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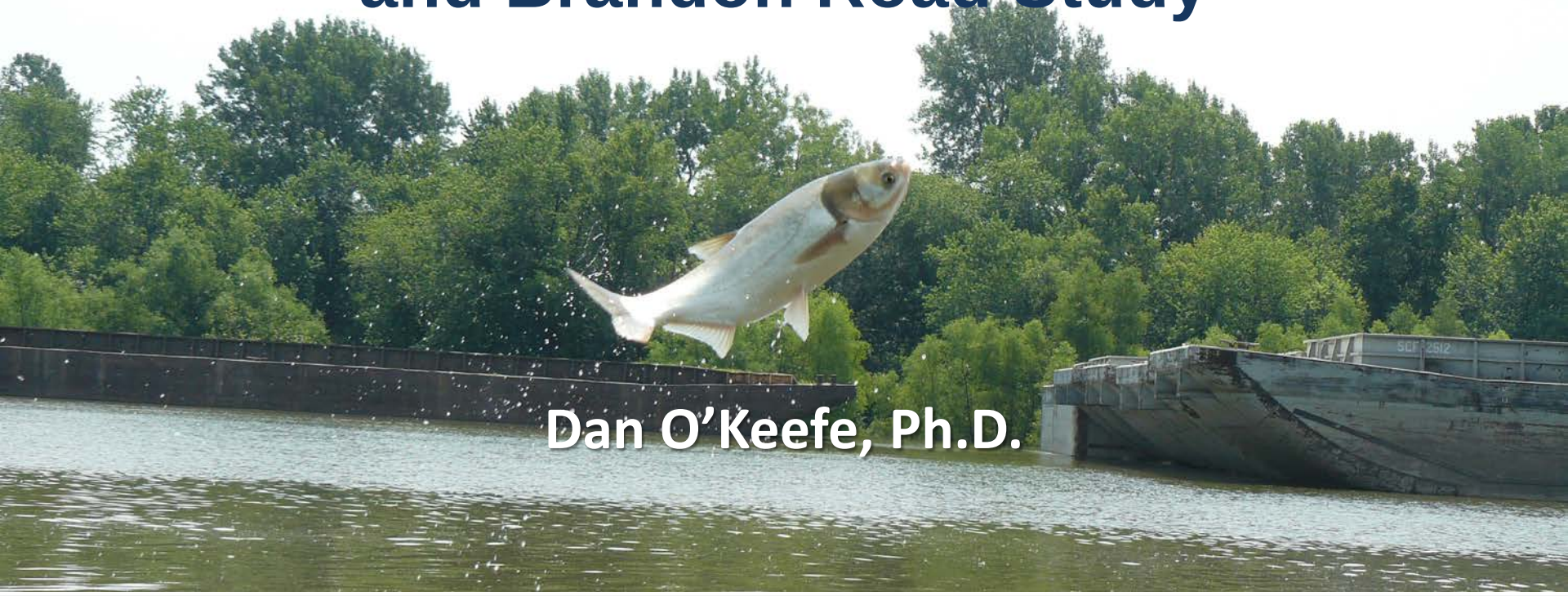
Asian Carp Prevention
and Brandon Road Study



Dan O'Keefe, Ph.D.

Sea Grant Michigan

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

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Siamese Giant Carp

Yellowcheek Carp

Jullien's Golden Carp

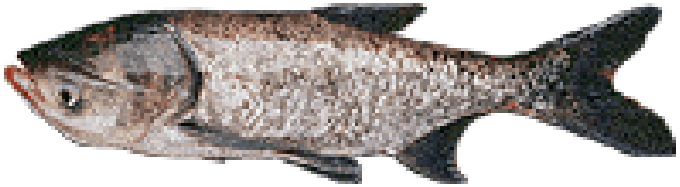
Predatory Carp

Common Carp

- **Introduced in 1880s**
- **Established in Great Lakes**
- **Botom feeder**
- **Can stimulate plankton growth and muddy water**

