
Asian Carps
A New Urgency

Imagine the Mississippi River like this.

Imagine the St. Croix River like this.

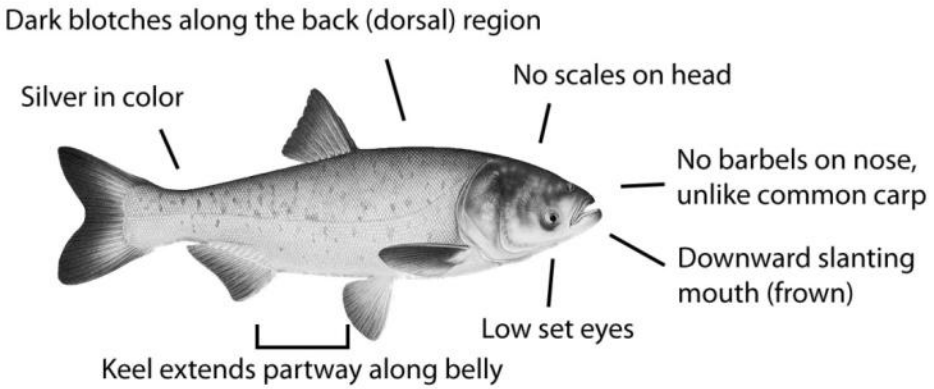
Silver carp near Havana, Illinois. http://prairierivers.org/tag/great-lakes/

Asian Carps die off below L&D 26.
March 10, 2011.
Would you want to walk your dog along this beach?

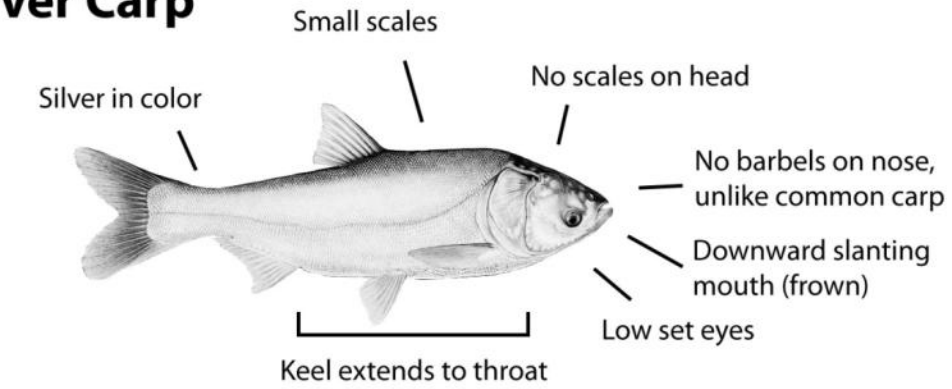
Photo: National Great Rivers Research and Education Center

4 Species of Asian carps are coming

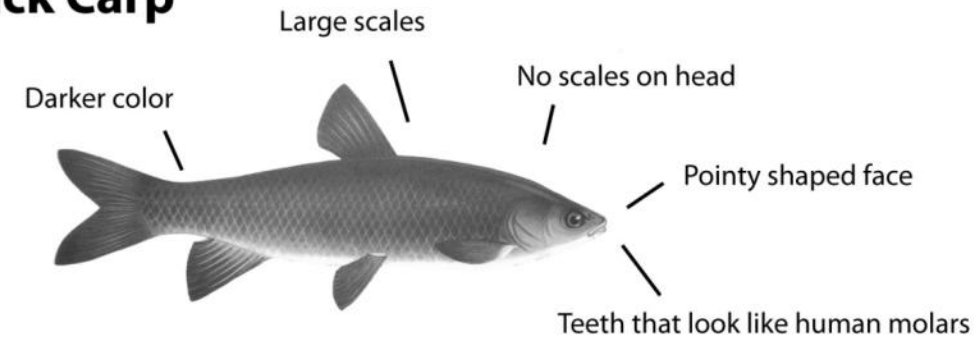
Bighead Carp



Silver Carp



Black Carp



Grass Carp

Source: Jay Rendall, DNR

http://www.asiancarp.org/documents/WhatToDoIfYouFindAnAsianCarp.pdf

Source: Jay Rendall, DNR

Grass Carp

- History – Grass carp imported in 1963 by aquaculture operations in Alabama and Arkansas. It is not known when they first escaped, but by the 1970s, grass carp had been taken from the Missouri and Mississippi rivers.
- Adults consume massive amounts of aquatic vegetation, eliminating habitat needed by native fish.

Grass Carp, continued

- They excrete up to half of what they eat undigested, changing aquatic habitat and causing water quality problems.
- Maximum observed weight – 99 pounds.
- Spawning patterns similar to other Asian carps.
  - Spawn with water level rises.
  - Multiple spawning times over a year.

Silver Carp

- History – Fish farmers brought Silver carp to the southern U.S. in 1973 to control algae (phytoplankton) in ponds and also as a food fish. By 1980, Silver carp had escaped into the Red River system in Louisiana but may have come upstream from Arkansas.

Note the chicken wire and poles.

http://www.cerc.usgs.gov/Branches.aspx?BranchId=40

Silver Carp

- Feed on phytoplankton and zooplankton, as do native filter feeders and fingerlings.
- Weigh 40-60 pounds as adults.
- Can jump up to 10 feet in the air when disturbed.
- Tendency to school.
- Have seriously injured boaters, and make recreational use of rivers and lakes difficult and dangerous.

Bighead Carp

- History – A fish farmer in Arkansas imported Bighead carp into the U.S. in 1974. By the 1980s, they had escaped into the Ohio and lower Mississippi rivers.

Why is he smiling?

http://www.in.gov/dnr/files/BIGHEAD_CARP.pdf

111 lb. Bighead carp taken in Lake of the Ozarks, MO, April 23, 2011

Courtesy of The Oar House Inn and Marina, Warsaw, MO

Bighead Carp

- Prefer zooplankton and but also eat phytoplankton - both needed by some native species.
- Reach 90 pounds or more – like 111 pounds.
- Females produce 226,213 to 769,964 eggs
- Spawn with water level rises.
- Multiple spawning times over a year.

Black Carp

- History – Imported unintentionally with grass carp during the early 1970s. More intentional use began in the 1980s.
  - Used as a food fish and to control a snail borne parasite - “yellow grub.”
  - In 1994, more than 30 black carp escaped from an aquaculture pond in Arkansas.
  - However, many of the black carp in the lower Mississippi River may have come from flooding of fish farms there.

http://www.cfr.msstate.edu/wildlife/symposium/index.html

Black Carp

- Molluscivores, which means they eat mussels and snails. For this reason, they could reduce or extinguish mussel species and take away food sources for native fish, waterfowl and vertebrate populations.
- Fingerlings and fry feed on zooplankton.
- Adults feed on mollusks and crustaceans as adults." (FishPro Study 2004). Also feed on freshwater shrimp, crawfish and insects.
- Maximum observed weight – 150 pounds.

Black Carp, continued

- Spawning patterns similar to sliver and bighead carp.
  - 129,000 to 1,800,00 eggs per year.
  - Multiple spawning times over a year.
  - Spawn with water level rises.

Ecosystem, Economic and Recreation Concerns

- Asian carps outcompete native fish.
  - Asian carps are 80-90% of the fish biomass of Illinois River.
- Asian carps take away food and habitat needed by native waterfowl.
- Economic losses come with reduced spending on fishing, hunting, and boating.
- Recreation suffers because Silver carp can make boating and swimming dangerous.
  - http://www.freshwaterfuture.org/resources/asian-carp.html

Recreational Hazards

http://www.dailymail.co.uk/news/article

Something to Consider

- Dr. Kelley Smith is the chief of the Michigan Department of Natural Resources' (MDNR) Fisheries Division.“ As a general rule of thumb, if walleye like it, carp will like it,” Escanaba Daily Press, April 12, 2011 (Bredin 4-13-11)

Current Effort

- January 2011, the Mississippi National River and Recreation Area (MNRRA) decided that we needed to learn more about Asian carps and how they might threaten our 72 miles of the Mississippi River.
  - We wanted to know where the invasion front was for each of the four species coming at us – the black, grass, silver and bighead.
  - We wanted to know how long it might be before they reached us.
  - We wanted to know who was working to stop or delay their advance up the Mississippi.
- So, we called a meeting of the Corps of Engineers, Department of Natural Resources (DNR) and U.S. Fish and Wildlife Service (FWS) in January 2011.

