MICHIGAN AQUACULTURE AND COMMERCIAL FISHERIES ISSUES

Ron Kinnunen
Michigan Sea Grant College Program

Sea Grant Michigan

NOAA National Oceanic and Atmospheric Administration U.S. Department of Commerce

Michigan State University

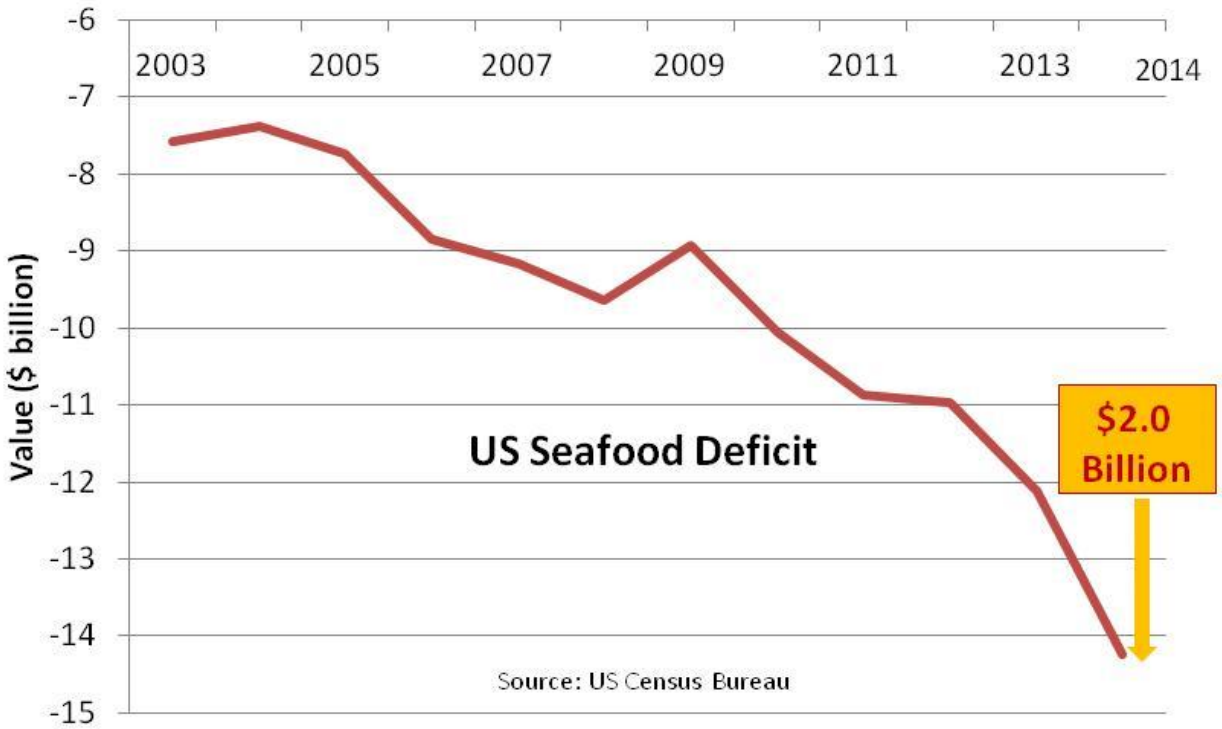
University of Michigan

Michigan capable of $1 billion from aquaculture

- Flow-through
- RAS
- Net-pens

US Trends

US Seafood Trade



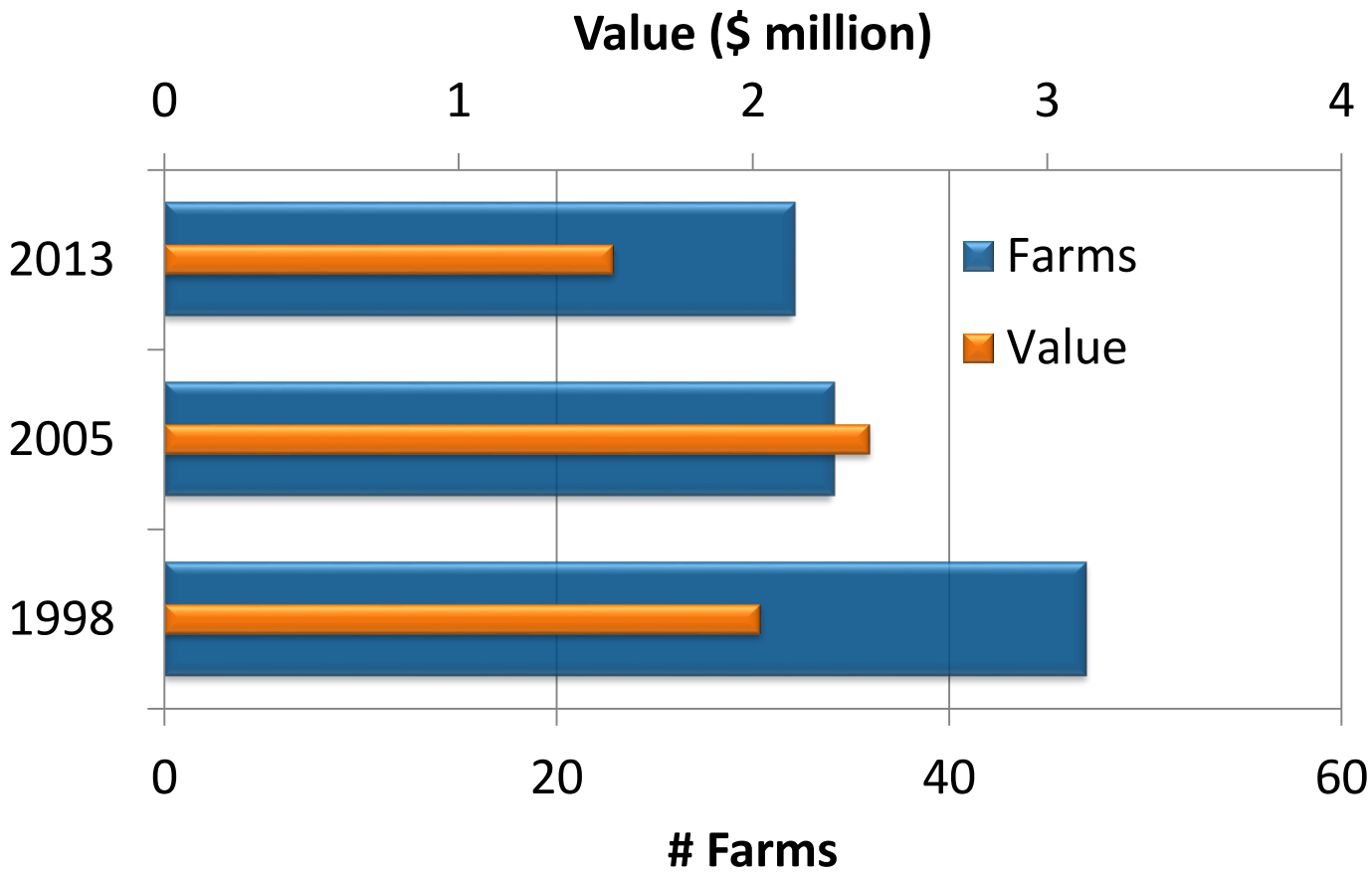
Largest ever recorded

What is Causing US to Fall Behind in Aquaculture?