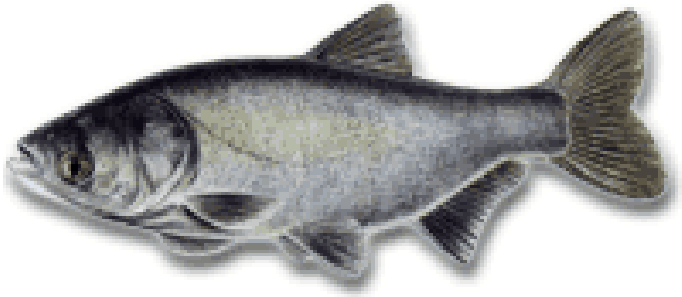
Common Carp x Goldfish hybrid

Four Asian Carp Species Prohibited in Michigan



Bighead Carp
Hypophthalmichthys nobilis

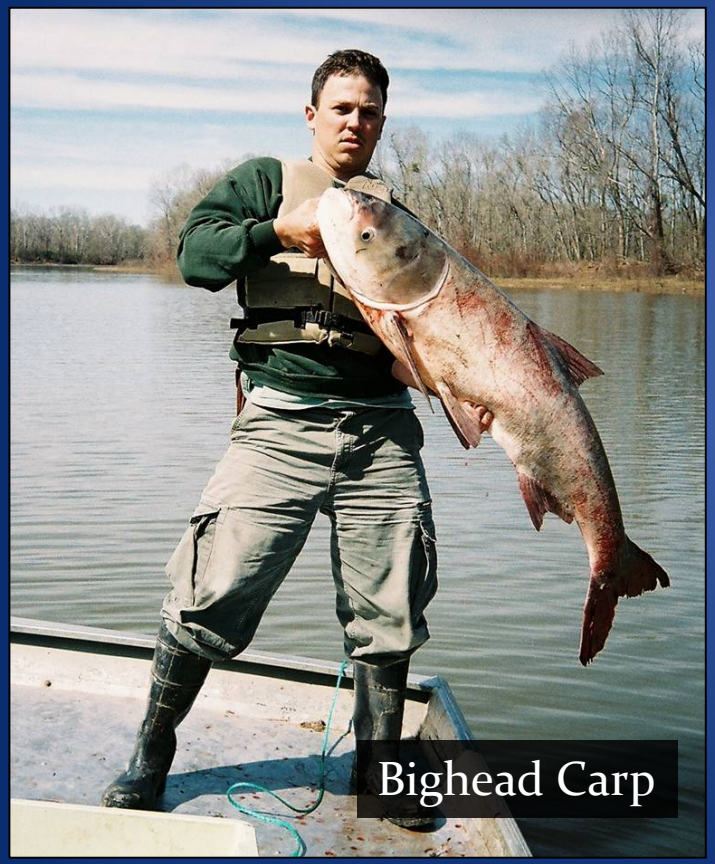
Black Carp
Mylopharyngodon piceus



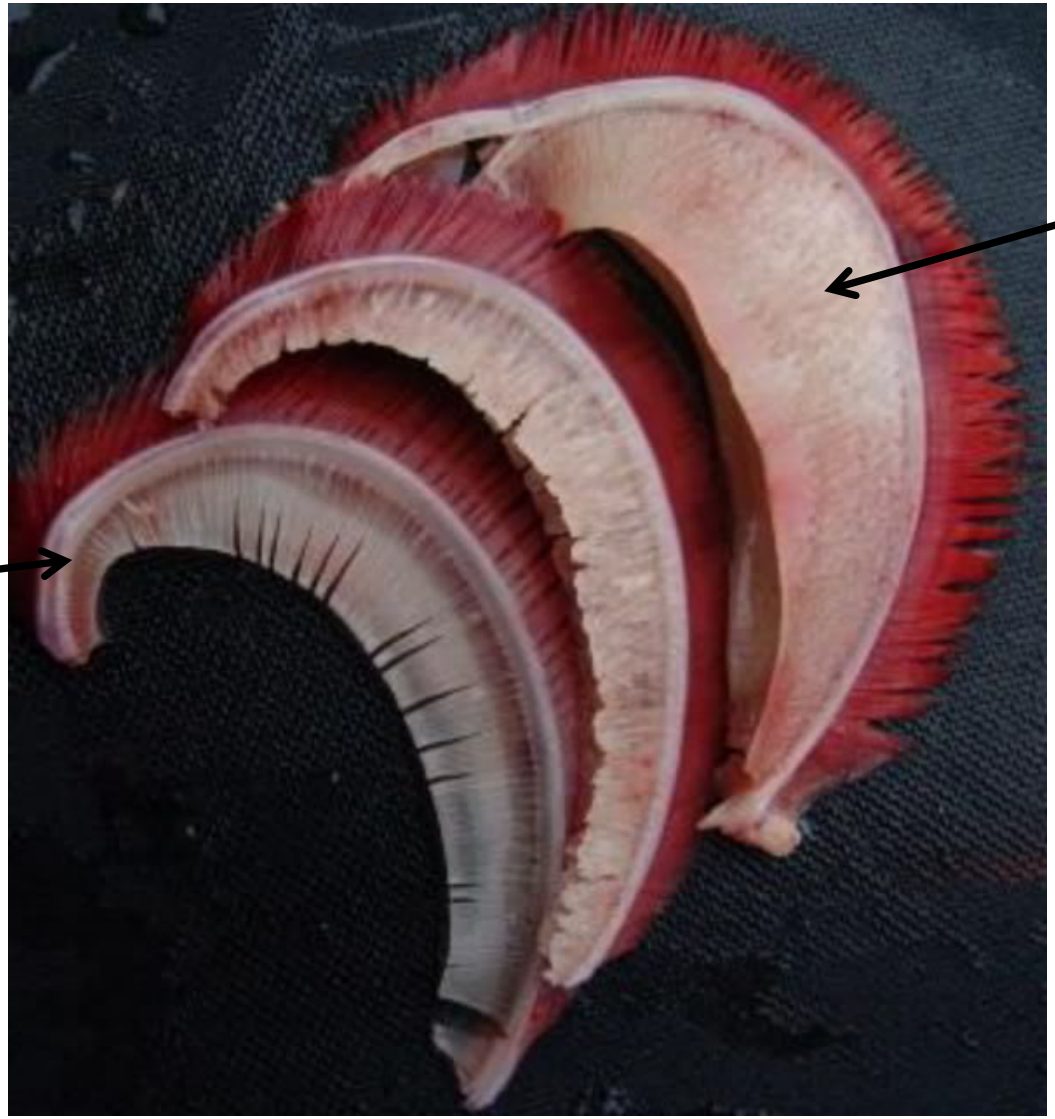
SilverCarp
Hypophthalmichthys molitrix

Grass Carp
Ctenopharyngodon idella

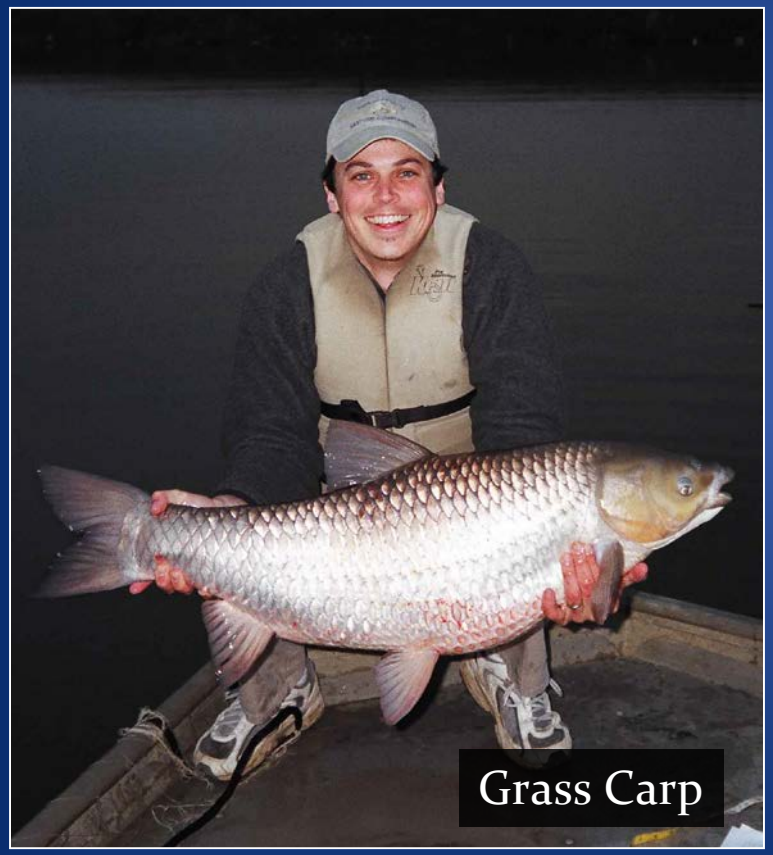
Two Filter-Feeding Asian Carps in Illinois



Gill Rakers for Filter Feeding



Two Asian Carps That Don't Filter Feed



Pharyngeal Teeth are found
in throat behind gills

Pharyngeal Teeth in Back of Throat

Grass Carp

Shreds Aquatic Vegetation

Black Carp

Crushes Molluscs (Mussels, Snails, etc.)

