

82nd Annual Midwest Directors' Meeting ***Share the Passion, Continue the Legacy***

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USGS Great Lakes Science Center

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USGS GREAT LAKES SCIENCE CENTER

Mission: Provide scientific information for restoring, enhancing, managing, and protecting the Great Lakes.

Great Lakes Fisheries: Provide fisheries managers with current information to support management decisions.

Large Research Vessels: Our large vessels provide the means for conducting deepwater research and status and trends reporting on *ALL* of the Great Lakes

Laboratories: Hammond Bay (sea Lamprey); Ann Arbor; Tunison lab



In 1932, a scientist weighs and measures chubs and lake trout.

A Modern Research Vessel Fleet and Labs



R/V Kiyi
(2001)



R/V Arcticus
(2014)



R/V Sturgeon
(2004)



R/V Muskie
(2011)



R/V Kaho
(2011)



The past:

Lake Trout population collapse and recovery; at least in Lake Superior

The present:

Maintaining commercial and recreational fisheries sustainability in light of changing ecosystems, predator-prey balance, and fishery changes

The future:

Changing fisheries

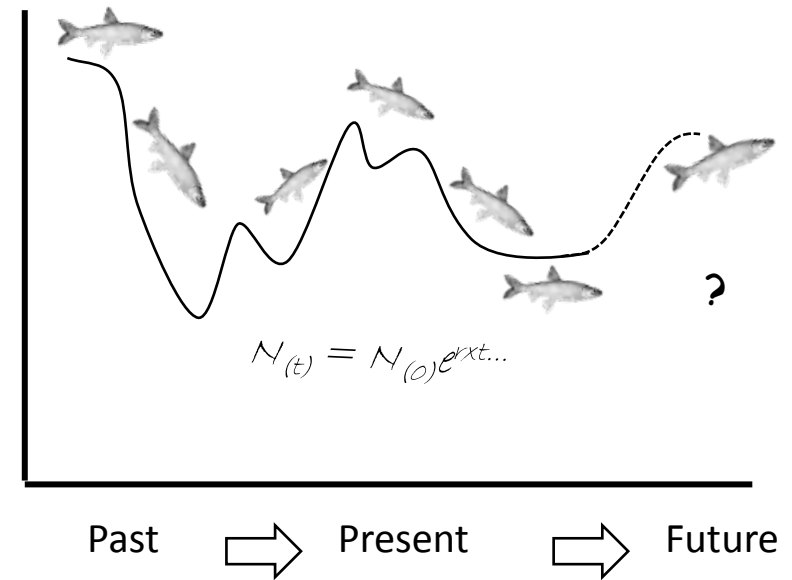
- international markets
- pen aquaculture

