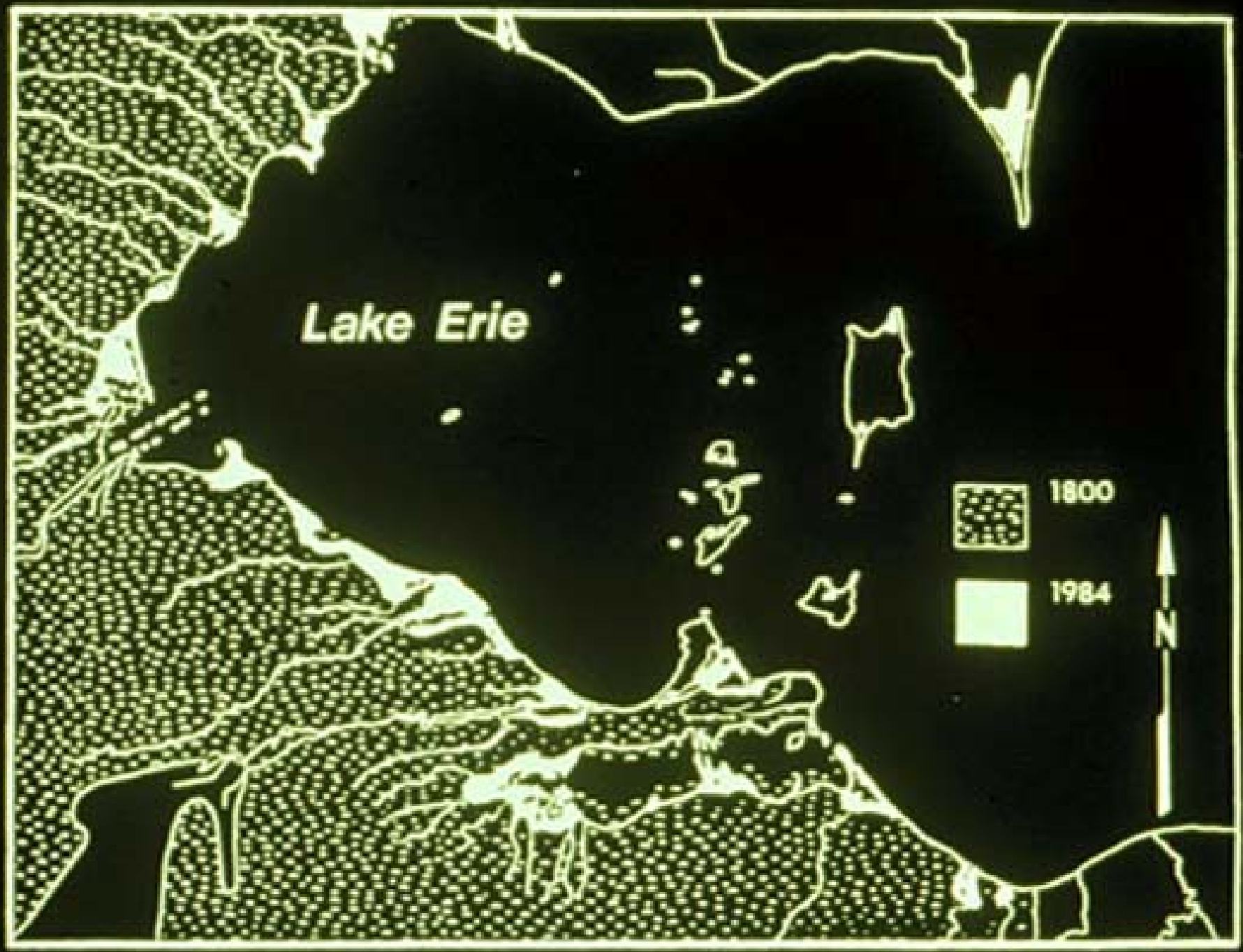
Fish and Wildlife Indicators

- Invertebrate Diversity
- Stability, productivity, survival and mortality of populations
- Contaminant load
- Sensitive species
- Tolerant species
- Exotic species

SOLEC '96

Status of Great Lakes Wetlands

Cootes Paradise, Lake Ontario


Lake Erie
1800
1984
N

METZGER MARSH WETLAND RESTORATION

DUCKS UNLIMITED

This project will restore 908 acres of critical coastal wetland. The marsh was once part of the Great Black Swamp, but became diked farmland. The area was breached in 1929, then subjected to the wave action and erosion of Lake Erie until the dikes were fully breached in 1952. Once restored, the marsh will be managed as an emergent lacustrine wetland to benefit waterfowl, fish, shorebirds, and eagles. This cooperative effort was begun as a Joint Venture Project for the North American Waterfowl Management Plan thanks to the following partners:

Ducks Unlimited, Inc., Ohio Division of Wildlife, US Fish and Wildlife Service, The North American Wetlands Conservation Council, US EPA, Herb Metzger, Maumee Valley Audubon Society, Lake Erie Waterfowlers, Wolf Creek Sportsmen's Association, Ohio Decoy Collectors and Carvers Association, Toledo Edison, Bluffton Sportsmen's Club.