- Catfish production dropped from 608 million lbs in 2005 to 301 million lbs 2014 due to global competition
- Regulations restricting expansion
- Indoor recirculating aquaculture system (RAS) failures and high risk


USDA
Training Program on Food Safety Requirements for Siluriformes
Chương Trình Đào Tạo về Các Yêu Cầu An Toàn Thực Phẩm cho Cá Siluriformes
January 2018
Can Tho, Viet Nam.

Michigan Aquaculture



15 year track record

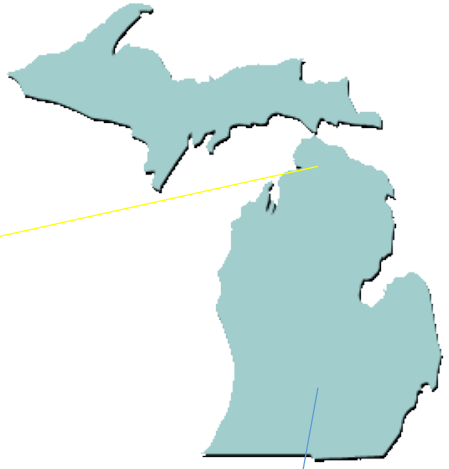
Source: USDA Aquaculture Census


Somewhere in Ontario waters of Lake Huron
Data SIO, NOAA, U.S. Navy, NGA, GEBCO
Image Landsat / Copernicus
Image NOAA
© 2016 Google
Google Earth
44°31'37.40" N 83°19'48.80" W elev 599 ft eye alt 884.87 mi

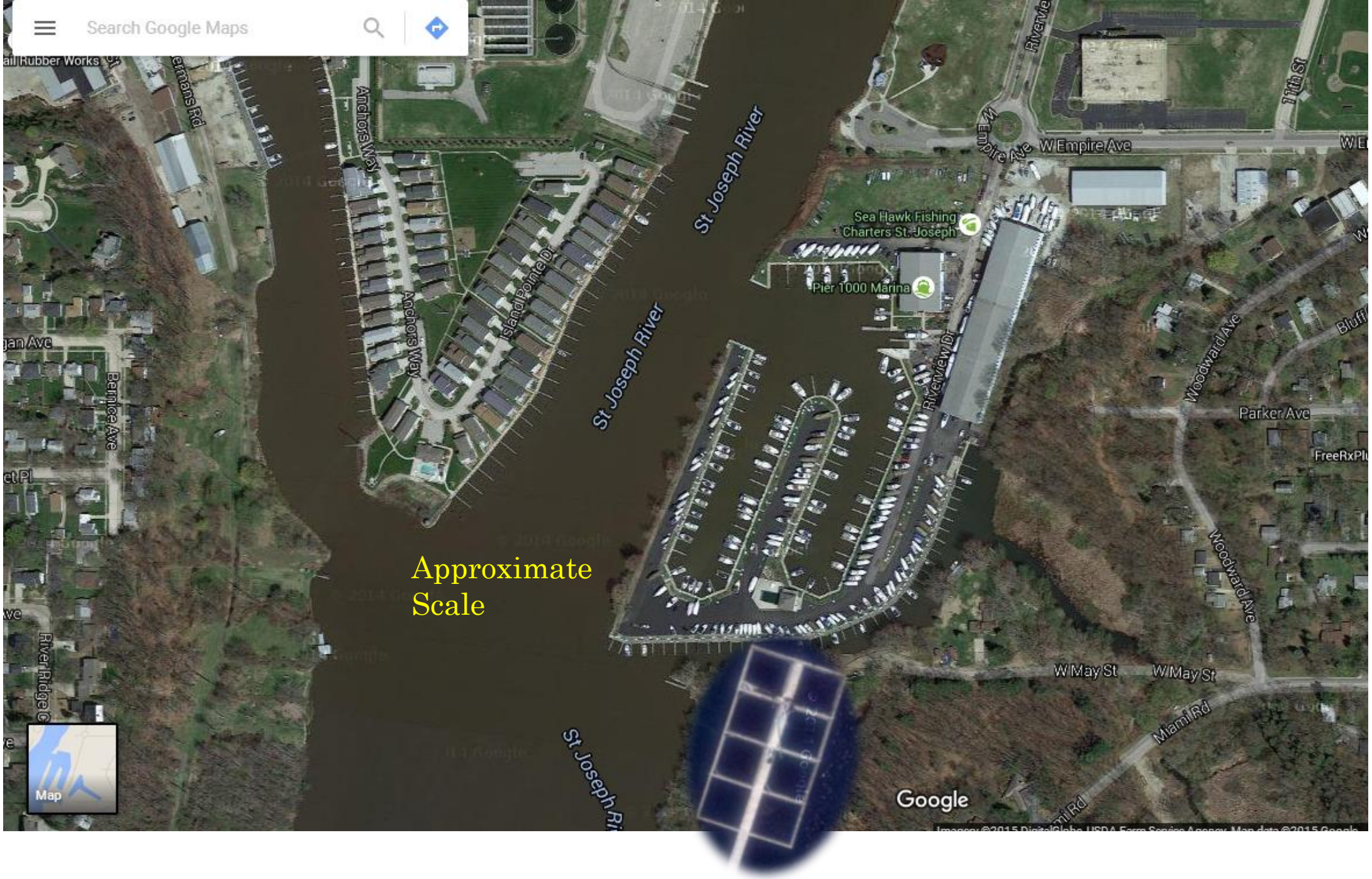

20,200 ft
Image © 2016 DigitalGlobe
Image © 2016 TerraMetrics
Google
Tour Guide
2003
46°03'03.36" N 81°59'33.17" W elev 438 ft eye alt