Changing ecosystems

- climate change
- invasive species

Changing societal demands

- recreational vs. commercial fisheries
- native vs. introduced species



Local Issues with Global Significance

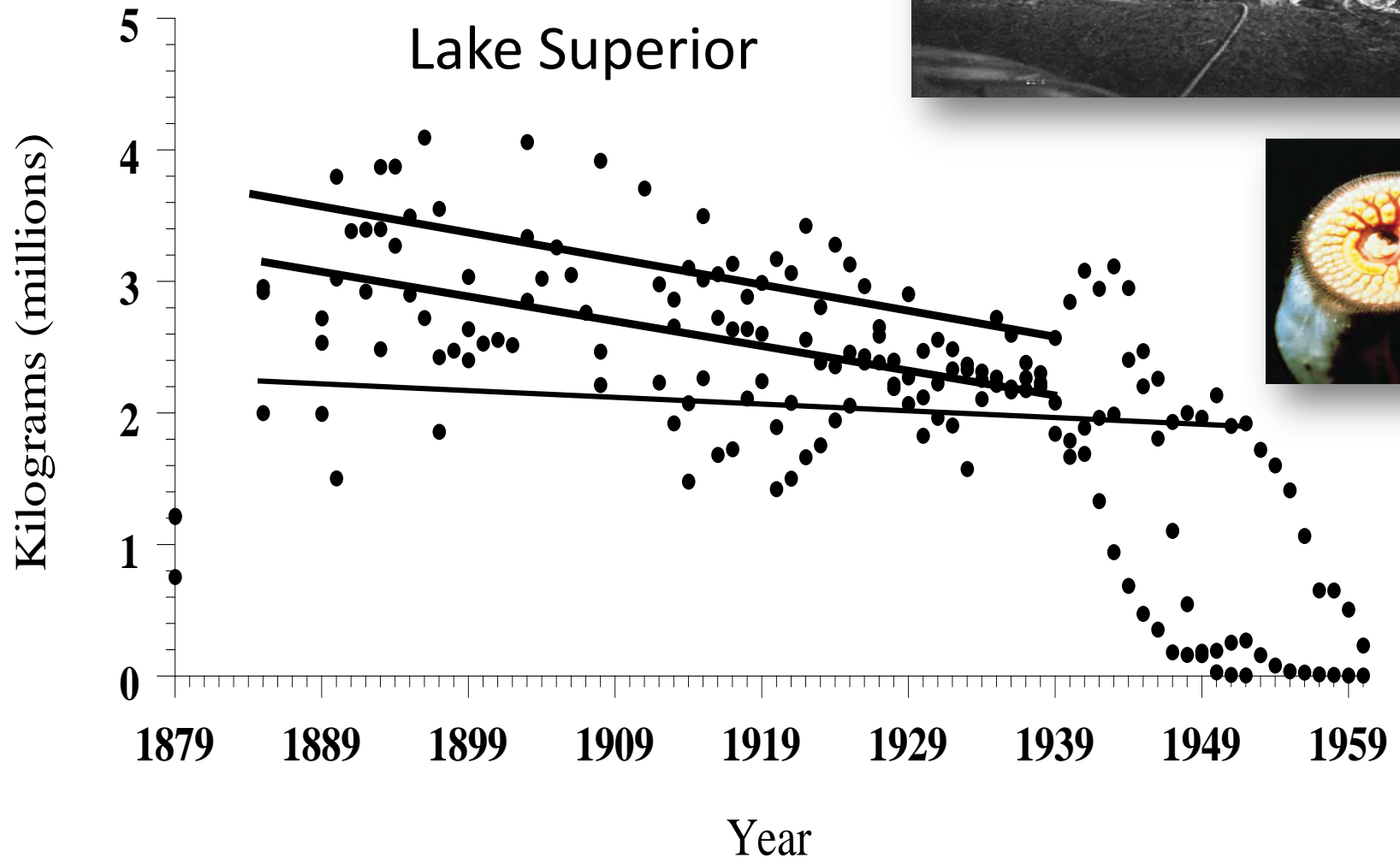


The Lake Superior story of success and hope!

- 
1. Fishing management
 2. Sea Lamprey control
 3. Ecosystem based data collection and management, e.g., foodweb based studies



Lake Trout Great Lakes



A Story of Success!

Harvest was managed within TAC in most areas and years.

Sea lamprey mortality
reduced to target levels

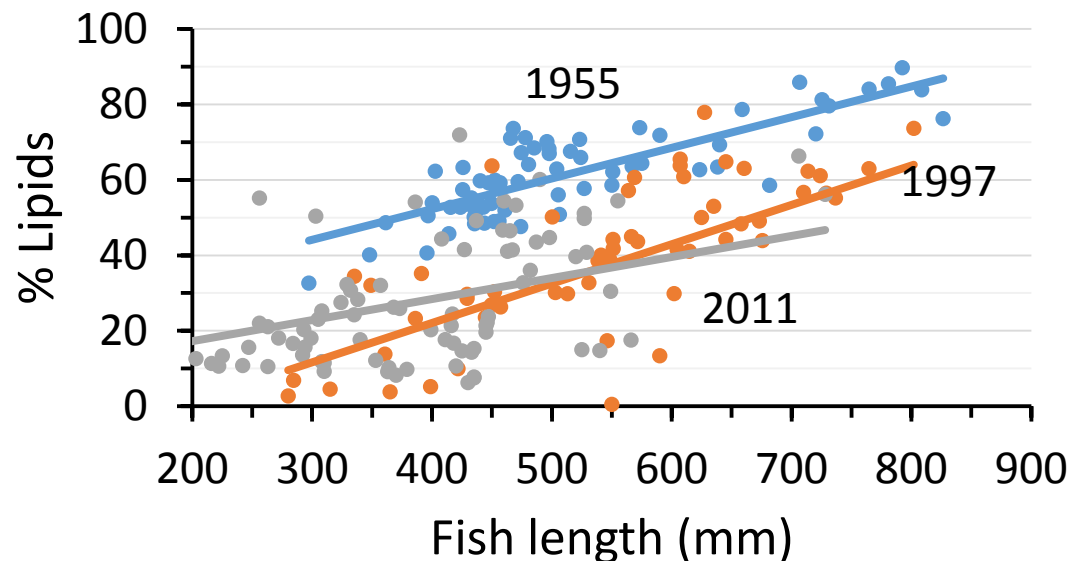
Wild fish $\geq 90\%$ of total
density & trending upward in
most areas.

