

2015 November Summary

Bottom Line: Monitoring occurred in the CAWS and upper Illinois Waterway downstream of the Electric Dispersal Barrier in November. **NO BIGHEAD CARP OR SILVER CARP were found in any new locations downstream of the Electric Dispersal Barrier.**

Small Asian Carp Monitoring Downstream of the Electric Dispersal Barrier

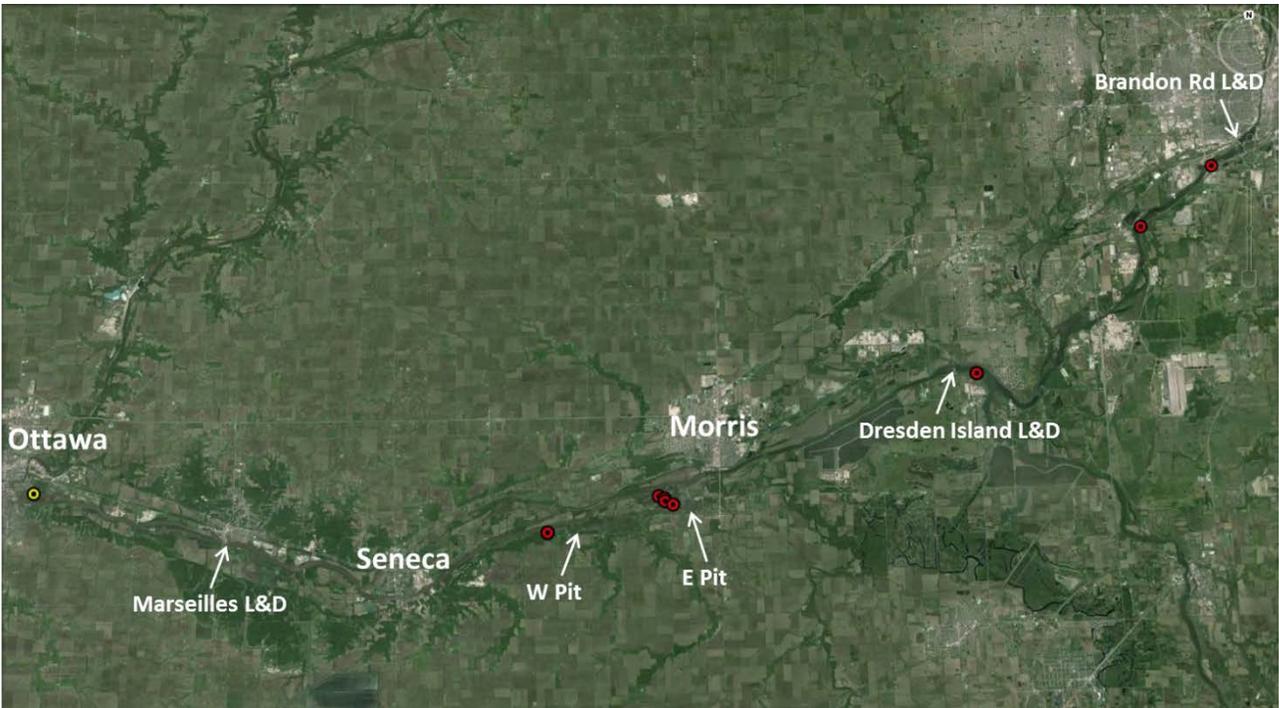
Commercial fishers, with assisting IDNR biologists, completed five 5/8" mesh seine hauls in the East and West Pits of Hanson Material Services in the Marseilles Pool and one 2" mesh seine haul in the side channel near Bull's Island in the Starved Rock Pool the week of November 9th. ***These efforts were a response to concern of recent captures of 6 inch fish above Starved Rock Lock and Dam and are intended to further inform any future actions.*** In addition, three 5/8" mesh seine hauls were completed in the Dresden Island Pool on November 30th (see map of seine haul locations below). Electrofishing transects were also conducted by IDNR and INHS biologists in all the aforementioned areas with the exception of the Dresden Island Pool. Electrofishing was also used to drive fish during the seine hauls in the East Pit and Starved Rock Pool.

Seine hauls:

- Crews collected 85,619 fish of 29 species.
- Approximately 83,000 Clupeidae species < 6" were identified with no small Asian Carp present.
- Five hundred seventy-two Silver Carp and 120 Bighead Carp (all adults) were collected in the 2" mesh seine near Bull's Island in the Starved Rock Pool. Based on a subsample of 30 individuals of each species, mean weights were 2163.7 g and 6754.3 g, respectively. This seine netted over 2 tons of Asian carp.
- Fifty-four adult Silver Carp were collected in the 5/8" mesh seine hauls in the East and West Pits of Hanson Material Services.

Electrofishing:

- 7.3 hours of response effort was conducted sampling for small Asian Carp (with additional effort used to drive fish into the seine)
- Crews collected 3,982 of 33 species and 1 hybrid group.
- Four hundred thirty-one Clupeidae species < 6" were identified with no small Asian Carp present.
- One Bighead Carp and 168 Silver Carp (all adults) were collected/observed in the East and West Pits of Hanson Material Services and in the Starved Rock Pool near Bull's Island.
- **Bottom line, no Small Asian carp were observed or collected during any of our sampling efforts.**



Map of 5/8" mesh (red dots) and 2" mesh (yellow dot) seine haul locations.

Fixed and Targeted Site Sampling Downstream of the Electric Dispersal Barrier

Electrofishing:

- Crews from IDNR, USACE and USFWS completed 77 electrofishing runs at fixed and random sites (19.25 hours total) in the Lockport, Brandon Road, