

The Great Lakes: An Environmental History

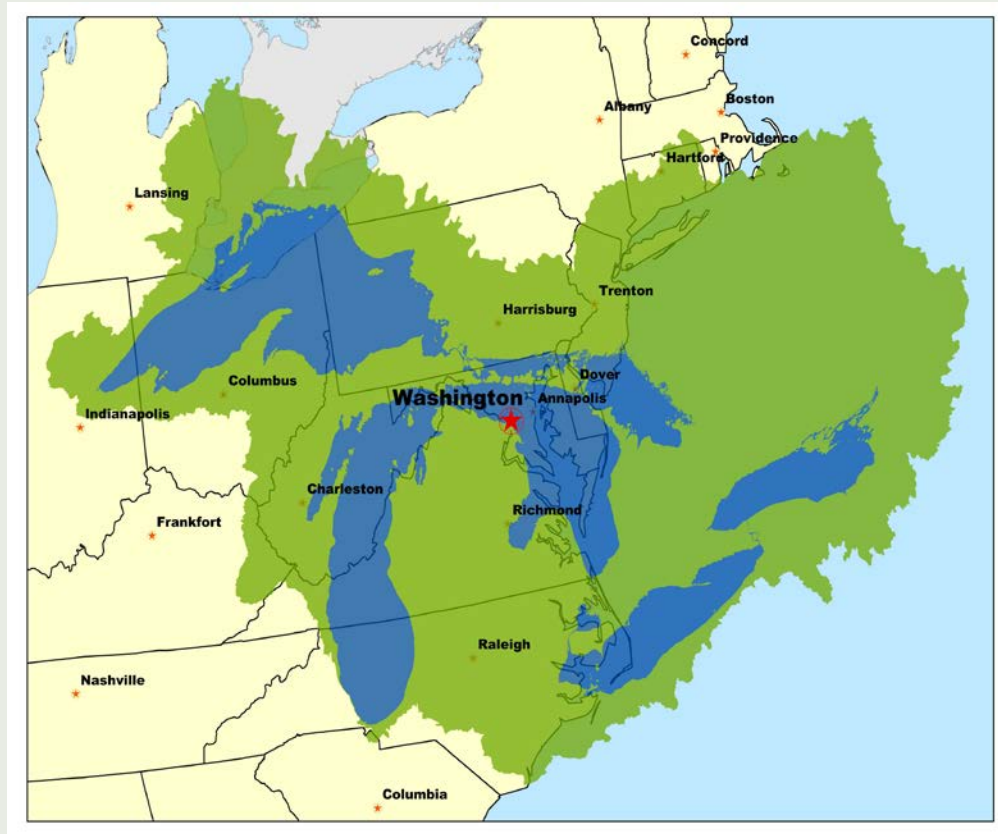


Jeffrey S. Schaeffer

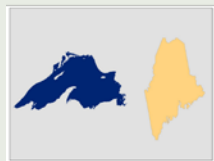
Tennessee Tech Water Center, Cookeville, TN 38505

