

# Addressing the Threat of Asian Carp in the Great Lakes/Midwest Region



Mike Weimer

U.S. Fish and Wildlife Service

Co-chair, Asian Carp Regional Coordinating Committee

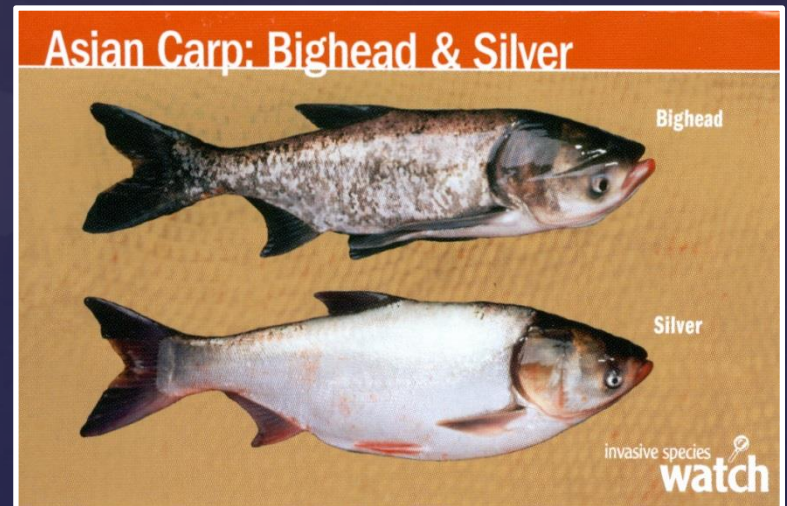
# Asian Carp Regional Coordinating Committee

Established by the White House  
Council of Environmental Quality in  
2009

Address the growing threat of Asian  
carp from the Mississippi River basin

Mission:

*To prevent the introduction and  
establishment of Asian carp in the  
Great Lakes*



# Asian Carp Regional Coordinating Committee



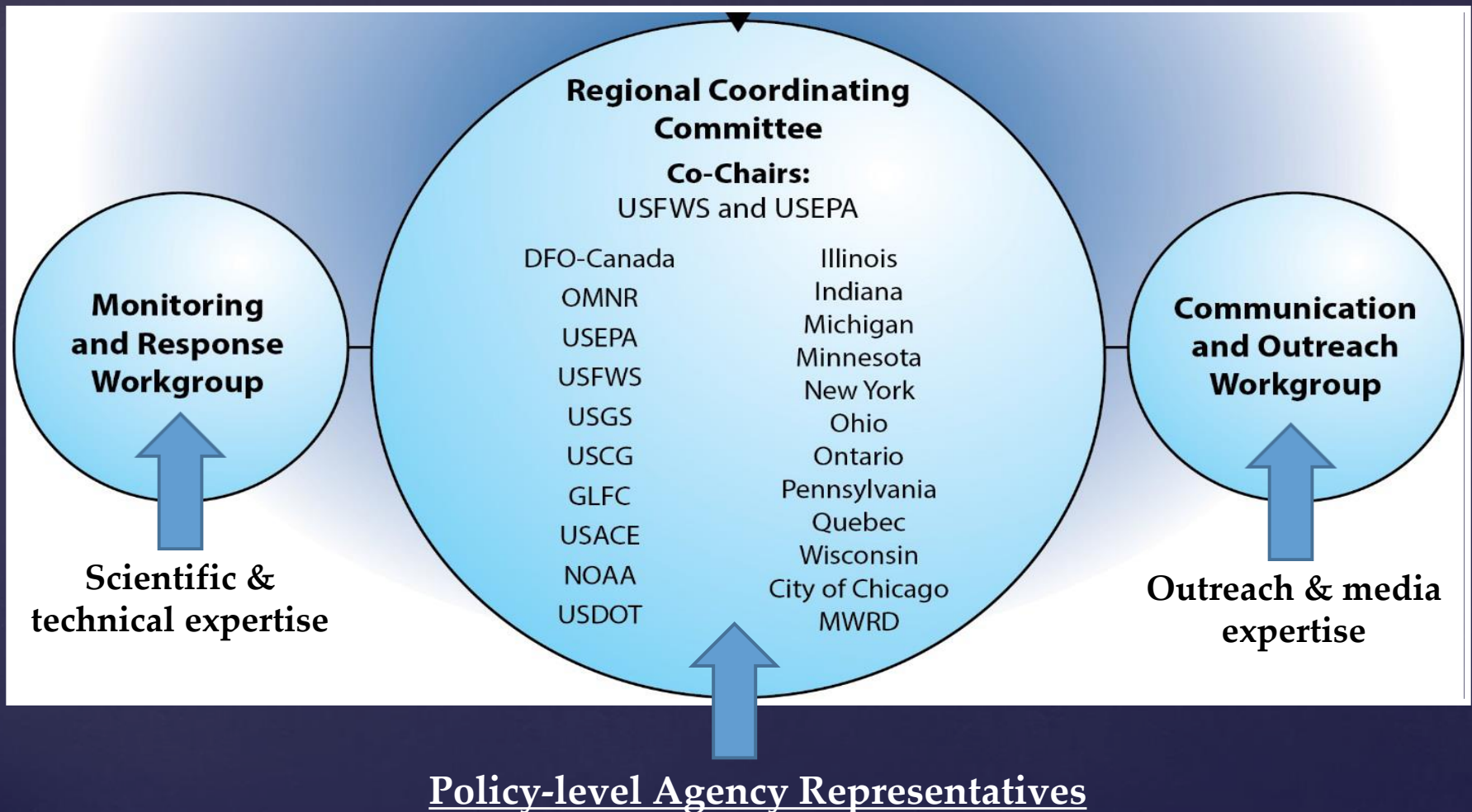
Fisheries and Oceans  
Canada  
Pêches et Océans  
Canada



*A bi-national partnership of 22 U.S and Canadian  
Federal, State, Provincial, and local agencies with  
a common goal of Asian carp prevention*

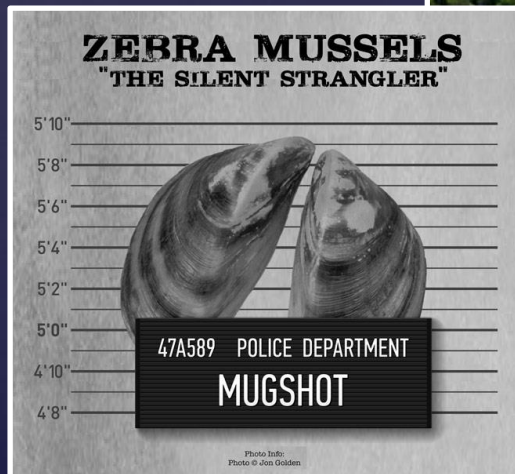


# ACRCC Organization



# Great Lakes Aquatic Invasive Species Challenge

- Legacy of invasive species introduction through ballast water, canals, and unintended movement and release
  - Sea lamprey
  - Zebra mussels
  - Round goby
  - Eurasian ruffe



# Great Lakes Aquatic Invasive Species Challenge

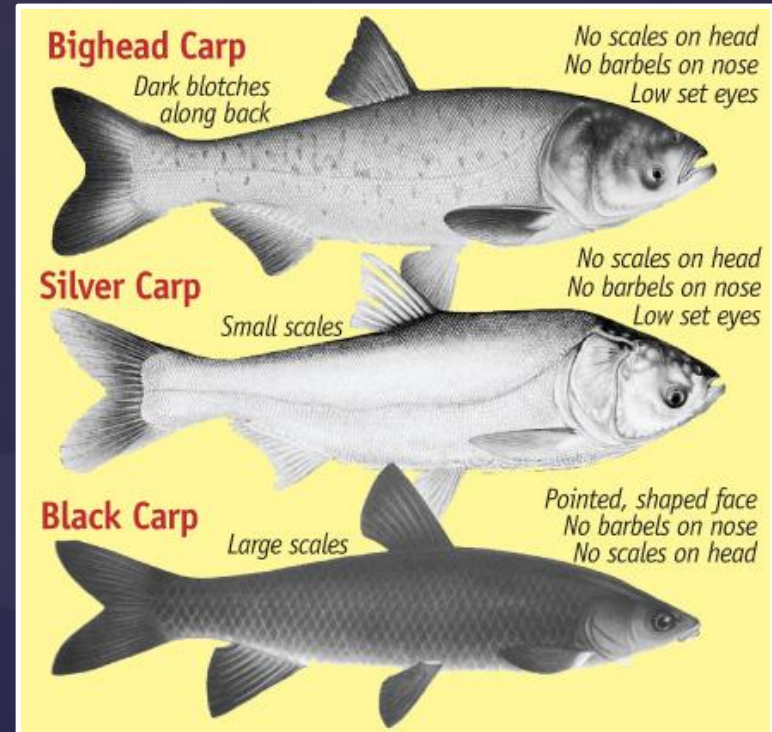
- Decades of ongoing effort to protect a native aquatic ecosystem and \$7 billion dollar fishery
  - Ongoing monitoring and control (eradication) actions conducted annually by U.S. and Canadian resource agencies
- Preventing further introduction is the most effective strategy