USGS Images

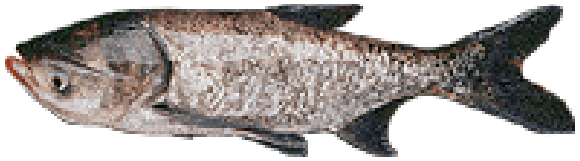
Grass Carp

- Consumes huge quantities of aquatic plants (100 lbs/day)
- Can severely impact fish and wildlife habitat
- Feeds on desirable plants and not nuisance plants
- Can lead to nuisance algae blooms (digests <50% of food)

Grass Carp in Lake Erie

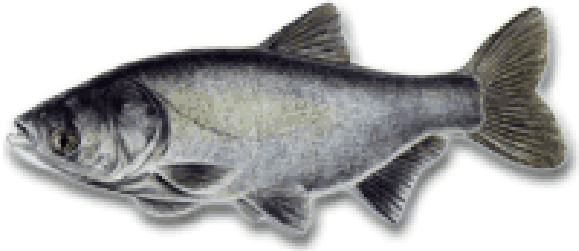
- Diploid vs. Triploid
- Known spawning locations
  - Sandusky River
  - Maumee River

Fisheries and Oceans Canada released this photo of an Asian grass carp captured in Lake Ontario in late August 2015 near St. Catharines. Eight total grass carp were caught in Canadian Great Lakes waters this summer. *(Fisheries and Oceans Canada)*