jschaeffer@tntech.edu

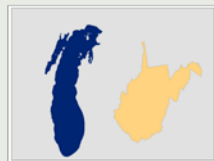
The Great Lakes



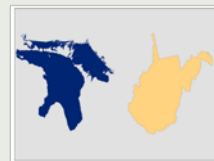
If Each Lake Were A State By Land Area



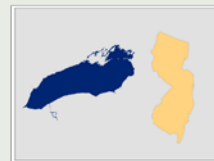
ME



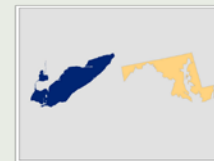
WV



WV

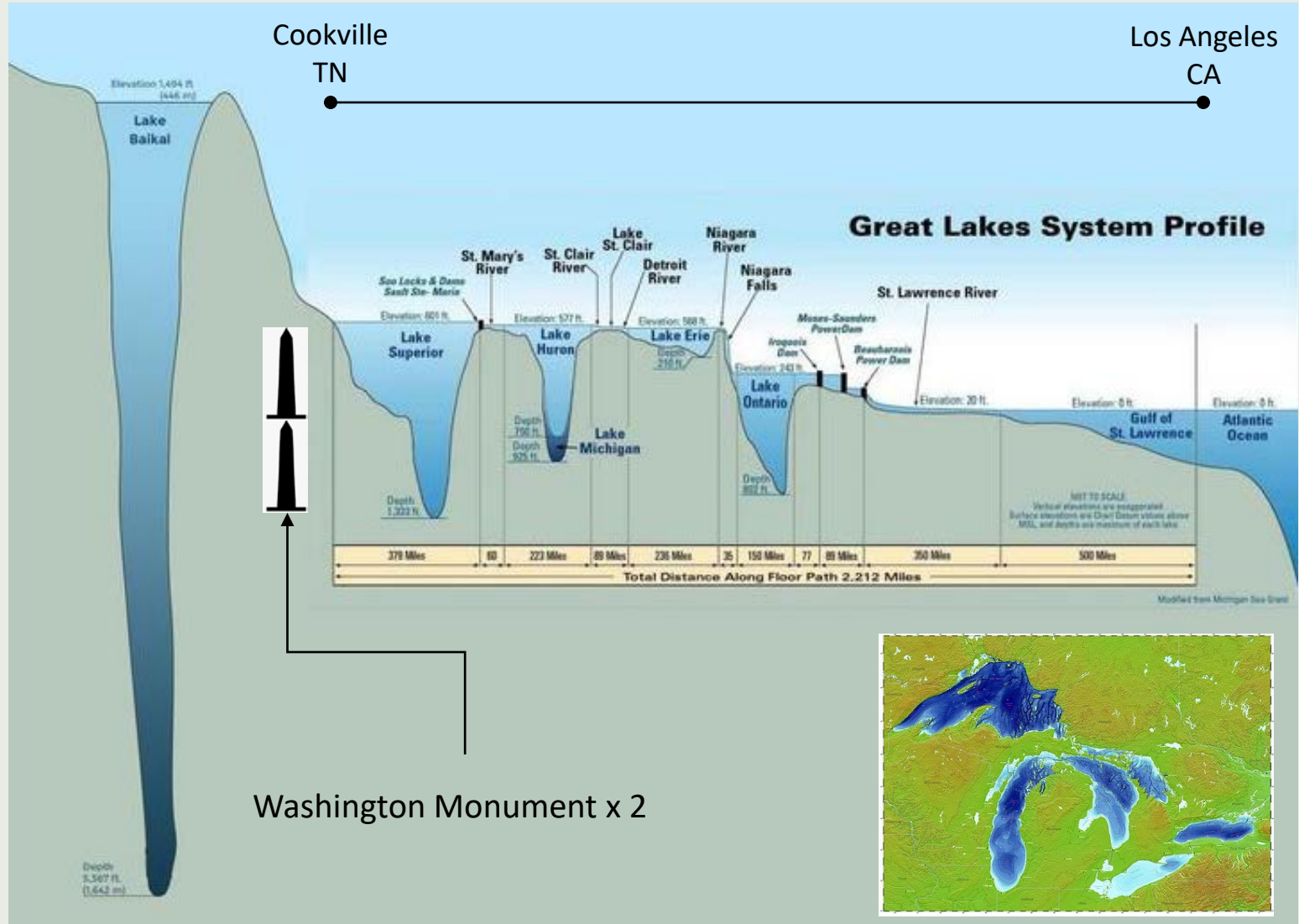


NJ

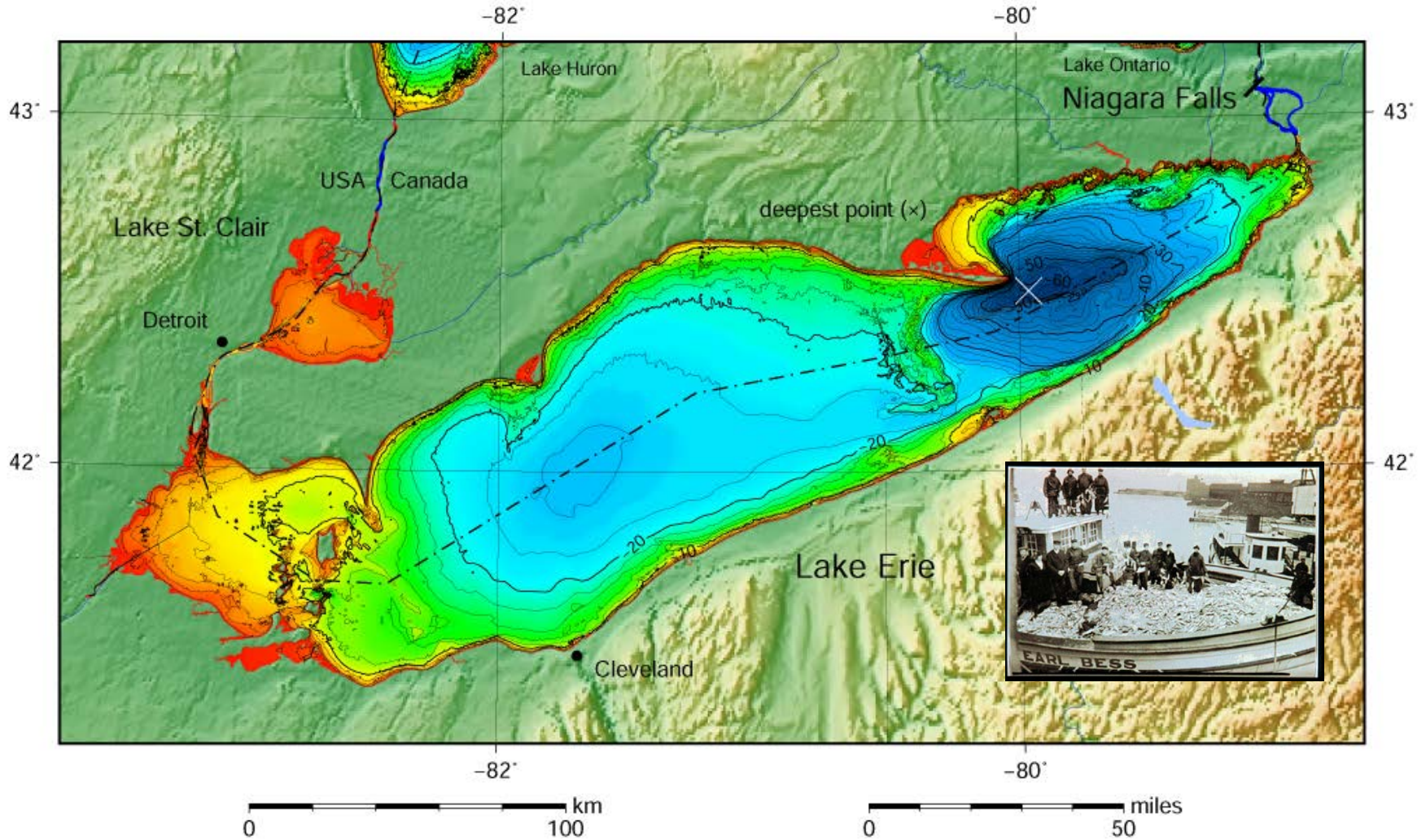
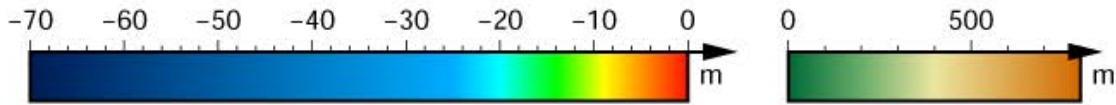


MD

System Profile



Lake Erie



Connecting Channels



Flows rival discharge of the Amazon!

Shipping, transportation



Motor City Muskies (Detroit, MI)



St. Marys River, 1908



INDIANS FISHING AT THE "SOO".

COPYRIGHT, 19

SMR connects L. Superior and Lake Huron



There were a lot of fish



Quantitative commercial estimates, and many anecdotal accounts of high angling catches using primitive methods



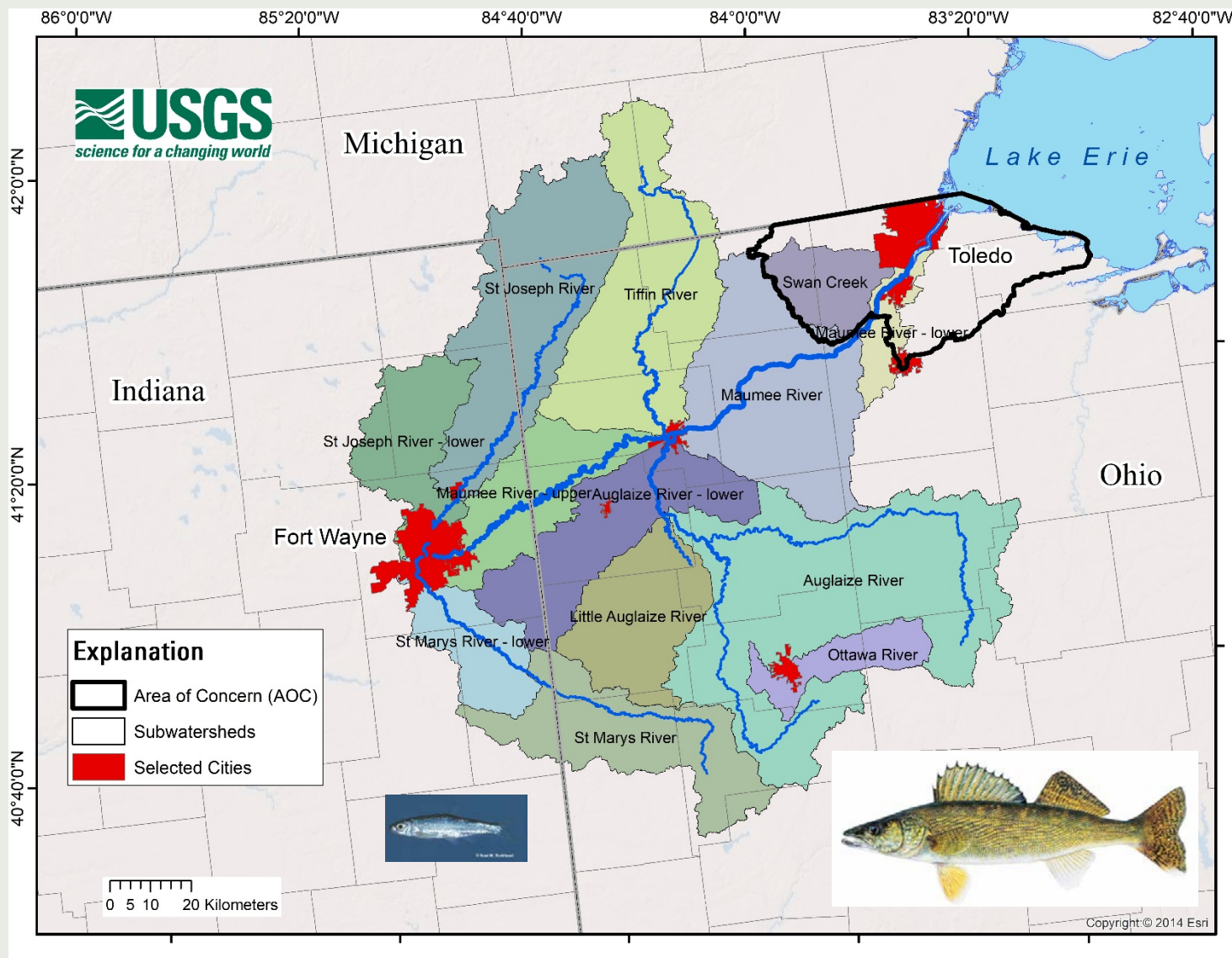
The great abundance of fish ... is a daily manna, which never fails... Moreover, better fish can not be eaten, and they are bathed and nourished in the purest water ... you could see anywhere.