North Wind Fisheries Manitoulin Island, Ontario

Meijer's - Petoskey, MI 2017



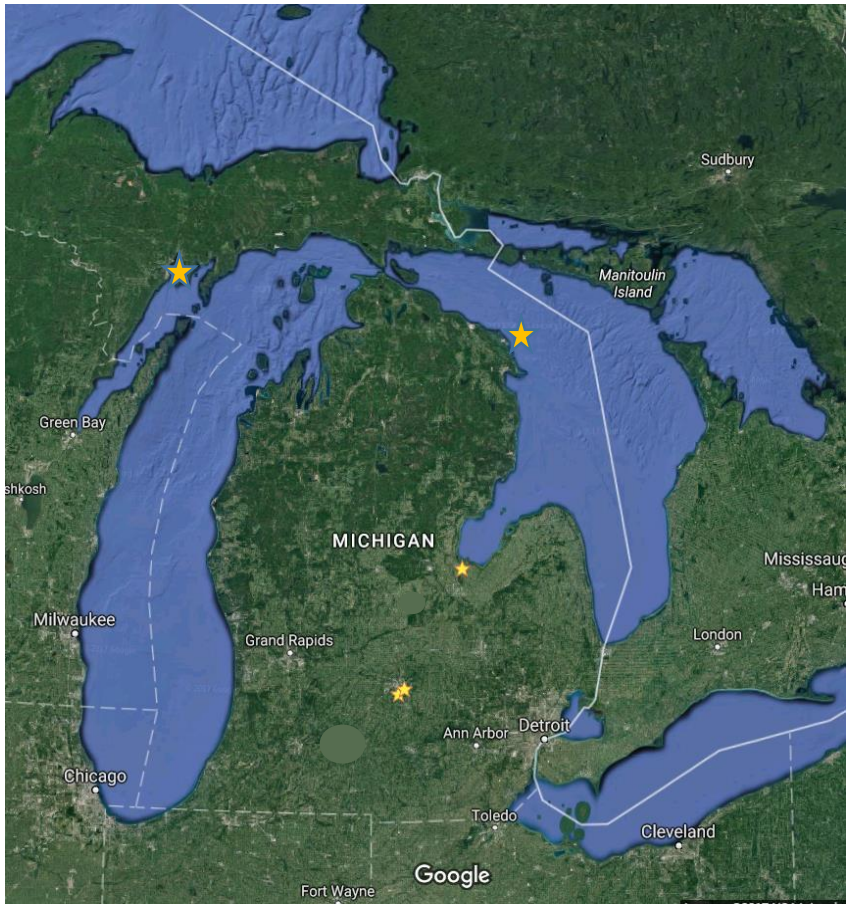
Meijer - Lansing, MI 2014


Search Google Maps
Anchors Way
Island Pointe Dr
St Joseph River
St Joseph River
St Joseph River
W Empire Ave
W Empire Ave
Sea Hawk Fishing Charters St. Joseph
Pier 1000 Marina
Riverview Dr
Woodward Ave
Parker Ave
Woodward Ave
W May St
W May St
Miami Rd
Bernice Ave
River Ridge Dr
Approximate Scale
Map
Google

December 2014

- 2 proposals for commercial net-pen aquaculture operations submitted to State of Michigan Quality of Life Group (QOL – all state agencies)

- At least one offered $2 million for research, monitoring, and an adaptive management framework



Summer 2015

Environmentalists oppose Great Lakes net pens, support current aquaculture practices

Mark Johnson (989) 732-1111 mjohnson@gaylordheraldtimes.com | Posted: Monday, November 23, 2015 3:35 pm

MICHIGAN — Two proposals are on the table to allow a fish-raising practice that some say would benefit the economy, while others say it would put the Great Lakes at risk.

nderway, allowing citizens to express their opinions on the
ture proposals with state agencies including the Michigan Departments
elopment, Natural Resources, and Environmental Quality. A public
ast week to gather some of these comments.

say the net-pen pro
thern Lake Huron –
f aquaculture practi

e, just this particula
Mitt Watershed Co

Recirculating aquaculture systems, a practice Tho
Michigan, raise mass amounts of fish using tanks
from the fish, a practice she said is suited to vaca

"We're not against aquaculture, just this particular kind of aquaculture… We already know how to do aquaculture in Michigan"

"Recirculating aquaculture… is already being implemented in Michigan, raise mass amounts of fish… a practice.. well suited to vacant warehouses "

Fisheries and Oceans Canada

Fisheries and Oceans Canada 2015 Study

- Freshwater Cage Aquaculture: Ecosystems Impacts from Dissolved and Particulate Waste Phosphorus
- Operations are contributing about 5 % of the annual total phosphorus loads to the North Channel
- Phosphorus additions to the environment from net pen aquaculture operations under the current level of fish production can generally be characterized as “low.”

Fisheries and Oceans Canada

Fisheries and Oceans Canada 2015 Study

- Offshore phosphorus loading is of less concern and higher phosphorus loads may be considered advisable as a means to help mitigate concerns regarding low levels of forage fish and the poor condition of sport and commercial fish species.

September 2015

Introduced Legislation

SB 526 introduced (with committee hearings)

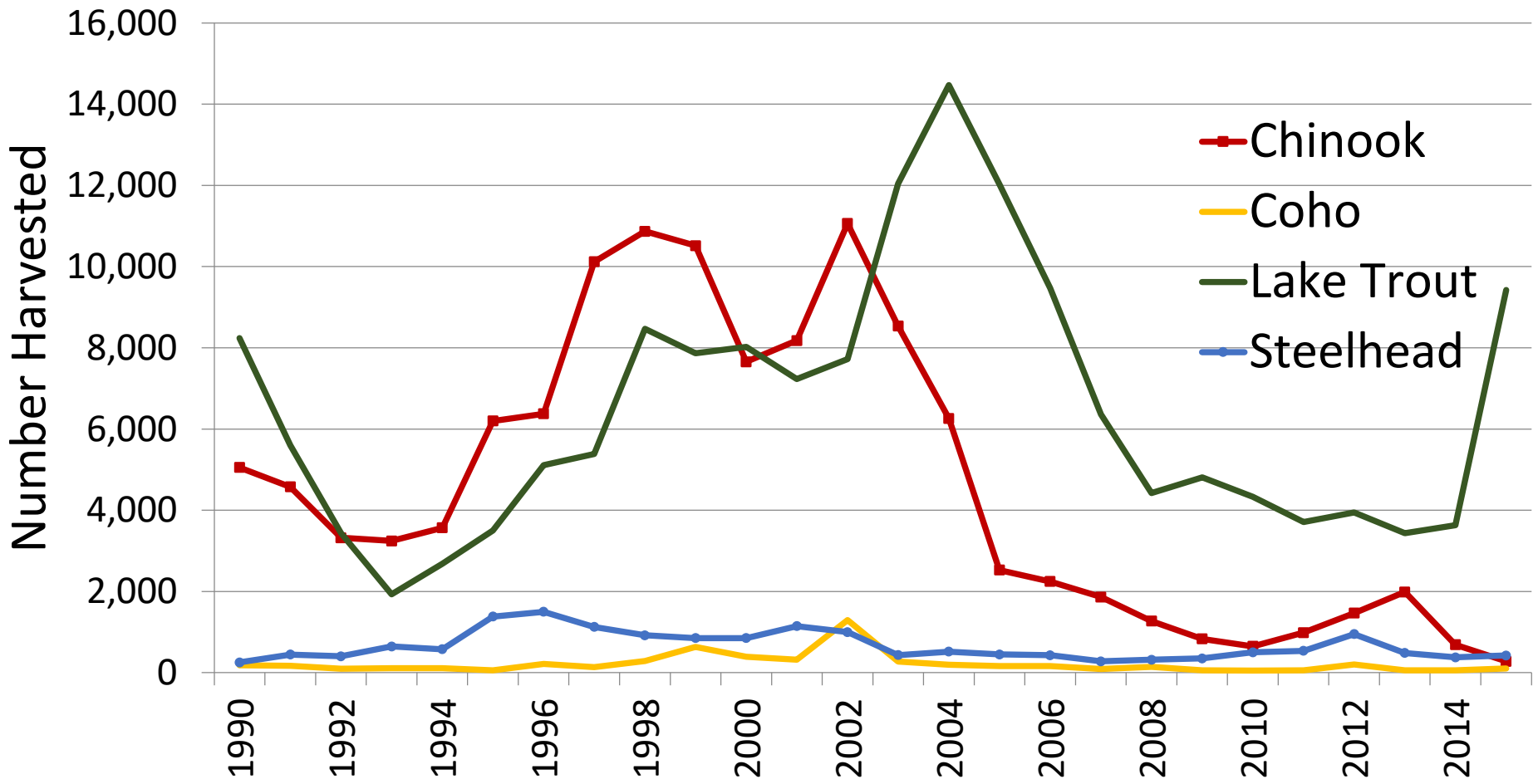
- Would have prohibited all aquaculture operations whose discharges are hydraulically connected to the Great Lakes