What We Learned

- No one knew where the invasion fronts were.
- No one knew how soon they might be here in large numbers.
- No one was doing anything to stop or slow their advance up the Mississippi River.

Not a New Concern

- Lots of good work had been done by the DNR and FWS, but actions had stalled.
  - 2007 National Plan
  - 2007 State Plan
- Except for some strays, Asian carps did not seem to be moving upriver too fast.
- It's hard to maintain a constant state of alarm.

Ad Hoc Task Force

- Everyone at the first meeting agreed that we needed to keep meeting.
- Since January we have met four more times.
  - The DNR is co-chairing what has become an Ad Hoc Task Force with MNRRA.
- Initial Goals
  - Determine where the carp were
  - Develop and Action Plan

Task Force Members

- National Park Service (co-chair)
  - Mississippi National River and Recreation Area
  - St. Croix National Scenic Riverway)
- Minnesota Dept. of Natural Resources (co-chair)
- US Army Corps of Engineers, St. Paul District
- US Fish and Wildlife Service
- US Geological Survey
- Wisconsin Department of Natural Resources
- Minnesota Dept. of Transportation
- Three Rivers Park District
- City of Minneapolis
- City of St. Paul
- City of Hastings
- Prairie Island Indian Community
- Shakopee Mdewakanton Sioux Community
- Saint Paul Port Authority

- <u>Technical Advisors</u>
  - University of Minnesota - Peter Sorensen & Lauren Miller
  - Mississippi River Fund
  - St. Croix Valley Foundation

- <u>Observers</u>
  - Friends of the Mississippi
  - Upper Mississippi River Waterways Association
  - St. Croix River Association

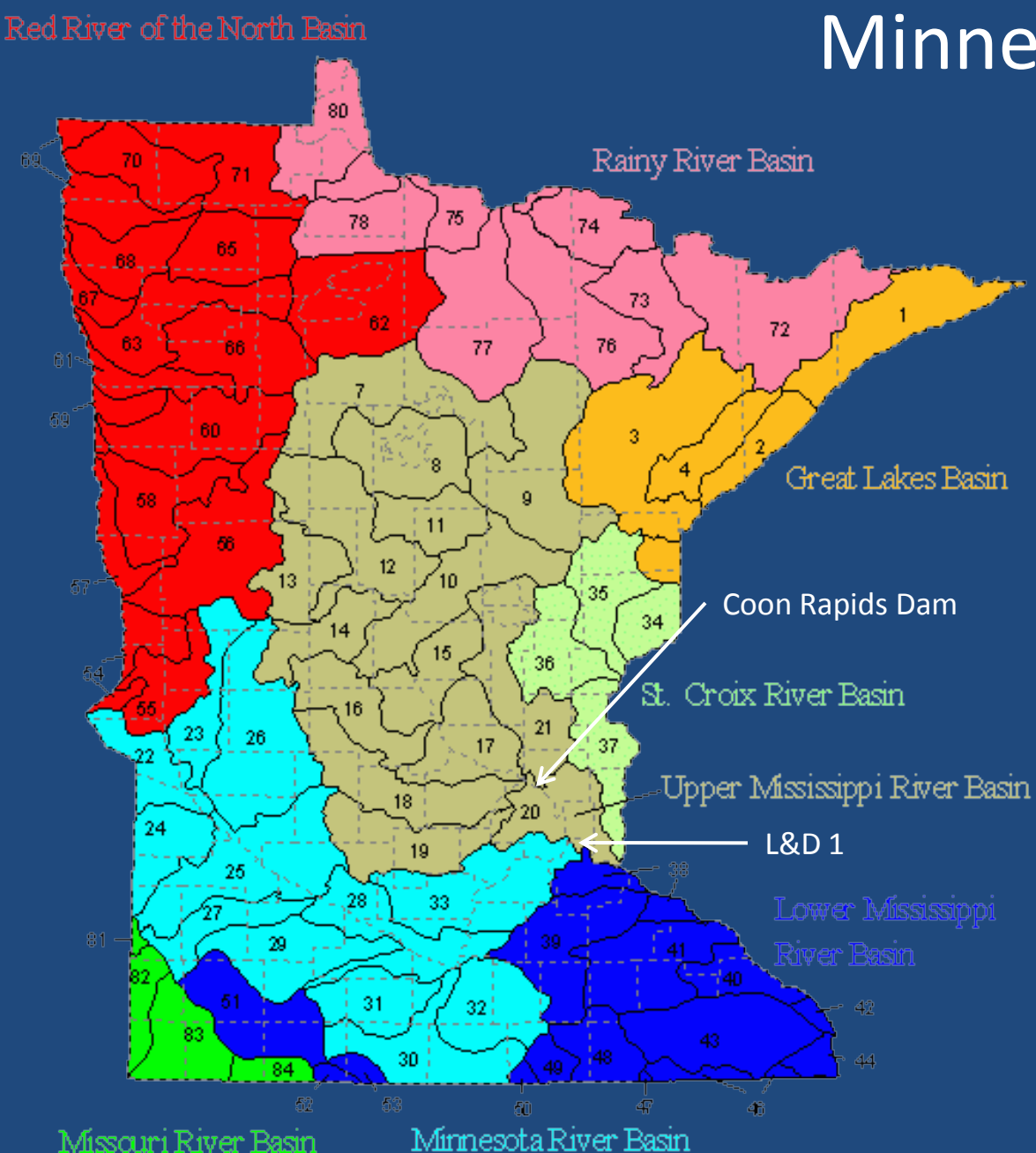
Minnesota Aquatic Invasives Coalition

- Started by the National Wildlife Federation, this a group of NGOs who have come together to address the Asian carps invasion.
- They meet on a conference every two weeks.
- They are developing a separate action plan from the Task Force, although they have many of the same strategies in mind.

National Wildlife Federation Minnesota AIS Coalition

- Izaak Walton League
- Becker County Coalition of Lake Associations
- Audubon Society
- Friends of the Mississippi River
- National Wildlife Federation
- Minnesota Conservation Federation
- MN Center for Environmental Advocacy
- Minnesota Waters
- And others

Major Basins and Watersheds of Minnesota



- As Asian carps come up the Mississippi River, these are the watersheds they will invade, except for the Red, Rainy and Great Lakes basins.