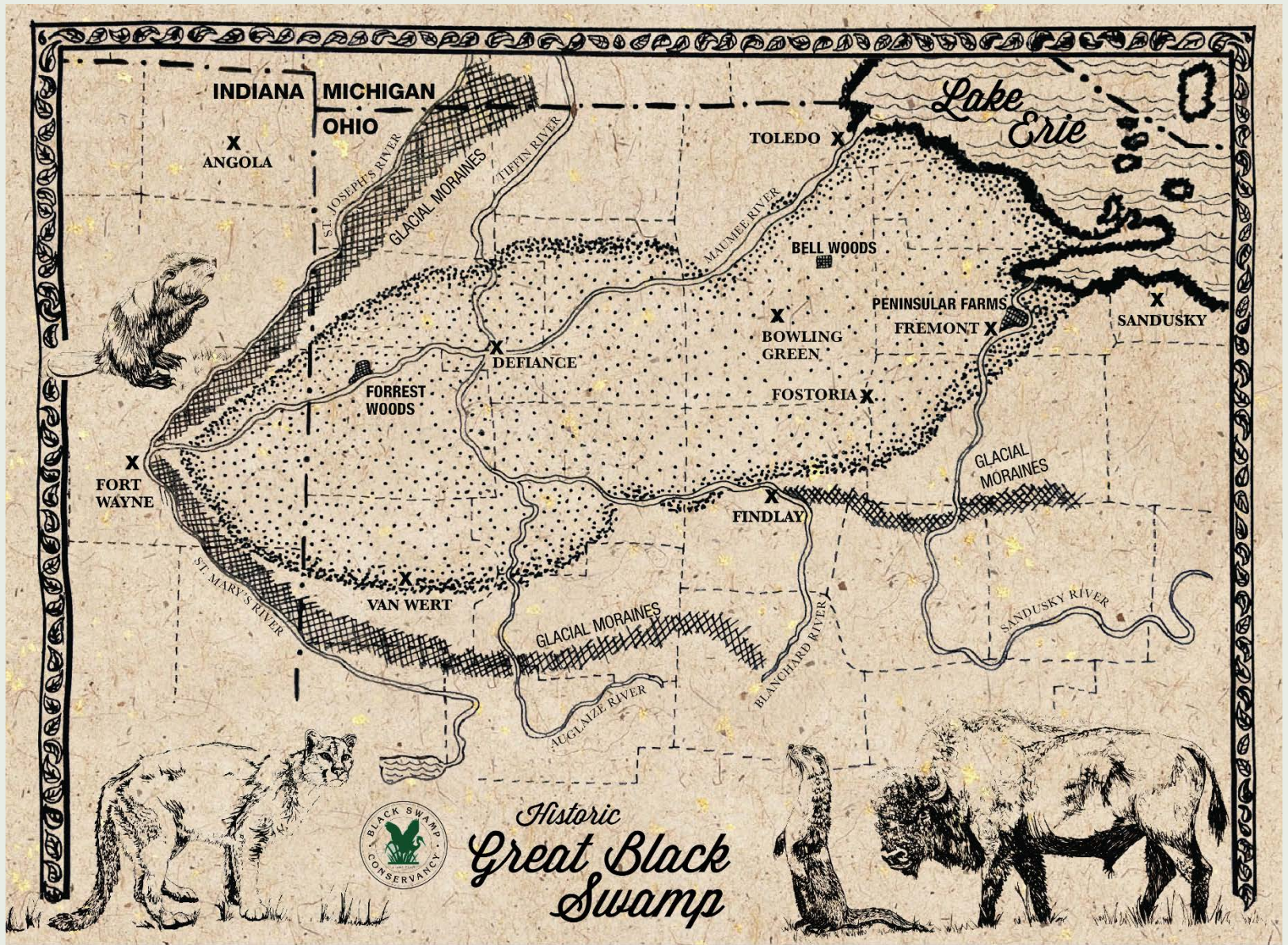
Antoine de la Mothe Cadillac (1658-1730)

Stressors affecting the Great Lakes

1. Habitat Loss
2. Invasive species
3. Overfishing

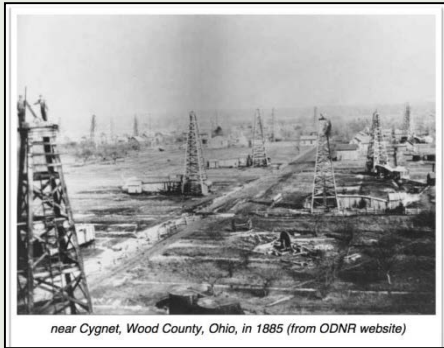
The Maumee River



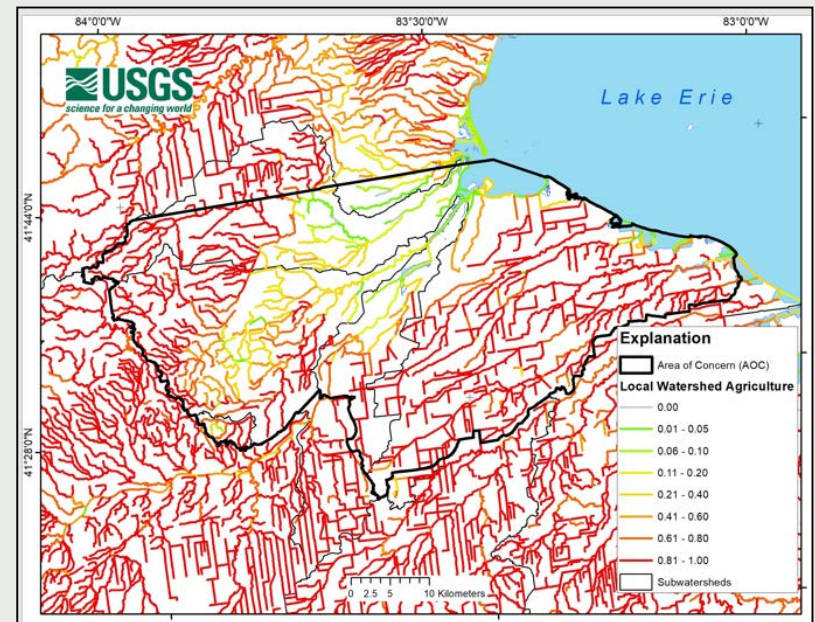
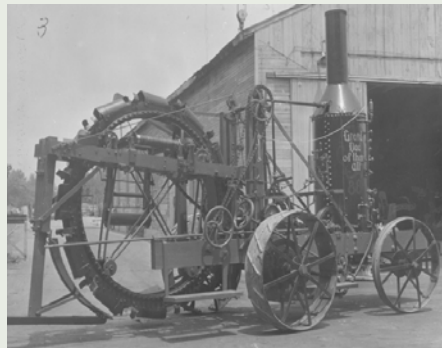




