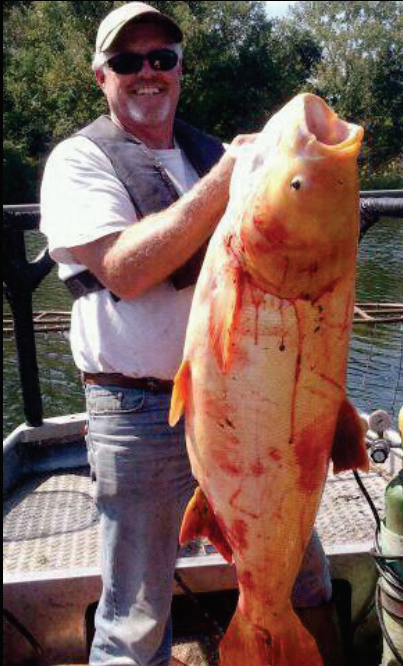


Illinois DNR and ANS

Protecting our environment from Invasive Species



Kevin Irons
Aquatic Nuisance Species Program Manager

[*kevin.iron@illinois.gov*](mailto:kevin.iron@illinois.gov)



Yangtze River	Illinois River
6,300 km long	439 km long
1,902,588 m ³ /sec discharge	640 m ³ /sec discharge (0.03%)
Upper - middle - lower	Upper - lower
370 species	120 species
Carp native; cultured	Carp non-native; not cultured
	- First collected in Illinois 1986

China-US partnerships to aid in:

1. Science/policy
2. Management goals/Fishing technology
3. Strategy/business opportunities



Federal and Regional Partners

U. S. Fish and Wildlife Service

- Cartersville, IL
- Lacrosse, WI
- Columbia, MO

U. S. Army Corps of Engineers

- Chicago District
- Rock Island District

U. S. Coast Guard

U. S. Environmental Protection Agency

U. S. Geological Survey

Great Lakes Fishery Commission

All Great Lakes States

Ontario and Canada

State, Local, and Research

Illinois Department of Natural Resources

Illinois Natural History Survey

Illinois Environmental Protection Agency

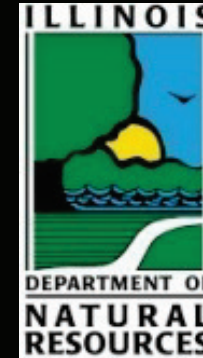
University of Illinois

Southern Illinois University

Western Illinois University

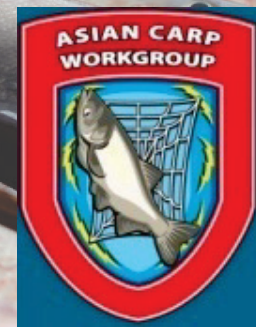
University of Notre Dame

Metropolitan Water Reclamation District



Why are we concerned? A lot of fish, right?

Photo by Blake Ruebush



Southern
Illinois University
Carbondale

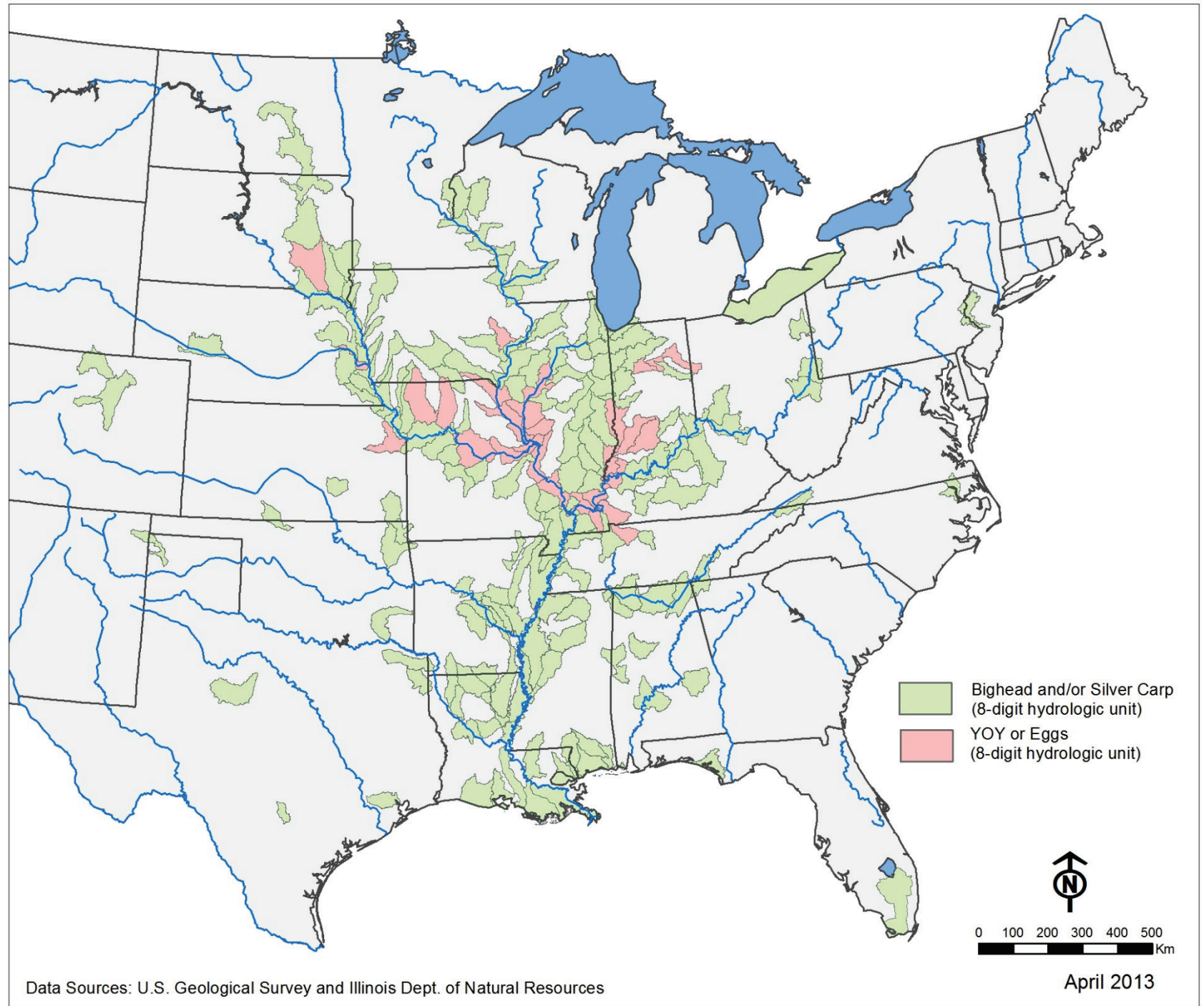


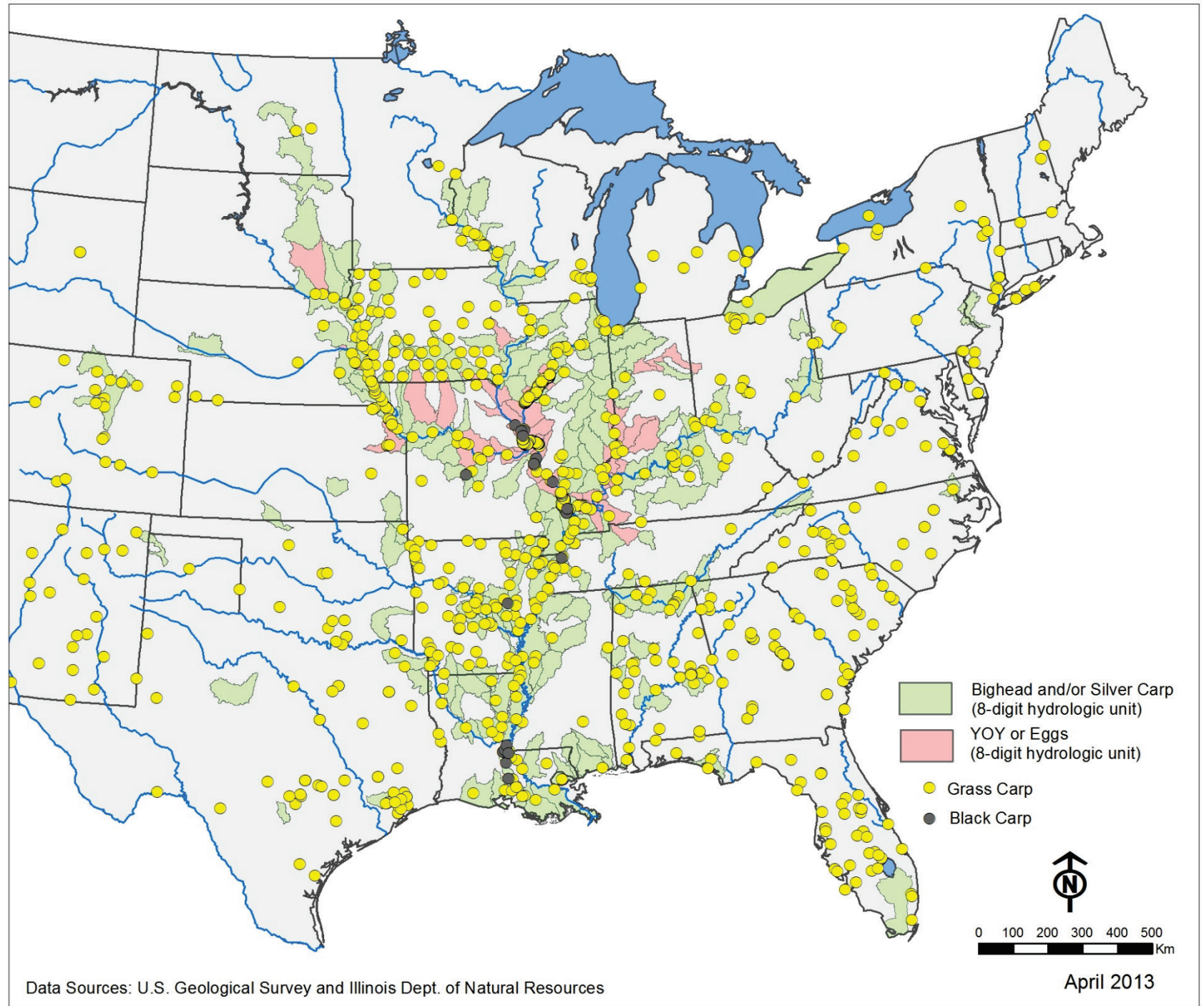
A wide-angle photograph of the Chicago skyline as seen from Lake Michigan. The water in the foreground is a calm, teal color, reflecting the clear blue sky. On the left, a stone pier with several large, grey, cylindrical buoys extends into the water. A line of green trees separates the water from the city. The skyline is composed of numerous skyscrapers of varying heights and colors, including a prominent red building. The sky is a uniform, clear blue.