http://www.dnr.state.mn.us/watersheds/map.html

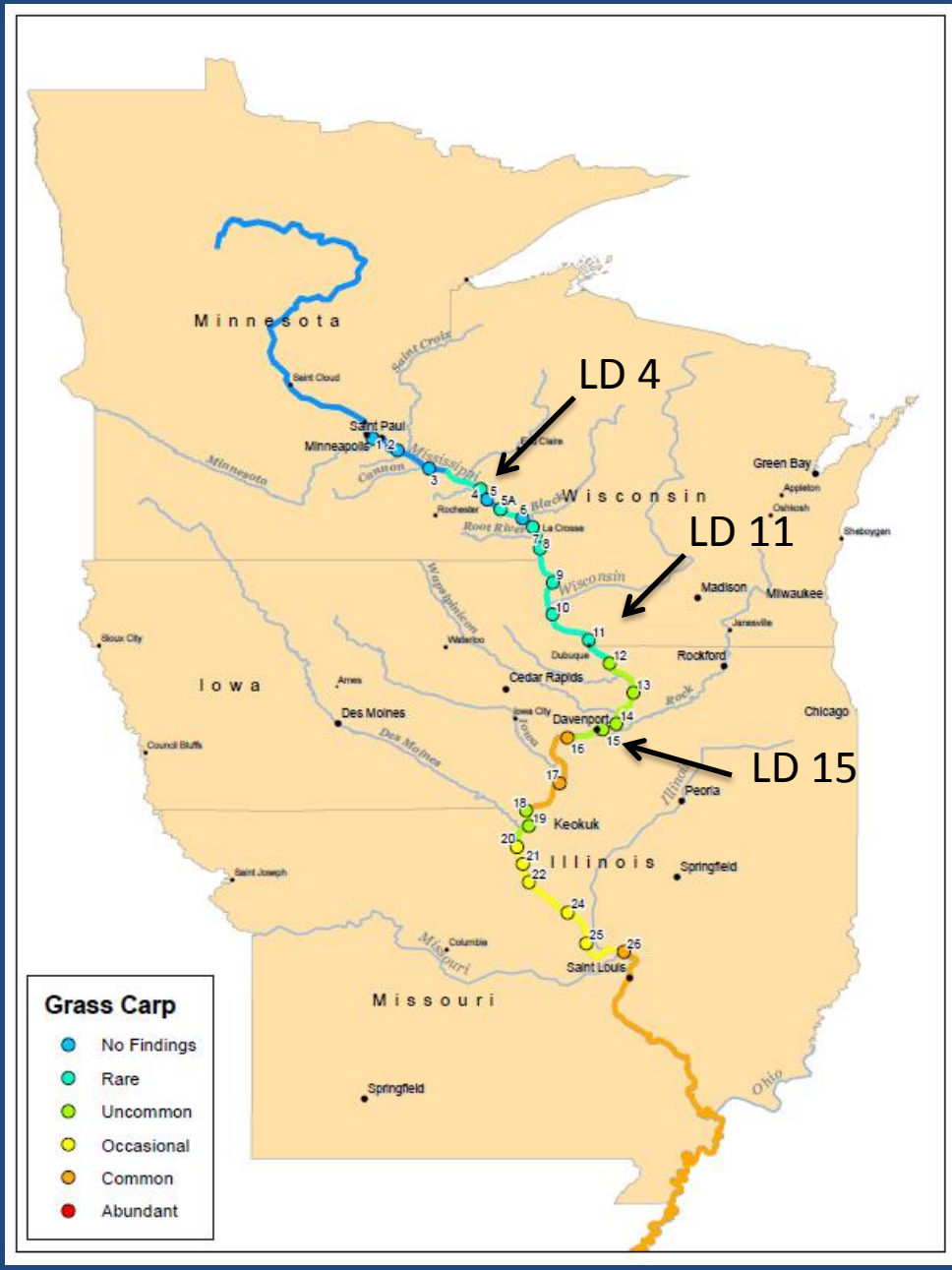
Where are they?

What is the Ad Hoc Task Force doing?

- Data Collection
  - Gathering and collating fish sampling data from state and federal efforts on the upper Mississippi River.
  - The following maps reflect what we've learned.
- eDNA Testing
- Action Plan

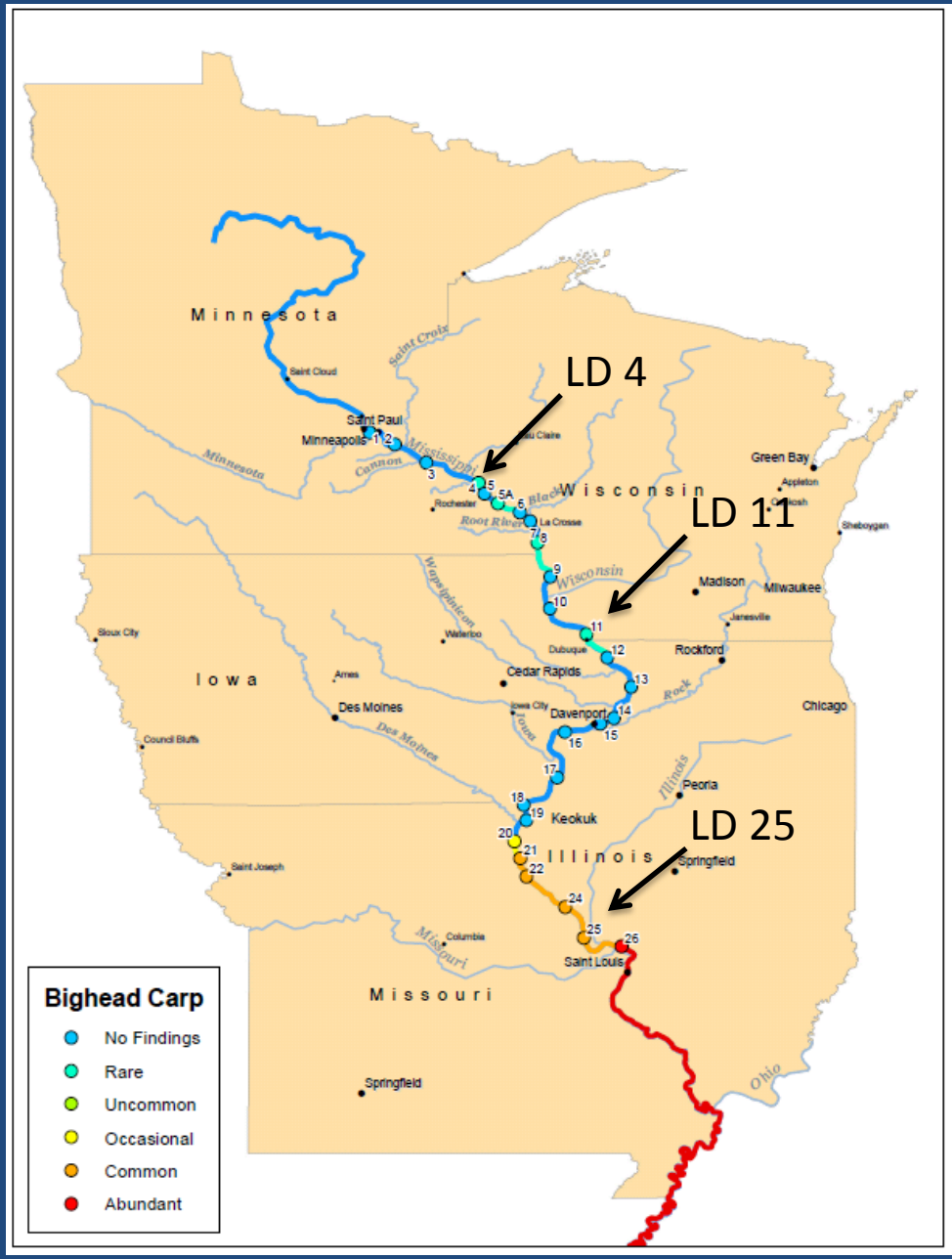
Grass Carp

- Individuals have been found as far north as Pool 4.
- Occur in extremely low numbers upriver of Pool 11
- Exist in small numbers from Pool 12 to Pool 15
- Currently, grass carp are found throughout the Mississippi River starting in Pool 16.
- A “Pool” is the reservoir above a lock and dam.



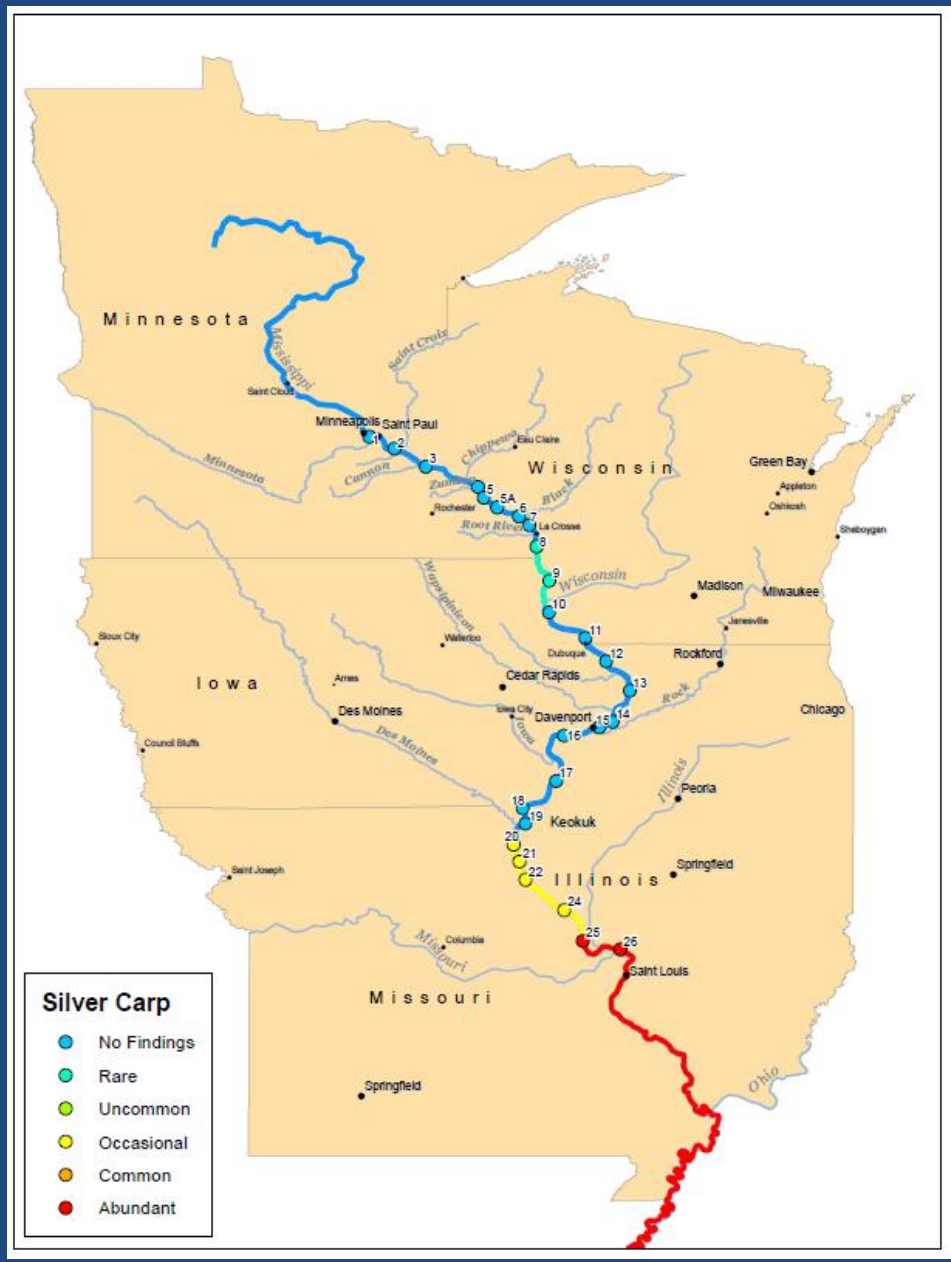
Bighead Carp

- Currently, there are large populations of bighead carp downriver of Pool 25.
- They are found throughout the Mississippi from Pool 21 through 25, and they exist in limited numbers in Pool 20.
- Individual bigheads have been caught in Pools 4 and 11 and two have been caught in the St. Croix (1996 & 2011).

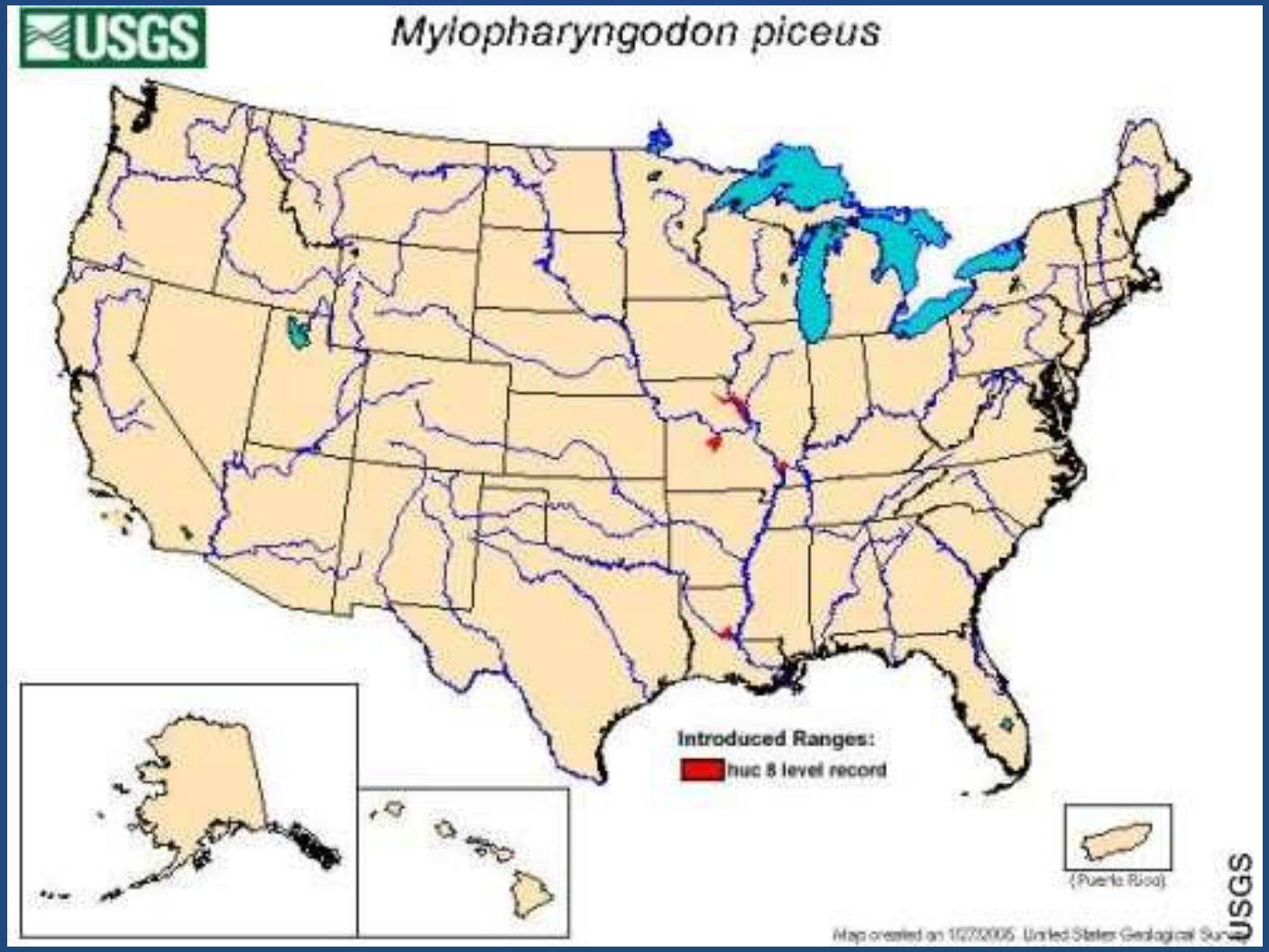


Silver Carp

- Currently, large populations of silver carp are found in the Mississippi in Pool 25 and downriver .
- Silver carp exist in limited numbers in Pool 20 through Pool 24.
- River conditions ideal for the spread upriver this year and last.
- Positive eDNA for Silver carp in the St. Croix June 2011.



Black



- Mostly in Missouri, we think or hope.

eDNA Testing

- Environmental DNA or eDNA testing is done by collecting water samples from the surface of a water body and then analyzing the samples in a lab.
- Positive results mean that the DNA of a species tested for is present but does not always mean a fish is present. Most often, however, a positive result means the fish species tested for is in the water.

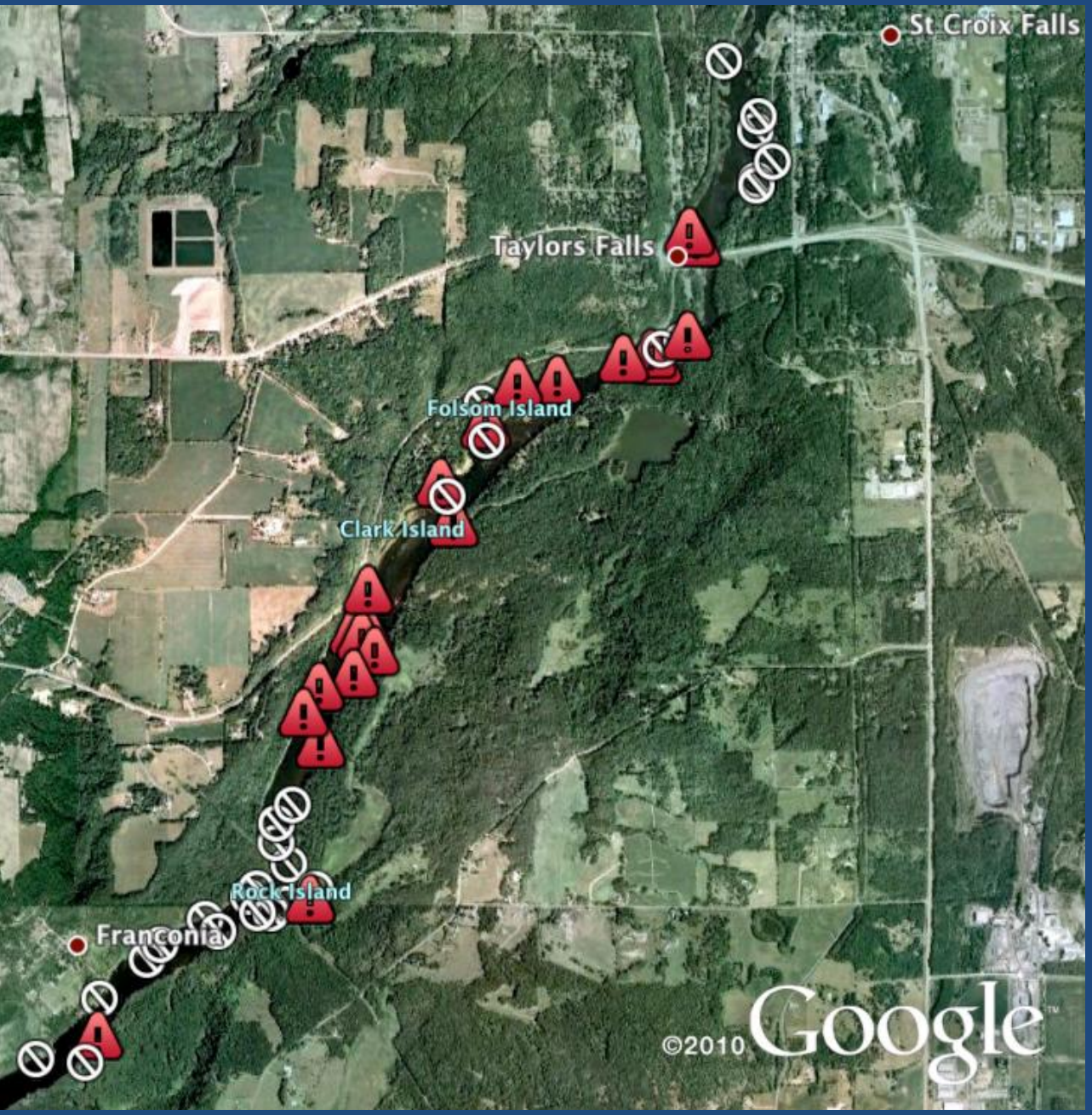
eDNA Testing

- Conducted on the St. Croix River on June 28.
  - Sampling done from below the dam Taylors Falls, MN, to Franconia, MN.
  - About a 4-mile stretch of river.
- Conducted on the Mississippi River on June 29.
  - Sampling done from Lock and Dam No. 1 (Ford Dam) down to the mouth of the Minnesota River.
  - A stretch of just over 3 miles.
- Testing looked for Silver, Bighead and Black carp.

eDNA Testing below Lock & Dam 1

Testing below Lock & Dam No. 1

- All 50 samples were negative for the 3 species.
- Testing conditions were not good. The river was at flood stage. So, the testing may have missed any DNA present in the water.



eDNA Testing below Taylors Falls.

Red = positive for Silver carp.

Testing on the St. Croix

- 22 of 50 (44%) samples tested positive for Silver carp.
- All samples negative for Bighead and Black carp.
- Sampling took place about 50 miles above the St. Croix's confluence with the Mississippi River.
  - 50 miles above the St. Croix River's mouth on the Mississippi is the 694 Bridge in Fridley.

Draft Action Plan

- Early Detection & Response
- Prevention
- Mitigation & Control
- Outreach & Communication

- Note: This is a Draft and has not been approved by the members of the Task Force.

Early Detection & Response

- Annual Fisheries Monitoring Pools 2-9
  - MN and WI DNRs
  - USGS Long Term Monitoring Program
- Monitor Commercial Fishing in Pools 2-9
- Collate existing information
- Public education and reporting
- Environmental DNA (eDNA) sampling, including at the mouth of key tributaries to the Mississippi River.
- Targeted commercial fishing.

Prevention

- Permanent or temporary barriers to block or slow upstream migration.
  - Upper St. Anthony Falls Lock closure study
  - Coon Rapids Dam – authorized by State Legislature
  - Experimental barriers and deterrents
  - Explore voluntary lock use minimization

Lock & Dam Locations

Barriers and Deterrents

- The DNR and Task Force are exploring bubble and sound barriers.
  - These types of barriers can push or herd fish away from certain places, like the mouth of a river.
  - They have not been tested on large river's against Asian carps.
  - Many issues still need to be examined, but this is being pursued rigorously.

Other Measures

- Other methods such as pheromone attractants are also being studied.
  - Pheromones can attract fish to a specific location where they can be netted or killed.
  - This work is still in the experimental stages.
- Bio-bullets are another method being explored to kill Asian carps.
  - The bullets are tiny poison pellets that have a coating on them that only carp digestive enzymes can dissolve.

Problems with Locks and Dams as barriers

- Most of them have Roller & Tainter gates, and, of course, the locks.
- The gates – as shown here – are lifted out of the water during floods.
- Asian carps tend to migrate during high water.

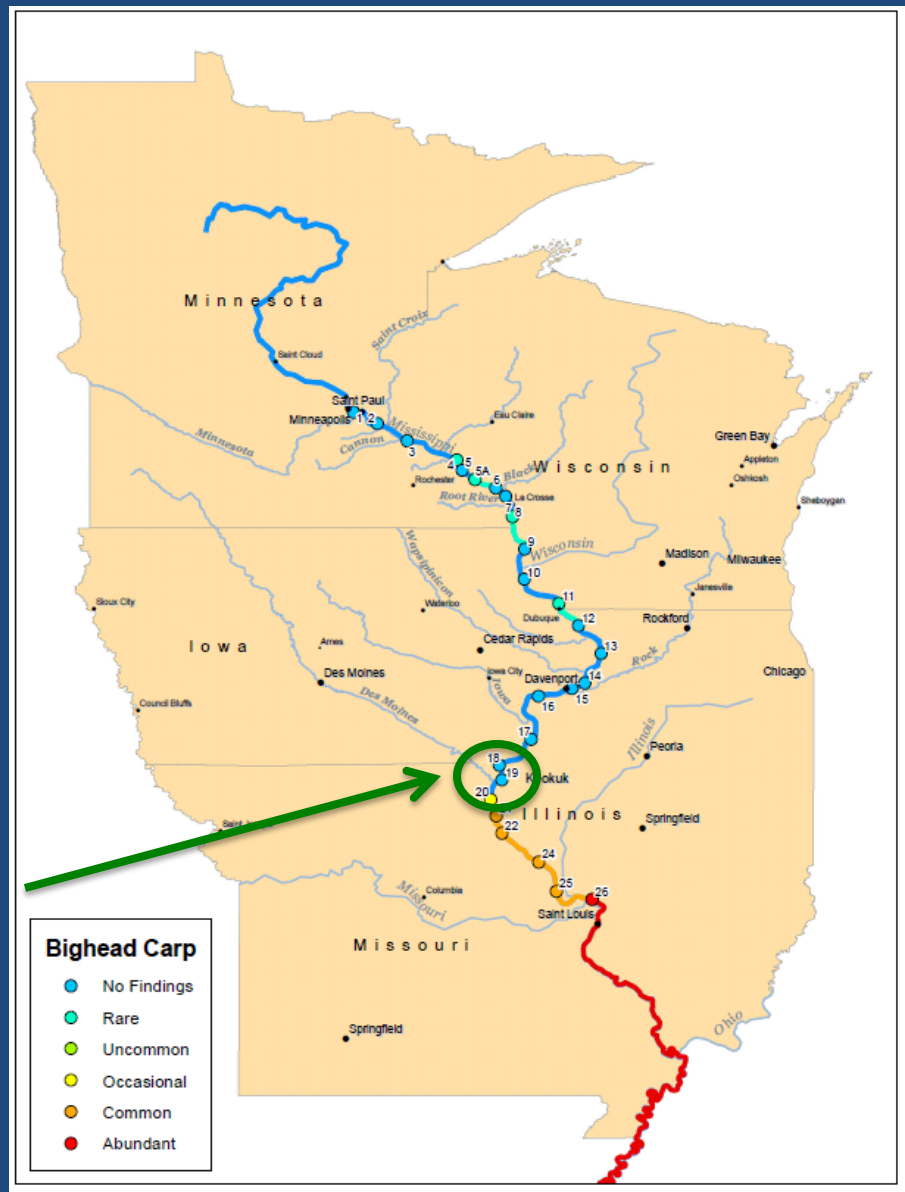
Lock and Dam N. 22. http://bciconstruction.biz/projects