"Concentrated fish poo is just not Pure Michigan,"

"A typical 200,000 fish operation creates as much waste as a city of 65,000 people, which would make the Great Lakes a giant toilet bowl."

Fish Waste

	Humans	Fish	Human: Fish
Number	65,000	200,000	
Fecal (kg/yr)	3,036,800	144,000	21.1
Phosphorus (kg/yr)	11,863	2,400	4.9
E coli (Kg/yr)	24	0	na



Lake Huron charter boat harvests 1990-2015

- Phosphorus shunt cycle

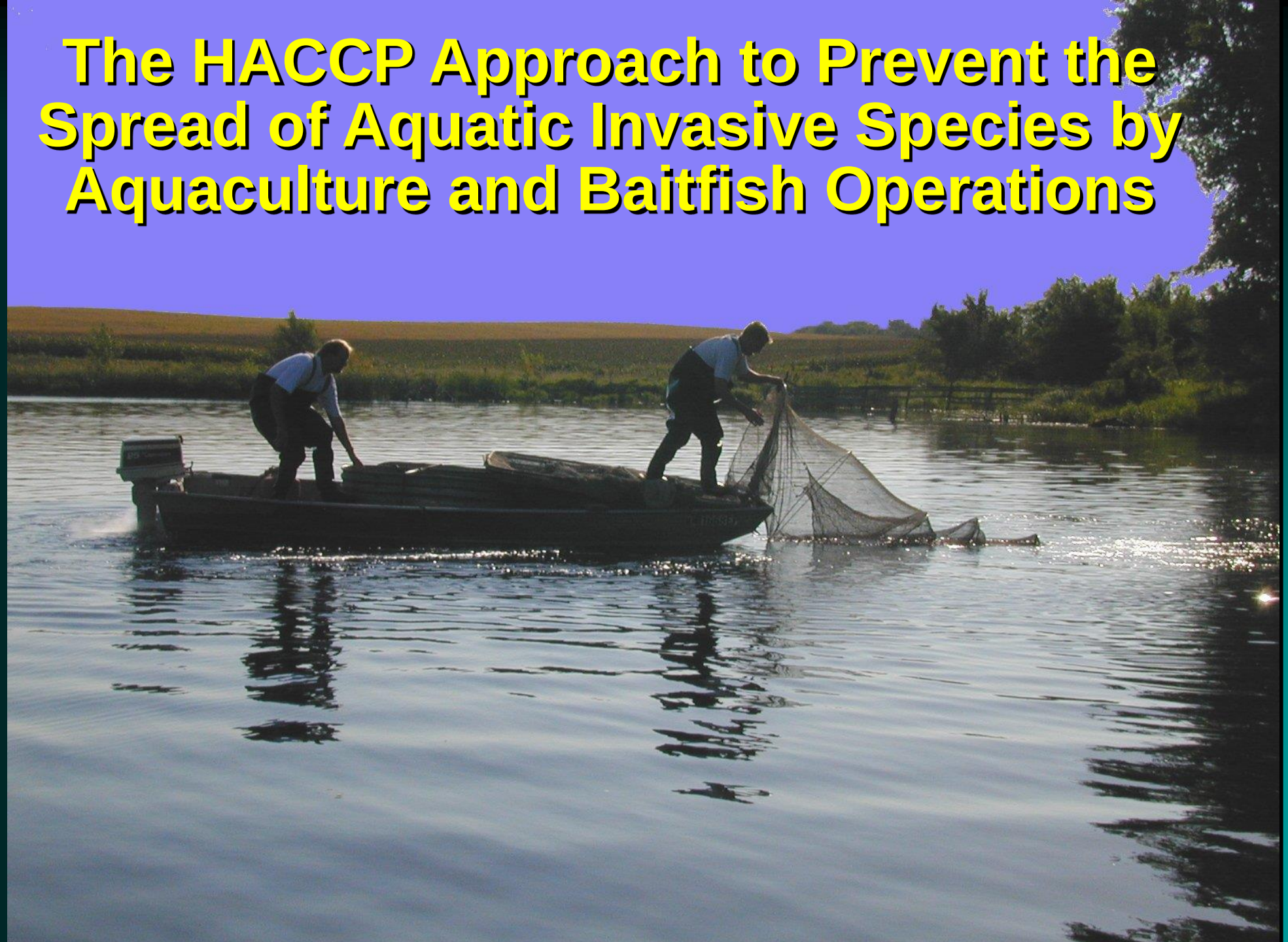
PERSPECTIVE / PERSPECTIVE

The nearshore phosphorus shunt: a consequence of ecosystem engineering by dreissenids in the Laurentian Great Lakes