City of Chicago

Laurentian Great Lakes

- Lake Michigan





ATTACK OF THE FLYING CARP

Great Lakes states sue to stop Asian carp invasion

http://host.madison.com/ct/news/local/article_fb5b0e6a-ffc8-11de-89ef-001cc4c002e0.html?print=1

Great Lakes states sue to stop Asian carp invasion Asian carp may have breached barrier - JSOnline

By JESSICA VANEGEREN | The Capital Times

They don't seem to be too fond of noise. If anything,

Betty and Kenny DeFord found that out five years home. Like corn kernels in a hot pan of cooking oil,

"When it was all said and done, we had thirty-son added to the boat."

DeFord admits this story may sound a bit far-fetched lower Mississippi, Missouri and Ohio rivers, the

This week the U.S. Army Corps of Engineers confirmed a man-made Chicago waterway that links the Mississippi River to the Great Lakes. DNA evidence of the fish just

In addition one dead fish was found in December; the presence of Asian carp DNA north of the electric

On Friday, the justices will discuss behind closed doors between the Great Lakes and the Asian carp. Then

The legal battle pits five Midwest states, including Illinois, against the federal government. The Great Lakes has 235,000 anglers fish Lake Michigan and Lake Superior according to a 2006 study by the U.S. Fish and Wildlife Service. Fish and Wildlife locks along a man-made canal keep drinking water from the downtown.

In a losing, decades-old battle to keep the Great Lakes water but eats 40 percent of its weight in plankton, the Asian carp have begun spawning three times a

"You can see why there is concern over these fish who have watched the Asian carp population explode. They are the poster child for invasive species."

The lawsuit, originally filed by Michigan Attorney General Mike Cox, was later joined by Missouri. Officials quickly realized that the

This water diversion began when the Chicago Sanitary and Ship Canal was built. Officials quickly realized that the

JOURNAL
INTERACTIVE

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[Wisconsin](#)

Great Lakes, Great Peril | Update

Asian carp may have breached barrier

By [Dan Egan](#) of the Journal Sentinel

Posted: Nov. 19, 2009

The decade-old battle to keep Asian carp out of the Great Lakes might be over.

New research shows the fish likely have made it past the \$9 million electric fish barrier on the Chicago Sanitary and Ship Canal, with the situation told the Journal Sentinel late Thursday.

The barrier is considered the last chance to stop the super-sized fish that can upend entire ecosystems, and researchers say that the carp had advanced to within a mile of the barrier.

<http://www.printthis.clickability.com/p>

Common carp “grandpa’s carp”

*Stocked intentionally in
1880’s across US*





• Annual Plan

Coordinated Plan with IDNR
taking the lead in
developing, USACE,
USFWS, USCG, USEPA,
USGS (UI, SIU, INHS +)

**21 project plans, 75
project objectives**

**Guides monitoring,
removal
operations,
research , and
protocols**



Asian Carp Regional Coordinating Committee
Monitoring and Response Workgroup

Monitoring and Response Plan for Asian Carp in the Upper Illinois River and Chicago Area Waterway System

April 2014



21 Projects in 2014

Monitoring Projects (6)

- Fixed and Random Site Monitoring Upstream of Barrier - Fixed and Random Site Monitoring Downstream of Barrier -Strategy for eDNA Monitoring in the CAWS -Larval Fish and Productivity Monitoring- Young-of Year and Juvenile Asian Carp Monitoring -Distribution and Movement of Juvenile Asian Carp in the Illinois Waterway

Removal Projects and Evaluations (5)

- Response Actions in the CAWS - Planned Intensive Surveillance in the CAWS - Barrier Maintenance and Fish Suppression -Barrier Defense Asian Carp Removal Project - Monitoring Asian Carp Population Metrics and Control Efforts

Barrier Effectiveness Evaluations (4)

- Telemetry Monitoring Plan -Monitoring Fish Abundance, Behavior and Fish-Barge Interactions at the barrier - Evaluating Asian Carp Detection Techniques with SONAR - Des Plaines River and Overflow Monitoring

Gear Effectiveness Evaluations and Development (4)

- Asian Carp Gear Efficiency and Detection Probability Study - Exploratory Gear Development Project - Unconventional Gear Development Project - Water Gun Development and Testing

Alternate Pathway Surveillance (2)

- Alternative Pathway Surveillance in Illinois – Law Enforcement; Urban Pond Monitoring

Characterizing Risk – Feb 2014

Developed from <http://www.asiancarp.us/news/DistributionMaps.htm>

Distances from Lake Michigan

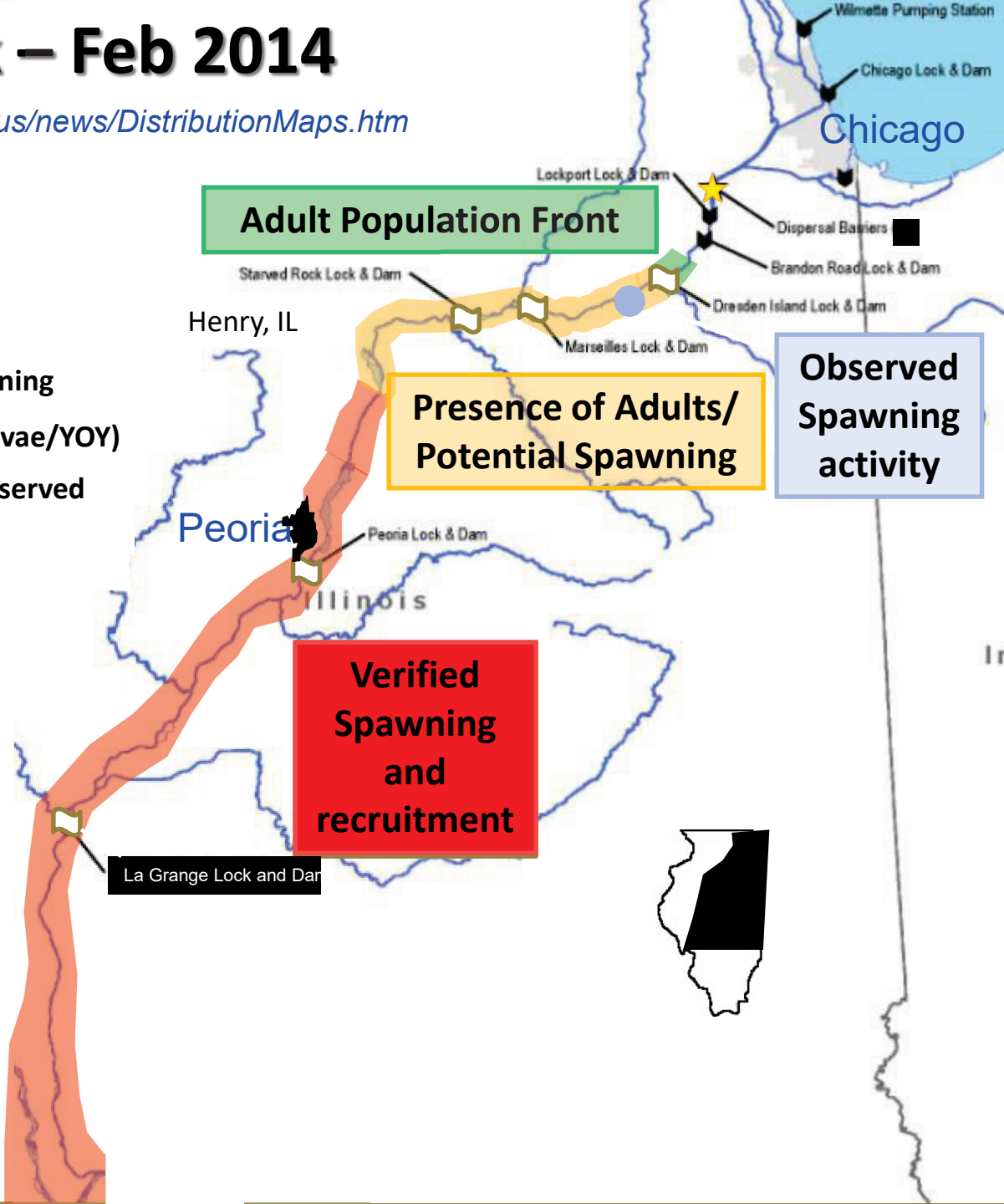
37 miles Dispersal barriers

55 miles Adult Population Front

62 miles Presence of Adults/Potential Spawning

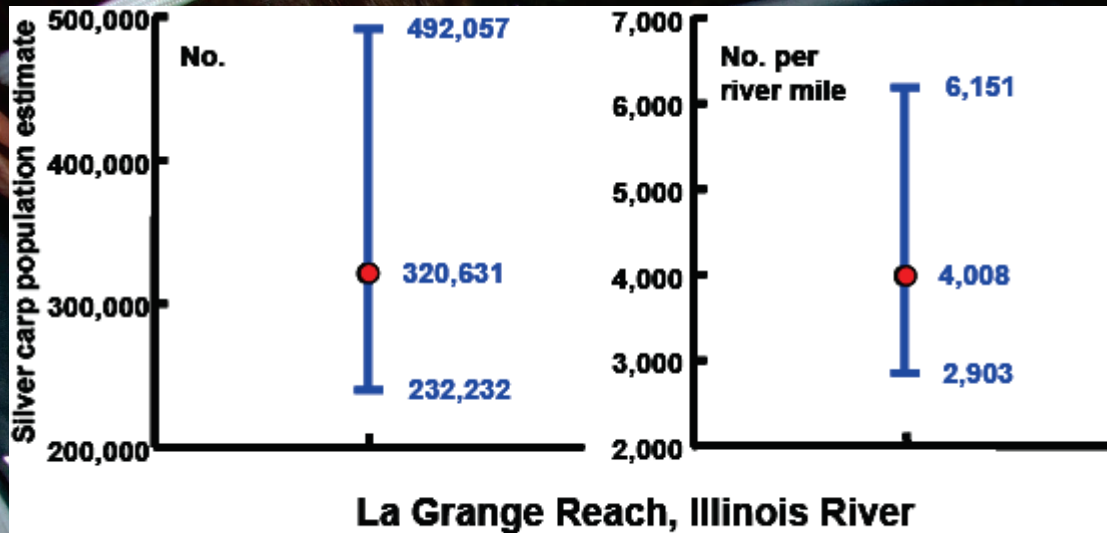
64 miles Observed Spawning activity (no larvae/YOY)