*Stocking ceased in most areas
after 1996!*



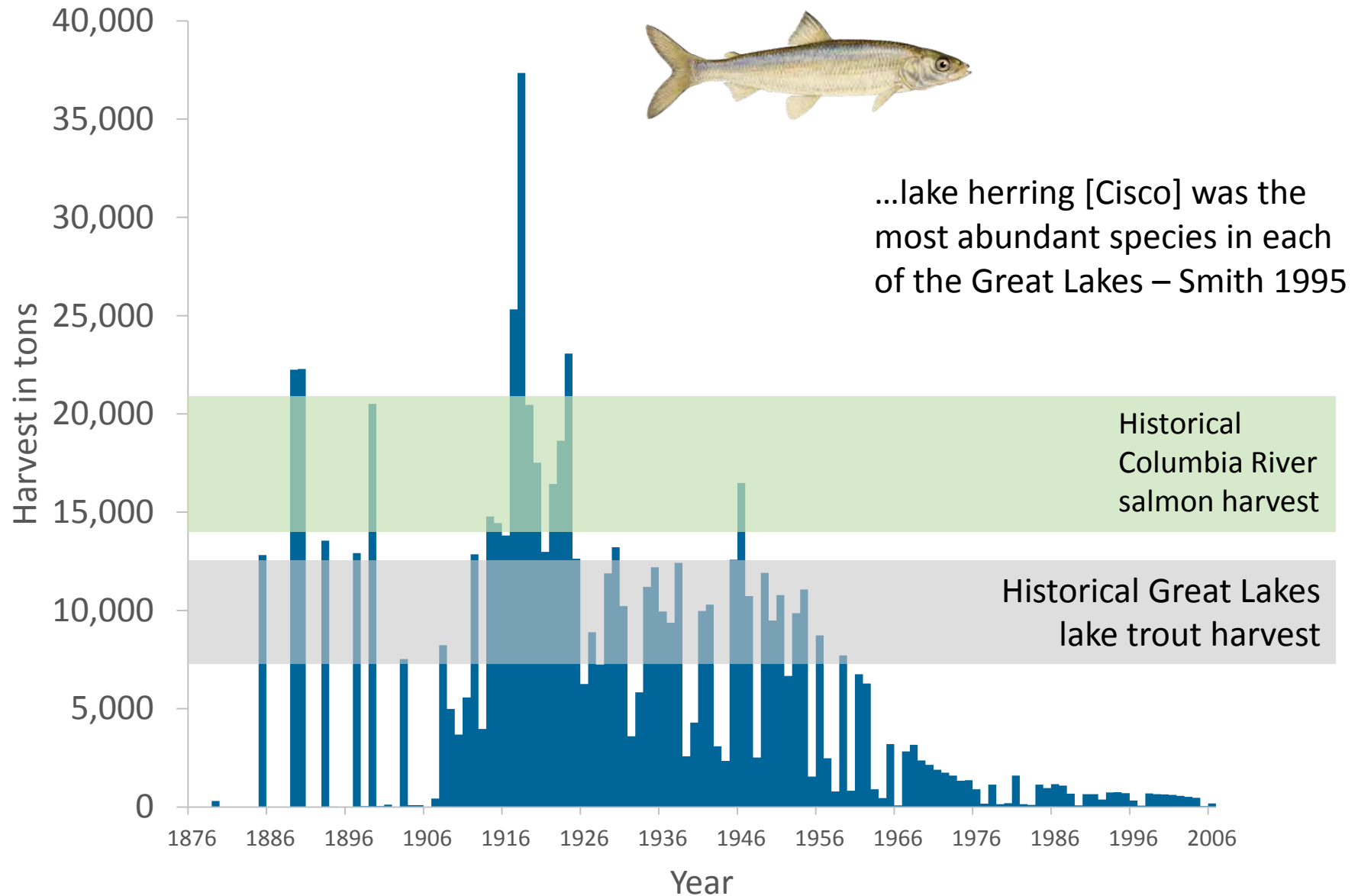


Present and future; Siscowet Lake Trout, where's the fat gone?