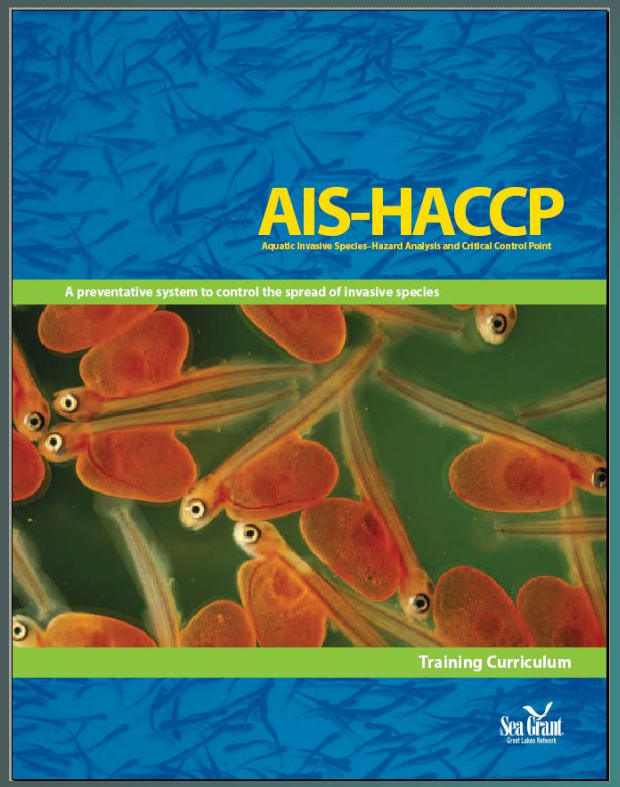
R.E. Hecky, R.E.H. Smith, D.R. Barton, S.J. Guildford, W.D. Taylor, M.N. Charlton, and T. Howell

Can. J. Fish. Aquat. Sci. **61**: 1285–1293 (2004)

The HACCP Approach to Prevent the Spread of Aquatic Invasive Species by Aquaculture and Baitfish Operations

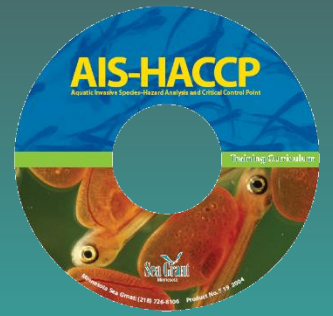


AIS-HACCP Training Materials

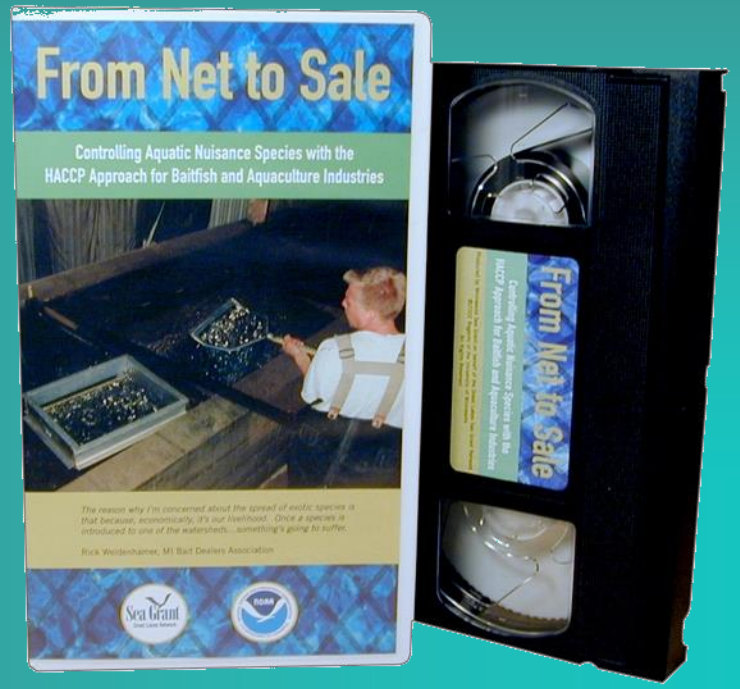


Curriculum

CD with resources



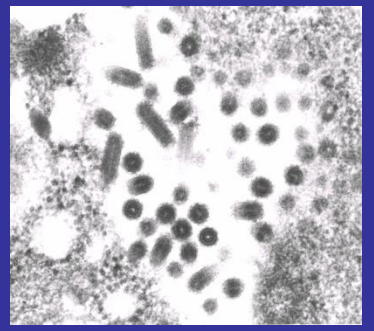
Supporting training video (22 min)



Sea Grant
Great Lakes Network

VHSV

- Viral Hemorrhagic Septicemia – Rhabdovirus
- Four known isolates
  - 3 European
  - 1 North American



- Causes large scale hemorrhaging in internal organs and osmotic regulation failure
- Large scale mortalities seen
  - In rainbow trout and turbot in Europe
  - In Pacific herring in Puget Sound, WA
- Not a human pathogen

Biosecurity Plans

- No "one-size-fits-all" solution
  - Varies with type of operation, species, life stage reared
- Range
  - Simple and quickly implemented
    - Foot dips; disinfection; signs
  - Other economic investment or effort
    - Dedicated quarantine equipment or facilities
- Cost-Benefit