Bighead Carp
Hypophthalmichthys nobilis

- Filter feeds on zooplankton



SilverCarp
Hypophthalmichthys molitrix

- Filter feeds on plankton
- Jumps when startled

Black Carp
Mylopharyngodon piceus

- Feeds on mussels and snails
- Not an imminent threat

Grass Carp
Ctenopharyngodon idella

- Feeds on rooted vegetation
- Destroys habitat

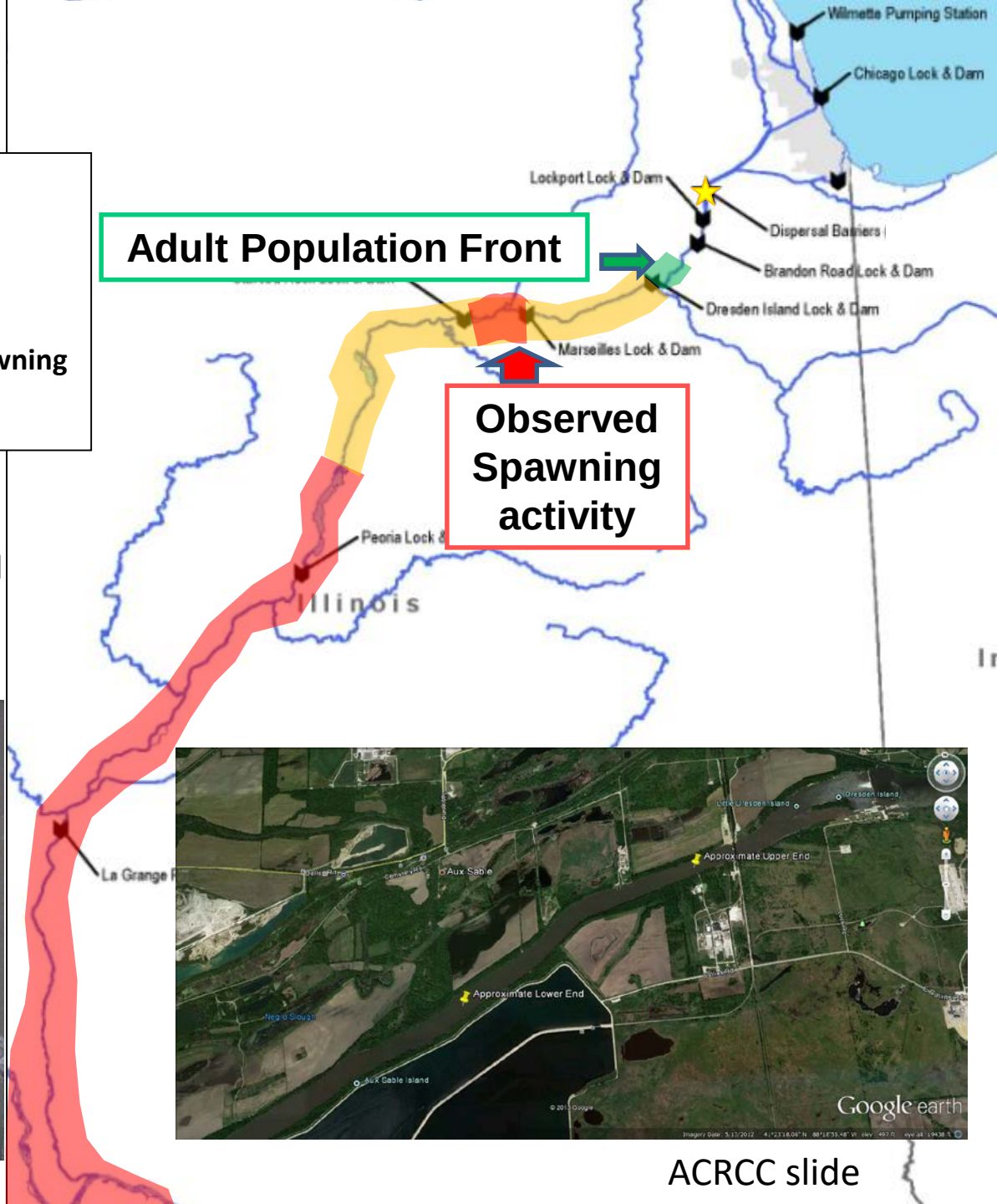
Silver Carp

Distances from Lake Michigan

37 miles	Dispersal barriers ★
55 miles	Adult Population Front
62 miles	Presence of Adults/Potential Spawning
62 miles	Verified Spawning

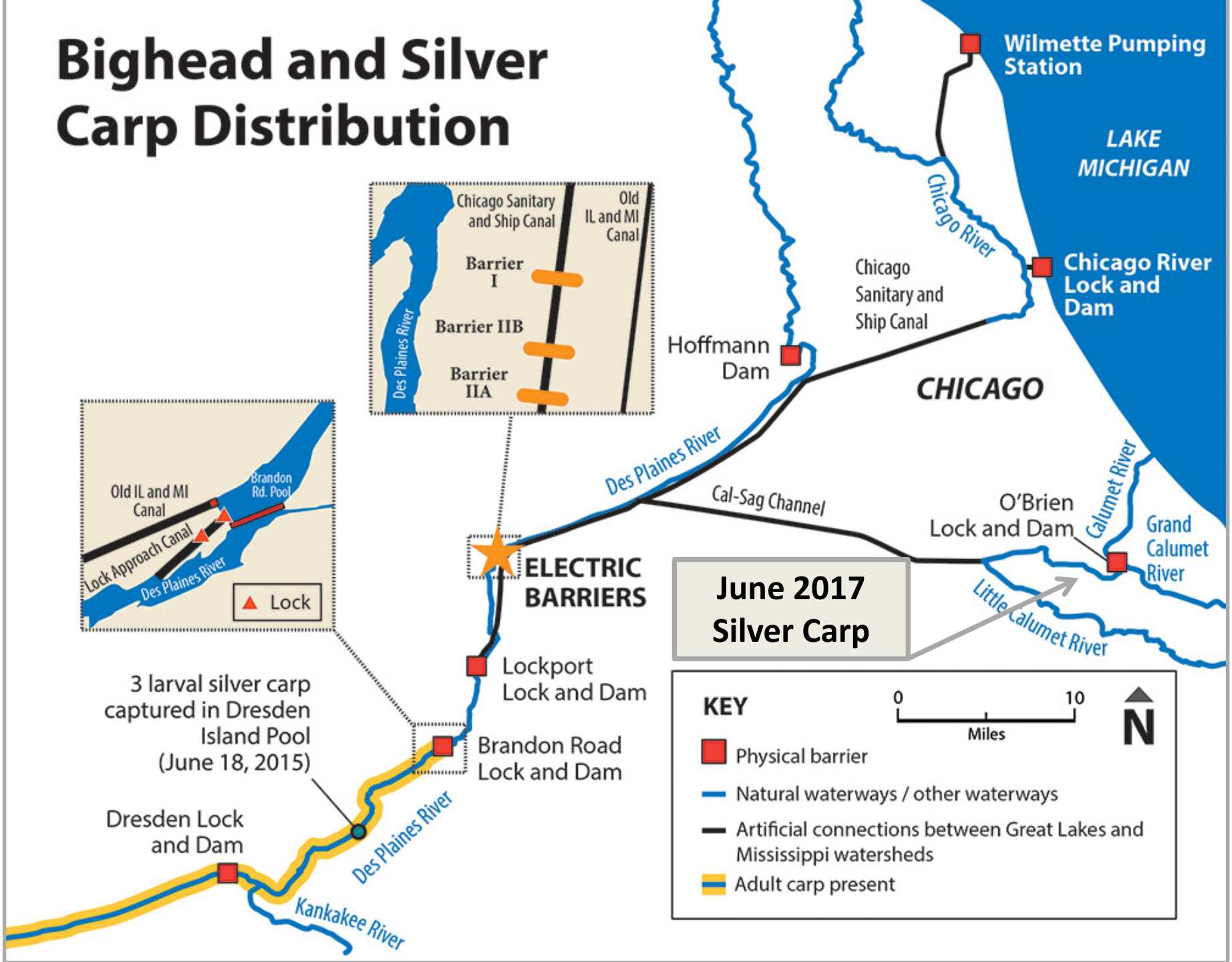
Areas of Concern

1) Verified Spawning Marseilles Pool
2) Verified Identification of AC eggs and larvae near Henry Illinois