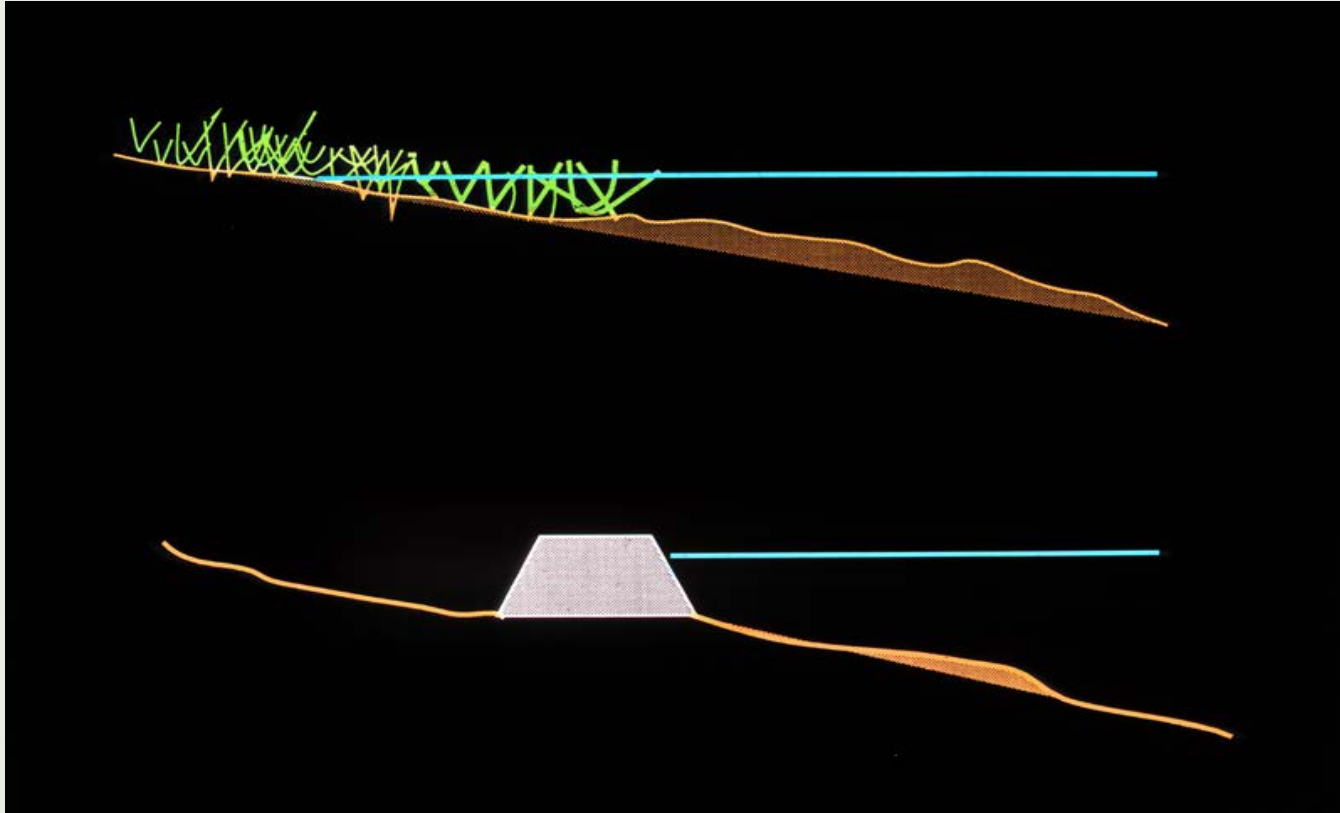
Conversion to Agriculture



near Cygnet, Wood County, Ohio, in 1885 (from ODNR website)