143 miles Established population: Closest observed small Asian carp (Henry, IL in Peoria Pool)

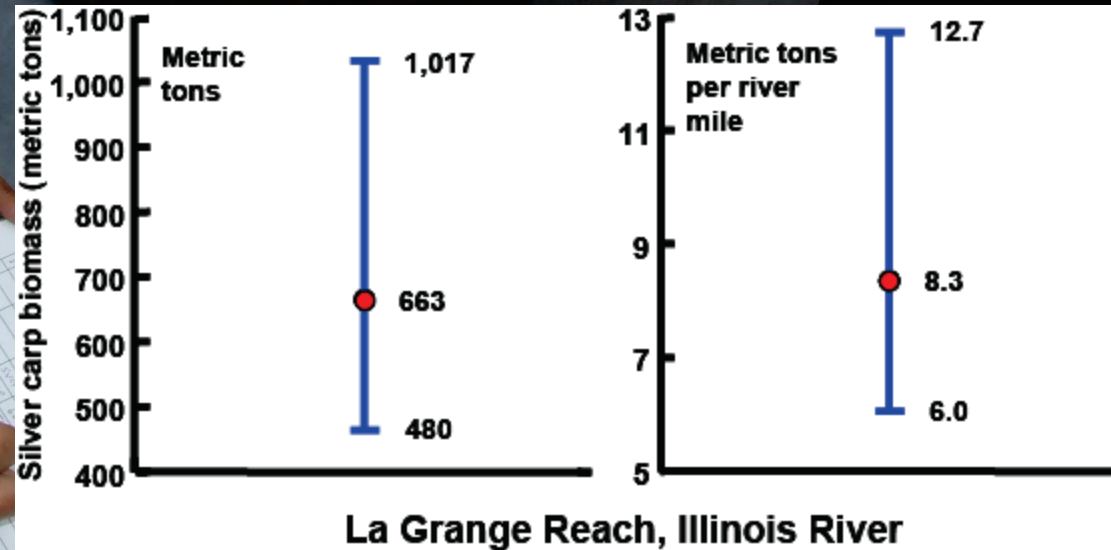


Mark and recapture Population Estimate – LaGrange Reach, Illinois River

(silver carp only)



As of December 7, 2007



As of December 7, 2007

Acoustic estimates

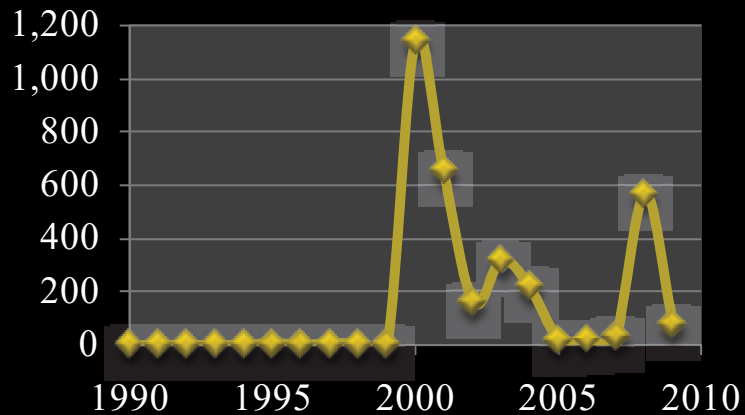
- Eight stratified transects completed on the main channel across 428 river km
 - 3,423 total river km sampled (2011)
- Biosonics DT-X split-beam echosounder
 - 208 kHz, 6.8° split
- Conducted during low river stages
- Main channel only, added backwaters in 2012 (analyses ongoing)



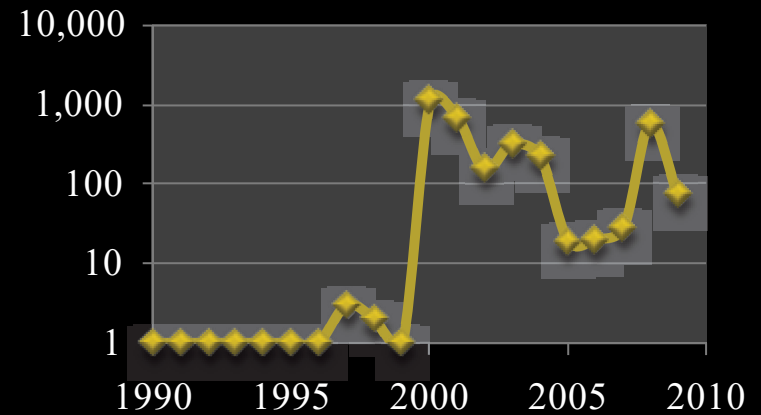


Abundance in LTRMP catches (numbers)