ACRCC slide

Bighead and Silver Carp Distribution



Shortcomings of Electric Barriers

- Even at increased voltage small fish (2-4”) swim through freely (USACE 2013)
- Metal barges disrupt electric field and large fish may pass in wake (USACE 2013)

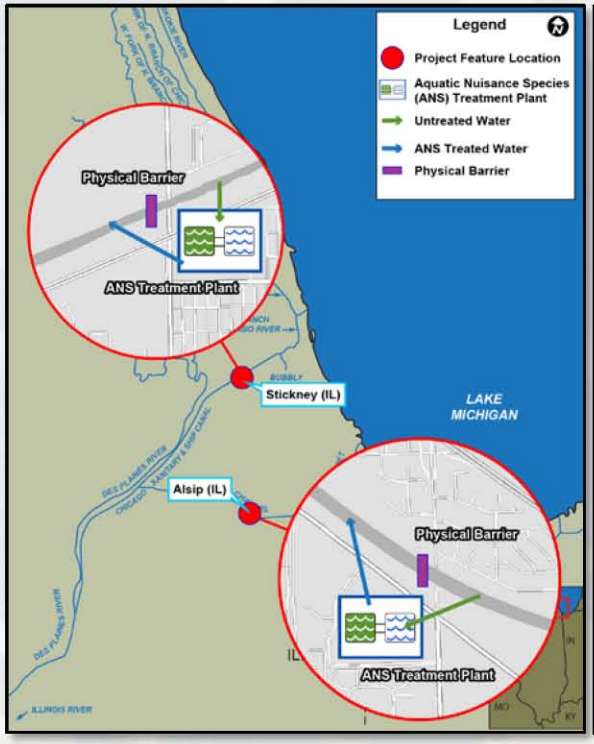
USACE image

DIDSON image of fish near the electric barrier in Chicago (USACE image).

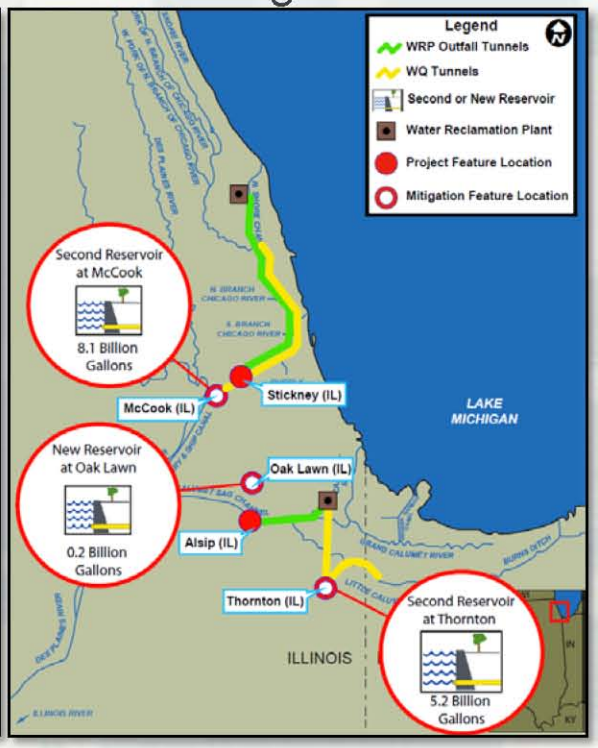
6 Mid-System Hydrologic Separation

- Overview
  - Two barrier locations
  - Risk reduction is not achieved until all barriers are complete
  - Mitigation measures control completion schedule of barriers
- Mitigation
  - Water quality *(Significant)*
    - CSO capture
    - Re-route water reclamation plant (WRP) effluent
    - Sediment remediation