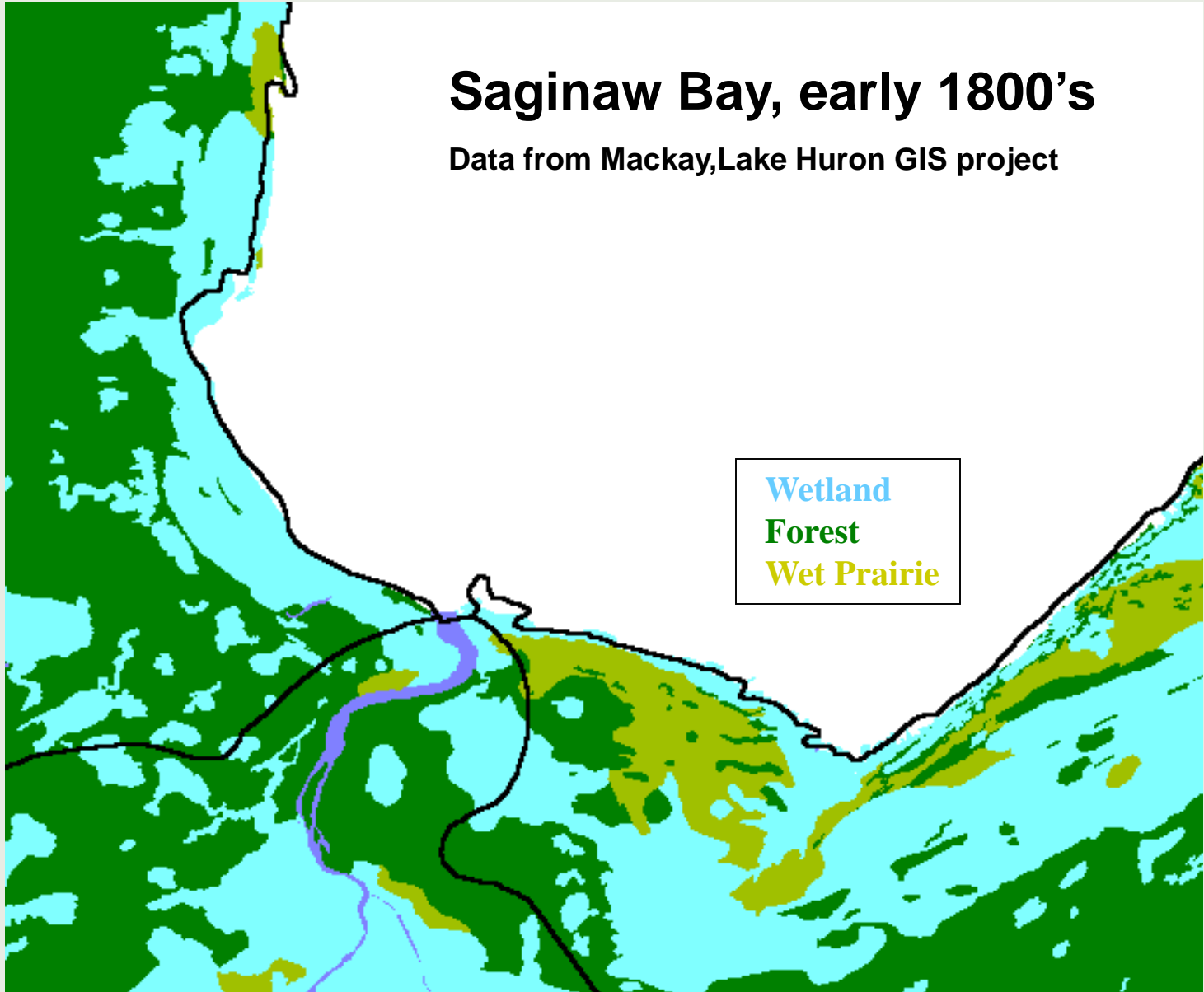


Habitat: Agricultural dikes



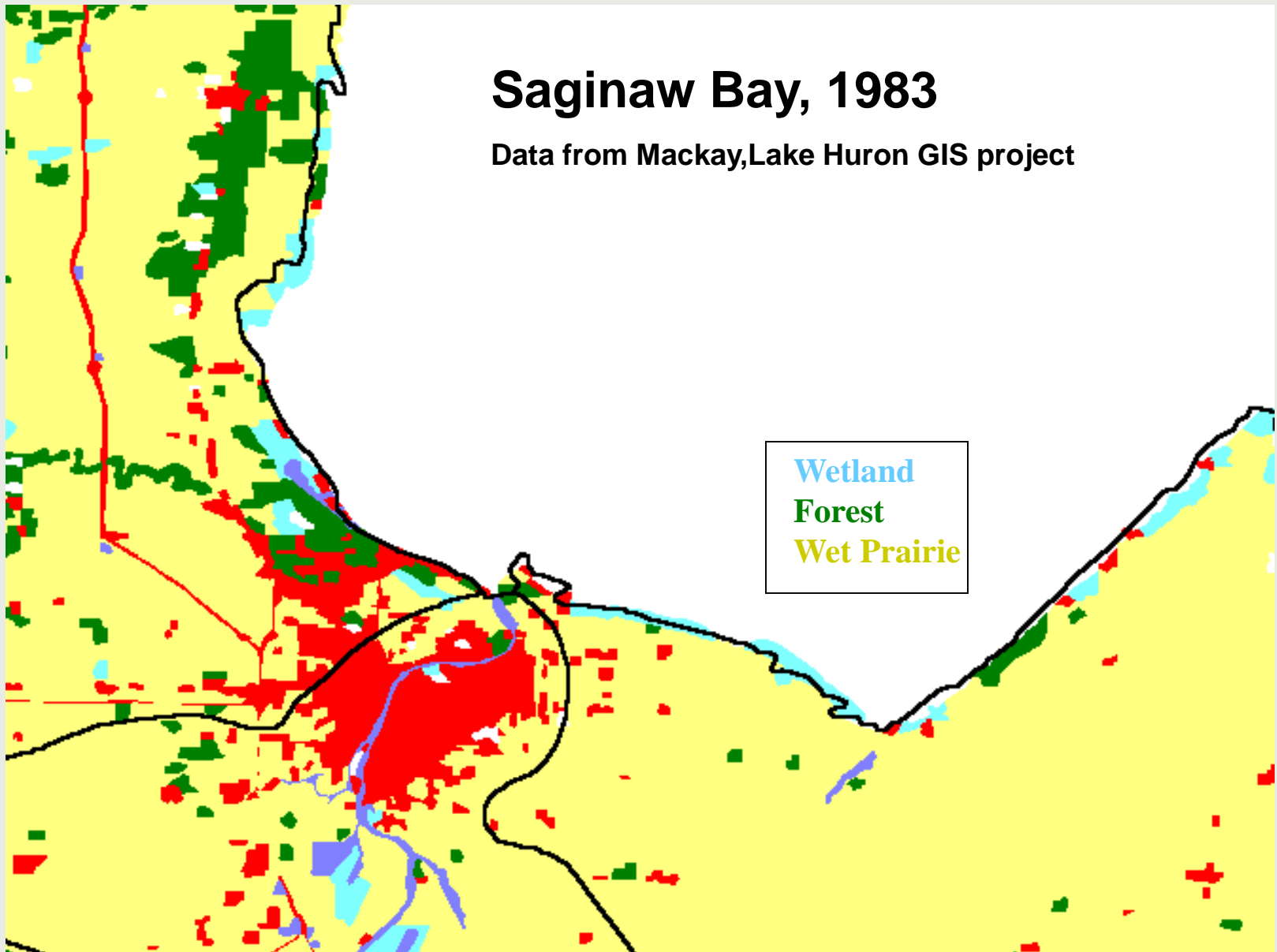
Saginaw Bay, early 1800's

Data from Mackay, Lake Huron GIS project



Saginaw Bay, 1983

Data from Mackay, Lake Huron GIS project



Habitat: Dams



Whitewater, Ausable River

Circa 1910

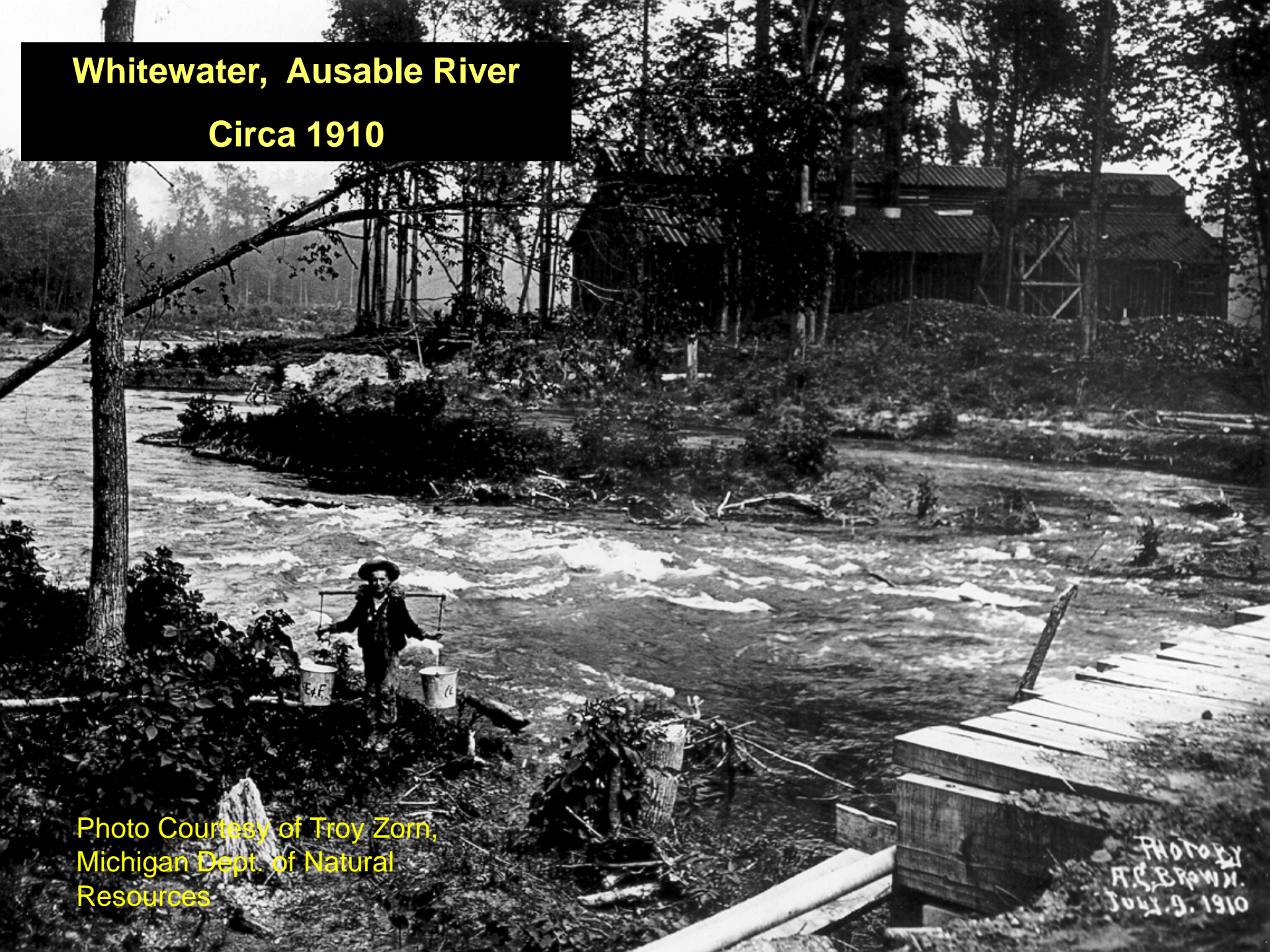


Photo Courtesy of Troy Zorn,
Michigan Dept. of Natural
Resources

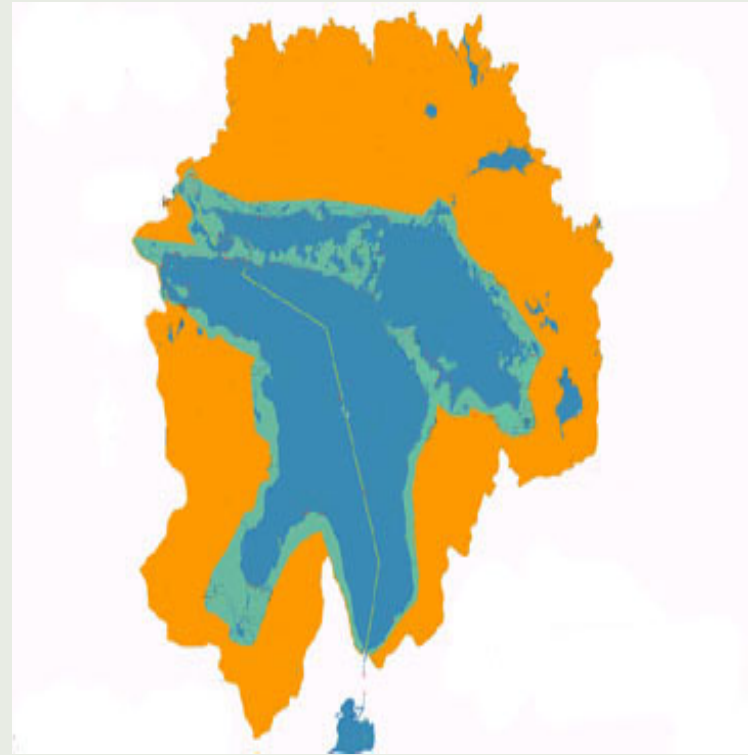
PHOTO BY
A. C. BROWN.
JULY 9, 1910

Habitat: dam impacts on migration