# ACRCC Focus

- Four Species (“Asian carp”):
  - ✓ Bighead carp – filter feeders (compete with native fish)
  - ✓ Silver carp – filter feeders (compete with native fish); the “jumpers”
  - ✓ Black carp – eat native mussels, many depleted
  - ✓ Grass Carp – eat aquatic vegetation, destroy habitat



# Asian Carp origin in the United States

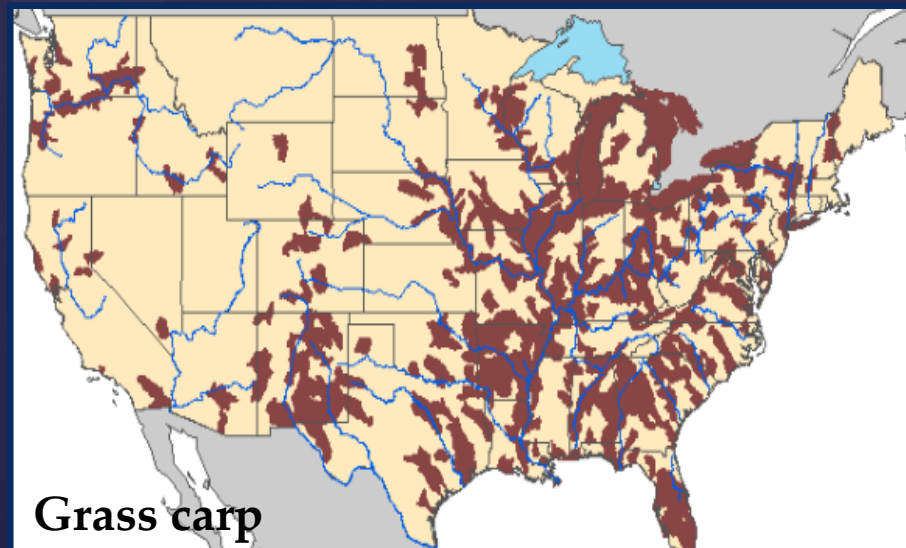
- Imported from Asia in 1960's/1970's to:
  - Control "nuisance" aquatic vegetation
  - Control algae and mollusks in aquaculture and municipal ponds
  - Escaped during flooding events; now established in Midwest rivers and tributaries
  - Common carp previously introduced in late 19<sup>th</sup> century



Photo: "Draft Management and Control Plan for Asian Carps in the United States," April 2006



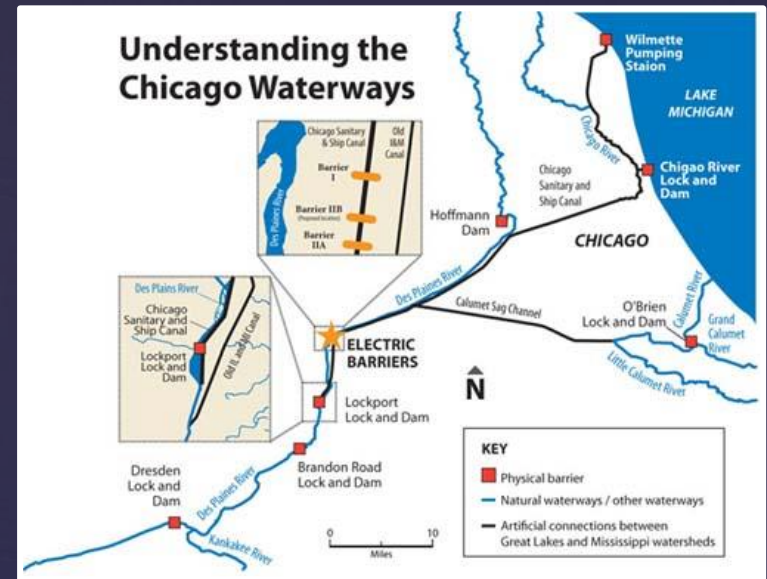
# Asian Carp distribution in the United States



# ACRCC Focus Locations

Focusing prevention efforts on key connections between the Great Lakes and Mississippi River basins:

- Permanent-Chicago Area Waterway System
- Temporary-“GLMRIS” Secondary Pathways (3)



Michigan Radio

# Great Lakes Mississippi Interbasin Study

- Corps of Engineers-led analysis of hydrologic connections between the Great Lakes and Mississippi River basins and AIS control options



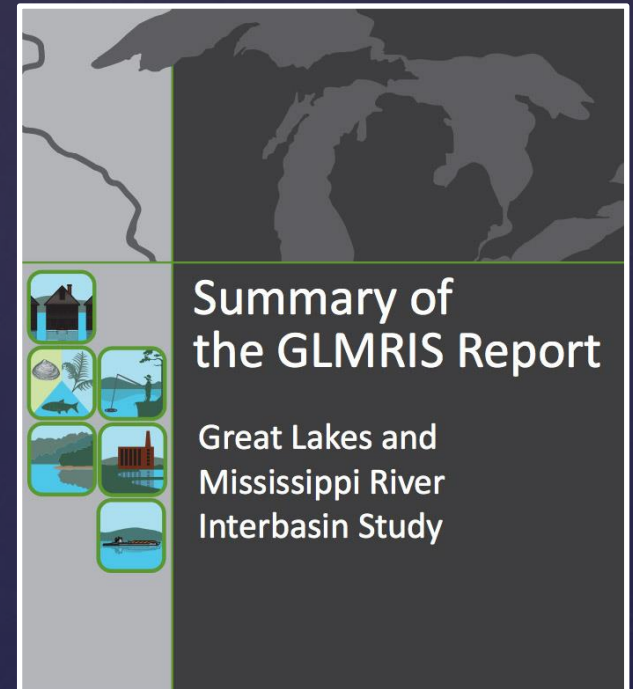
- Helped further inform ACRCC actions (including secondary/temporary pathways for Asian carp)



# GLMRIS

## Identified:

- 18 sites temporarily connected during flooding
  - 3 sites (in Indiana and Ohio) as highest-priority locations for Asian carp prevention
    - ✓ Eagle Marsh (IN)
    - ✓ Killbuck Creek (OH)
    - ✓ Ohio Erie Canal (OH)
- Brandon Road Lock and Dam in Joliet, Illinois as highest-priority (most strategic) “permanent” location to implement AIS control technologies to protect Great Lakes



## Presence of Bighead and Silver Carp in the Illinois Waterway

-  Adult Population Front
-  Potential Spawning
-  Verified Spawning
-  Three Captures of Black Carp
-  Juvenile Collection
-  Lock & Dam
-  Dispersal Barriers