Three Exceptions

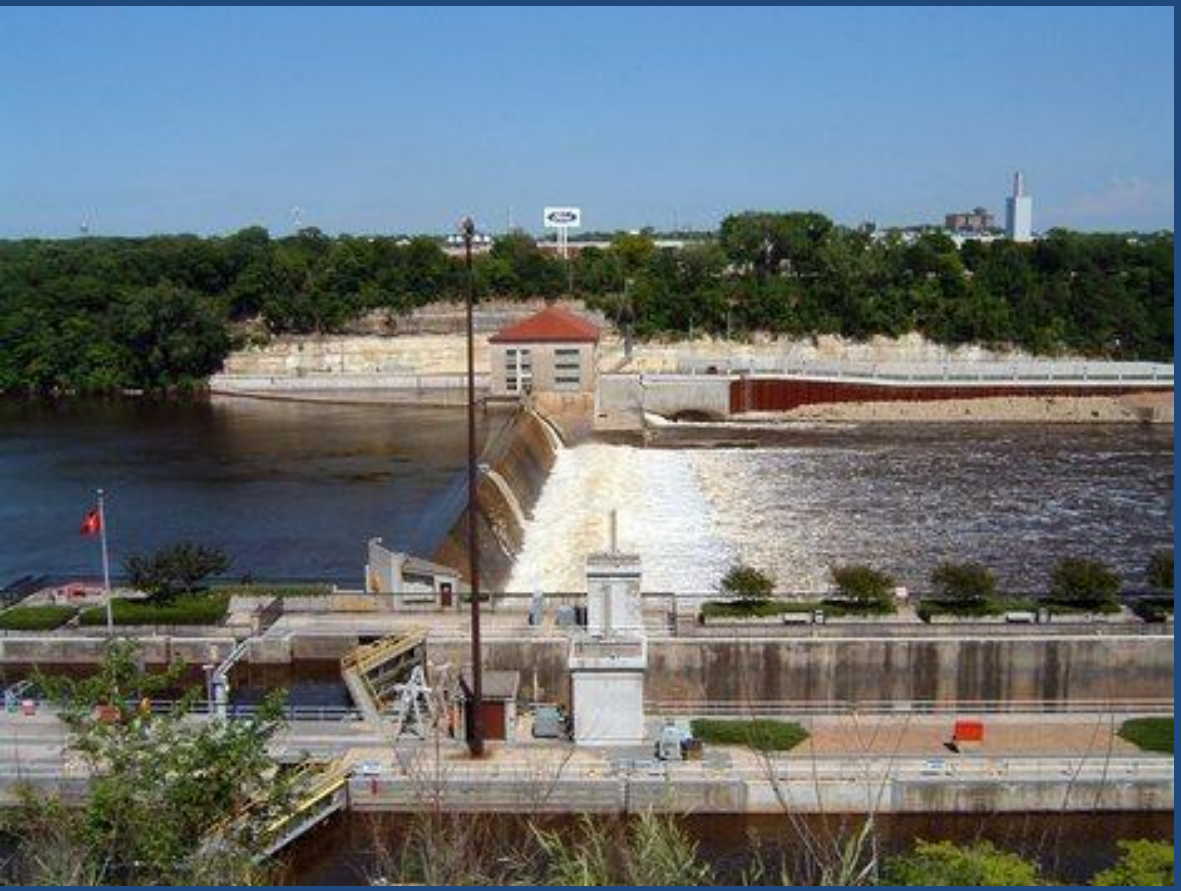
Lock & Dam 19, at Keokuk, Iowa

- 39-foot head
- Fixed-crest spillway
- Lock treatment required
- Lock closure not an option

http://www.historickeokukhomefsbo.com/Home/keokuk-lock---dam-19



Lock & Dam No. 1, Minneapolis & St. Paul



- 36-foot head
- Fixed-crest spillway
- Lock treatment or closure required

Upper St. Anthony Falls Lock & Dam, Minneapolis

- 49.9-foot head
- Fixed-crest spillway
- Lock treatment or closure required

blogs.citypages.com

Emergency Closure
Lock & Dam No. 1 or USAF Lock

- Given their height and design, these dams would be 100% effective as barriers to fish migration if the locks were closed.
- A closure would occur only if needed & would not necessarily permanent.
- Closing the locks to prevent Asian carp migration would need a Congressional authorization for the Corps to do so.
- Any consideration of closing locks will involve extensive discussions with shippers, recreational users, the cities of Minneapolis and St. Paul and others.
- The Task Force does not have consensus on this issue at this time.