Then

Map courtesy of Troy Zorn,
Michigan Dept. of Natural
Resources



Now

Watershed impacts: Logging



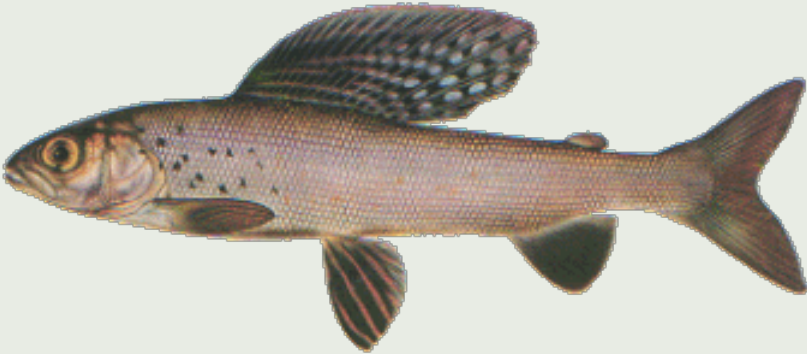
Watershed impacts: logging



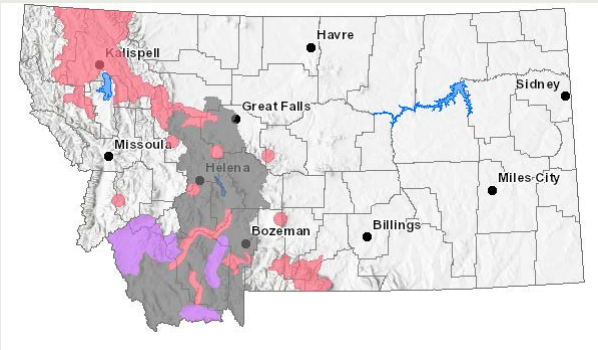
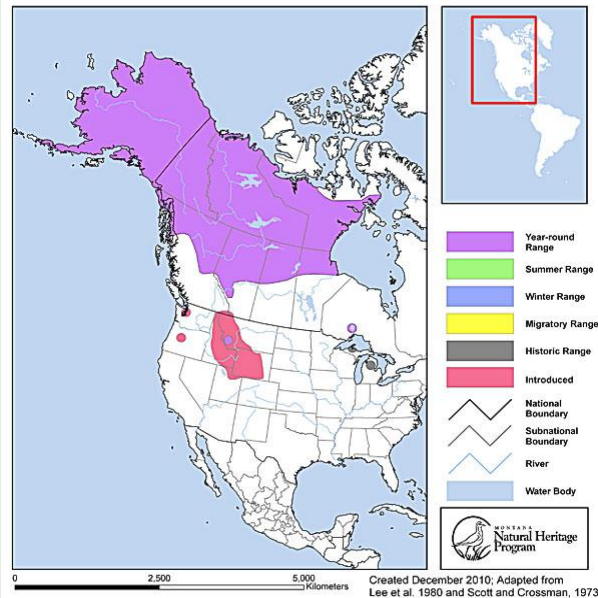
Target: old growth white pines
Cut, then float them down
rivers



Michigan Grayling



1936



The Great Peshtigo Fire



October 8, 1871: 1.2 M acres burned, >1500 lives lost
One of the largest disasters in American History
So why have you never heard of it?