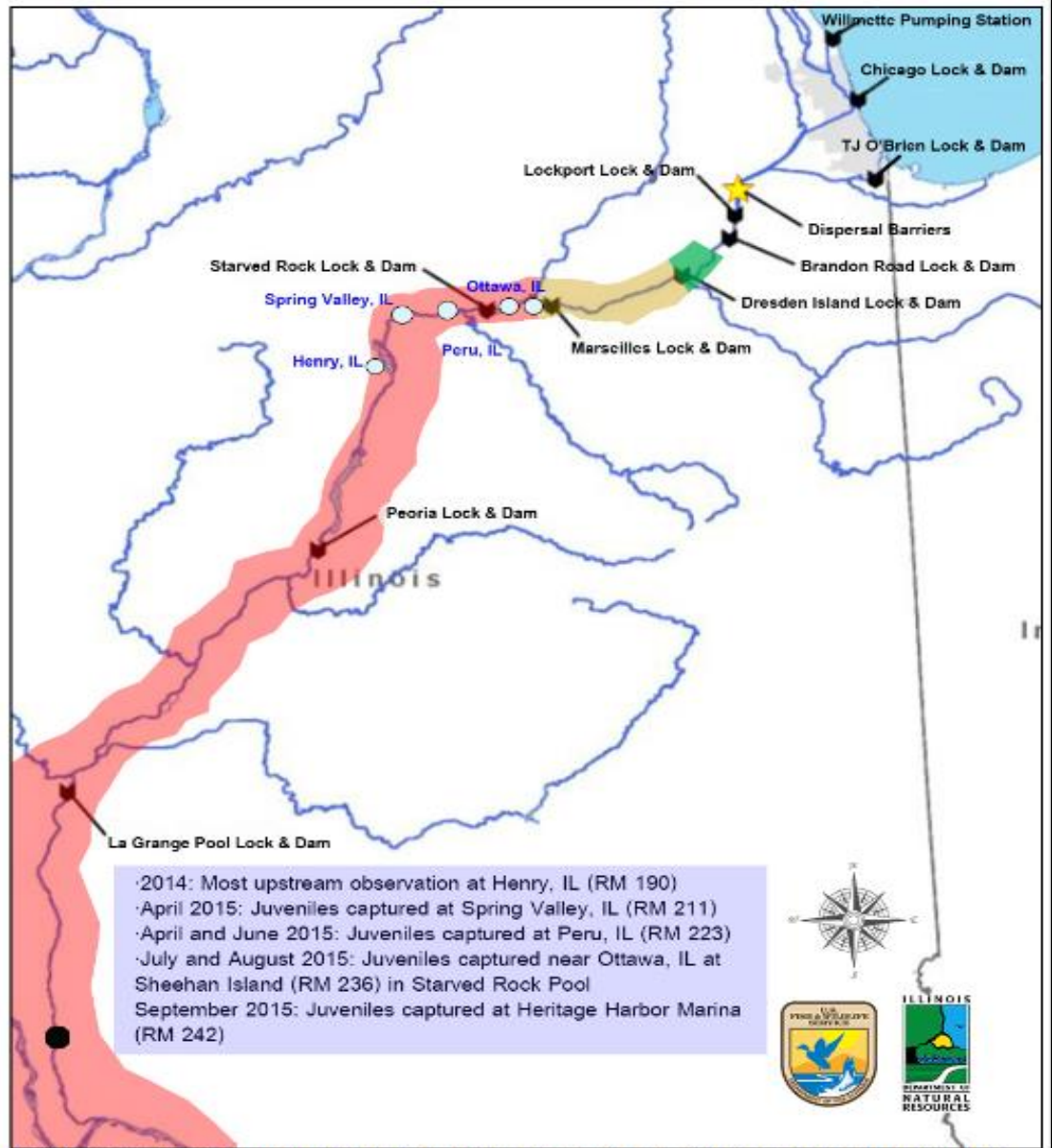
### Distance From Lake Michigan

55 Miles : Adult Population Front

62 Miles : Potential Spawning

91 Miles : Verified Spawning

 37 Miles : Dispersal Barriers

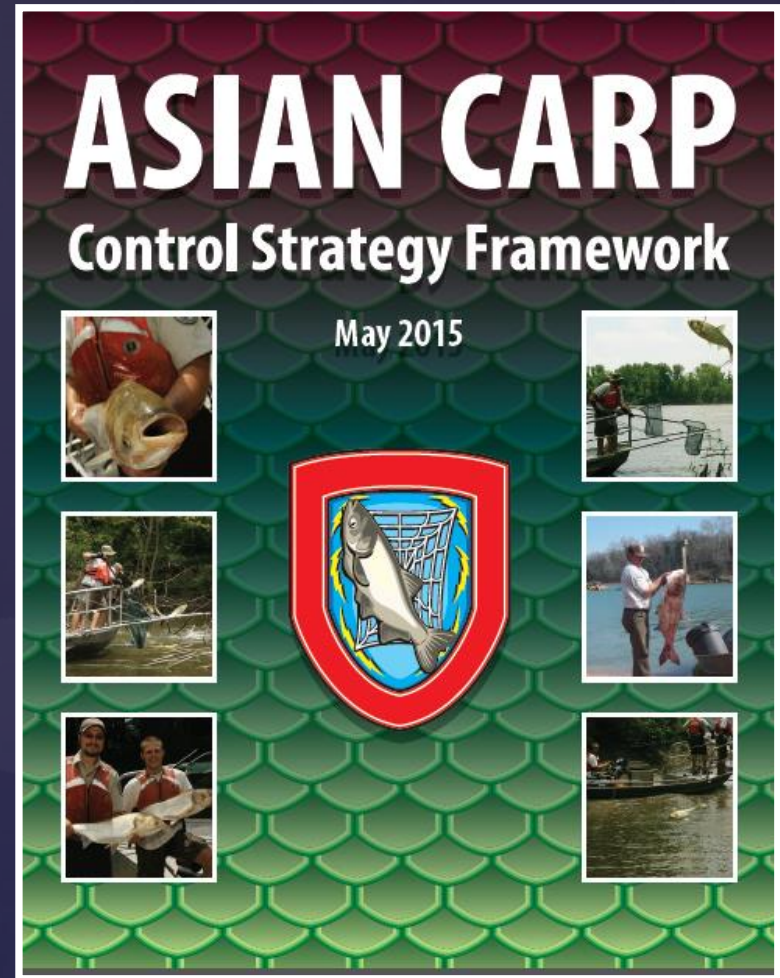


September 2015

As of September 2015, small Asian carp were found in the Starved Rock Pool of the Illinois Waterway. The location is 54 miles downstream from the electric dispersal barriers. Small Asian carp are now 91 miles away from Lake Michigan. This marks a 52 mile upstream increase in where small Asian carp were found in 2014.

# ACRCC's Asian Carp Control Strategy

- Developed annually since 2010
- Includes all agency projects and funding overview
- Builds on recommendations of National Asian Carp Management Plan (2007)
- Supported by annual ACRCC Monitoring and Response Plan
- 43 interagency projects in 2015
- Supported by ~\$74M in designated funds (FY2015)



*available at: [asiancarp.us](http://asiancarp.us)*



# Asian Carp Control Strategy

- Housed on national Asian carp website: *asiancarp.us*



**\$800,000 in Funding Announced to Help States Fight Asian Carp**

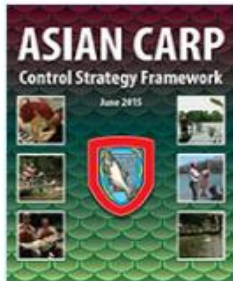
Read more >

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View all >

### Highlights

- Six-inch silver carp found in Starved Rock Pool, Illinois River
- Illinois and Michigan Work Together to Remove Asian Carp
- \$800,000 in Funding Announced to Help States Fight Asian Carp
- Map on Location of Carps in the Illinois Waterway

## Recent Documents



2015 Asian Carp Control Strategy Framework



2015 Monitoring and Response Plan



2014 Water Resources Reform & Development Act Report



Asian Carp Control Plan



2014 Monitoring & Response Plan Interim Summary (5.4 MB PDF)

# 2015 Asian Carp Control Strategy

- Includes a combination of:
  - Monitoring and “early detection”
  - AC population control
  - Research and development (new technologies)
  - Design and engineering
  - Communications and Outreach
  - Law enforcement
- Annual activities (43) funded through:
  - State and Federal agency base budgets
  - Great Lakes Restoration Initiative funds

In 2015, \$74.2M total support:

  - \$16.0M GLRI (22%)
  - \$58.2 Base (78%)

