Great Lakes Governance and the Risk of Grass Carp

Dr. John Dettmers
Fishery Management Program Director
Great Lakes Fishery Commission

for

Northeast-Midwest Institute Congressional Briefing
February 6, 2018
Not what we will be talking about today

• Prevent arrival into the Great Lakes
• Widespread effects on fishes possible
• ACRCC, MRWG, GLRI roles pivotal
• Successful prevention necessary!
- Grass carp imported to U.S. in 1963
- Used to control aquatic vegetation
- Sterile (triploid) fish available through USFWS inspection beginning in 1985
- Prevention for bighead carp, silver carp still important
- Grass carp first reported from Lake Erie in 1985
- Immediate focus on Lake Erie
- Existing fishery management structures in place
Key Findings

- Sterile (triploid) Grass Carp are not expected to be a major problem.
- Substantial reductions in peak submerged aquatic vegetation (SAV) predicted (*if no additional management actions are taken*).
- Adults are herbivorous; direct competition with Great Lakes fishes unlikely;
- Consumption of SAV could affect the biotic community:
  - **FISH:**
    - 66 of 136 GL fishes may experience high or moderate negative consequences (e.g., Largemouth Bass, Northern Pike, Bowfin, Walleye)
  - **BIRDS:**
    - 37 of 47 Canadian GL bird species may experience high or moderate negative consequences (e.g., Sora, Least Bittern, Mallard, Black Tern).
Overall Risk

- Lake Erie is at risk of developing an established Grass Carp population within 10 years.
- If establishment occurs and the Grass Carp population grows, ecological consequences will increase.
- Regulations and enforcement of regulations are two important factors that may affect the likelihood of arrival.
- Immediate actions to reduce the probability of establishment and delay or reduce subsequent ecological consequences in Lake Erie would be most effective.
- Socio-economic risk evaluation coming later in 2018?
CONVENTION ON GREAT LAKES FISHERIES (1954)

Great Lakes Fishery Convention Act
Great Lakes Fisheries Act

Great Lakes Fishery Commission

Canadian advisors
U.S. advisors
GLFC-appointed boards

Programs:
- Sea lamprey control
- Science

Secretariat

Commission Duty
Sea Lamprey Control
Science

Mutual Cooperation
Maintain "Working Arrangements" (Joint Strategic Plan)
- Council of Great Lakes Fishery Agencies
- Council of Lake Committees
- Lake Committees
- Law Enforcement Committee
- Fish Health Committee
Three Pillars of Great Lakes Fishery Management

- BINATIONAL
  (Great Lakes Fishery Commission)
- PROVINCIAL STATE U.S. TRIBAL
- FEDERAL
A Joint Strategic Plan for Management of Great Lakes Fisheries

- Plan signed in 1981; revised in 1997
  - Voluntary, non-binding
- Many jurisdictions on the lakes
  - Provincial, state, tribal, federal, binational
  - Need to work together
- Complex issues
  - Need to understand the resource
  - Need to translate science into management
  - Need to balance competing interests
- Participants work together
  - Under the Joint Strategic Plan
  - Through "lake committee" meetings
- Great Lakes Fishery Commission facilitates
- Highly successful agreement!
Grass Carp Governance

- **Role of the ACRCC**
  - Important for *prevention* activities for bighead carp, silver carp, and black carp
  - Important for Grass Carp *prevention* activities
    - Arrival through the CAWS and other GLMRIS pathways
    - Through interstate trade

- **Role of coordinated fishery management through the GLFC**
  - Grass Carp (or other invasive fishes) response activities in the Great Lakes, *after arrival has occurred*
  - Strong state, provincial, federal partnerships
  - States and Province hold primary decision making authority
    - Excellent federal support: research, eDNA development, and technical assistance
Grass Carp Action With the Joint Strategic Plan

Lake Erie Committee Activities:
- A prudent, adaptive approach based on the latest information available to reduce the population of Grass Carp
- Information gathering (MI, OH, ON, NY, PA, USGS, USFWS, DFO)
- Structured decision making (all affected agencies invited)
- Action (MI, OH, ON, PA, NY, USFWS, DFO, USGS)
- Coordination support from the GLFC

Council of Great Lakes Fishery Agencies Activities:
- Invasive Fishes Executive Committee to focus on any new invasive fish
- 5-year Grass Carp strategic framework under development
- Communication plan under development
How Can Congress Help?

- Amend the Lacey Act to prohibit interstate transport of listed species
- Provide base budget funding to federal agencies
  - Department of State (GLFC) for coordination support of joint activities in response to Grass Carp in Lake Erie and its tributaries.
  - USGS for research to support identified grass carp priorities
  - USFWS for development of a grass carp eDNA marker and other technical assistance
  - Grants to states to enable sufficient effort to be applied to the problem
Michigan Efforts and Response to Grass Carp

Dr. Seth Herbst
Aquatic Invasive Species Coordinator

Northeast-Midwest Institute
Congressional Briefing
February 6, 2018
Michigan has prohibited grass carp since 1969.
MDNR responds aggressively to findings of grass carp.

- Massive eradication event in 1980s
- 2010 Asian Carps Management Plan
- Detection of illegal Grass Carp in live fish hauling truck in 2012 – strong penalties
- 2012 Marrs Lake inland Grass Carp response
- First detection of fertile Grass Carp in Lake Erie in 2012
  - Lake Erie Committee created working group
Grass carp risk evaluated and response determined.

Addressing Risk:
- Active enforcement
- Increased captures reported
- Determined mostly fertile fish
- Eggs found in Sandusky River
- No eggs or larvae in MI rivers

Implementing Initial Response:
- 2014 Lake Erie Response Exercise
- Partnership and bounty program with commercial fishers
- Increasing effectiveness using science and partnerships
2014 Lake Erie Invasive Carp Response Exercise

Collaborating partners:

USGS
science for a changing world

Fisheries and Oceans Canada

Ontario

CMU
CENTRAL MICHIGAN UNIVERSITY

Funding Source
Great Lakes RESTORATION
Response is complex in Lake Erie and grass carp are difficult to capture.

- Conducted over 3 days in Sept. 2014
- $125,000 for MDNR
- Used multiple removal gears
- 2 grass carp collected and two others observed
- Lake Erie is 10,000 square miles
Partnership with commercial fishers greatly increases removals.

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<th>Trap net</th>
<th>Totals</th>
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Grass Carp Captures (Catch rate)

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Totals**

- 67 (0.18)
- 10 (<0.01)

61 Grass Carp removed from Michigan waters

**3 additional fish from other sources (angler & MDNR)
Using telemetry to inform response and risk

- Identify river use and timing in Lake Erie
- Determine areas of aggregation
- Determine the extent of movements in Lake Erie and potential for spread into Lakes St. Clair and Huron
Network of Receivers to Detect Tagged Carp
50 Grass Carp Captured, Tagged and Released
Telemetry results are guiding actions for response.

• Three high use tributaries
• Inter-basin and inter-lake movements are occurring  
  – Large movements in excess of 62 miles
• Locations and timing of movements used to guide response actions  
  – 2017 Sandusky River Response
Tagged fish detections are informing responses.
Structured Decision Making (SDM)

- Uses available information and stakeholders values
- Formal structure for making decision in a transparent and collaborative process

1. Establish goals and objectives using the best available information
2. Collaboratively carry out response actions
Iterative process to engage all parties through the process

Michigan State University hosted three workshops

1. December 2016 – set foundation
2. June 2017 – refine SDM components
3. September 2017 – consequences and tradeoffs
4. 2018 – taking action
SDM Recommendations

• **Response action takeaways**
  – Targeted removal in strategic locations likely effective
  – Barriers likely effective

• **More info needed to evaluate and increase response effectiveness**
  – Survival and reproduction estimates
  – Seasonal movements
  – Removal types, seasons, habitats
Lake Erie Grass Carp Adaptive Response Plan

- 5 year implementation
- Science based
  - primary focus is response
  - prevention and monitoring
- Incorporates SDM outcomes
- Maximizes likelihood of success through continued partnerships
- GLRI resources will be critical
Ohio Efforts & Response to Grass Carp

Northeast-Midwest Institute Congressional Briefing, February 6, 2018

Rich Carter, Executive Administrator
Fish Management & Research
Background

6.2 Million Acres

Lake Erie
Background

6.2 Million Acres

Ground Zero

Lake Erie
Background

6.2 Million Acres

Ground Zero

Maumee Bay & River

Sandusky Bay & River
History…

July 2012  Increased Awareness

Late 2012

October 2013
Ohio’s Plan for Action

Prevent Establishment

Statewide Ploidy Testing:
- ODNR Caught Wild Fish
- Domestic Sterile Fish

Bait Fish Inspections

Enforce Fertile Prohibition

Close Knowledge Gaps
Ohio’s Plan for Action

Closing Knowledge Gaps:
- Key to understanding opportunities to prevent establishment
- Adaptive approach
- Informed by ongoing science
Ohio Efforts & Response to Grass Carp

- Background
- Ohio’s 2017 Efforts
- Future Plans
Ohio’s 2017 Efforts

Informed by Ongoing Science...

- Reproduction in Sandusky River
  - 2012 (12 juveniles)
  - Fertilized eggs in 2015 (n=8) and 2017 (n=7,800)
  - Associated with high river discharge
Targeted Response - Summer 2017

- 5/31: 2 boats, 205 min., 1 sighting
- 6/8: 1 boat, 157 min., 0 sightings
- 6/13: 1 boat, 110 min., 0 sightings
- 6/22: 1 boat, 105 min., 0 sightings
- 6/28: Eggs collected
- 7/12: 1 boat, 76 min., 0 sightings
- 7/19: 2 boats, 227 min., 1 sighting
- 7/25: 1 boat, 70 min., 0 sightings
- 8/2: No Fish