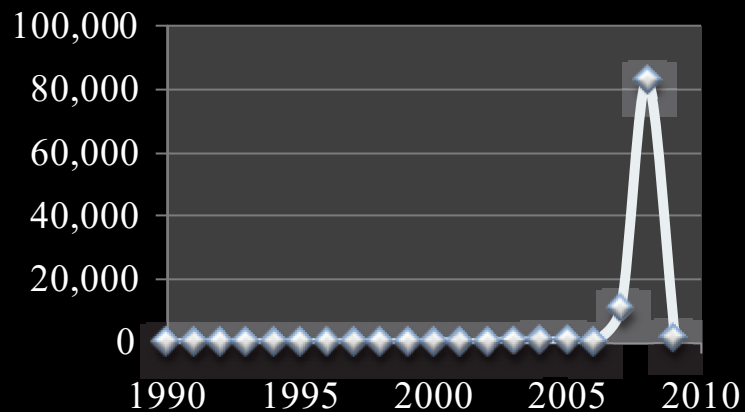
Bighead carp



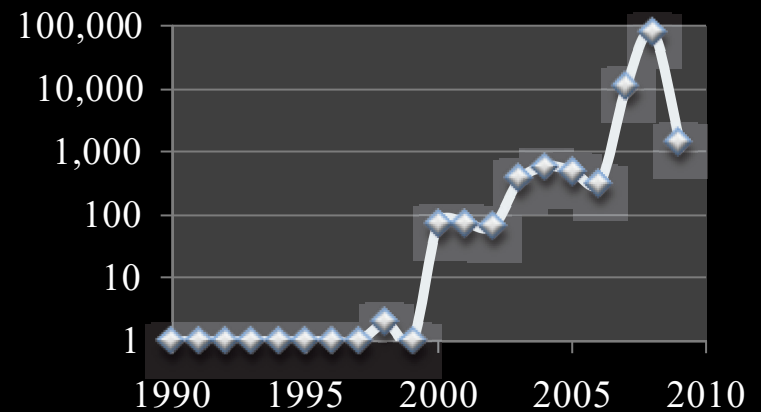
Bighead carp



Silver carp



Silver carp

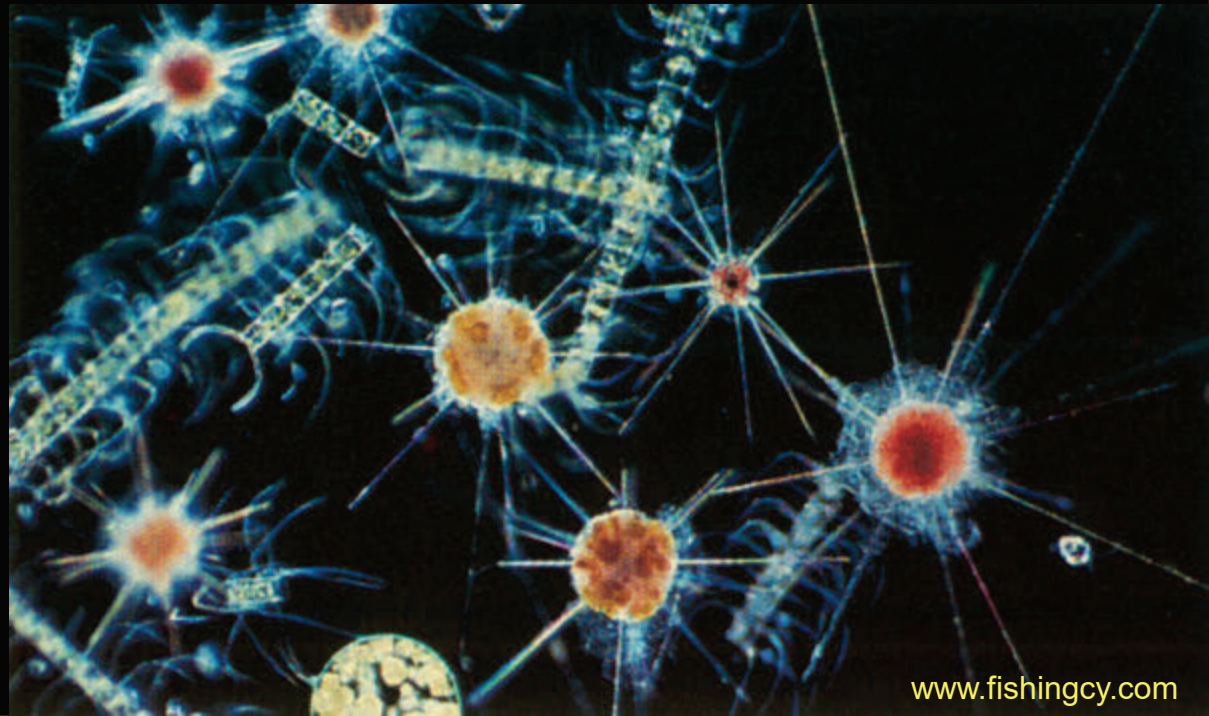




Zooplankton

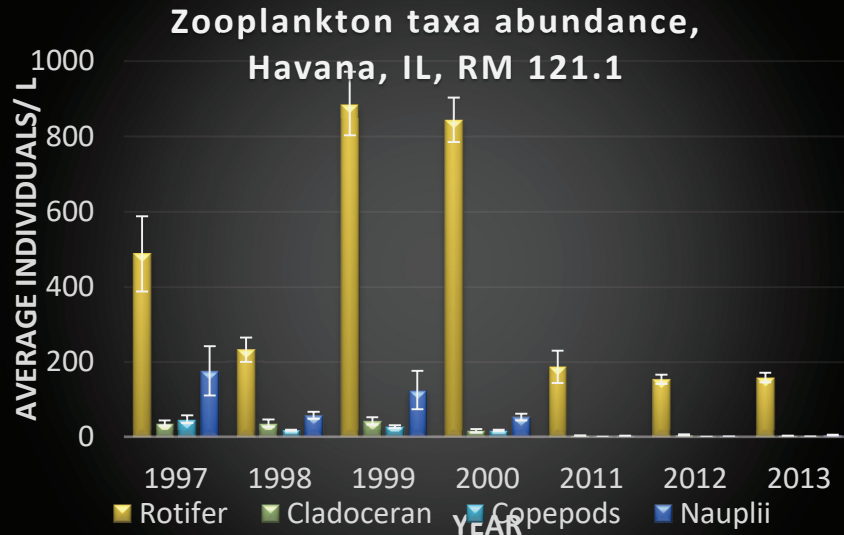


Phytoplankton



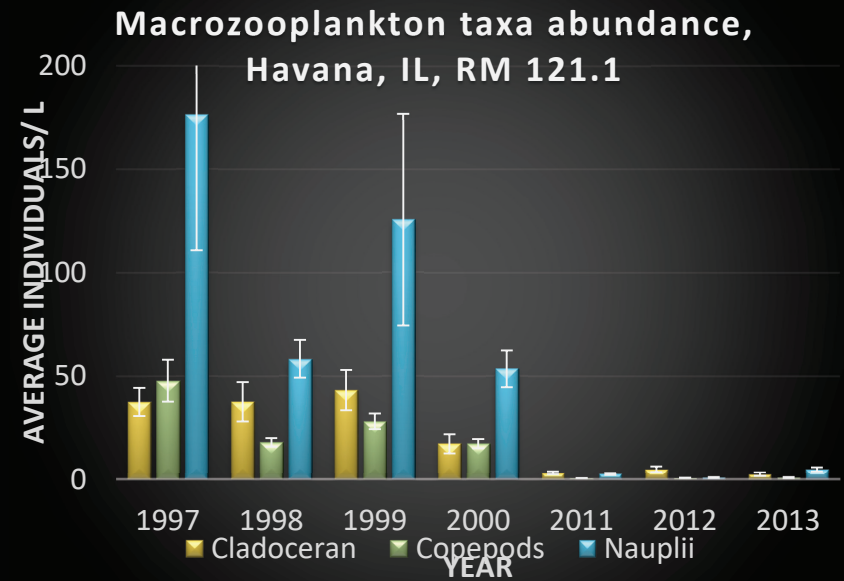




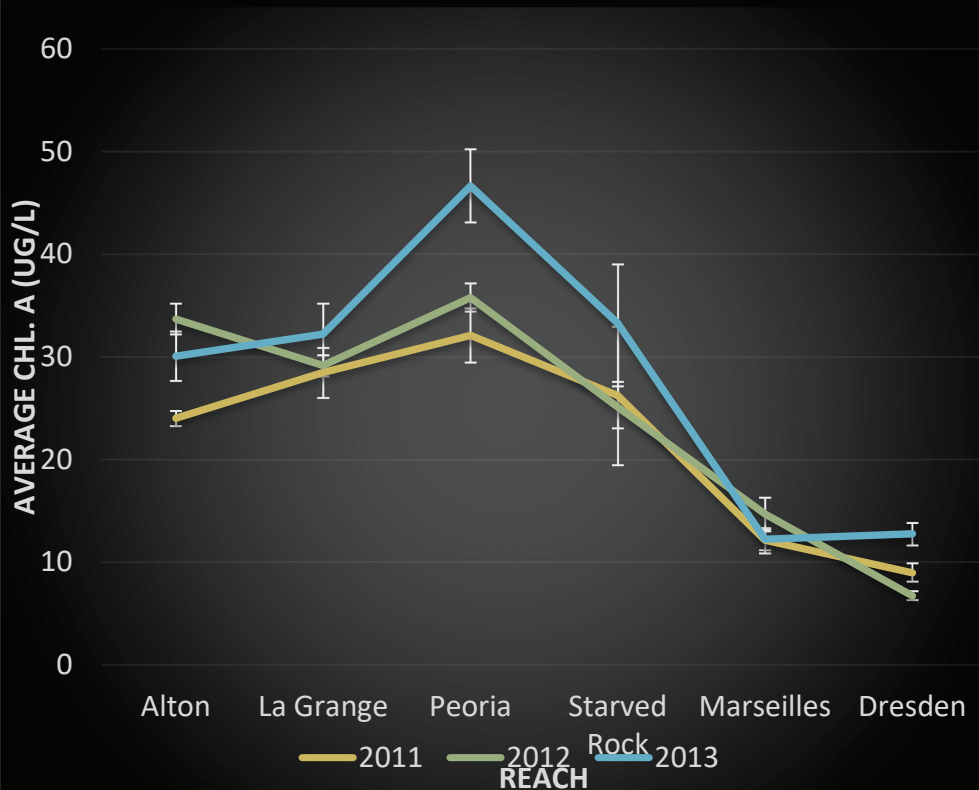


Zooplankton abundance and community composition

- Rotifers dominate the zooplankton community by number of individuals every year
- Unfortunately a data gap exists between 2000 and 2011
- All samples collected with 55um mesh



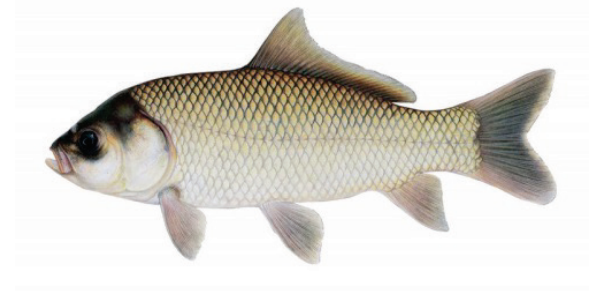
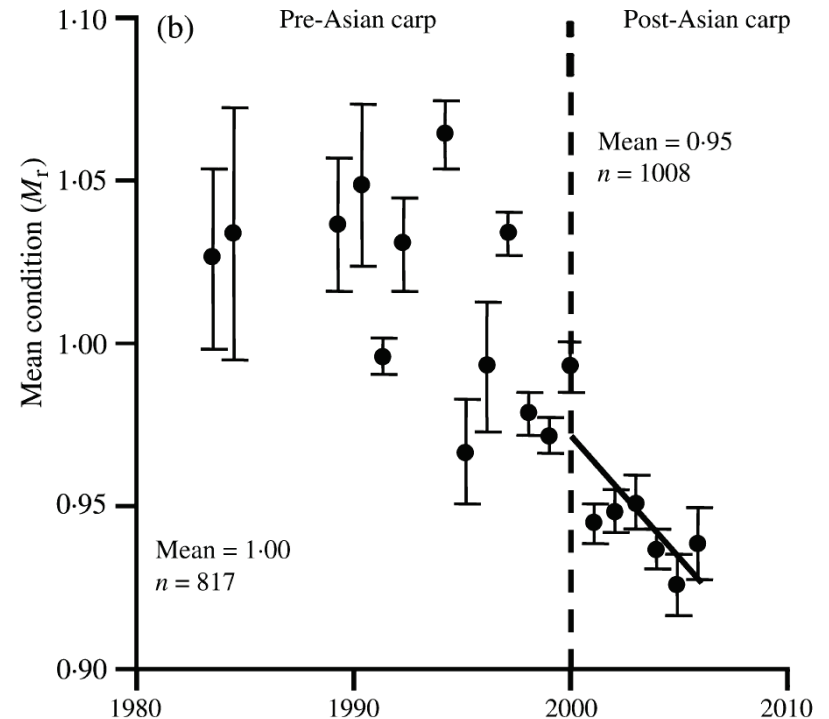
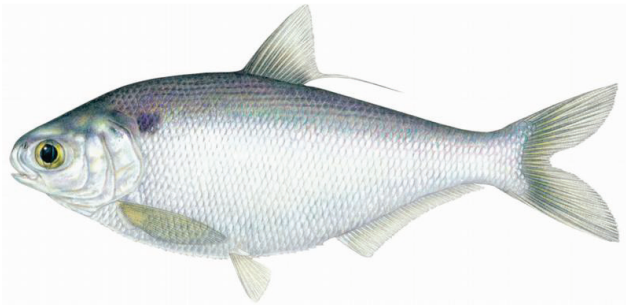
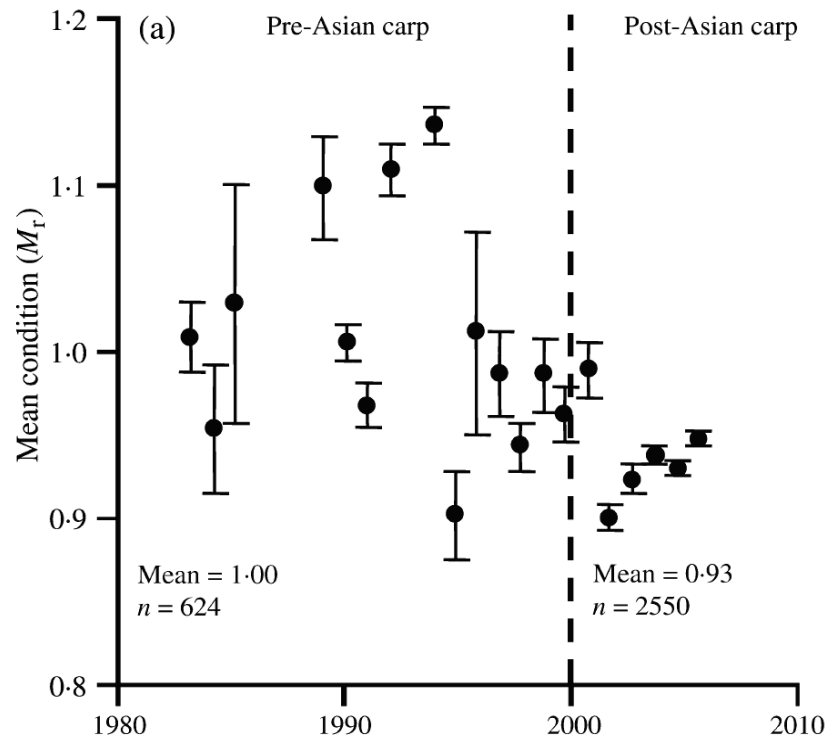
Primary Production



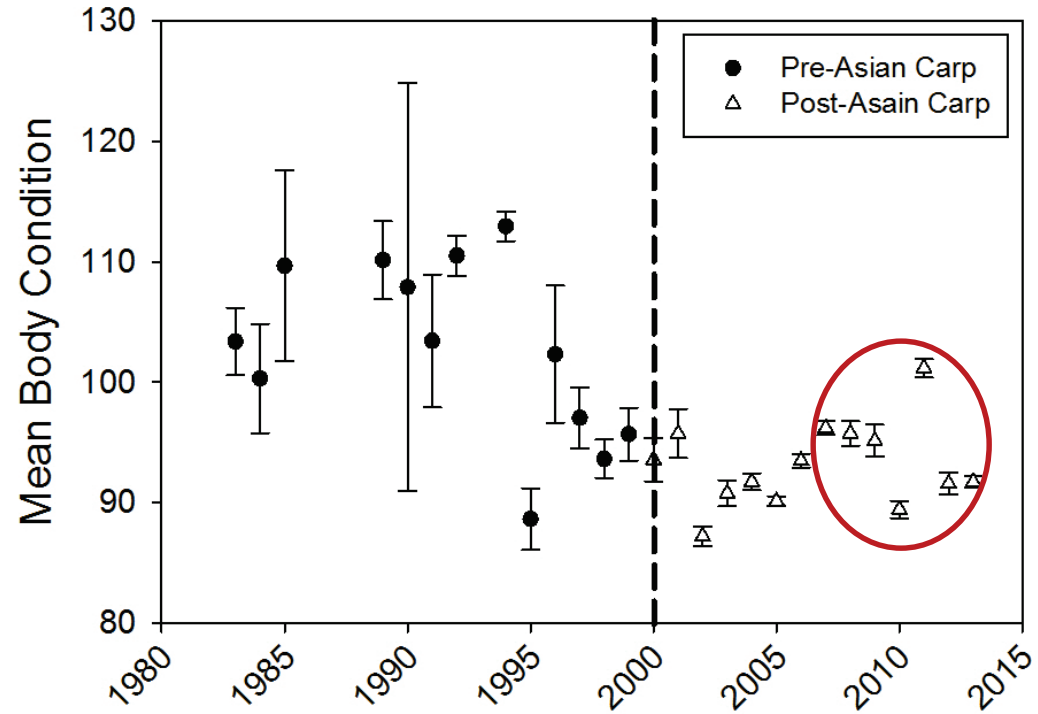
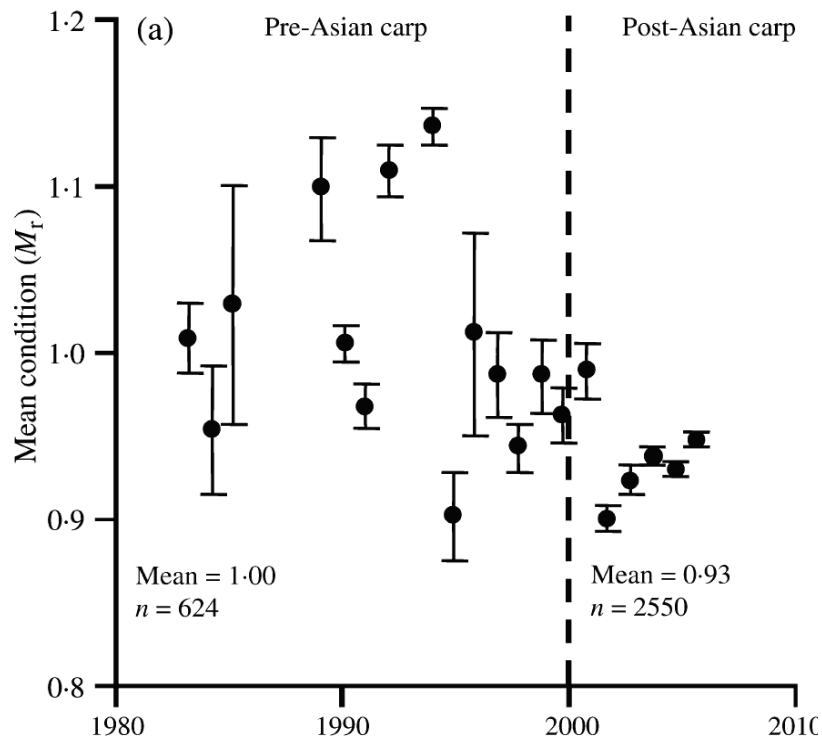
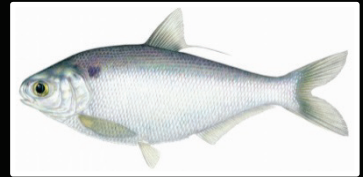
- Chl.a concentrations may help to explain silver carp distribution
- Elevated levels in the Peoria reach are likely due to the shallow, expansive habitat of Upper Peoria Lake

Native Planktivores

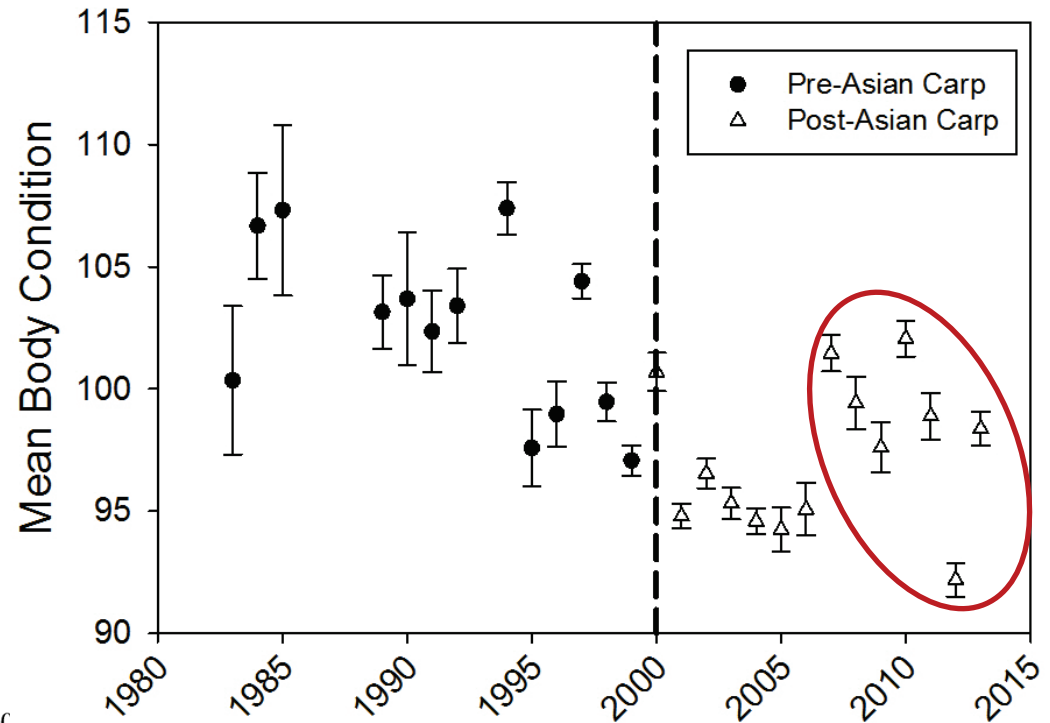
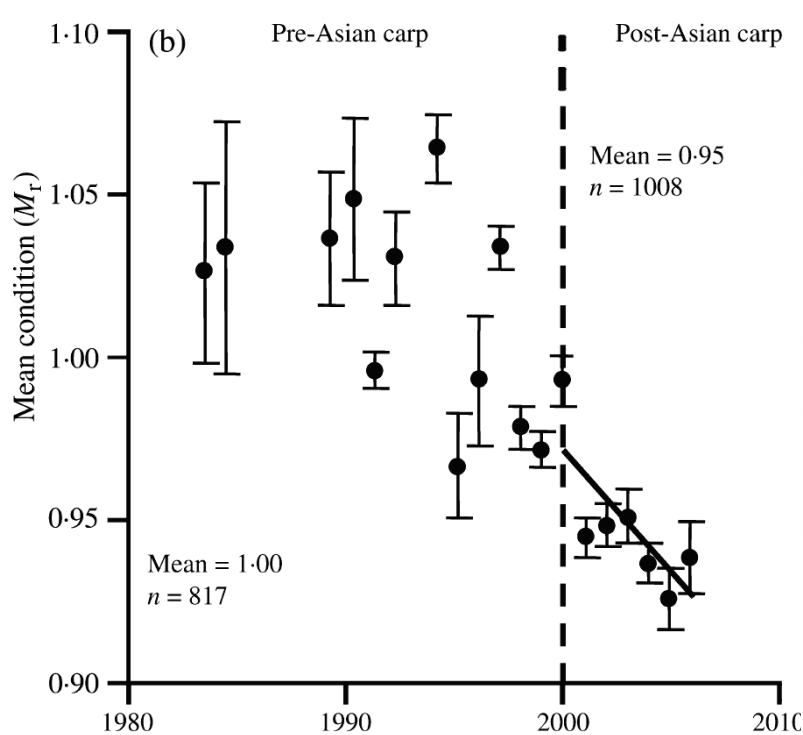
Figure from Irons et al. 2007