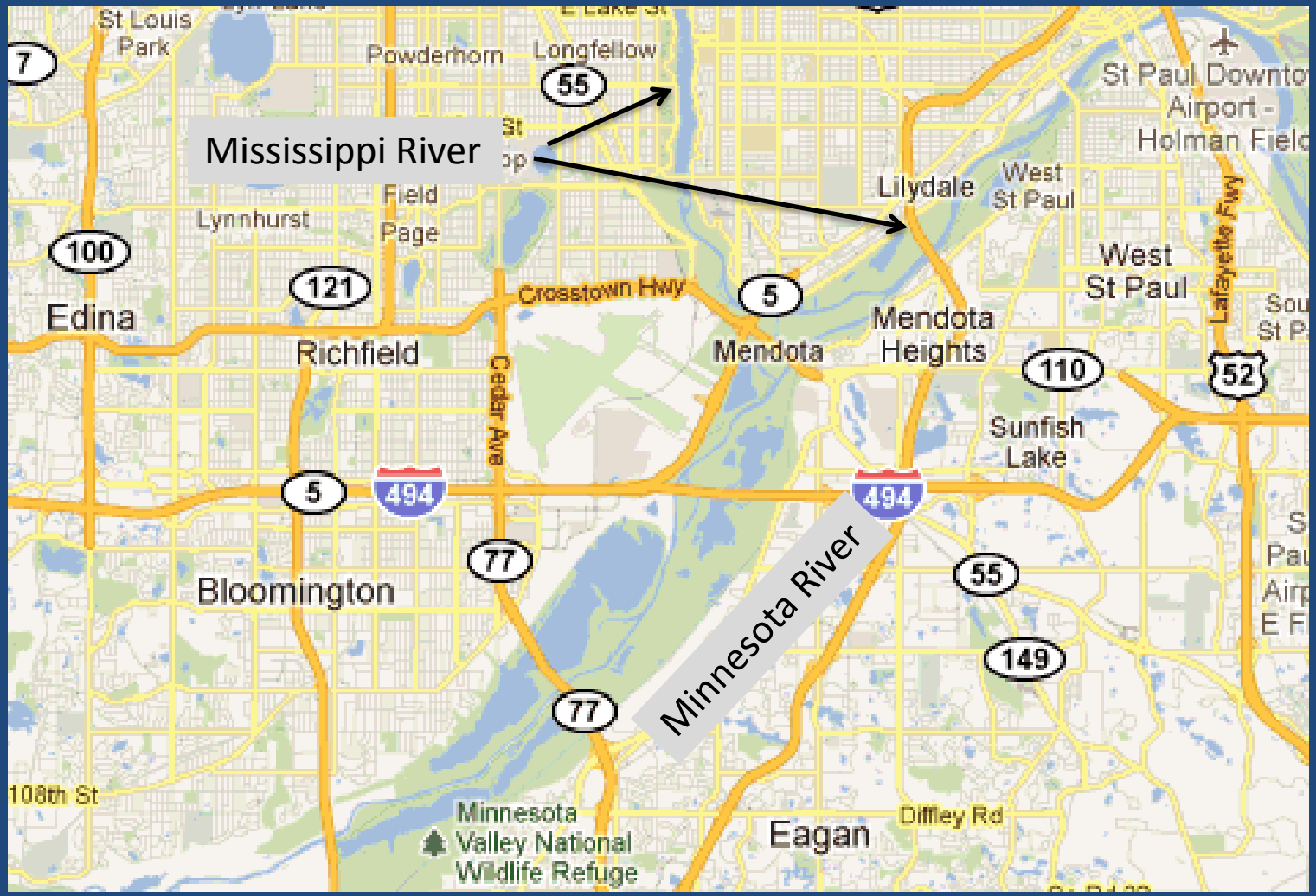
Barriers and Deterrents at Locks

- At Lock and Dam No. 2, high water forces the gates out of the water every 7-8 years, the least of any dam on the Mississippi River below the Twin Cities.
- This lock could be a candidate for a bubble or acoustic barrier at its entry.
- Pheromones or other measures could be used to direct fish away from the lock gate.
- These measures could be put in place at the locks in the Twin Cities to ensure Asian carps did not get through them, if not detected through the testing program. If they could be made 100% effective, a lock closure would not be necessary.

Difficult but critical locations for potential barriers:
Mouth of the St. Croix River and Somewhere on the Minnesota River

Mississippi – St. Croix Confluence

Mississippi-Minnesota Confluence



Note the broad Minnesota River Valley , which is also very low. A barrier here would be difficult.

Google Maps

Mitigation & Control

- Research: how to eradicate or control.
- Removal: to keep numbers down.
- Habitat Improvement: to benefit native species and help them compete better.
- Restrict harvest of some native fish: to ensure robust native fish populations. This would need careful study and thorough discussions.

Outreach & Communication

- We need to get the word out
  - Stakeholders
  - General Public
  - Media
- Establish and maintain a contact list for responding to the media
- Use and build on existing Asian carp efforts
- Regular new releases and media events

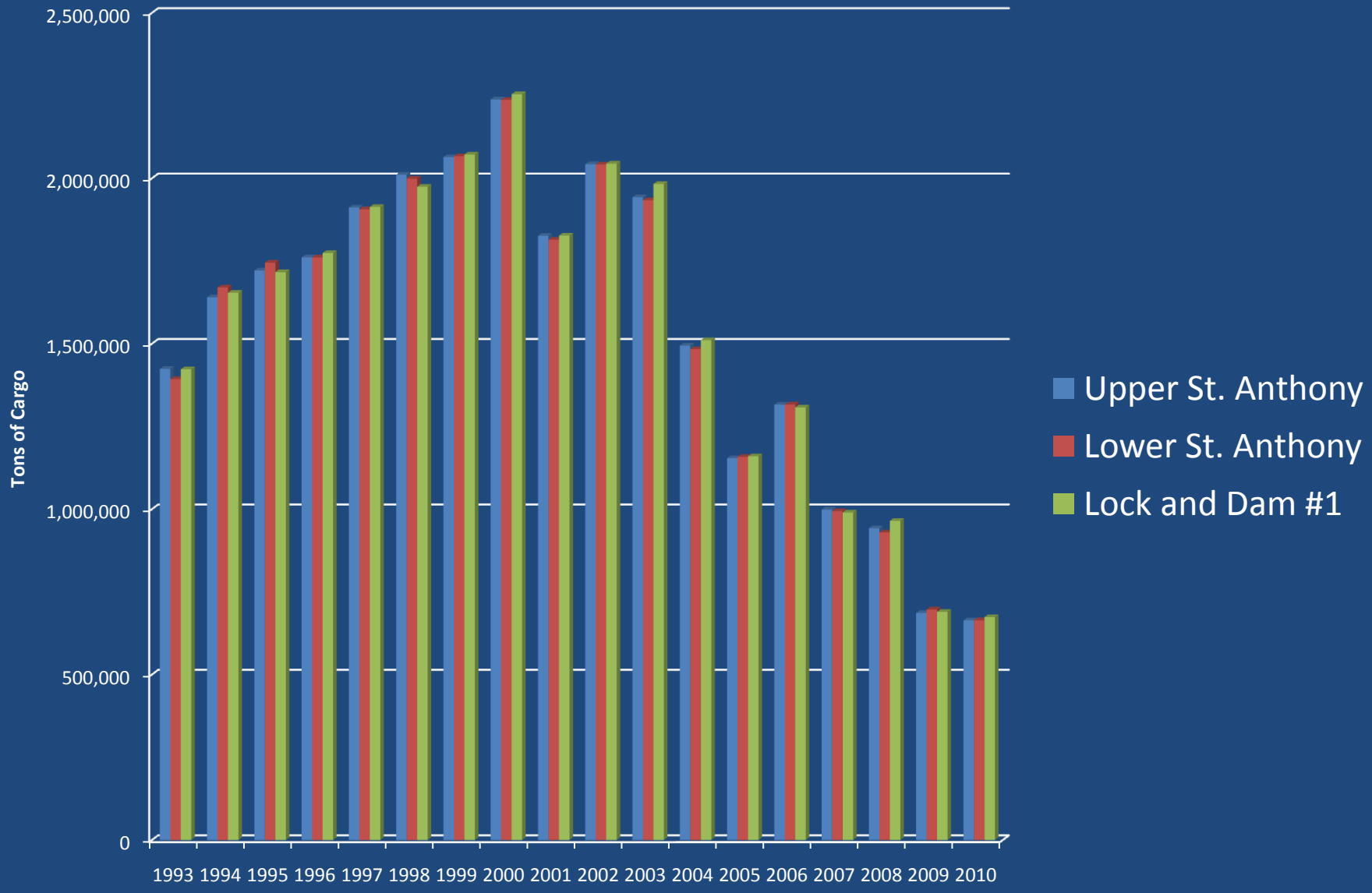
What can you do?

- Take action
- Encourage Resolutions from cities and organizations
  - Minneapolis & Hastings examples
- Report any finds
- Bait – never dump the bait bucket into the water
- GLMRIS Meetings this summer