Ecological Changes Related to Aquatic Invasive Species

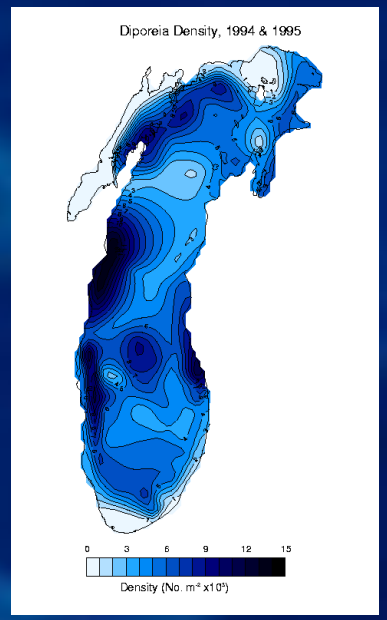
Affects on Commercial Fishing Gear

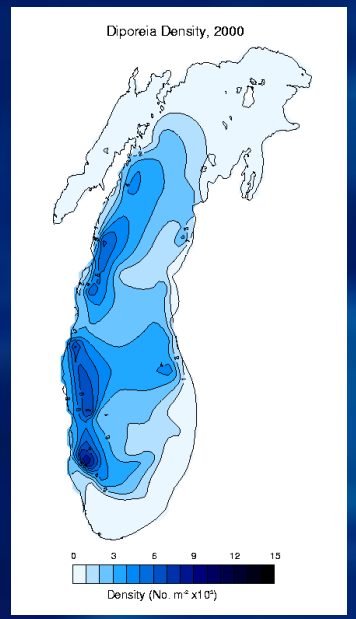
Affects on Commercial Fishing Gear

Lake Whitefish Recruitment Issues

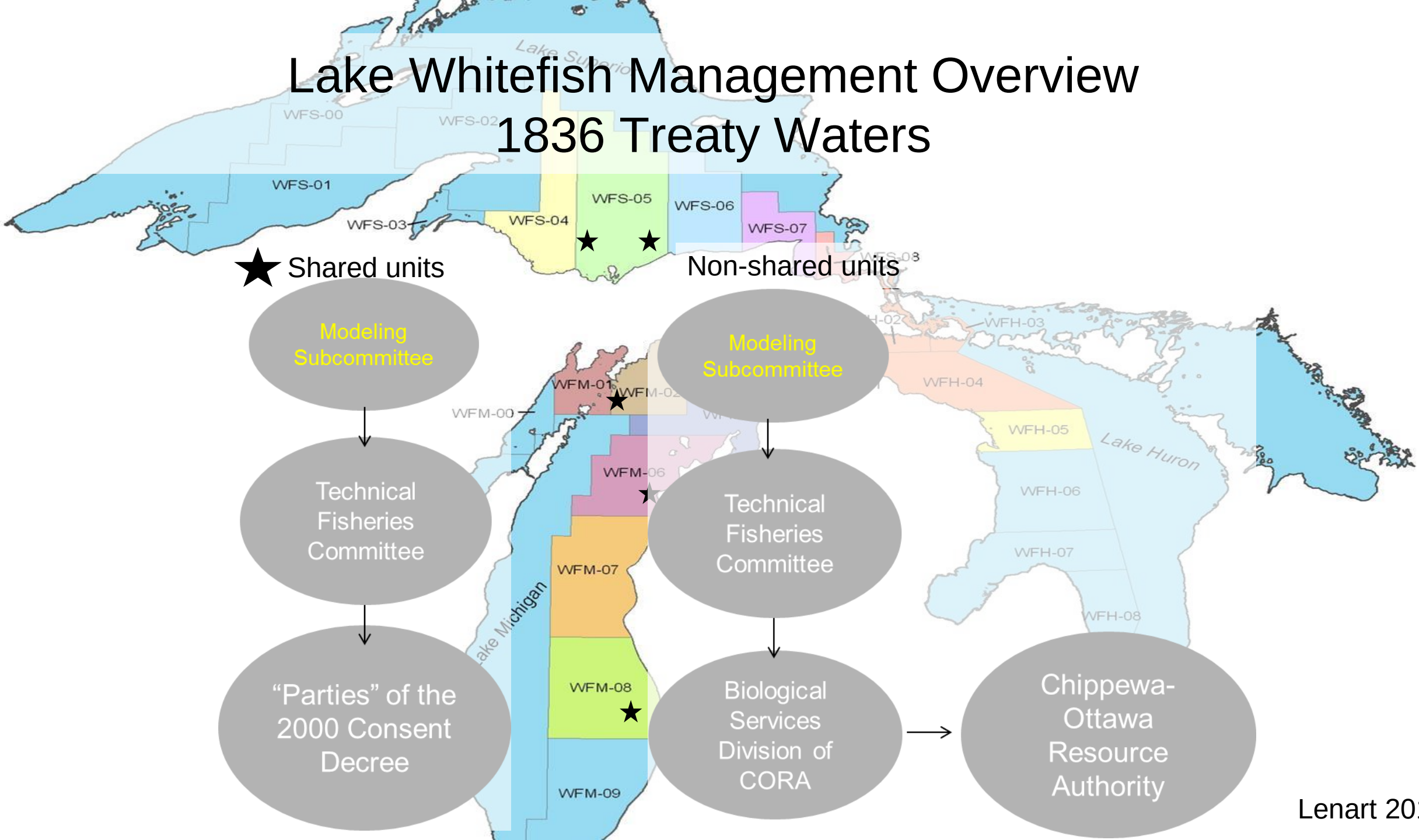
Great Lakes Whitefish

- Important fishery
- Reduced growth and condition
- Declines in *Diporeia*
  - Energy-rich prey source
  - High in HUFA levels
  - Transfer of essential FA
  - Switch to *Dreissena*
    - Low in essential FA
- Population health





Lake Whitefish Management Overview
1836 Treaty Waters



★ Shared units

Non-shared units

Modeling Subcommittee

Technical Fisheries Committee

"Parties" of the 2000 Consent Decree

Modeling Subcommittee

Technical Fisheries Committee

Biological Services Division of CORA

Chippewa-Ottawa Resource Authority

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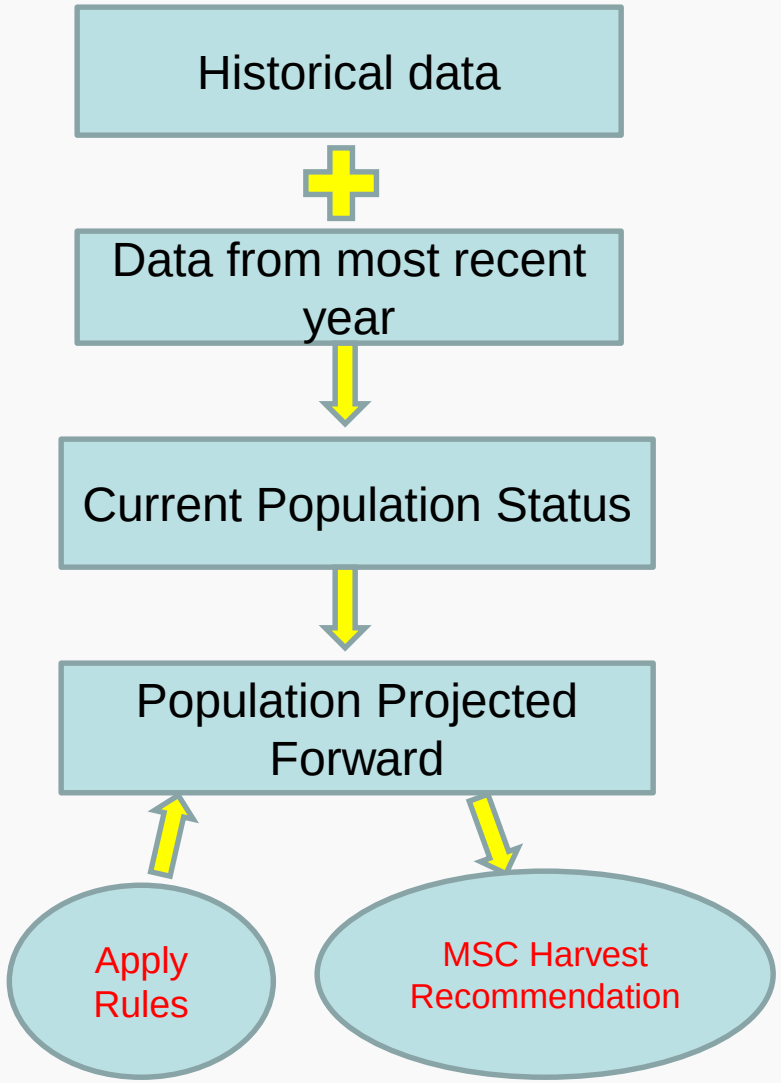
Population Models and the Management Process