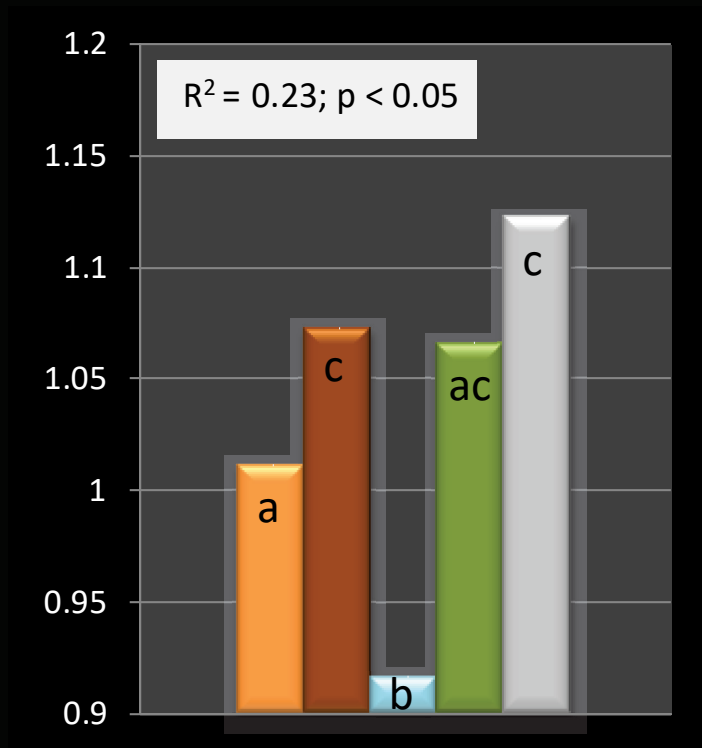
Gizzard Shad



Bigmouth Buffalo



Bighead carp Relative condition (K_n) x river



Illinois River

n = 101

Mississippi River

n = 146

Missouri River

n = 177

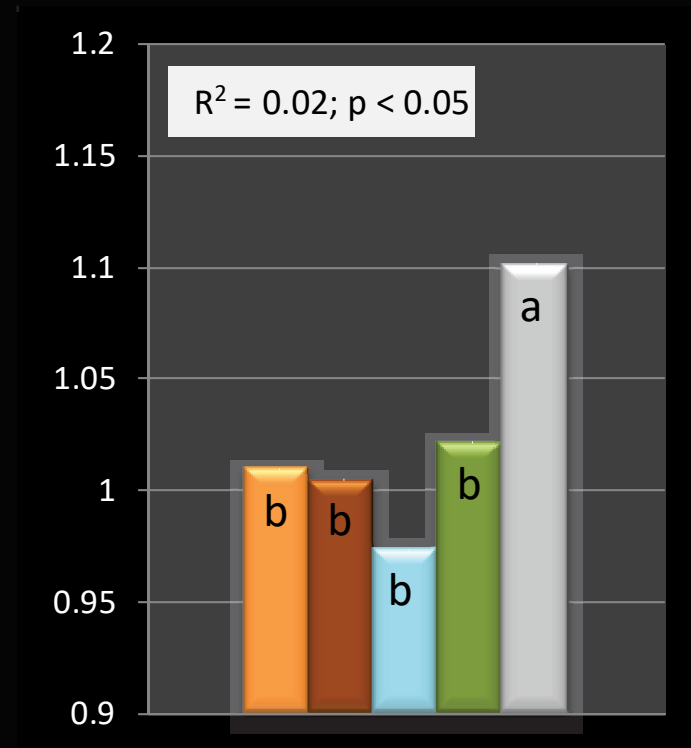
Ohio River

n = 122

Wabash River

n = 19

Silver carp Relative condition (K_n) x river



Illinois River

n = 1,229

Mississippi River

n = 497

Missouri River

n = 164

Ohio River

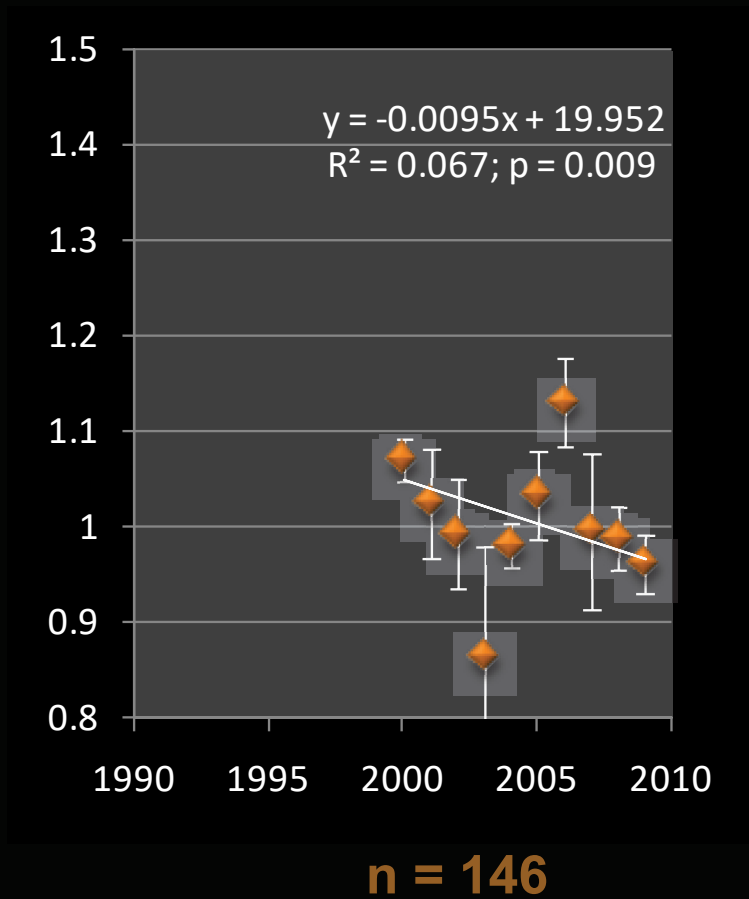
n = 194

Wabash River

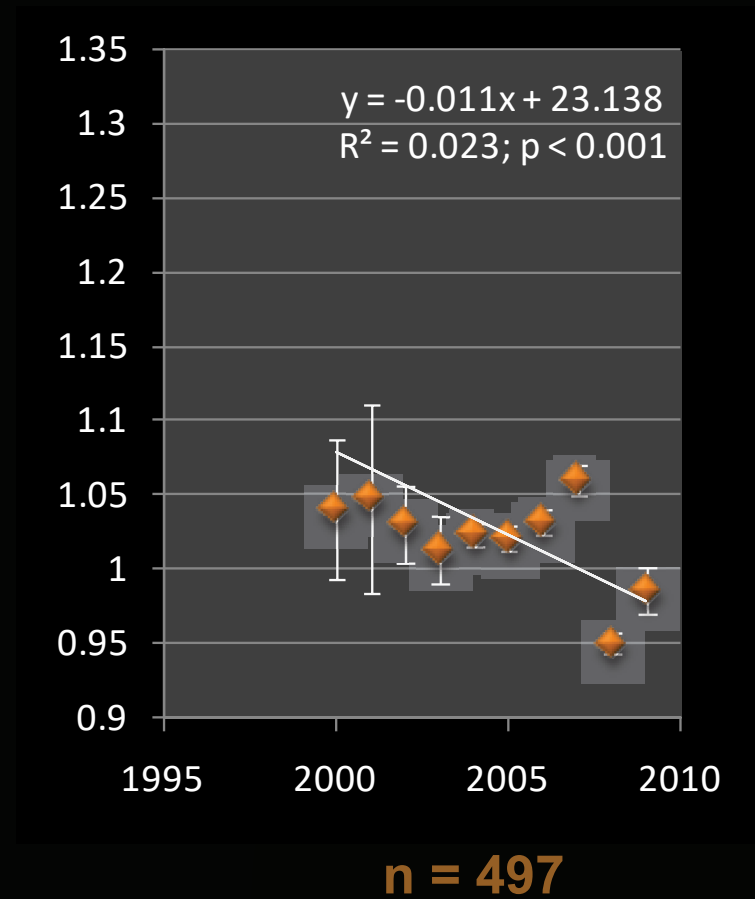
n = 67

Illinois River

Bighead carp
Relative condition (K_n) x year

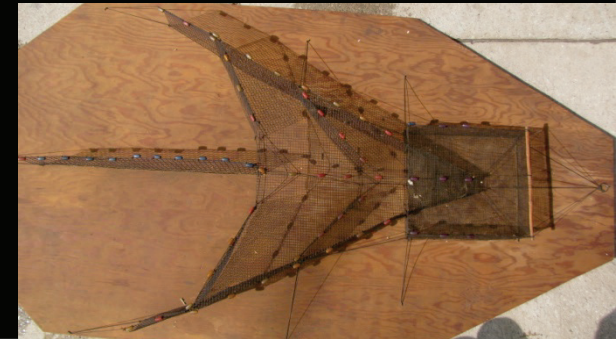
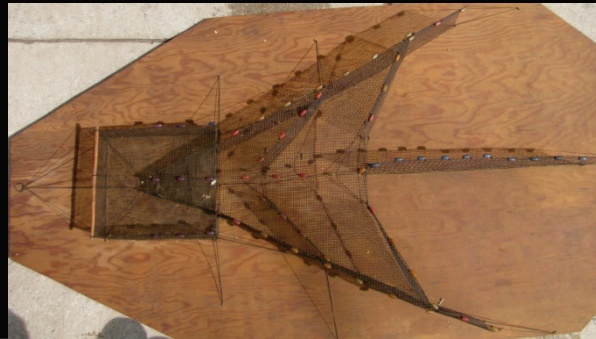


Silver carp
Relative condition (K_n) x year



Evaluation of new gears - INHS

- **No Asian carp were captured in the Great Lakes trap net in Lake Calumet over 107 net-days**
- The Great Lakes trap nets were highly effective at capturing Asian carp in the Material Services pit (Marseilles Pool) over 70 net-days
- Over 40 comparisons, surface-to-bottom gill nets caught more Asian carp than traditional gill nets per 4-hour set, whereas surface-to-bottom gill nets had similar catch rates to large mesh sinking gill nets per unit area of net
- Standard small (1.2 m diameter) hoop nets caught more Asian carp than large (2 m) hoop nets per net night
- Spreading soybean meal on the surface of the water did not attract Asian carp to feed





Small and Large Hoop nets



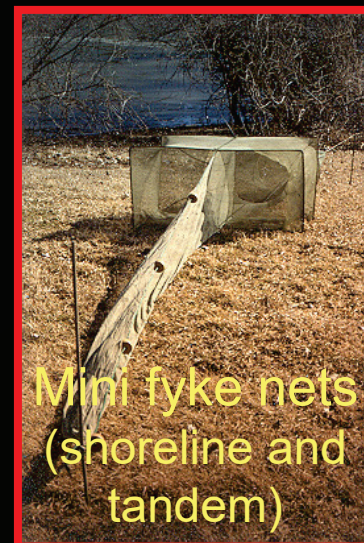
Gill and Trammel nets



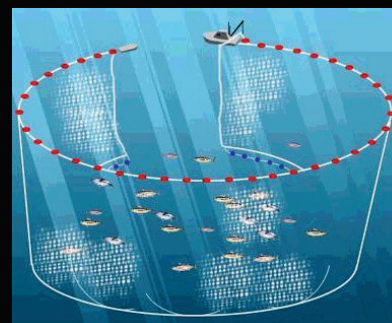
Electrofishing (Day and night)