- Density dependent causes following population recovery?
- Lack of prey?
- Loss of genetic diversity due to population crash in the 1950s?
- Hybridization with Lean Lake Trout?
- Change in age structure; are today's populations younger?

Historical Cisco harvest



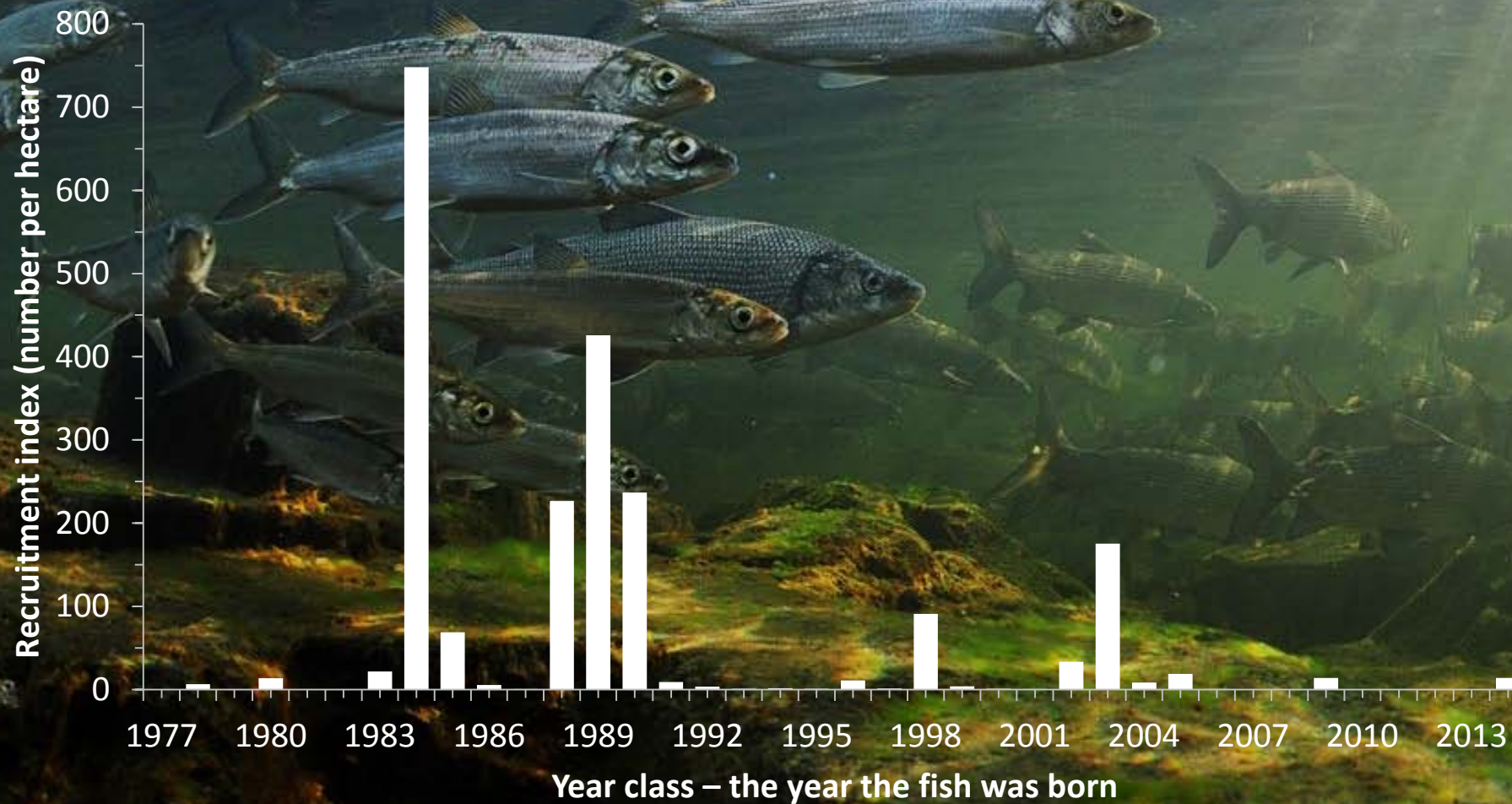


Why the lack of recruitment?

Change in predators – are they being eaten?

Change in their food supply – are they starving?

Environmental changes? Where is the bottleneck?