Overview



Mitigation



Estimated Time to Completion: **25 yr**

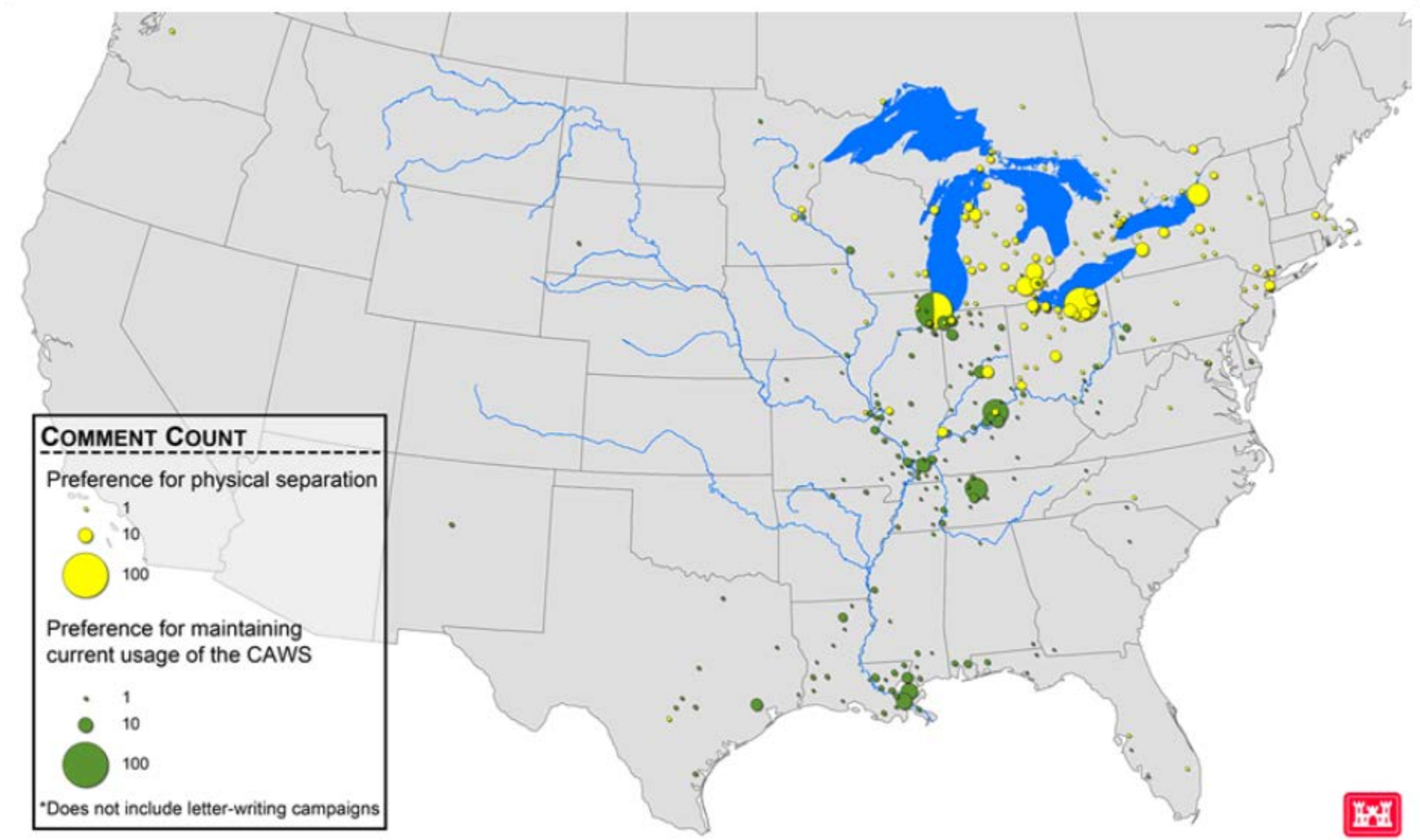
Estimated Cost: **$15.5B**

ESTIMATED COSTS

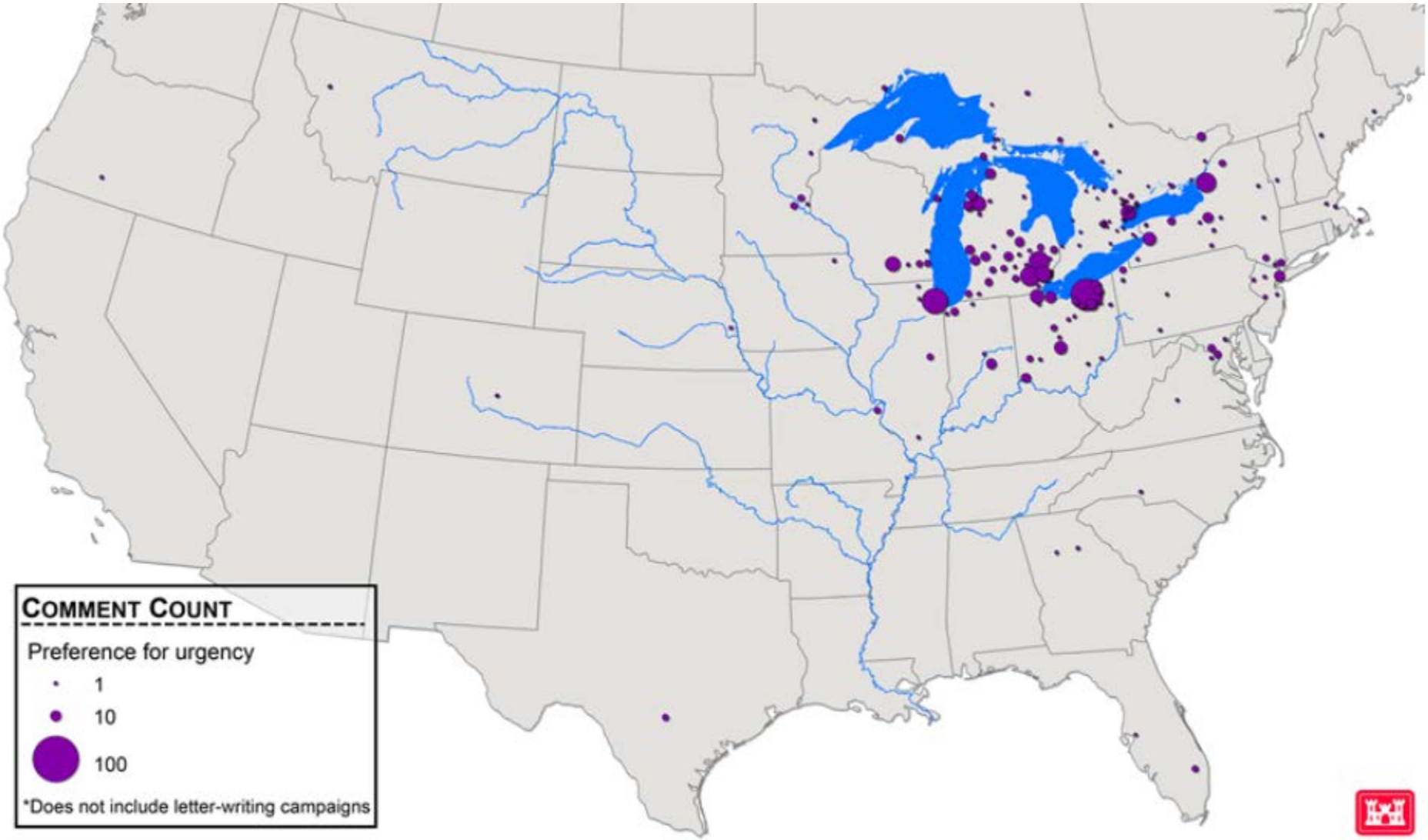
Element	Costs (2014 dollars)
ANS Control Measures	$223,000,000
CAWS Ecosystem Mitigation Measures	$42,000,000
Water Quality Mitigation Measures	$12,886,000,000
Flood Risk Management Mitigation Measures	$24,000,000
Design/Construction Management	$2,257,000,000
Lands, Easements, Rights of Way Relocations, and Disposal Areas	$80,000,000
Operation, Maintenance, Repair, Replacement, & Rehabilitation (annual)	$67,000,000
Nonstructural Controls (annual)	$68,000,000
Alternative Total (does not include annual costs)	**$15,512,000,000**

USACE Image

2014 GLMRIS Public Comments Regarding Physical Separation



2014 GLMRIS Public Comments Expressing the Need for Urgent Action



GLMRIS/Brandon Road Timeline

- May 2014 summary of GLMRIS comments released
  - "No consensus" between Great Lakes and navigation interests
  - No preferred alternative identified
- April 2015 study of Brandon Road options begins
- February 2017 Brandon Road study completed
- August 2017 Brandon Road study released
- Sept.-Dec. 2017 public meetings and comments

WHY BRANDON ROAD?