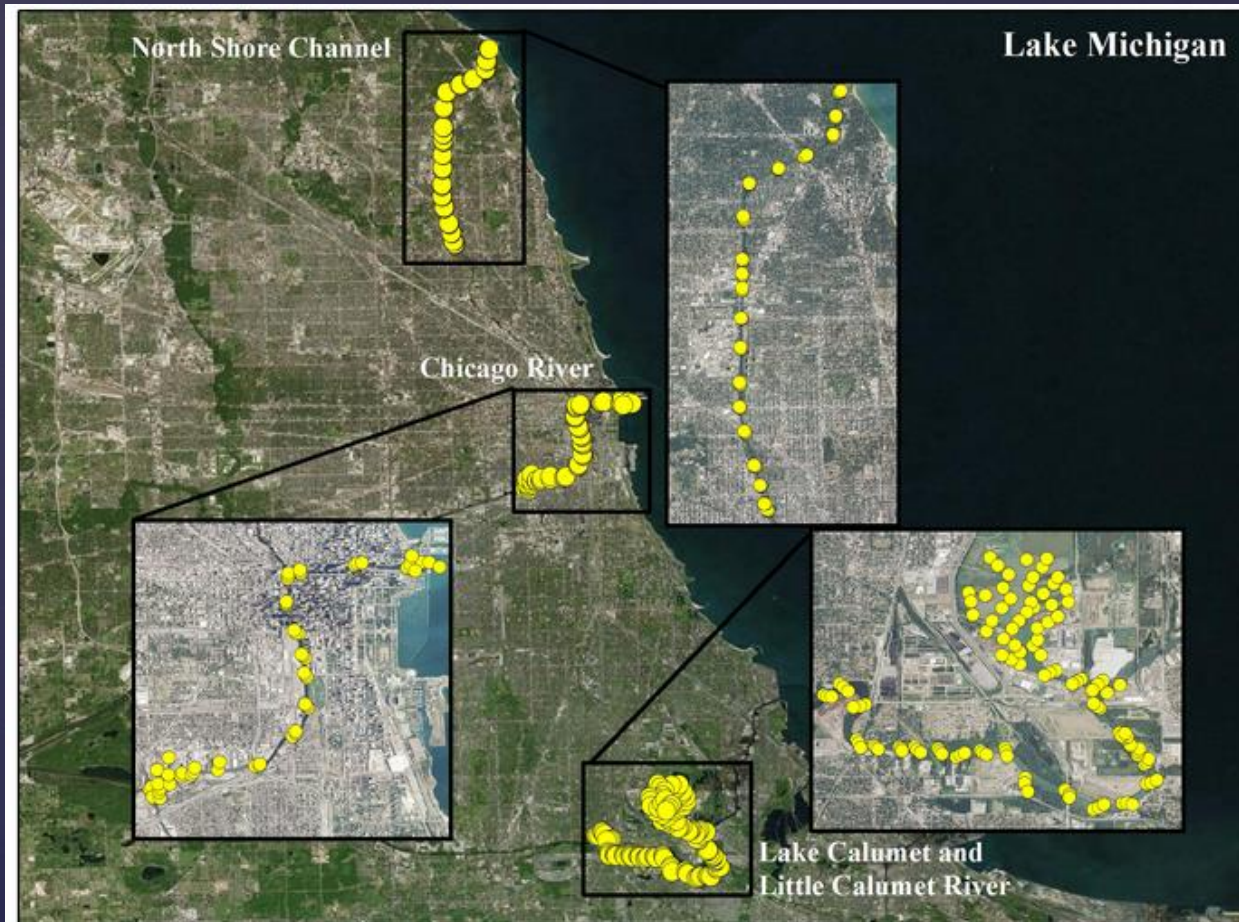
# Asian carp monitoring and early detection

- Great Lakes-wide field monitoring effort conducted by US and Canadian agencies
- Uses state-of-the-art environmental DNA testing (eDNA)
- eDNA used since 2009; results shared
- Allows for detecting possible presence of Asian carp through analysis of water samples for AC genetic material
- Used in conjunction with “traditional” gears (netting and electrofishing)





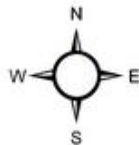
# Asian carp monitoring and early detection



Results posted at:  
<http://www.fws.gov/midwest/fisheries/eDNA.html>

eDNA Sample Points

● Negative

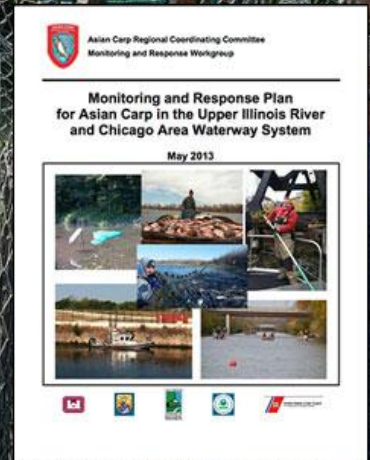


0 1 2 4 6 8 Miles



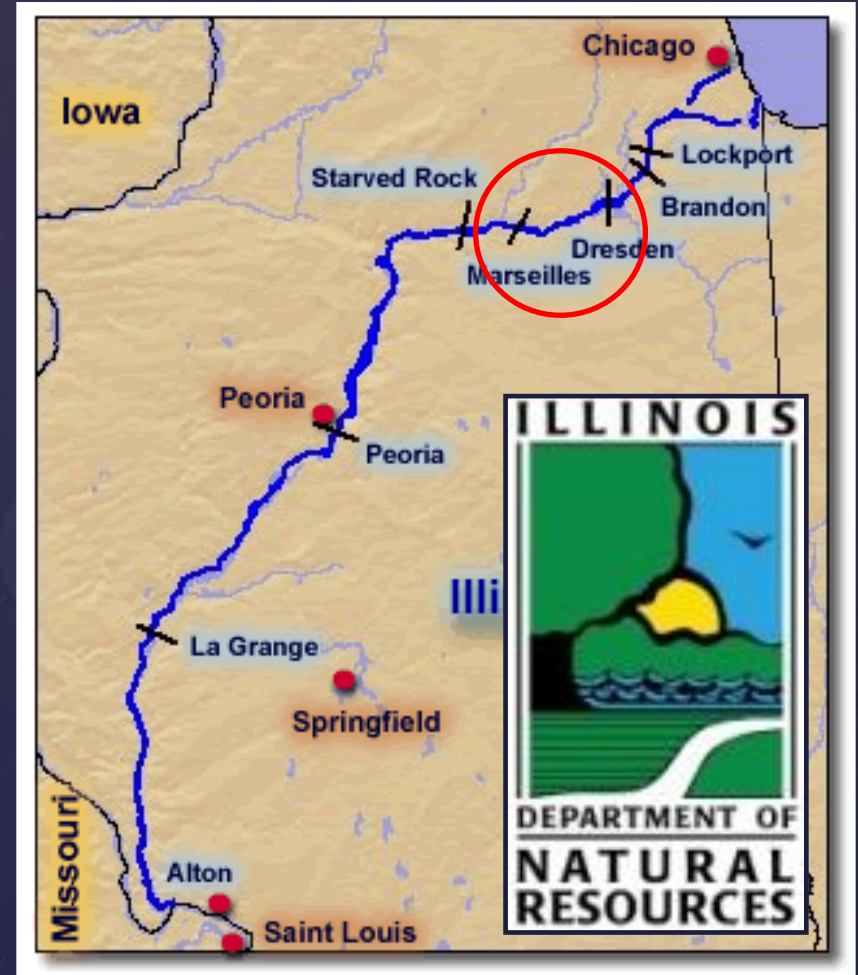
# Asian carp monitoring and early detection

- Ongoing “traditional” sampling conducted in Illinois Waterway, CAWS, other sites, & Canadian locations.
  - Additional emphasis currently on detection of small/juvenile fish (where are the carp reproducing? have they moved?)
  - Intensive sampling used in the event of positive eDNA finding ( “follow-up” for presence of actual fish)





# Asian carp removal (Upper Illinois Waterway)



- Uses contracted commercial fishers
- Led by Illinois Dept. of Natural Resources
- Focus on areas of moderate adult population with no evidence of reproducing fish (areas where removal efforts should be most effective at population control)



# Asian carp removal

- Over 1,400 miles of nets deployed
- Over 3.25M lbs removed
- Minimal impact to native fishes (< 1% of total catch is game fish; non-target fish returned to water)