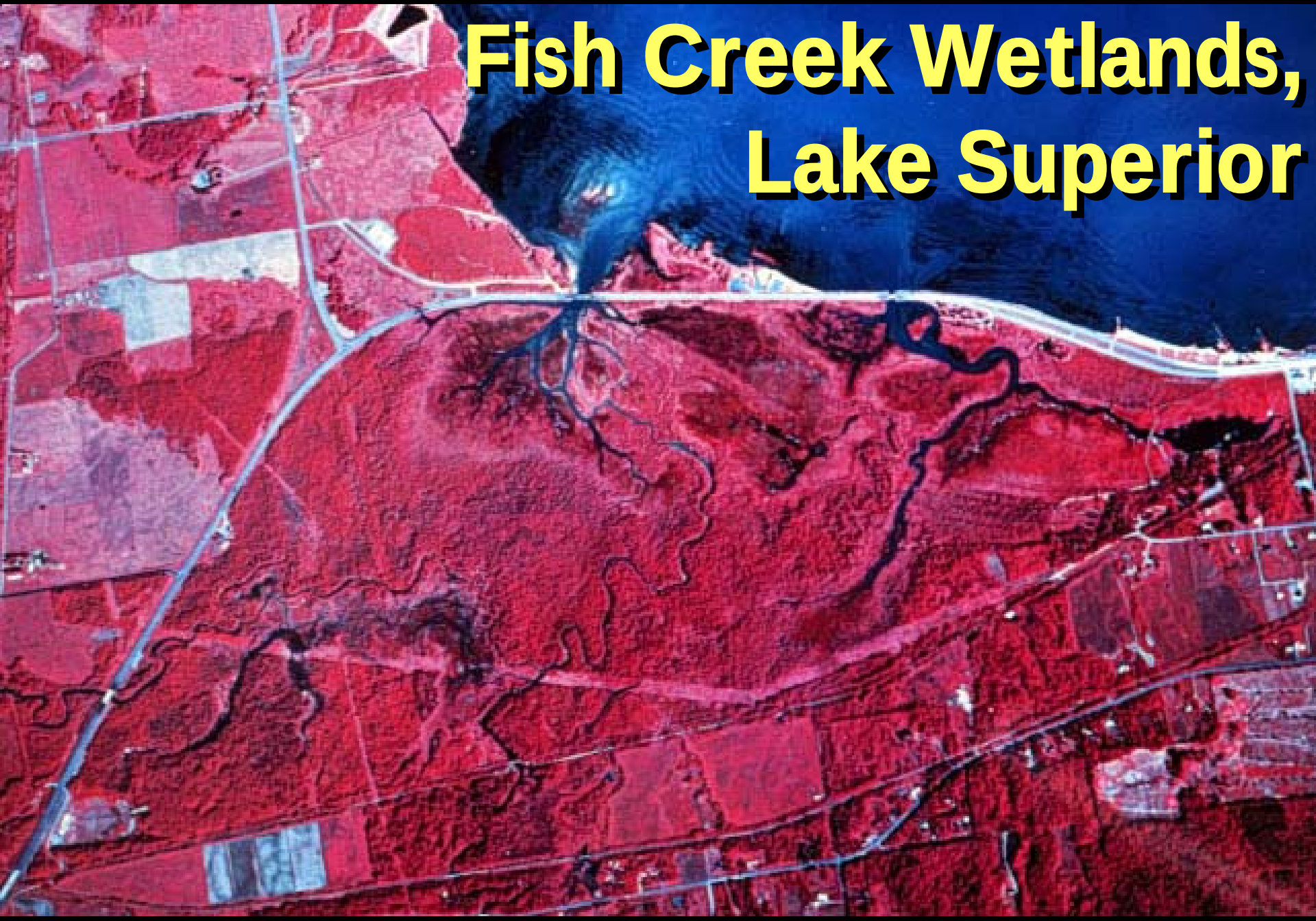
North American Wetlands Conservation Council

NAWCC

Dickinson Island, Lake St. Clair

Arcadia Wetlands,
Lake Michigan

Superior Harbor, Lake Superior


Fish Creek Wetlands,
Lake Superior

SOLEC '96

Conclusions

- Great Lakes wetlands serve many important functions
- The diversity of these wetlands is largely derived from response to natural stressors, such as water-level changes

SOLEC '96

Conclusions

- A variety of human-induced stressors have greatly affected wetlands
- A number of indicators of wetland degradation exist, but little work has been done to assess such degradation

SOLEC '96

Conclusions

- Impacts to wetlands vary by lake and by site in relation to differences in human activities and land use practices
- Successful long-term protection, restoration, and management is most likely to result from efforts to return to or mimic natural landscapes, functions, and processes