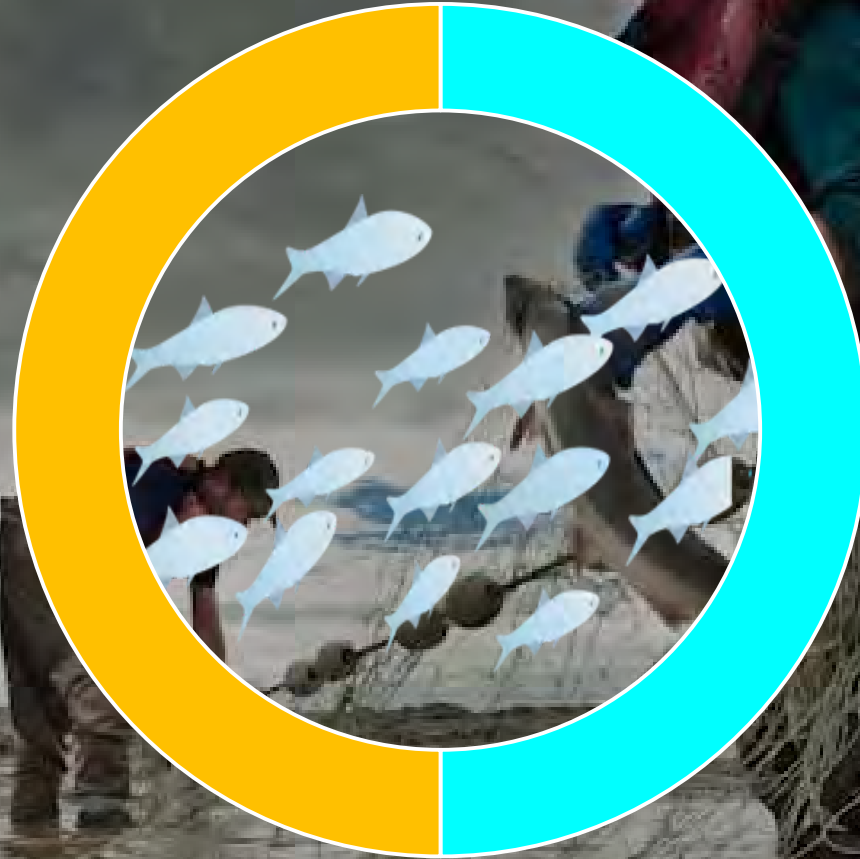


Changing global fisheries



Changing global fish food production

50%
Marine
fisheries



50%
Inland
fisheries

Welcomme, 2011. An overview of global catch statistics for inland fish
Jung Youn et al. 2014. Inland capture fishery contributions to global food security and threats to their future.