- **Effective**
  - ~ 34 foot high dam
  - Upstream movement through lock
  - Avoids flood bypass via Upper Des Plaines
- **Relevant**
  - Identified in 3 of 6 structural alternatives (GLMRIS Report)
- **Responsive**
  - Stakeholder input
  - Upstream of leading edge of Asian Carp population
- **Valuable**
  - Enhance effectiveness of existing technologies
- **Minimizes Impacts**
  - Location seeks to minimize impacts to current waterway uses.

US Army Corps of Engineers.

U.S.ARMY

TENTATIVELY SELECTED PLAN (TSP)

Overview:

- ❑ Reduces risk of Mississippi River Basin ANS establishment in Great Lakes Basin
- ❑ Allows for continued navigation
- ❑ Nonstructural measures
- ❑ Mitigation required to address impacts to connectivity

Estimated Cost to Construct: **$275.4M**
Estimated Cost to Operate and Maintain: **$8.2M/yr**
Estimated Nonstructural Measures: **$11.3M/yr**
Estimated Time to Construct: **5 yr**

US Army Corps of Engineers.

U.S.ARMY

GLMRIS Brandon Road

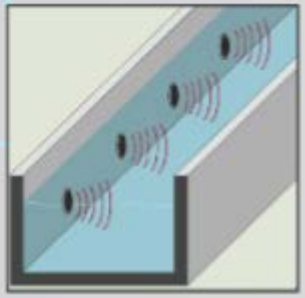
Summary of the Great Lakes Mississippi River Interbasin Study - Brandon Road

US Army Corps of Engineers ®

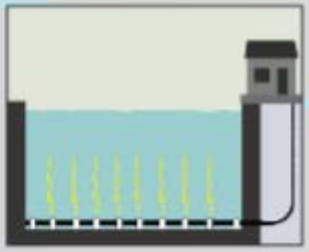
September 2017

STRUCTURAL CONTROLS

Structural controls require the design, construction and operation of a permanent feature in the vicinity of the lock and adjacent waterway and take longer to implement. The structural control measures in the Tentatively Selected Plan provide physical deterrents to swimming and floating ANS.

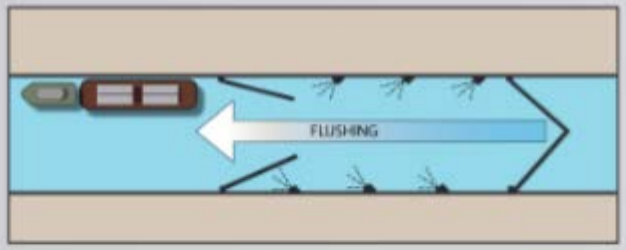


Complex noise is underwater sound generated to deter ANS fish species from entering the approach channel and lock; it is ineffective for floating and hitchhiking ANS.

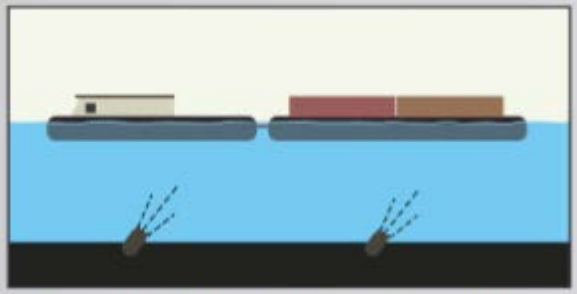


Electric dispersal barrier creates an electric field that repels fish.

Engineered channel is a concrete structure installed within the downstream approach channel to the Brandon Road Lock that will house structural ANS controls. The engineered channel increases the efficacy and reduces the negative impacts of some ANS controls, and provides a platform from which to evaluate future ANS controls and potentially incorporate them.



Flushing lock removes floating ANS from the downstream pool by flushing the lock with water from the upstream pool. It does not control the passage of swimming or hitchhiking ANS.



Water jets installed along the bottom of the engineered channel are designed to remove small and stunned fish that may become entrained in spaces between barges.

What about physical separation?

- Undeniably the most effective
- Also the least expensive to taxpayers

Table 6-43 Estimated Costs of the Lock Closure Alternative

Element	Estimated Cost
Construction[a]	$5,900,000
Nonstructural[b]	$9,200,000
OMRR&R[b]	$20,000

[a] Costs are provided as total cost, present value (project first costs).
[b] Costs are provided as average annual costs.