- Fishery monitoring
  - Age and size composition
  - Effort and Yield
- Data Time Series
  - Begins in mid 1980s
  - LWF data thru year **2016** used to establish 2018 harvest limits



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Model Outputs

- Unit-specific estimates
  - Abundance
    - By age and year
  - Biomass*
    - Spawning and total by year
  - Mortality*
    - By age and year

**Management targets*

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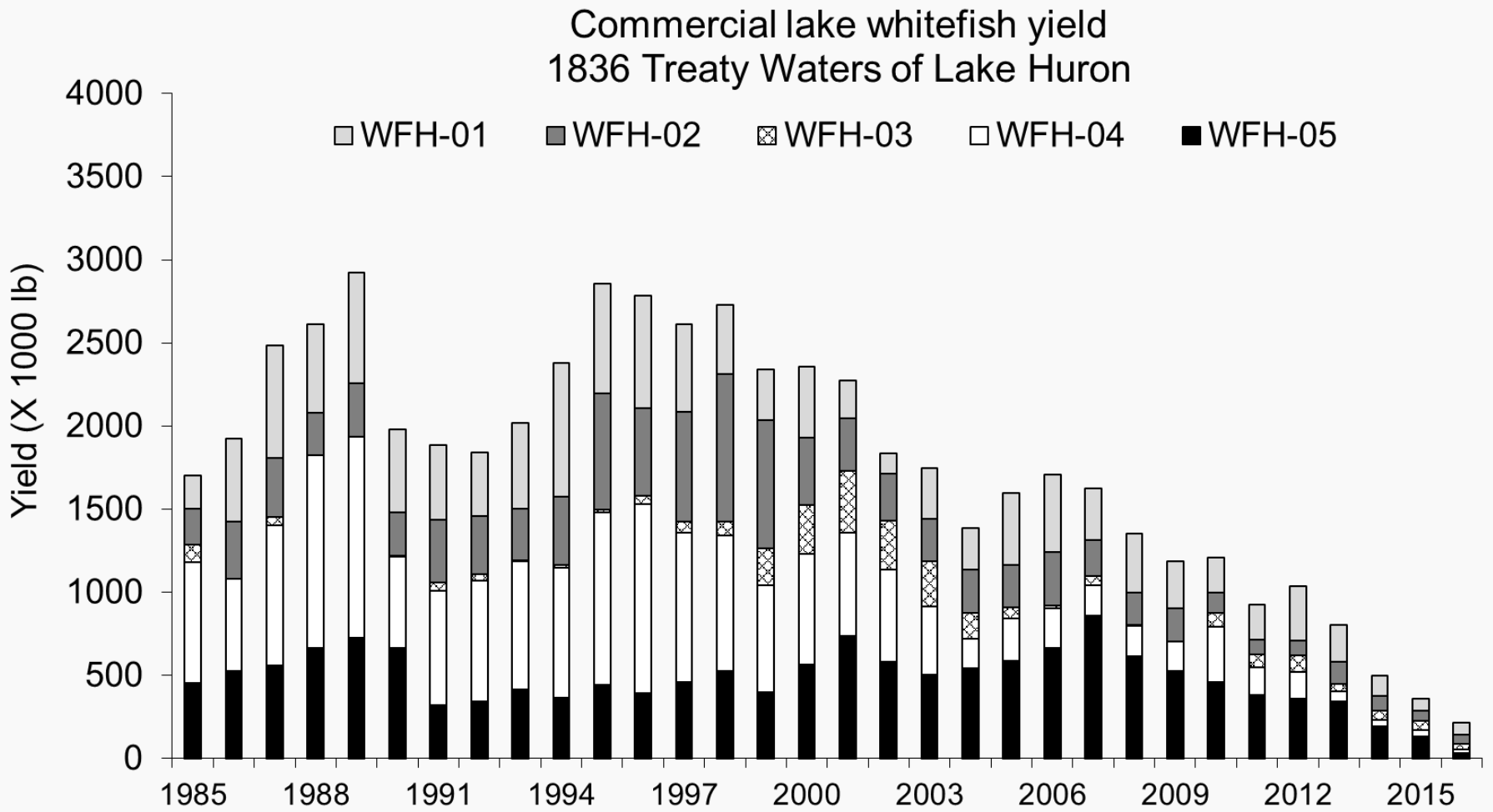
Commercial lake whitefish yield
1836 Treaty Waters of Lake Huron
WFH-01
WFH-02
WFH-03
WFH-04
WFH-05
Yield (X 1000 lb)
4000
3500
3000
2500
2000
1500
1000
500
0
1985
1988
1991
1994
1997
2000
2003
2006
2009
2012
2015

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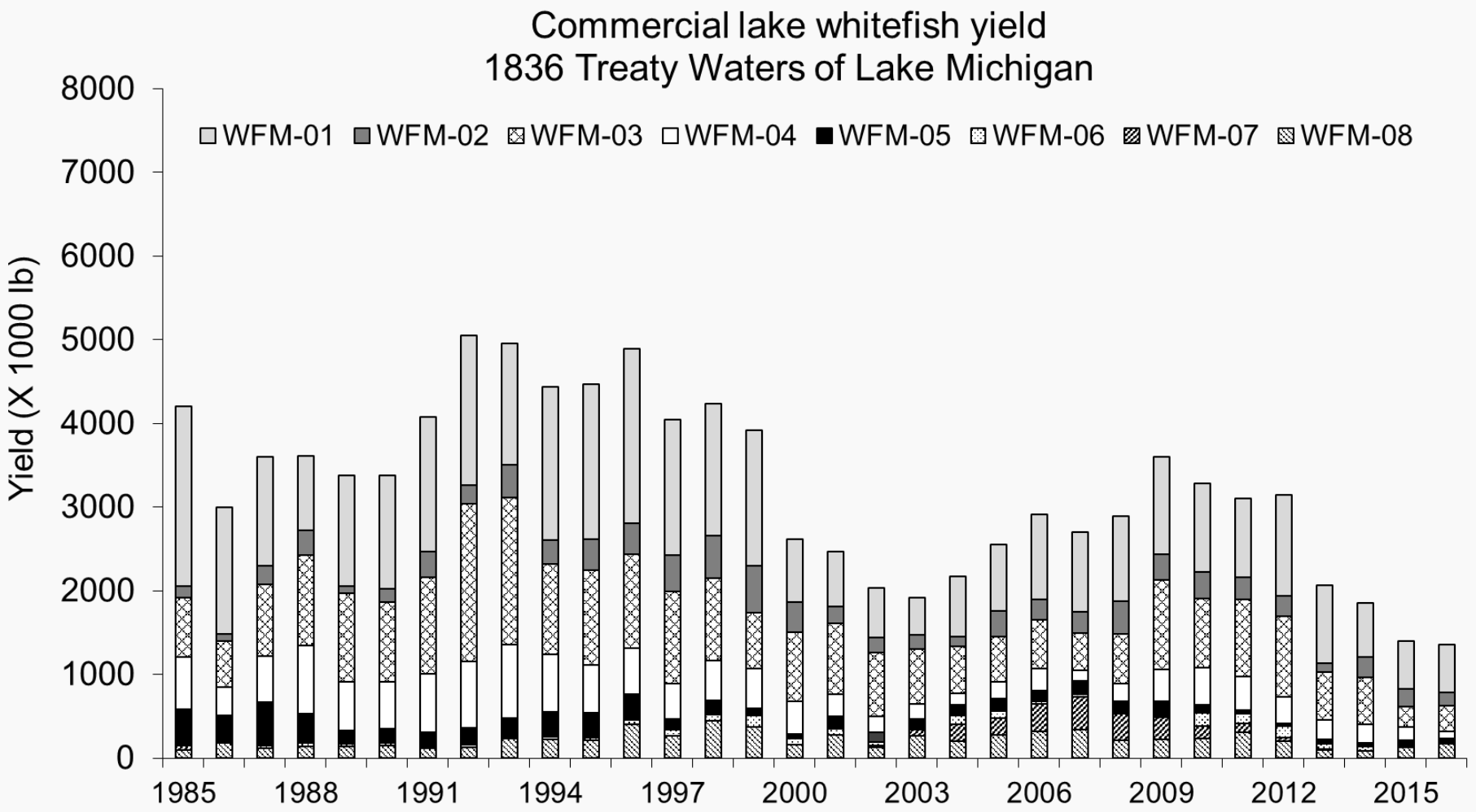
Commercial lake whitefish yield
1836 Treaty Waters of Lake Michigan
WFM-01
WFM-02
WFM-03
WFM-04
WFM-05
WFM-06
WFM-07
WFM-08
Yield (X 1000 lb)
8000
7000
6000
5000
4000
3000
2000
1000
0
1985
1988
1991
1994
1997
2000
2003
2006
2009
2012
2015