Fish Farmers Eye The Great Lakes

By PETER PAYETTE • JUL 3, 2014



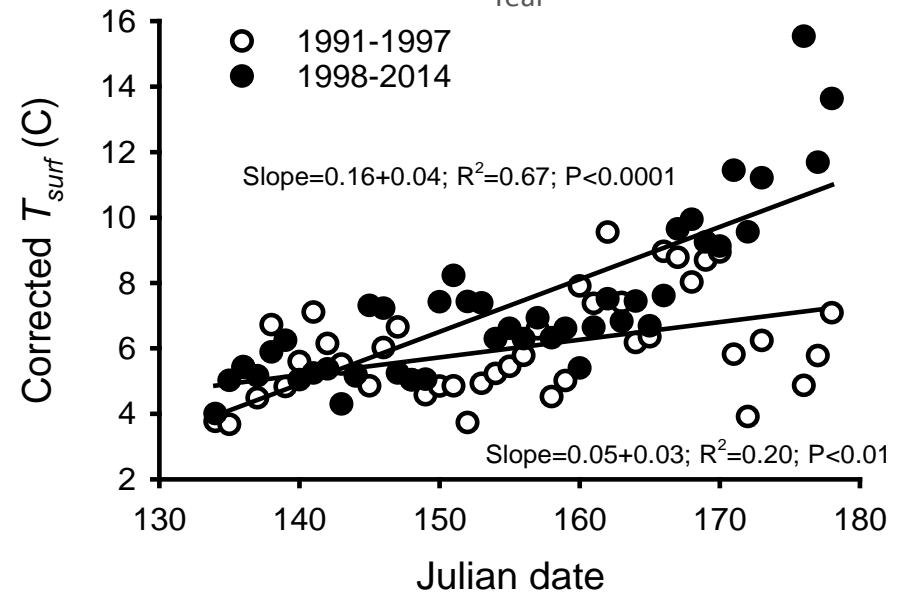
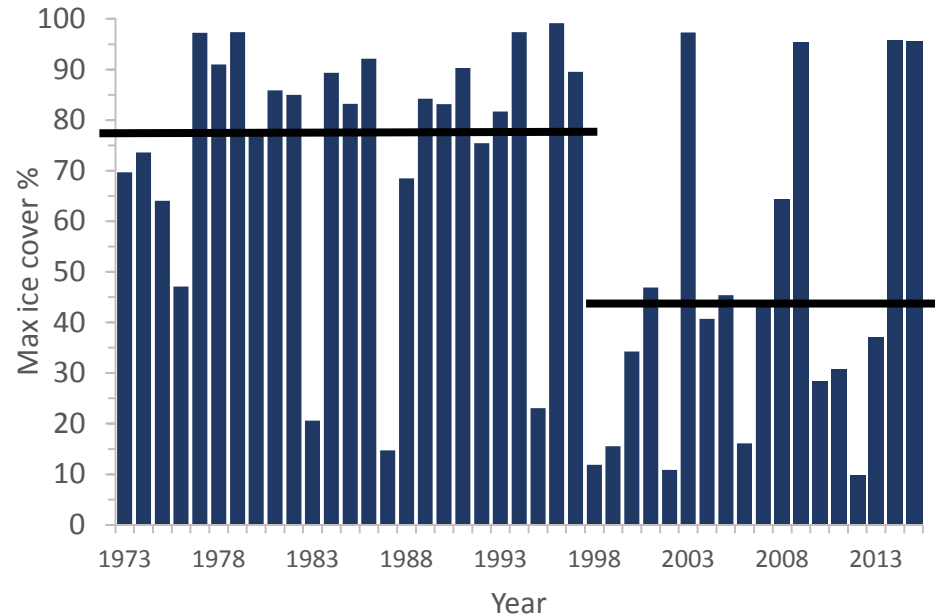
USGS COMMITMENT

We remain committed to providing scientific information in collaboration with our partners to meet the research needs of Great Lakes resource managers



Extra slides

Present and future?...Less ice cover = earlier warming

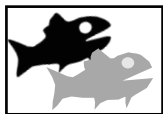
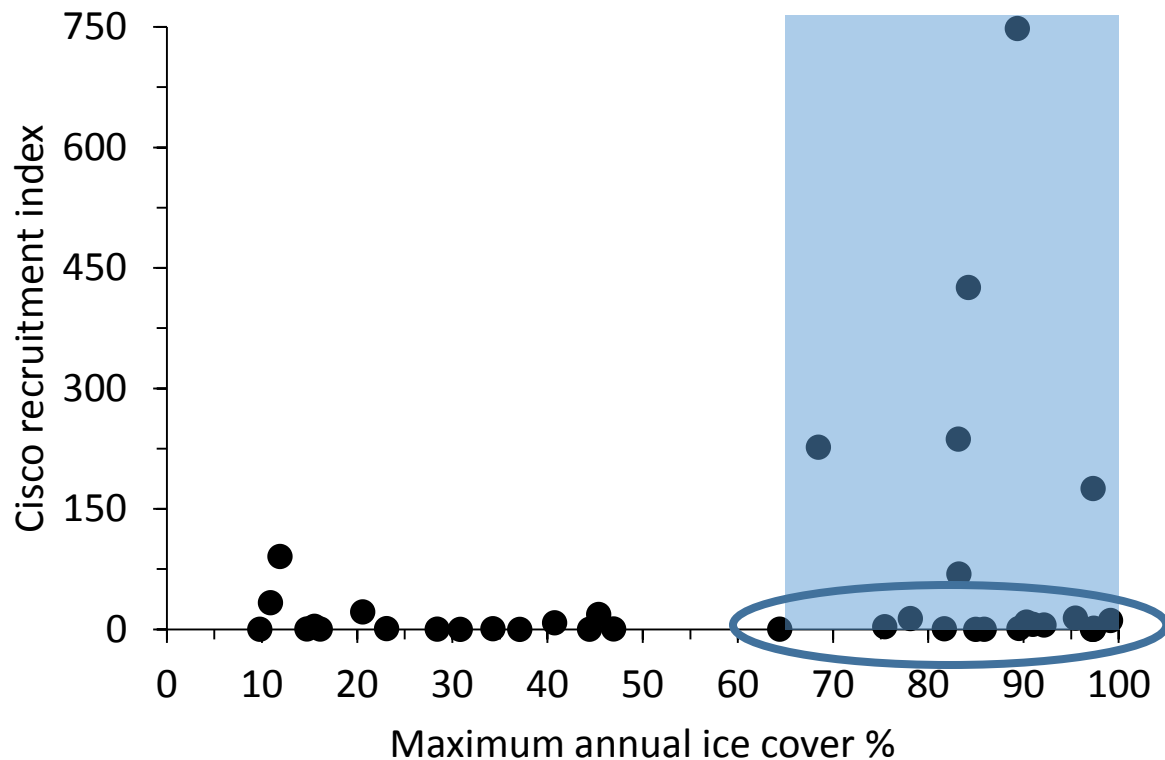