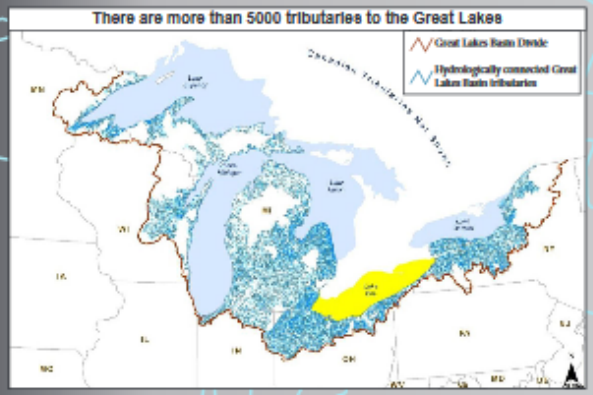
Table 8-5 Summary of Alternative Costs and Outputs Used in CE/ICA

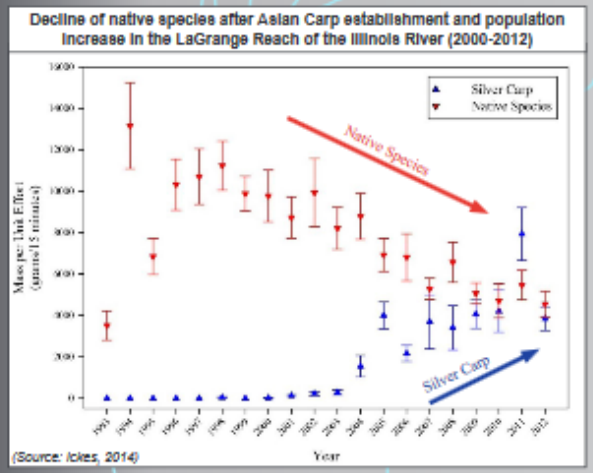
Alternative	Acronym	Average Annual Cost[a]	Output (Probability of No Establishment)					
			Bighead and Silver Carp			*A. lacustre*		
			Min.	Med.	Max.	Min.	Med.	Max.
No New Federal Action	NNFA	**$0**	64	71	78	12	**39**	64
Nonstructural	NSA	**$11,500,000**	74	80	85	12	**39**	64
Technology Alternative – Electric Barrier	TAEB	**$60,600,000**	86	89	92	14	**42**	66
Technology Alternative – Complex Noise	TACN	**$43,000,000**	81	85	89	14	**42**	66
Technology Alternative – Complex Noise with Electric Barrier	TACNEB	**$56,200,000**	83	87	90	14	**42**	65
Lock Closure	LCA	**$328,200,000**	97	98	99	22	**58**	83

[a] Average annual cost includes construction, nonstructural measures, O&M, adaptive management, LERRDs, and impacts on navigation (NED costs).

GLMRIS-Brandon Road

Great Lakes Mississippi River Interbasin Study-Brandon Road





CONSEQUENCES OF ASIAN CARP ESTABLISHMENT IN THE GREAT LAKES BASIN

- Consequences assessed for currently known aquatic nuisance species that threaten Great Lakes Basin.
- Difficult to forecast consequences in new basins.
- Unable to forecast consequences of future species.
- Tentatively-Selected Plan would be adapted to address future aquatic nuisance species.

ENVIRONMENTAL

- Modeling studies and data from other invaded systems indicate Asian Carp have the potential to adversely affect aquatic communities in Great Lakes and its tributaries (see graph). Studies indicate Great Lakes Basin is suitable for Asian Carp establishment.
- Significant uncertainty about the Asian Carp population size the Great Lakes Basin can support. The magnitude of environmental impacts is uncertain.

ECONOMIC

- Available data was limited:
  1. Lake Erie fisheries could be evaluated.
  2. Considered changes in fish biomass.
  3. Impacts estimated for 3 fishing activities in Lake Erie.
  4. Impacts depend on Asian Carp abundance and diet.
- Impacts to recreational water uses, commerce and tourism, and property values could not be quantified, but could be affected by Asian Carp establishment.

SOCIOPOLITICAL

- If Asian Carp become established in the Great Lakes Basin:
  1. They could impact boater safety and the public's perception of Great Lakes and tributary quality.
  2. Could be extremely costly to manage.

US Army Corps of Engineers

What about cost to Great Lakes Region?

- Largely unaccounted for
  - Water quality
  - Fishing
  - Property values
  - Boating
  - Human health and safety…

River Recreation Impacts (Spacapan et al. 2012, 2016)

- River users hit by jumping silver carp
  - 56.9% in 2010
  - 94.3% in 2011
- River users injured by jumping silver carp
  - 20% in 2011

Table 8-5 Summary of Alternative Costs and Outputs Used in CE/ICA

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[a] Average annual cost includes construction, nonstructural measures, O&M, adaptive management, LERRDs, and impacts on navigation (NED costs).

$318.7 M per year impacts on navigation

GLMRIS
GREAT LAKES AND MISSISSIPPI RIVER INTERBASIN STUDY

US Army Corps of Engineers

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Brandon Road

- Brandon Road Study Area
- Public Meetings
- Submit Comments on the Draft GLMRIS-BR Report
- 2014 NEPA Scoping

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Public Meetings

Draft GLMRIS-BR Report

USACE is hosting public meetings to discuss the contents of the report and receive oral and written comments from the public. Those who plan to speak at a meeting are encouraged to use the "Register to Speak" buttons below. All four meetings will also be available to the public via phone and web conference and Facebook Live. From the start of each meeting until the scheduled time for opening remarks, GLMRIS-BR Team Members will be available in person for open house format one-on-one discussions about the Study. Online participants should plan to join the conference call, webinar and Facebook Live events shortly before opening remarks. Meeting locations and times are listed below.

New Orleans, LA

Tuesday, December 5, 2017
1:00 PM – 4:00 PM CST
USACE New Orleans District
District Assembly Room
7400 Leake Avenue
New Orleans, LA 70118

Agenda
1:00 PM CST: Welcoming/Opening Remarks
1:10 PM CST: GLMRIS-Brandon Road Study Presentation
1:40 PM CST: Oral Comment Period Begins
Oral comments are limited to 3 minutes per person
4:00 PM CST: Meeting Adjourned

Google Map | Register to Speak

Public Meeting Materials

GLMRIS Brandon Road Study Public Meeting Presentation Slides
September 2017 3.4 MB

Overview of Navigation Economics Analysis 200 KB

Banners

Brandon Road 601 KB


Questions?