Fyke nets (shoreline and tandem)



Mini fyke nets (shoreline and tandem)





Large Great Lakes Pound nets have been developed by ACRCC Gear Development Group led by IDNR

These surface to bottom traps can be fished for extended times and extended across large areas, such as mouth of Lake Calumet



Seines







8/2/2017



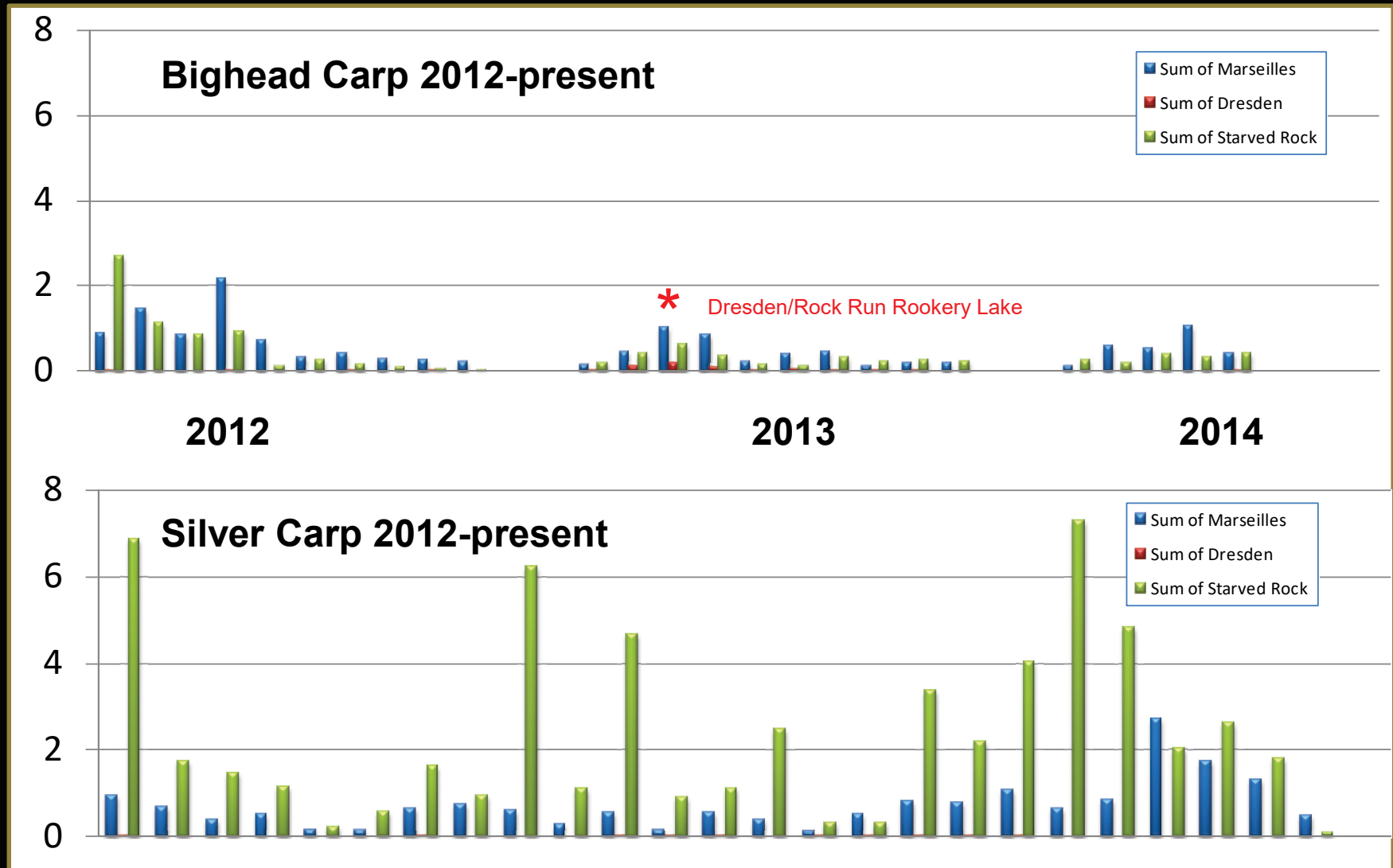
Contracted removal where commercial efforts are not permitted.



Reduced propagule pressure

Contracted Removal Efforts

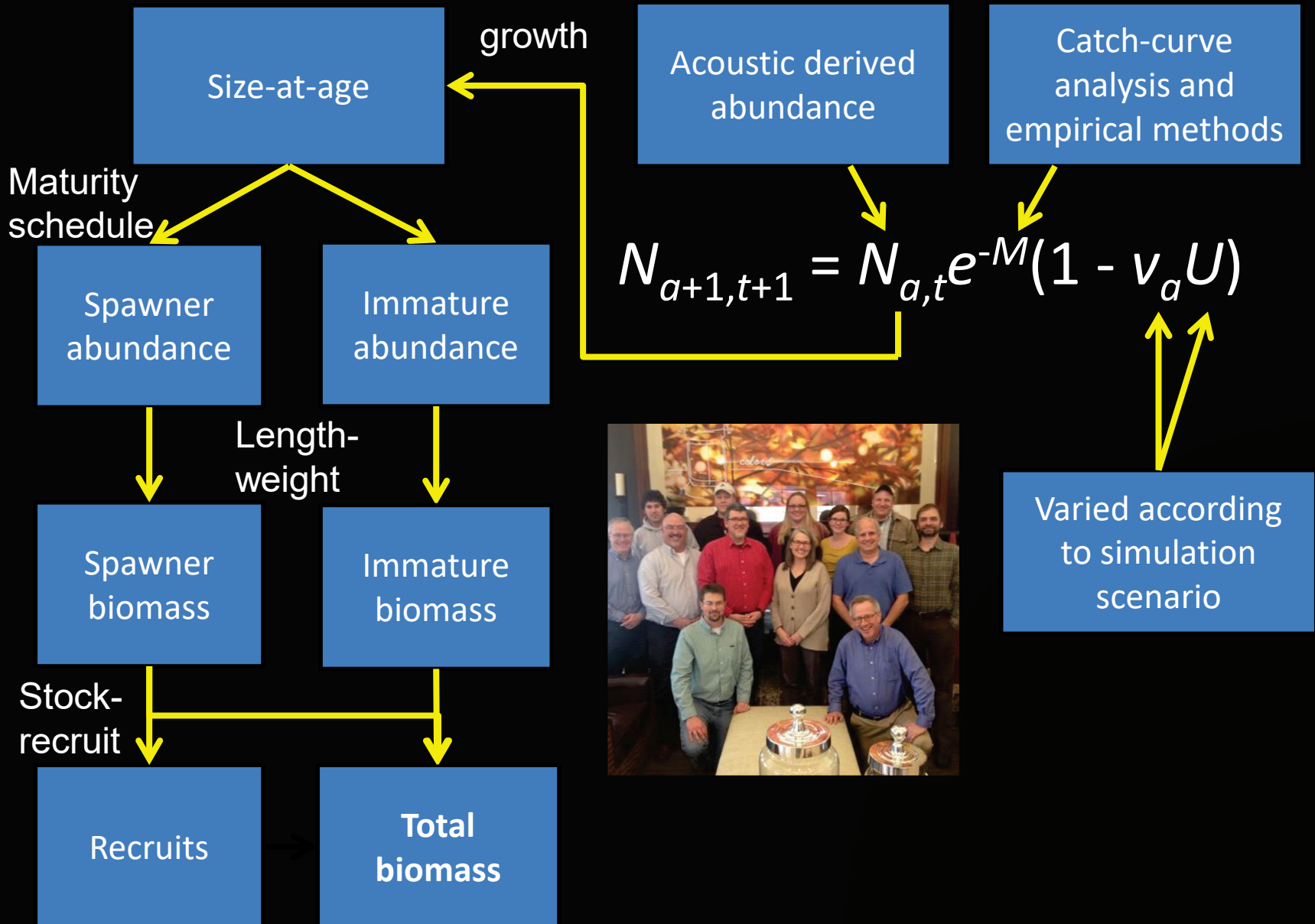
Upper Illinois River (Fish per yard of net set)