The Great Chicago Fire



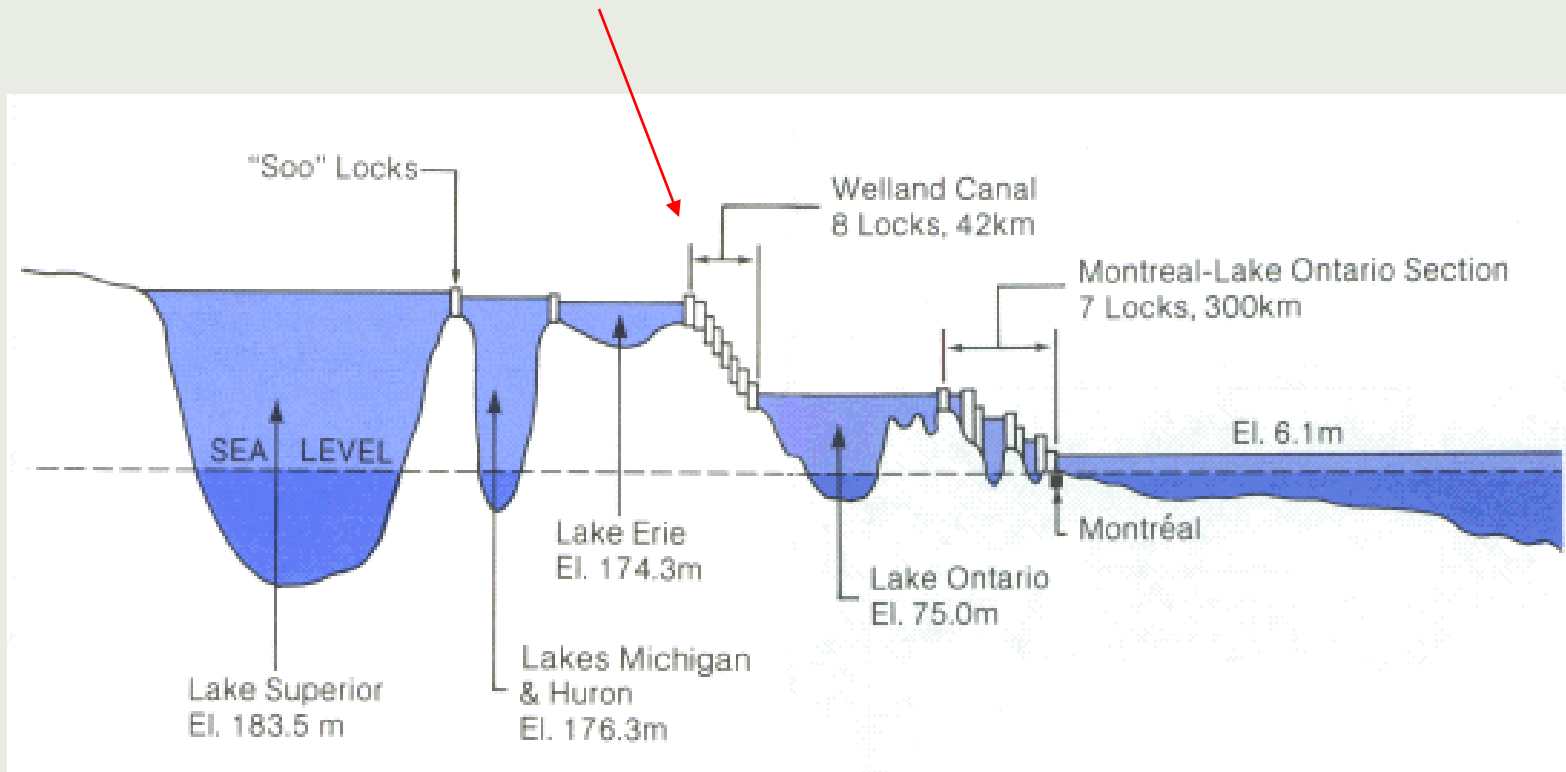
October 8, 1871

Invasives: Ship Canals

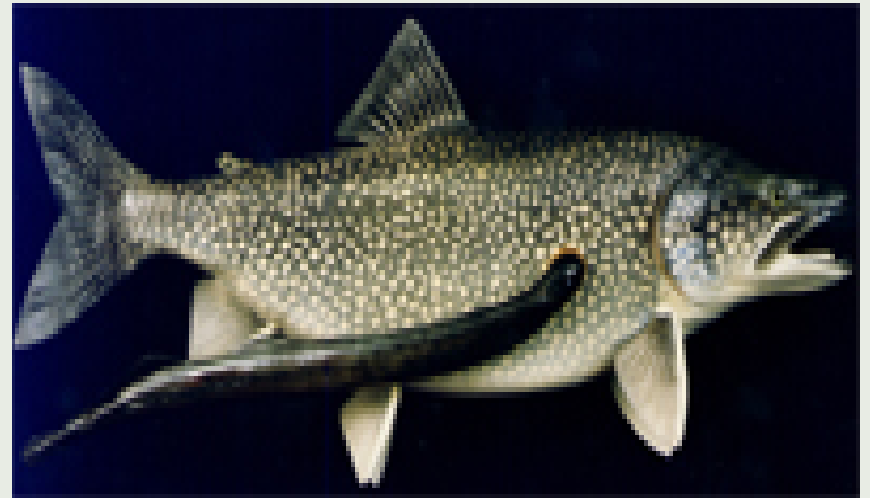


Invasives: Ship Canals

Welland Canal: 1829

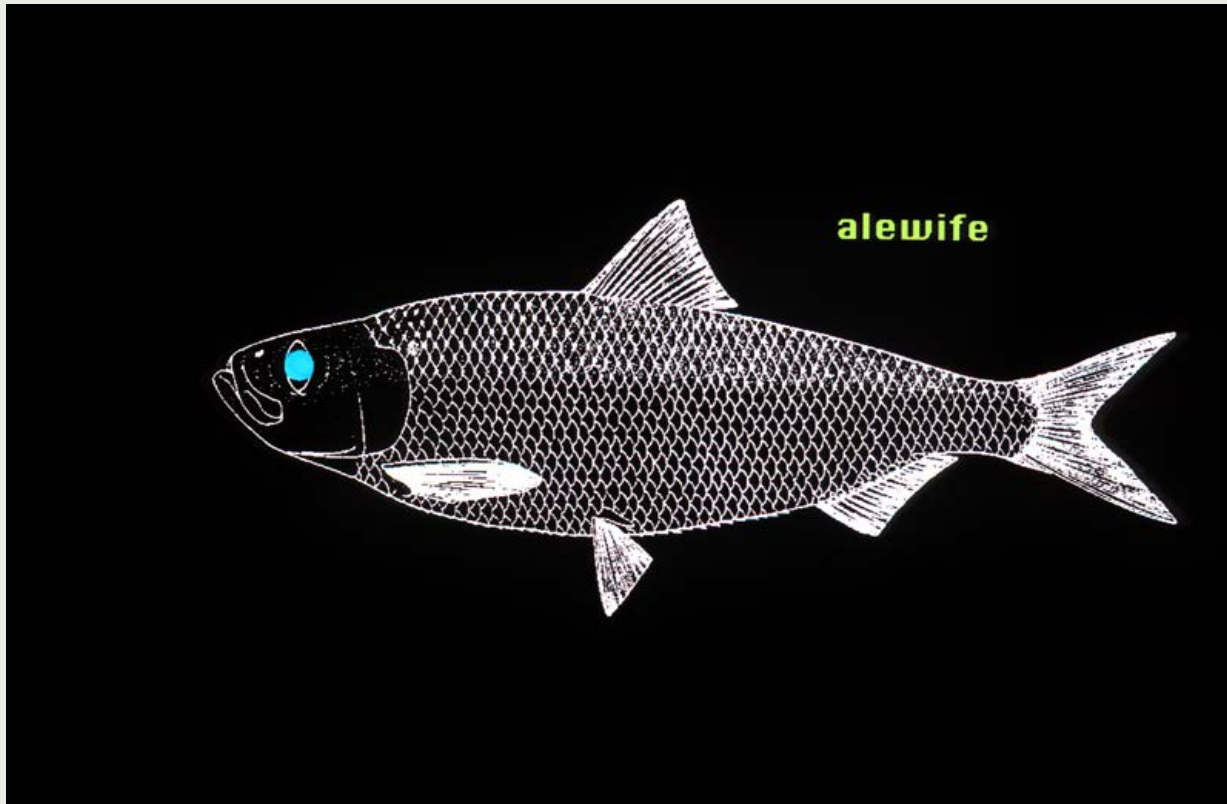


Sea Lamprey



A vertebrate parasite

Alewife



Planktivore: Competition? Egg and fry consumption?