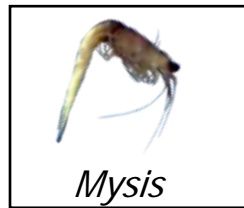
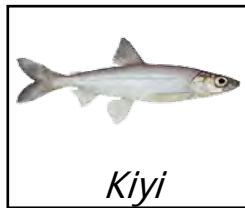
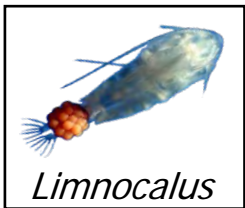
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Lake Superior ice and Cisco recruitment relationship status?

Single
Engaged
Divorced
✓ It's complicated
Separated
Married



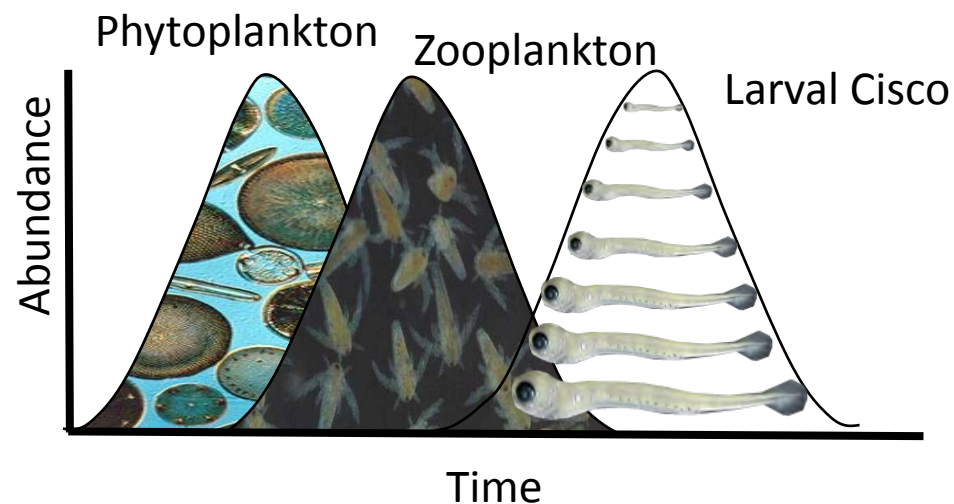
See all friend recommendations



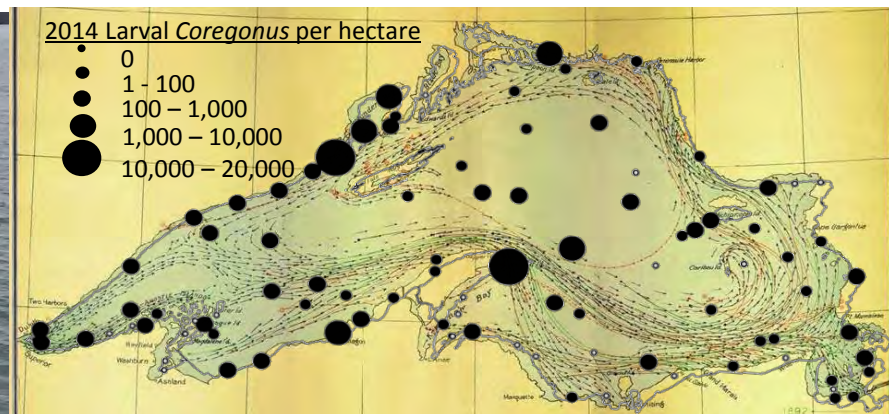


What factors determine successful recruitment events?