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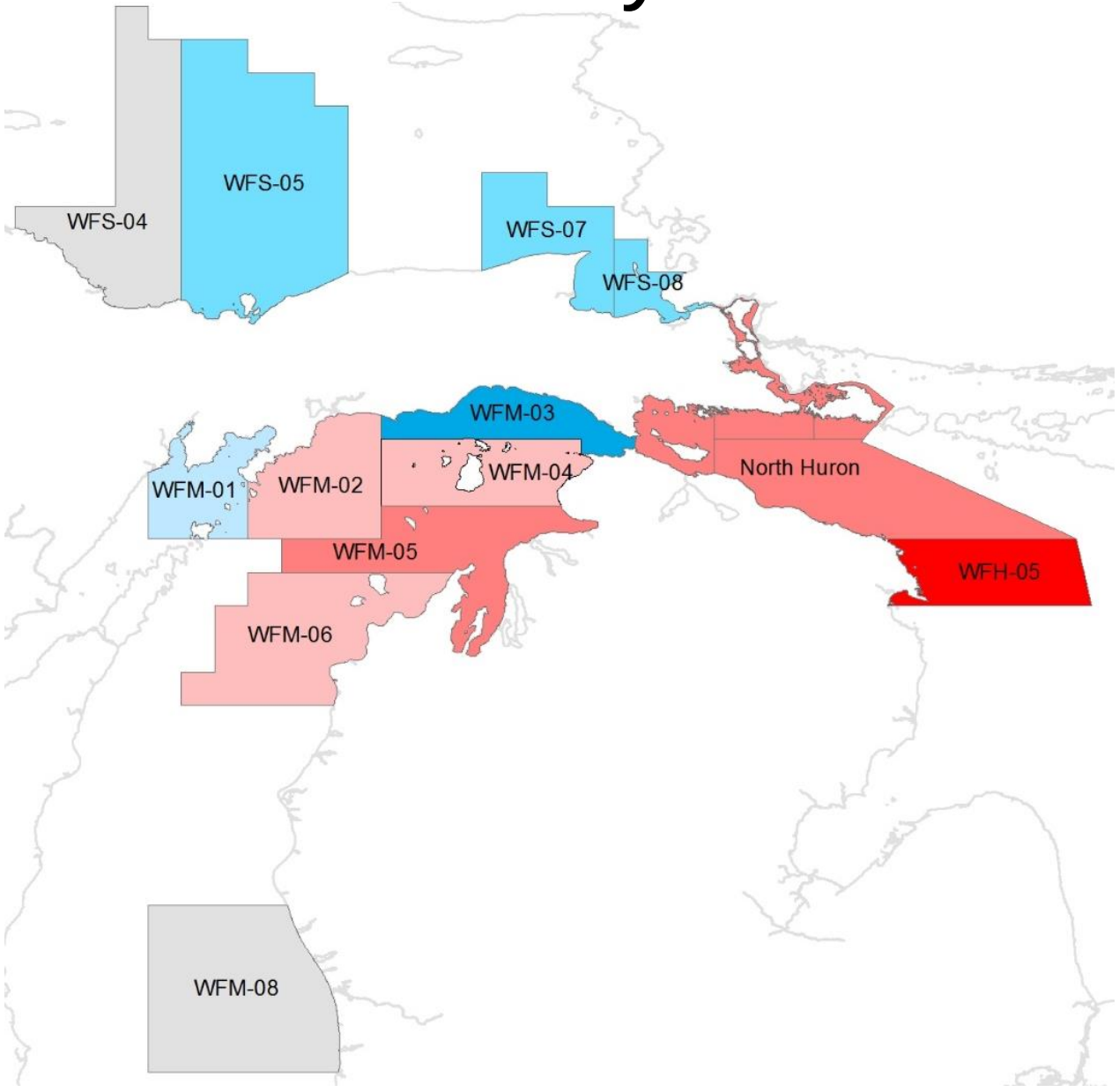
Status of Stocks Summary- Trends

- Not including the “mortality” trend, only 3 of the 33 individual scores for lakes MI and HU are positive



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Michigan Commercial Fishing Statute

Proposed Structure (Statute – Rules – Orders)

- Statute: Hard Regulatory Items
  - License Requirements
  - Rule and Order Authorities
  - Acceptable Fishing Gears
  - Data and Harvest Reporting
  - Commercial Species Lists
  - Fees, Fines, and Penalties

Proposed Structure (Statute – Rules – Orders)

- Rules: Items that require limited flexibility
  - Fishing Seasons
  - Depth Restrictions
  - Size Limits
  - Bycatch Allowances
  - Reporting Methods and Timelines

Proposed Structure (Statute – Rules – Orders)

- Orders: Items that require immediate flexibility
  - Emergency Actions
  - “Items of agreement”

Proposed DNR Authorities

- Clearly defined DNR authority to issue orders, rules and license conditions.

What's Next???

- 2020 Consent Decree

Questions?