Common Carp

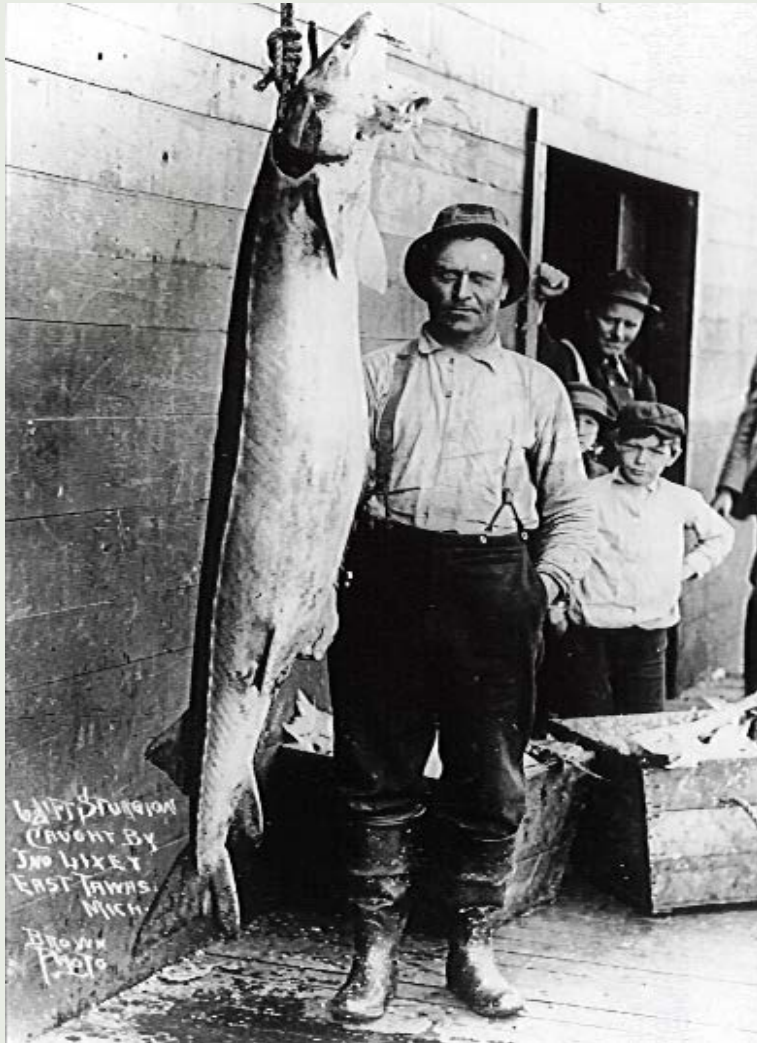


Deliberate introduction: U.S. Fish Commission

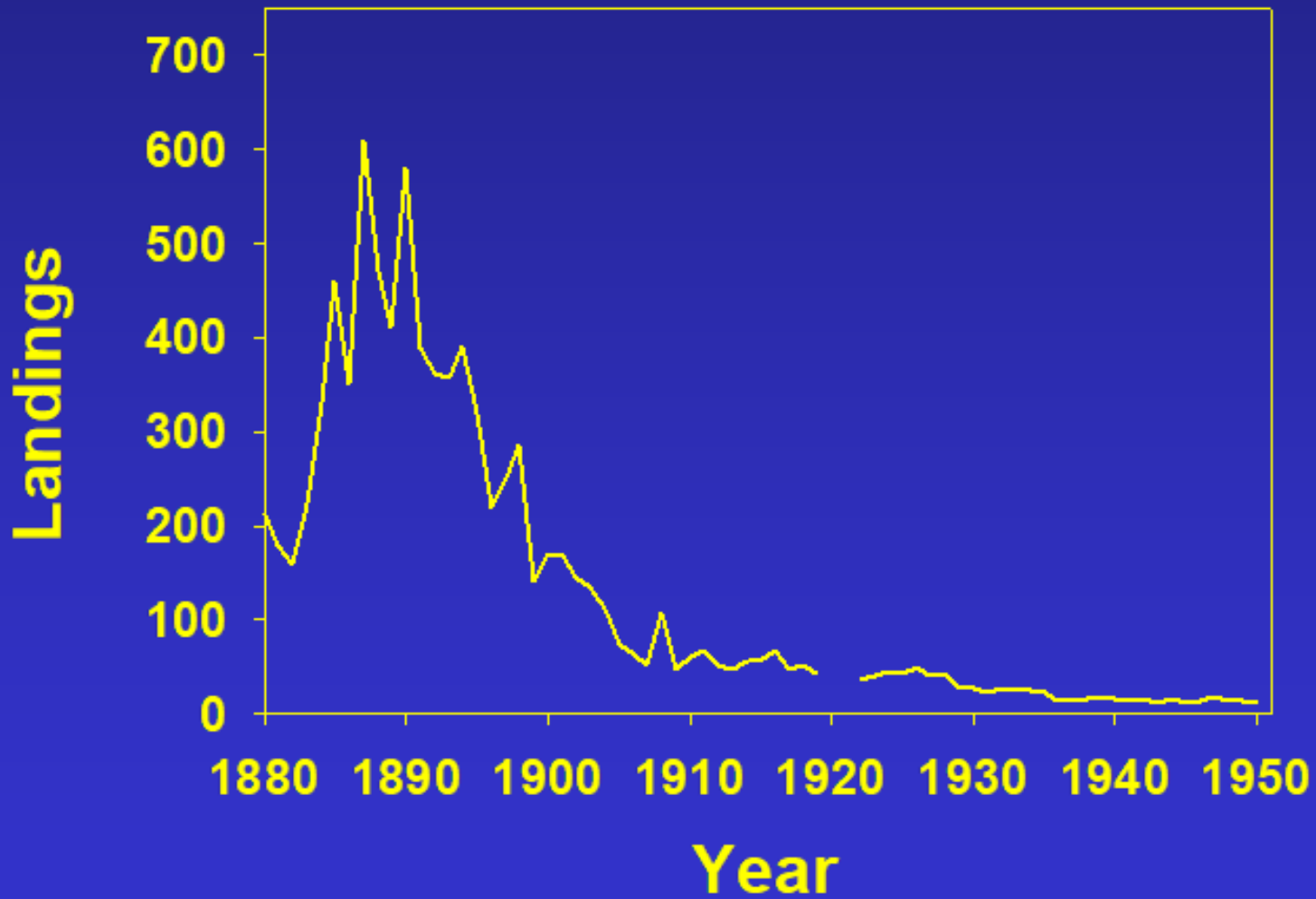
Additional stressor on wetlands

Impacts to waterfowl as well as native fishes

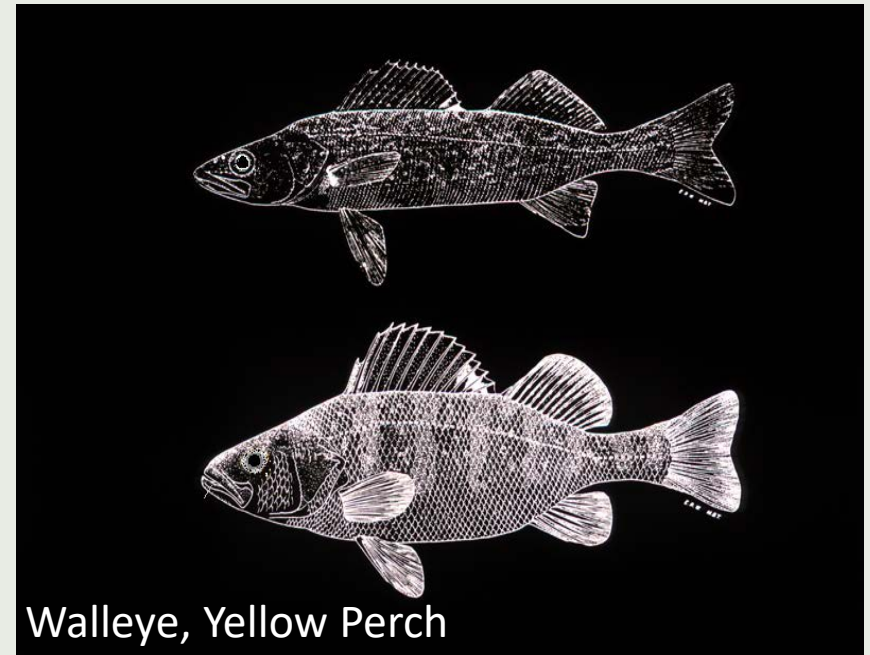
Overfishing: lake sturgeon



Lake Sturgeon landings



Exploitation followed a pattern: high value to low value



Mechanization, steam power

Transition from cotton to synthetic nets

Lack of data, meaningful regulations

Ineffective management

Cuyahoga River, Cleveland, OH, 1969



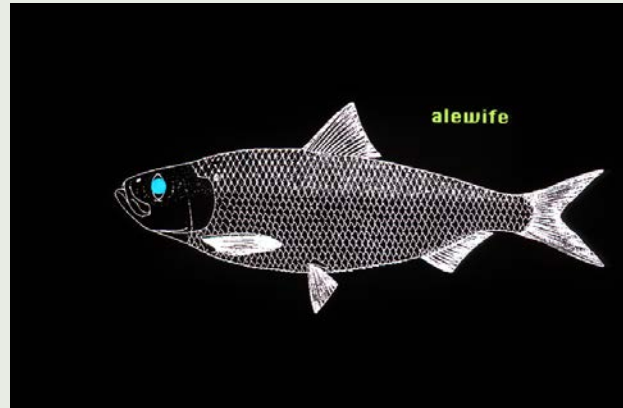
Time Magazine photo of earlier fire

Clean Water Act- 1972



*1970-1990: water quality, habitat protection, fisheries management
Led to substantial improvements*

Rehabilitation: 1975-1985



1985-1995: Ballast Water Invaders

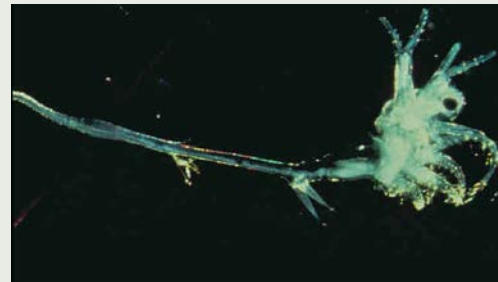
Zebra and Quagga mussels



Round Goby



Spiny water fleas: Bythotrephes, Cercopagis



Eurasian Ruffe



Bloody Red Shrimp



Harmful Algal Blooms



Caused by P in agricultural runoff

Toledo drinking water crisis, 2015



Asian carp

Imported by fish farms

**Escaped into the
Mississippi**

Moving north

**Now very close to Lake
Michigan**

One example of prevention



Reaction, but not prevention

- **Never avoided problems**
- **Wait until problem is severe**
- **apply money and technology**
- **New problems are more expensive**
- **System is changing faster than managers can respond**

Reflection

- Largest freshwater system on the planet
- multiple habitat types supported diversity, production
- Stressors: Habitat loss, Invasives, overfishing
- System was rehabilitated well
- But now, a new round of wicked problems



Questions?



American Lotus *Nelumbo lutea*