Discharge, cubic feet per second

May 27 2017 to Aug 19 2017
Planned Action, August 28-31

- Lower Sandusky River

- Compare methods
  - Block GN/E-fishing
  - Enclosure GN/E-fishing
  - Enclosure TN/E-fishing
  - Mini Fyke nets for juveniles

- Plan informed through telemetry
Effort

- Block GN: 13.8 hrs. soak; 9.0 pedal
- Enclosure GN: 5.8 soak; 9.4 pedal
- Enclosure Trammel: 13.9 soak; 7.2 pedal
- Mini Fyke Nets: 96 hrs. overnight

- 45 Individuals
- ~ $ 40 - 50 K
Catch

- Block GN: 1 Grass Carp
- Enclosure GN: 0 Grass Carp
- Enclosure Trammel: 7 Grass Carp ★
- Mini Fyke Nets: 0 Grass Carp

http://www.eurocbc.org
http://www.memphisnet.net
www.dhgate.com
What did we learn?

• Trammel Nets Work Best
• Habitat
  – Shorelines with trees
  – Gradual slope to drop-off
  – Woody debris
  – Not in Submerged Aquatic Vegetation
Ohio Efforts & Response to Grass Carp

- Background
- Ohio’s 2017 Efforts
- Future Plans
Ohio’s Future Plans...

Planned Response – Summer 2018
- Continue Weekly & Flow Targeted Actions
- June 11-15 - “Robust All Hands Action”

Fund 2 Year Project w/U of Toledo – Estimate Numbers

5-Year Response Strategy
Ohio’s Future Plans...

5-Year Response Strategy
- Collaborate & Integrate w/Partners Critical
- Utilizing Recommendations from SDM Process
- Use Science-Based Approach
- Inform & Develop Most Effective Removal Strategies

Funding is Necessary

Implement Strategy
Ohio Efforts & Response to Grass Carp

Background

Ohio’s 2017 Efforts

Future Plans
Research to inform Grass Carp Response in the Great Lakes

Congressional Briefing on Grass Carp
February 6 2018
• Determine where and when Grass Carp spawn
  • Use models to identify spawning locations
  • Identify cues that trigger spawning
  • Sample rivers for eggs and small fish
  • Understand spawning population size and behavior
• Map and monitor aquatic plants
  • Identify Grass Carp habitats to inform responses
  • Inventory aquatic plants and develop monitoring program
  • Determine the level of impacts from Grass Carp
• Develop targeted controls
  • Attractants and toxins
  • Identify aggregations to target for removal
• Inform agency efforts to eradicate Grass Carp
Reproduction in Lake Erie Tributaries

- Eggs collected in Sandusky River
  - 2015: 8 eggs (6/18-7/14)
  - 2017: 7,649 eggs (5/30-7/12)
  - Juvenile fish recruited from 2011, 2013, 2015

- First eggs from Maumee River (2017)
  - 5 eggs, late developmental stage

- Chemical analysis of ear bones from adult Grass Carp implies that spawning is occurring in more than the Sandusky River
Reproduction in Lake Erie Tributaries

- Most grass carp collected have been **fertile**
- Spawning has coincided with high flow
  - High flow events have been increasing since circa 1977

Fertility testing began circa 2012
Modeling egg transport

- Supports agencies needs to identify potential hatching and spawning locations
  - Informs risk and potential response locations
- Sandusky River (Fremont OH) ~21 km from Sandusky Bay
  - New USGS gage in lower Sandusky R. informs model refinement
- Maumee: **Cannot predict** – no suitable hydraulic model
Genetic information from eggs and adult tissues will:
- provide estimates of the effective spawning population size
- determine whether the Maumee River and Sandusky River are distinct spawning populations?
  - Separate populations = greater threat

Female Grass Carp taken from Lake Erie to date (collected 2014, near Cedar Point)
(~59.2 lbs, ~10 lbs eggs [>1 million eggs])

Grass Carp Eggs (arrows) from Sandusky River, May 2017
Vegetation mapping and monitoring

- Satellite imagery, hydroacoustics, and on-the-water sampling to map and assess vegetation

- Most Grass Carp were captured from locations where their preferred plants were in low abundance.

- Grass Carp could impact plants that provide fish and duck habitat
Grass Carp toxin

- Formulated bait for selective delivery
  - Can be used with new or current lethal control agents
  - Developing methods to apply bait
- Identified candidate lethal control chemical selective for GC
  - Assessing registration requirements
Next Steps –

• Focus on spawning
  • Identify rivers that need hydraulic models – very few available
  • Use FluEgg model to identify rivers where eggs may hatch
  • Expand monitoring efforts to other rivers to detect spawning
  • Removal of Ballville Dam (Sandusky River) may change spawning success – need to expand hydraulic model above Ballville Dam
  • Use National Water Model (near, medium and long-term forecasts) to predict high flow events and spawning
  • Complete genetic analyses to estimate relative spawning population and number of spawning populations

• Monitor aquatic vegetation to assess impacts to fish and duck habitat and water quality

• Test control tools in research ponds then field settings

• Support state agency response efforts