Spring warming and predator-prey phenology



Lots of larval fish, but few 1 year olds



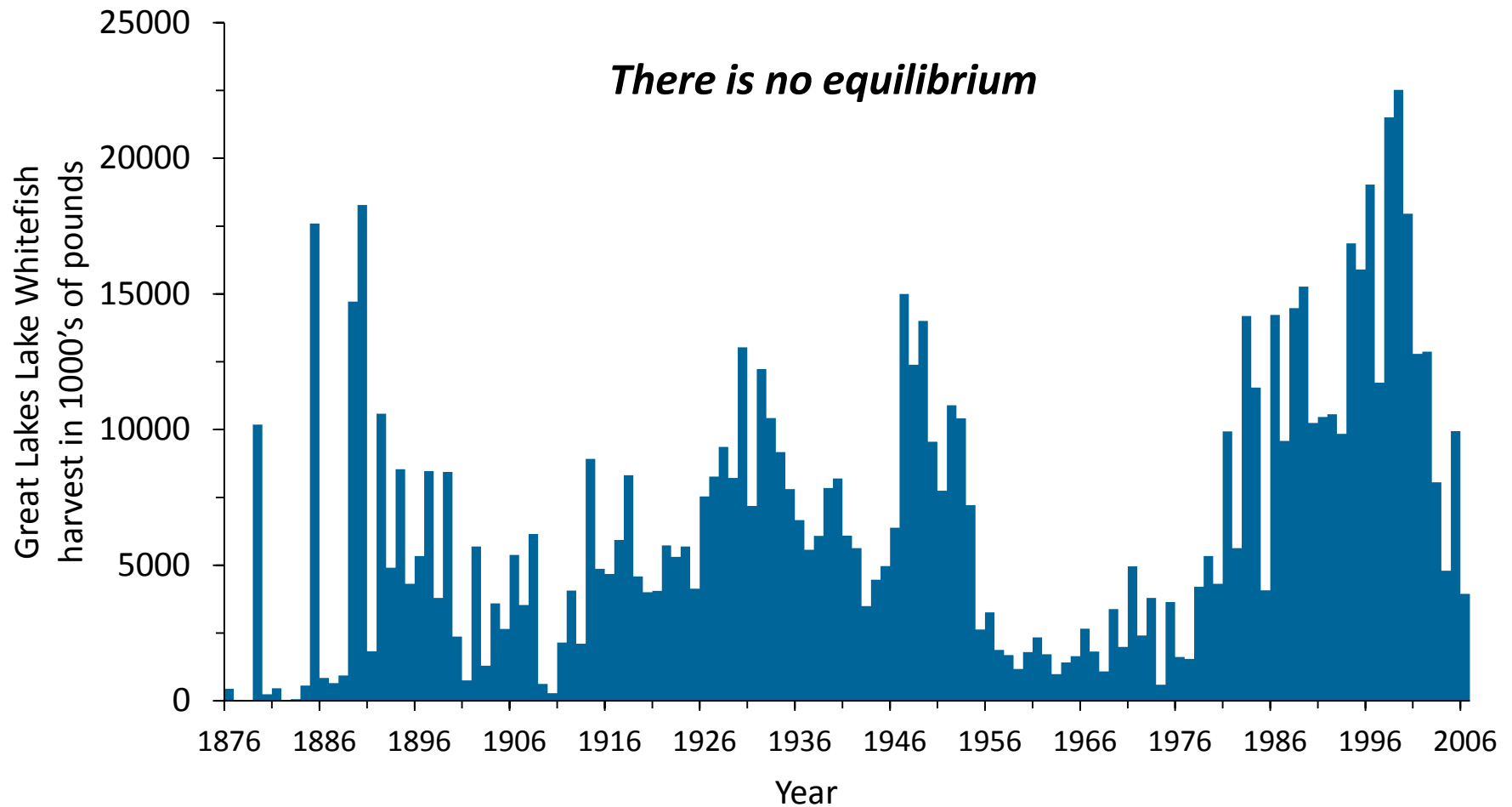
lakewide estimate
14.2 billion \pm 30
million
May-July 2014



Changing global fisheries



What's the future hold?...Change



Great Lakes Coregonids

Lake Whitefish

Cisco, a.k.a., Lake Herring

Bloater

Kiyi

Blackfin Cisco

Shortjaw Cisco

Pygmy whitefish

Round whitefish



USGS research to address:

Population status and trends

Species and stock identification

Life history

Ecosystem services role

Recruitment, and lack there of...

Propagation and stocking