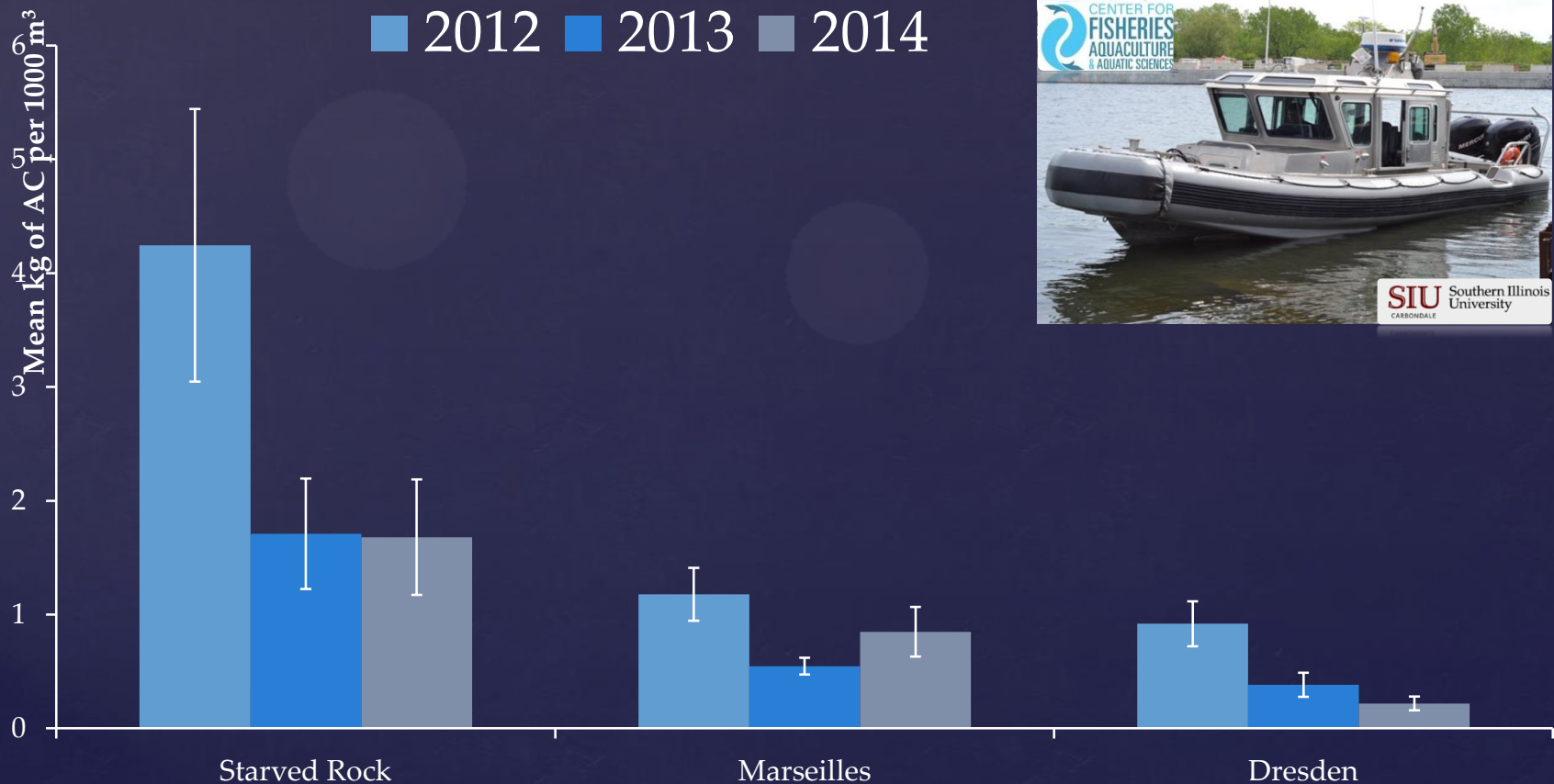
## **GOOD NEWS:**

Leading edge of established population has not moved since 2006 (9 years)



# Hydroacoustic estimates of Asian carp (2012 – 2014)

- Evidence of effects of targeted fishing on adult Asian carp populations



# Monitoring and Control

## ABOVE BARRIER (A)

- Seasonal Intensive Monitoring
- eDNA Monitoring

## AT BARRIER (B)

- Fish Clearing (w/barrier maintenance)
- Sonar surveys (fish density)
- Evaluation of barge effects on barrier (fish entrainment)
- Routine electrofishing

## Brandon Road Lock and Dam (C)

- Sonar surveys

## BELOW BARRIER

### @ Lockport, Brandon Rd, and Dresden Island pools (D):

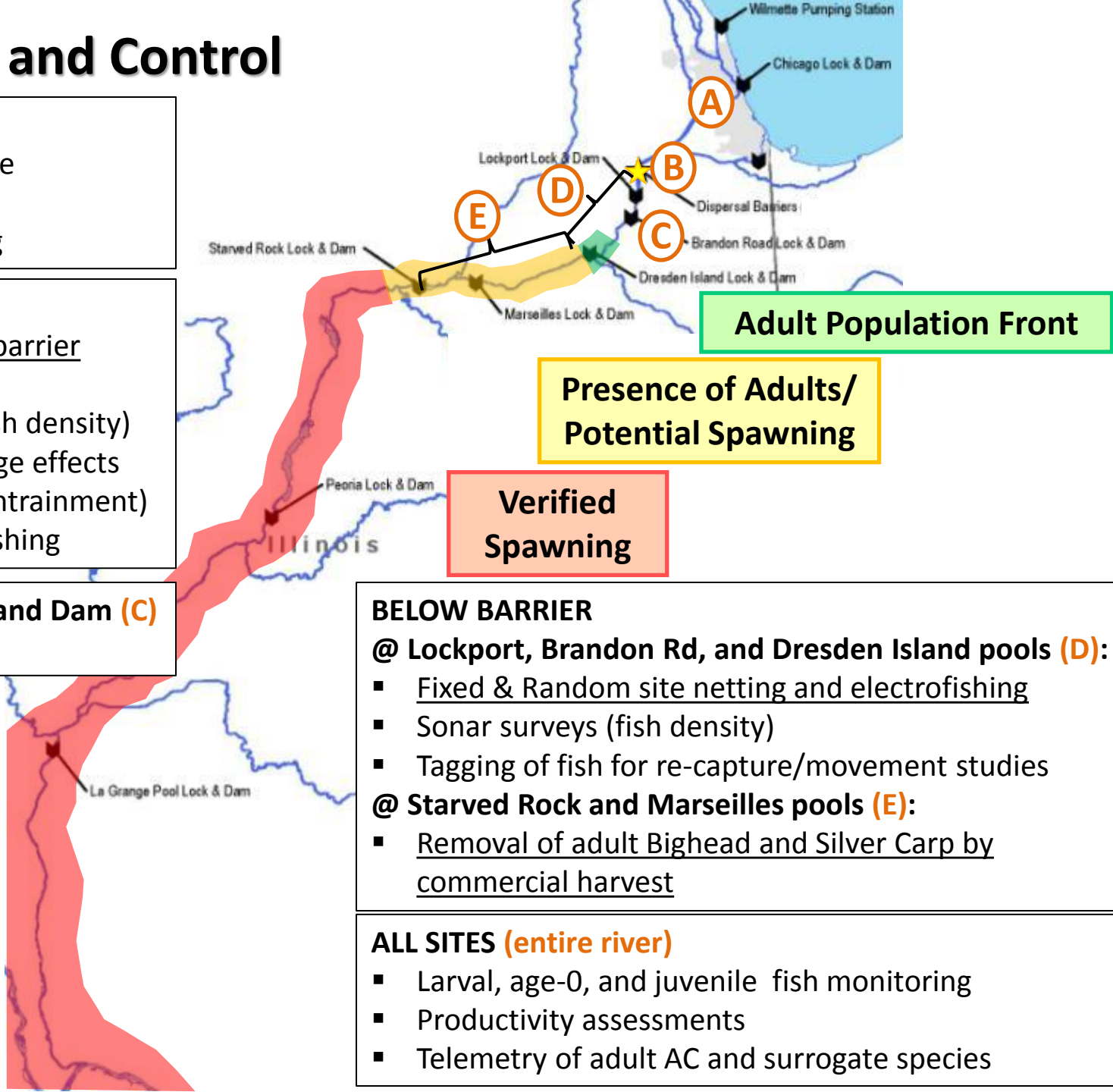
- Fixed & Random site netting and electrofishing
- Sonar surveys (fish density)
- Tagging of fish for re-capture/movement studies

### @ Starved Rock and Marseilles pools (E):

- Removal of adult Bighead and Silver Carp by commercial harvest

## ALL SITES (entire river)

- Larval, age-0, and juvenile fish monitoring
- Productivity assessments
- Telemetry of adult AC and surrogate species





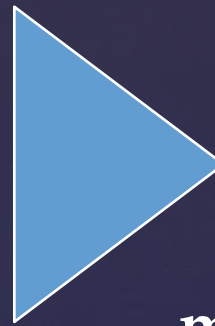
# Research and Design

- Development of new technologies to:
  - ✓ Understand AC life cycles to target vulnerabilities
  - ✓ Quickly detect Asian carp
  - ✓ Block movement of Asian carp
  - ✓ Reduce population levels
- Research efforts led by U.S. Geological Survey, Corps of Engineers, and partner State agencies and universities



# Areas of Research

- Life cycle and behavior
- Detection and monitoring
- Movement Barriers
- Population Control Tools



**Integrated  
Pest  
Management  
(multi-pronged  
management strategy)**



# Research and Tools

- Applied toward building a holistic IPM and applied to control other invasive species
- Transferrable to State and Federal resource agency managers for field implementation