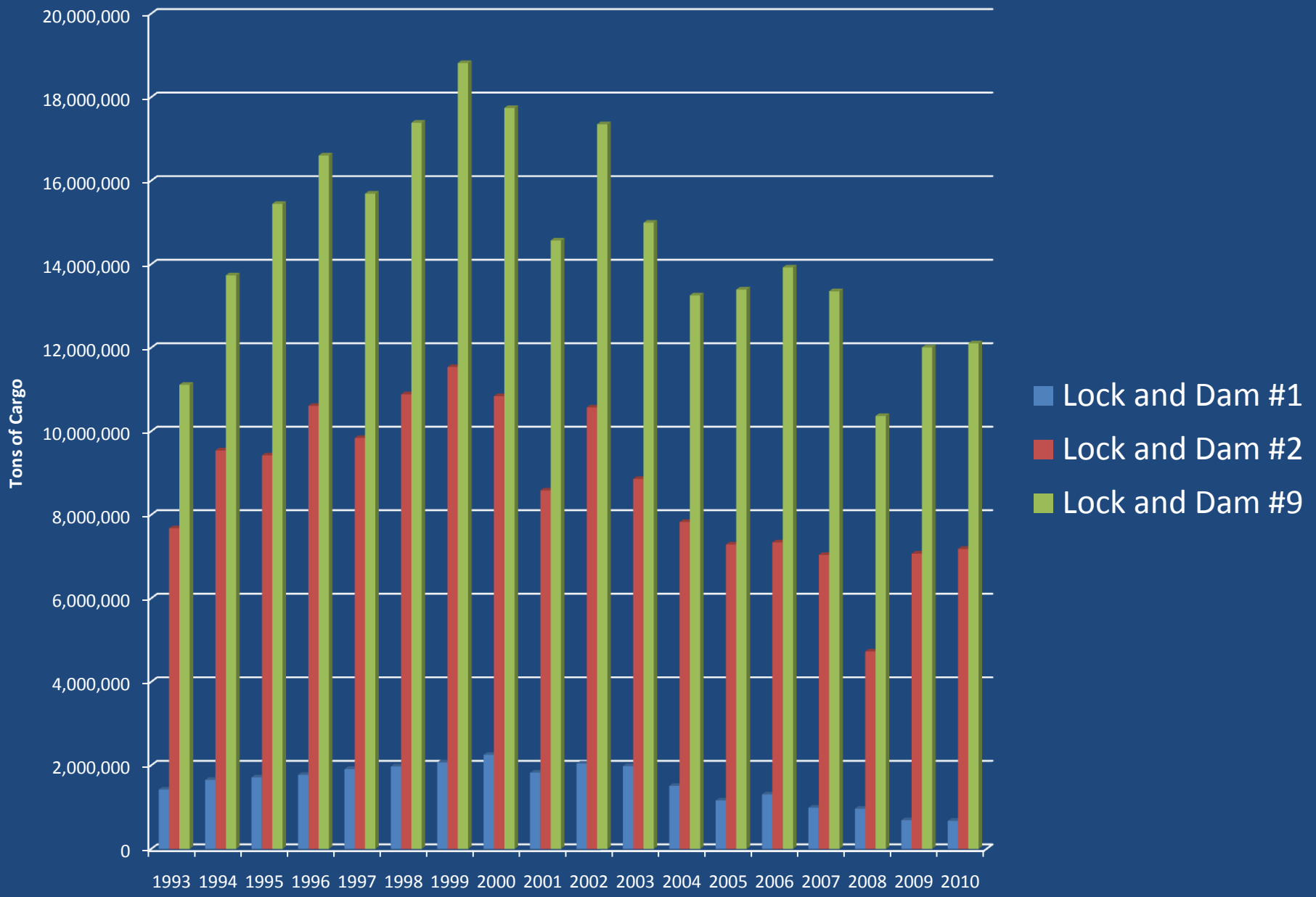
Questions?

Additional Information

Tons of Cargo Through Upper St. Anthony, Lower St. Anthony, and Lock and Dam #1 by Year



Tons of Cargo Through Lock and Dam #1, #2, and #9 by Year



Asian Carps Reports

Location	Species	Date	Number caught	Type of gear
St. Croix River	Bighead adult	10/17/1996	1	commercial
Lake Pepin – near Camp Lacupolis	Bighead adult	10/23/2003	1	commercial
Lake Pepin – near Frontenac	Bighead adult	10/3/2007	1	commercial
Miss River Pool 8 – gravel pit - WI	Bighead adult	11/1/2008	3	commercial
Miss River Pool 8 – Running Slough	Silver adult	11/1/2008	1	commercial
Miss River Pool 5a – Polander Lake	Bighead adult	1/1/2009	1	commercial
Miss River Pool 9 – Ferryville (WI/IA)	Bighead adult	1/30/2009	1	commercial
Miss River Pool 8 – WI side	Silver adult	3/10/2009	1	commercial
Miss River Pool 9 – Winneshiek Slough (WI/IA)	Silver adult	2/14/2011	1	commercial
St. Croix River - near Prescott	Bighead adult	4/18/2011	1	commercial

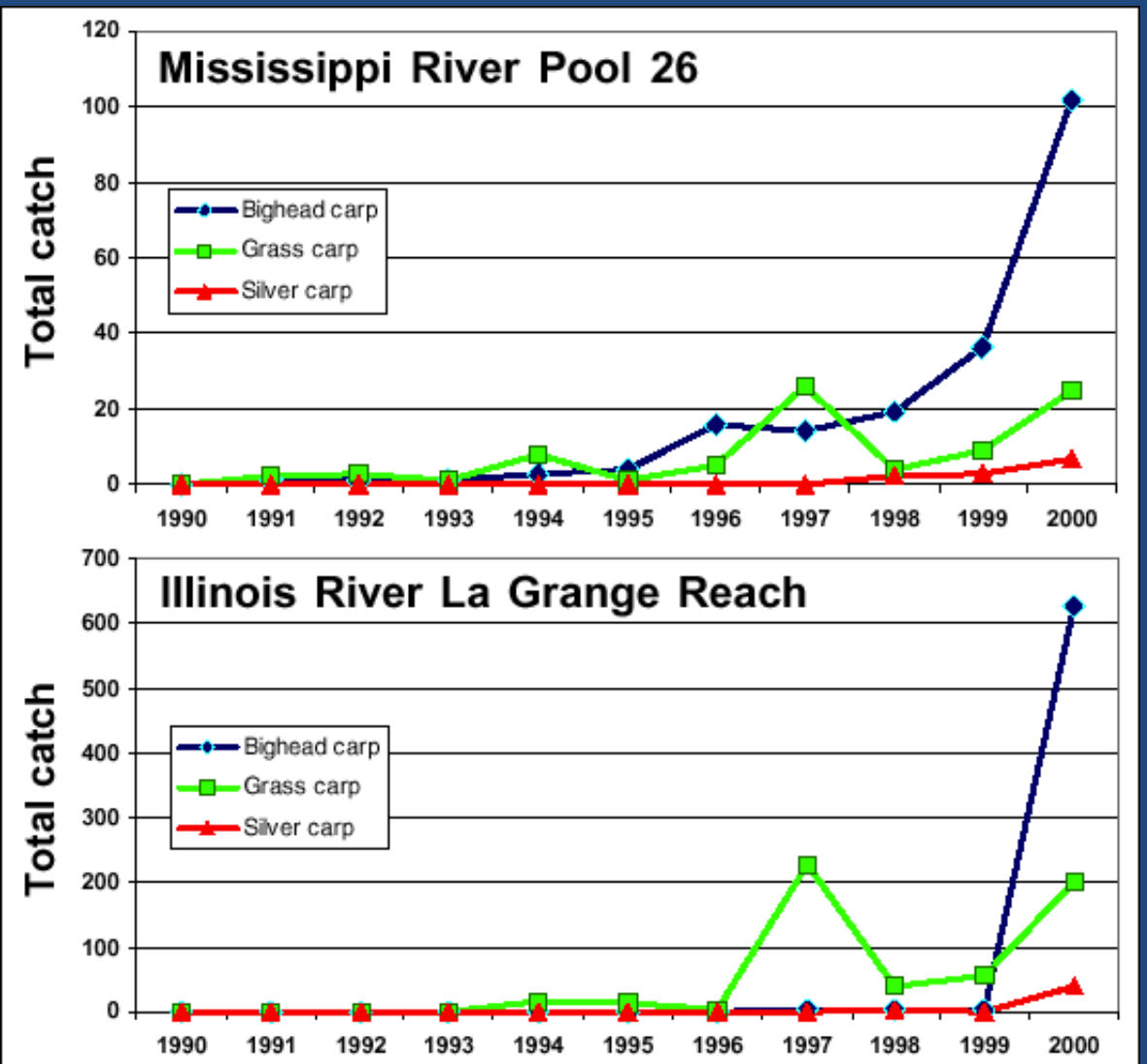


Figure 2. Annual catch of Asian carp collected by the Long Term Resource Monitoring Program from pool 26 of the Mississippi River and La Grange Reach of the Illinois River, 1990-2000. Monitoring during 1990-1999 occurred during June 15 – October 31 of each year. Monitoring in 2000 was done from June 15 to September 15.

It takes time for the Asian carp populations to reach a critical mass, but then explosive growth occurs.

http://www.umesc.usgs.gov/reports_publications/psrs/psr_2000_05.html

If Asian carps make up to Lock and Dam 1, St. Anthony Falls Lock and Dam, or the Coon Rapids Dam, they may be jumping below those structures in numbers similar to what is shown here. So, stopping or slowing their advance as far downstream as possible is essential.