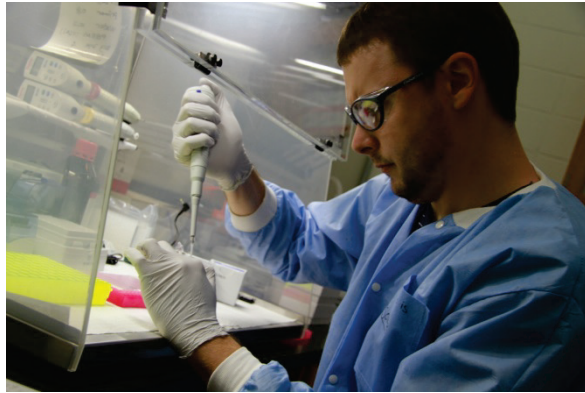
>2,600,000 lbs to date



Developed a Simple(?) Model



environmental DNA

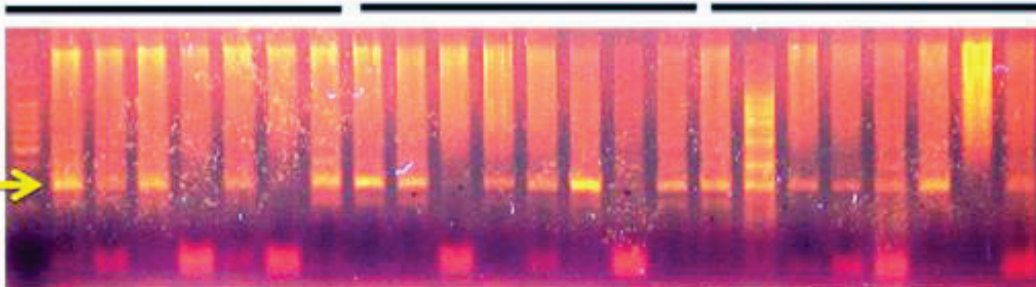


Replicates
from Site 1

Replicates
from Site 2

Replicates
from Site 3

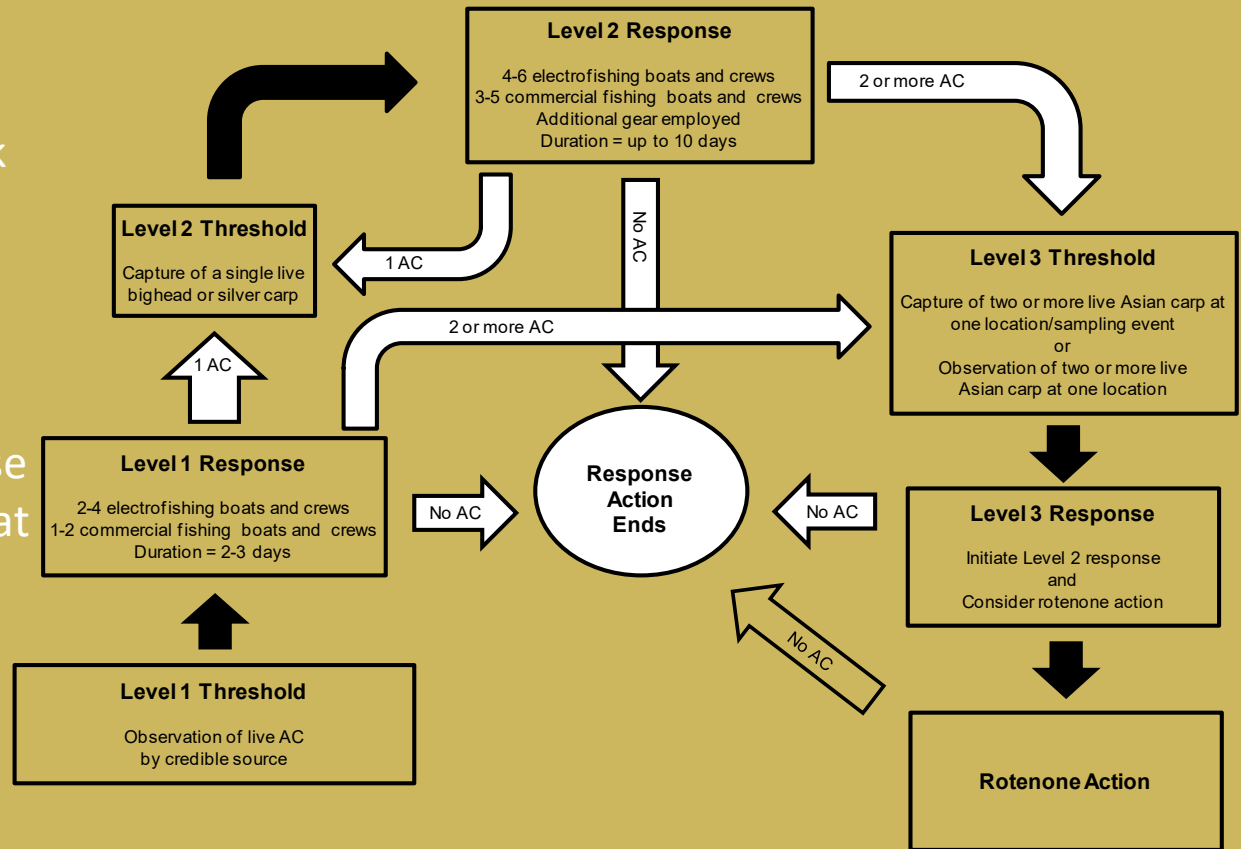
Silver
carp



Current Response Action Matrix

Remove AC for the CAWS upstream of Lockport Lock and Power Station when warranted

Determine AC population abundance through intense targeted sampling efforts at locations deemed likely to hold fish



Water Gun Development and Testing – USGS (also adding sound/complex sound assessments)



Alternate Pathway Surveillance in Illinois – Urban Pond Monitoring - IDNR

- Sampled 19 ponds with electrofishing and trammel/gill nets during 2012
- 727 person-hours spent to complete 30 hours of electrofishing and 6.2 miles of nets
- Collected 9,103 fish representing 29 species plus 2 hybrids
- 6 Bighead carp were removed from three ponds (Garfield Park, Humboldt Park, Joe's Pond)

*** 3 on exhibit at the
John G. Shedd Aquarium ***



Investigations of a Chemical Barrier to Deter Asian Carp – INHS

- Experiments at Osage Beach, MO, to quantify the impacts of CO₂ exposure on the stress response of larval silver carp and bighead carp
- Experiments at UMESC to quantify the impacts of CO₂ exposure on the behavior and stress response of fingerling silver carp and bighead carp. Preliminary analyses indicate that fingerling Asian carp will actively avoid water with CO₂
- Experiments to assess the impacts of short-term exposure on largemouth bass and bluegill
- Discussions ongoing between U of I and UMESC about field experiments to quantify movement and activity of free-swimming carp in a pond following exposure to CO₂
- **Discussions between U of I and various state and federal agencies (e.g., EPA) about permitting and permission issues related to large-scale field deployments of CO₂ barriers**



Alternate Pathway Surveillance in Illinois – Law Enforcement – IDNR

- Invasive species law enforcement unit was formed
- ISU logged 1,035 hours investigating invasive species issues
- ISU gained much intelligence from Chinatown operation
- Conducted a joint investigation with USFWS in which several charges and penalties were given to a fish hauler
- A multi-agency Asian carp task force was formed to share intelligence, information and plan future operations



Live fish in Markets
Education, Outreach, and Enforcement
FACT SHEET

While both Bighead and Silver Carp (Asian carp) are listed under the Lacey Act as illegal to transport alive, many local communities and/or markets have a desire to acquire Asian carp for consumption. If fish are alive, there is a risk of unintentional or intentional release into the wild according to proximity to local water bodies, ethnic customs or traditions, or purposeful releases. IL DNR has increased officer presence, friendly enforcement activities, and communications related to Asian carp. Since 2009 when a ban of live bighead and silver carp went into effect in Illinois, the Department has communicated with local management and regulatory entities such as the City of Chicago, Department of the Environment as well as industry representatives of the live fish market and suppliers. This has proved successful in promoting open dialogue between store owners, the public, and enforcement officials.



Recently, multiple, and repeated attempts in transportation of live Bighead and Silver Carp into Ontario Canada from the US has heightened concern of these species to be found alive in Northeast Illinois area fish markets. The desire for this fish stems from cultural familiarity with Asian carp in areas such as China and other areas around the world. These Asian carp are some of the most cultured fish in the world and can be found in food markets widely as well. Until the Lacey Act listed these as injurious, Toronto Ontario Canada had a live market estimated at \$5 million for Bighead Carp alone. Highly sought after for its food value, the head makes a high quality fish soup base.



In April 2012, IL DNR law enforcement and biologists visited live fish markets across Northeast Illinois (Chicago-land) to follow up on tips from concerned citizens regarding the sale of protected species of aquatic life and the sale of endangered and/or invasive species. Transportation and source of these species is also a concern. IL DNR law enforcement routinely inspects facilities such as these every few years to maintain vigilance in this matter.

Over two days 32 businesses were visited in the Chicago-land area. Several had minor permit violations for not having an Aquatic Life Retail/Wholesale license with 25 written warnings issued and 3 citations written. A host of aquatic species were found in these markets (Table 1) they included numerous fish, turtle, frog, and crustacean species. No Federal or Illinois endangered or threatened species were discovered. Only freshwater aquatic species fall under the IL DNR enforcement mandate, but other salt water species of fish, crustaceans, and mussels were noted and a plethora of frozen products were also seen.



Retail Live Bait Surveys



New gears and capture technologies:

Experimental trawls; experimental gill nets

Deployment of novel gears, targeting smaller fish

Pheromone research

Nutrient modeling to predict Asian carp locations where rare

Use of Hydro-canon deterrent/barrier/eradicator



Illinois River

Items came from a 2010 Marketing summit

Commercial harvest Incentives Market development



Innovative Kosher Products!

Franks	Gefilte Fish	Salami
NEW!	NEW!	NEW!
✓ Kosher parve	✓ Kosher parve	✓ Kosher parve
✓ Fully cooked	✓ Fully cooked, ready to eat	✓ Fully cooked
✓ 1 lb (16oz) package with 8 hot dogs	✓ Up to half the cost of other leading brands	✓ 1 lb (16oz) tube
✓ High in protein	✓ No MSG	✓ High in protein
✓ High in omega-3	✓ No GMO	✓ High in omega-3
✓ No MSG	✓ Gluten Free	✓ No MSG
✓ No GMO	✓ Low cholesterol and sodium	✓ No GMO
✓ Gluten Free	✓ Better than home-made	✓ Gluten Free
✓ Low cholesterol and sodium	✓ Stores for up to 6 months in refrigerator with no preservatives	✓ Low cholesterol and sodium
✓ 0% fat and only 90 calories	✓ Made from wild caught carp and white fish or northern pike	✓ 3.5% fat and only 70 calories
✓ Made from wild caught carp		✓ Made from wild caught carp



<http://agricultureguide.org/fishmeal-plants/>

http://www.bombayharbor.com/Product/10959/The_Fish_Meal.html

2013/2014 USGS Demonstrations

Water Gun + attractant + commercial fishers = SUCCESS?



- CO₂
- feeding lures



Truly an Integrated Pest Management Approach



Examples of Regional Coordination

- **Council of Great Lakes Governors AIS Task Force – mutual aid agreement, most wanted list**
- **Monitoring and Sampling Plan for Asian Carp in Illinois River and Chicago Area Waterway System**
- **ANS Basin Panels – information sharing**

“Who You Gonna Call?”

Wisconsin
DNR

Indiana
DNR

Minnesota
DNR

Quebec
SDEFCC

Pennsylvania
DEP

New York
DEC



Illinois
DNR

Michigan
DNR

Ontario
MNR

ANS BUSTERS

Future Direction

How should we think about regional and national strategies and resources to continue the momentum?

- **Is there a potential for a funding program similar to federal aid model?**
- **Must have ability to be flexible to adopt new approaches quickly, efficient**
- **Engagement models to inform and guide**
- **Effectiveness measures are important**

Questions?



Danny Brown