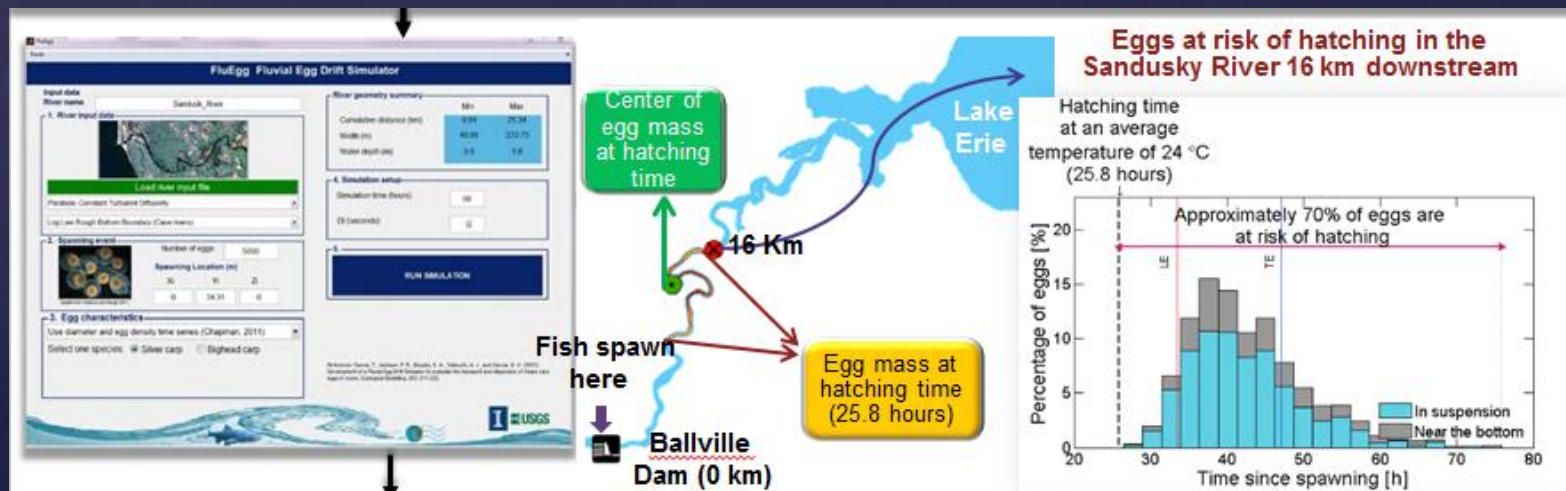
# Identifying Control Opportunities

Studies of life cycle and behavior of Asian carp conducted in both established and emerging populations to identify vulnerabilities that can be exploited for control

Example:

Asian Carp Tributary Assessment Model-

- Identifies tributaries where Asian carp may spawn
- Identifies locations where habitat manipulation or spawning barriers could decrease egg survival



# Early Detection in the Field

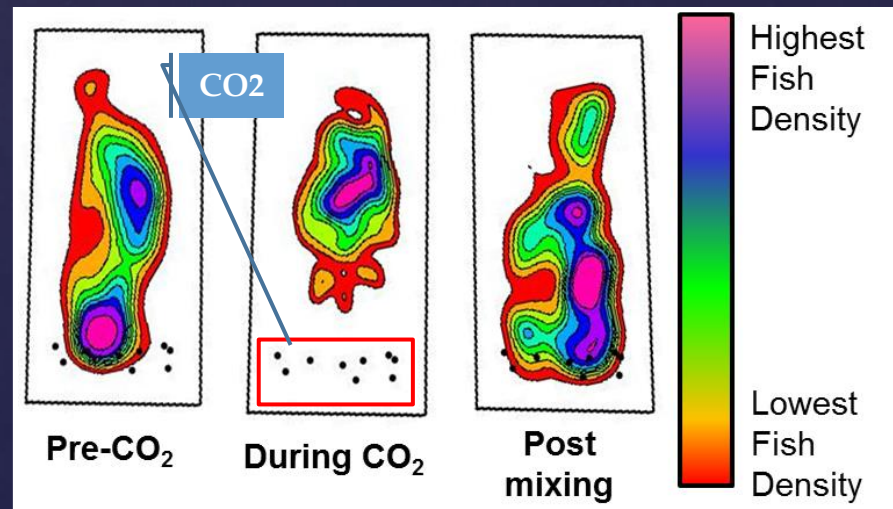
- Development of portable eDNA testing kit for use in the field (including law enforcement)
  - Results provided in near real-time
  - Can be focused on individual species (e.g. Silver carp, Bighead carp)
  - Reduces lag time in follow-up with management actions needed to respond to Asian carp detection.



# Control Tools/Technologies

CO<sub>2</sub> - Use of concentrated carbon dioxide (CO<sub>2</sub>) as a barrier to fish movement

- Non-lethal and non-selective for fish species (stops both target and non-target fish species)
- Potential impacts to native mussels and structures; needs further research

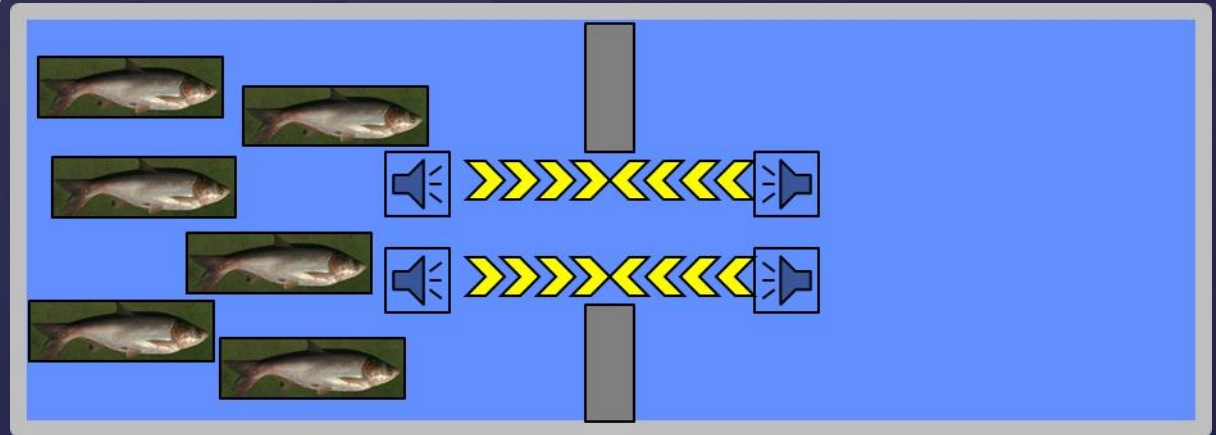




# Control Tools/Technologies

Waterguns/Sound-Use of underwater seismic “guns” and sound to deter fish movement

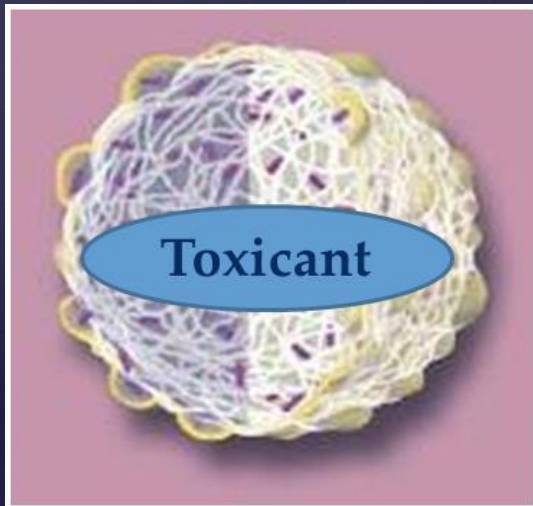
- Intense and focused sound waves
- Non-selective for fish species (stops both target and non-target fish species)
- Can be deployed near lock structures for key confluences



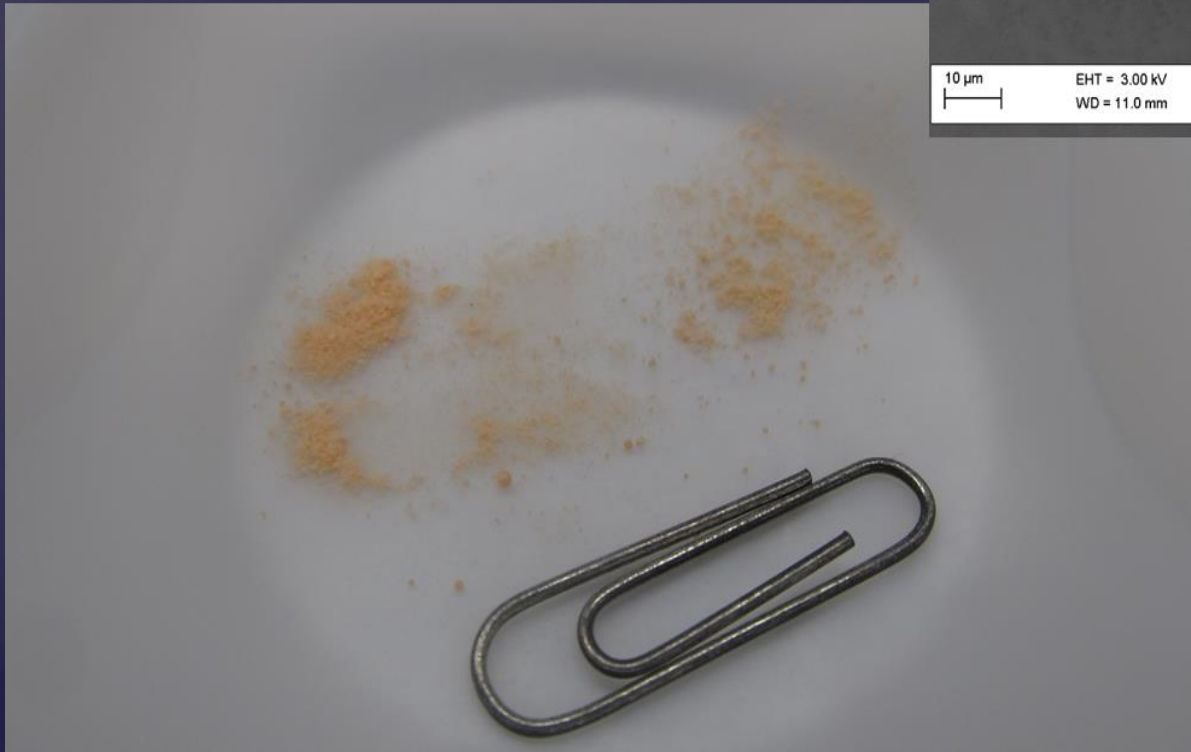
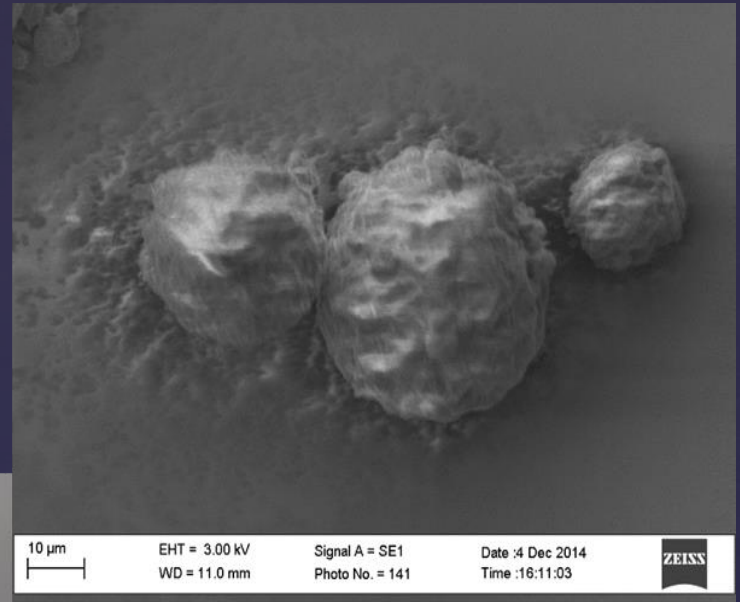
# Control Tools/Technologies

## Microparticles:

- Development of piscicides (fish toxicants) targeting based on physiology and metabolism of Asian carp
- Piscicide activated when ingested by target species
- Currently being developed, additional field trials and non-target species research being conducted.
- Developed and manufactured multiple types of particles that are readily consumed by Silver and Bighead carp



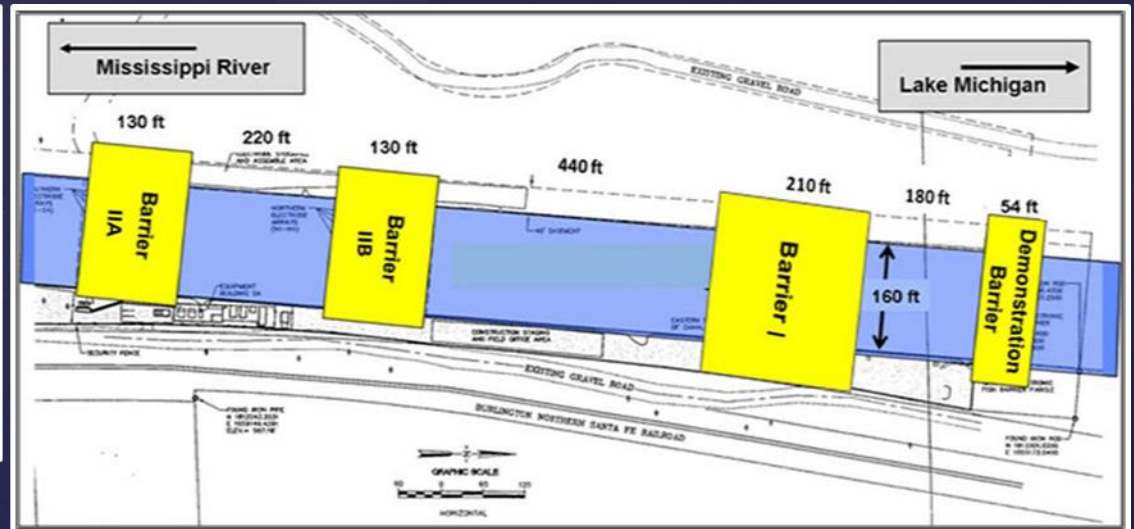
# Microparticles





# Operational Control Barriers

- Electrical Barriers in the Chicago Sanitary and Ship Canal
- Important “line in the sand” in the CAWS
- First barrier constructed in 2002
- Current arrays include Demonstration Barrier, Barrier 2A and Barrier 2B (added 2009 and 2011)
- New third permanent barrier (Barrier 1) under construction; to be activated September 2017

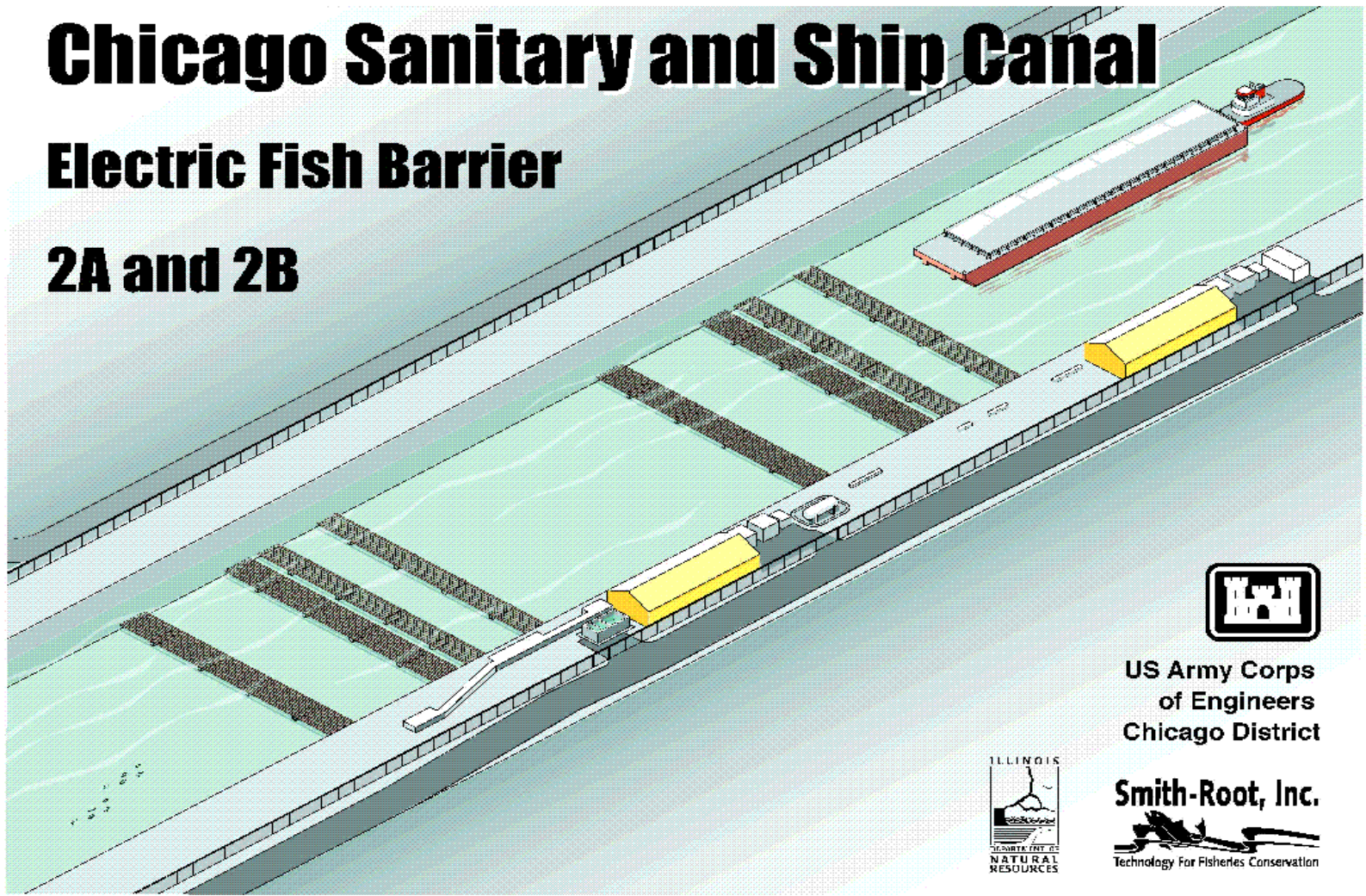


# Operational Control Barriers

## Chicago Sanitary and Ship Canal

### Electric Fish Barrier

### 2A and 2B



US Army Corps  
of Engineers  
Chicago District



**Smith-Root, Inc.**

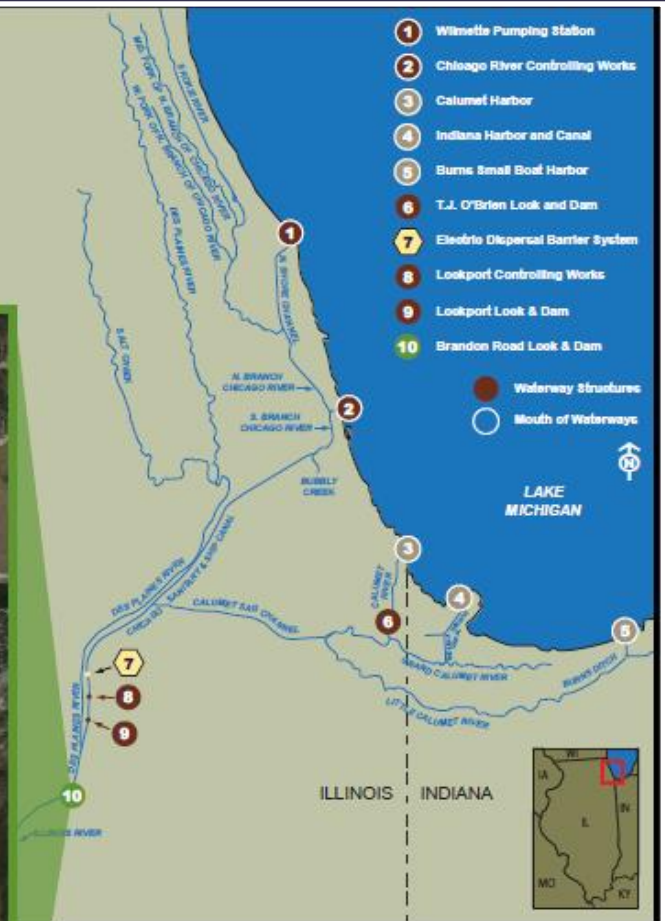


Technology For Fisheries Conservation



# GLMRIS

## Brandon Road





# GLMRIS - Brandon Road

GLMRIS Report provides basis for development of alternatives

- Viability of establishing a one-way control point to prevent upstream transfer of ANS (toward the Great Lakes)

## Goals

- Reduce risk of one-way ANS transfer to the maximum extent
- Minimize impacts to existing uses/users



# Why Brandon Road?

- As a control point, it can address upstream transfer of AIS through all CAWS pathways
  - ✓ Avoids AIS bypass toward Lake Michigan via other upstream tributaries (e.g. Lower Des Plaines)
  - ✓ Provides opportunity for engineered alternatives for controls
  - ✓ Offers the most rapidly-achievable structural option
- Identified as a priority option in the GLMRIS Report (included in 3 of 6 structural alternatives)
- Provides an opportunity to potentially use a combination of existing control technologies and demonstrate new concepts (e.g. CO<sub>2</sub>, sound)
- Adds strong defense to existing upstream AIS controls (electrical barriers)

# GLMRIS - Brandon Road

Follow GLMRIS project at:  
[glmrис.anl.gov](http://glmrис.anl.gov)

Facebook  
[facebook.com/glmris](https://facebook.com/glmris)

Twitter  
[@GLMRIS](https://twitter.com/GLMRIS)

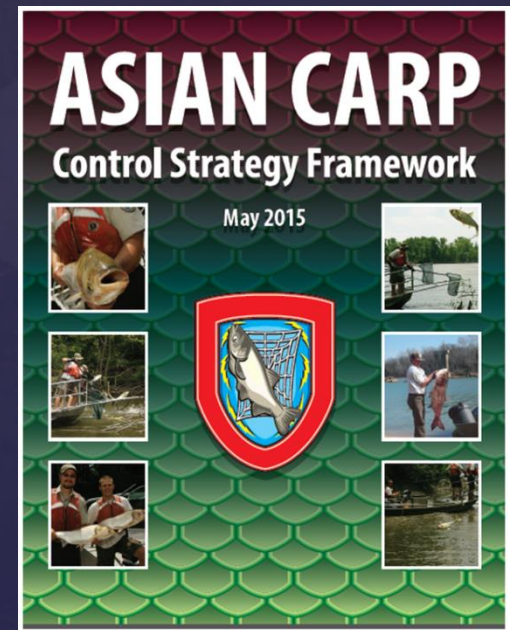
Email  
[glmrис@usace.army.mil](mailto:glmrис@usace.army.mil)

The screenshot displays the GLMRIS website interface. At the top, the logo reads "GLMRIS GREAT LAKES AND MISSISSIPPI RIVER INTERBASIN STUDY" with a map of the region. The US Army Corps of Engineers logo is in the top right. A navigation bar includes links for HOME, ABOUT THE STUDY, STAY INVOLVED, DOCUMENTS, NEWS, FAQs, ABOUT US, and E-MAIL SERVICES. The main content area is titled "Stay Involved" and features a sidebar with "Stay Involved" links (View Scoping Comments, Completed NEPA Public Scoping Meetings and Transcripts, What is NEPA Scoping?), a "Subscribe" form with fields for "E-mail Address" and "Zip Code", and a "Print version" link. The main text explains the website's role as an online center for public information and involvement, mentioning e-mail alerts, newsletters, and public forums. A social media section promotes Facebook and Twitter. A featured article titled "Interbasin Study GLMRIS" discusses a "common-name" directory of potentially invasive aquatic species, with a link to <http://bit.ly/rjFdr>. A Facebook social plugin at the bottom shows a post from "Great Lakes & Mississippi River Interbasin Study (GLMRIS) on Facebook" with 148 likes and a link to a document titled "Aquatic Nuisance Species (ANS)".



# Additional 2015 Framework Projects:

- Evaluation of potential for fish entrainment between barges in transit
- Design and evaluation of new Asian carp detection gears
- Enforcement of illegal transport of Asian carp
- Evaluation of Asian carp seasonal movement using tagged fish and telemetry
- Next-steps toward Asian carp prevention (closure) at Killbuck Creek and Ohio Erie Canal (Ohio) - GLMRIS
- Construction of Asian carp berm/barrier at Eagle Marsh (Indiana) – GLMRIS



# ACRCC – Next Steps

- Now developing the 2016 Framework Strategy
- Builds off results of 2015 work, and addressing all four Asian carp species (+50 projects)
- New draft strategy will look forward into 2017/2018
- ACRCC meeting October 14-15 in Cleveland, OH to finalize strategy

Please visit [asiancarp.us](http://asiancarp.us) for news and current information...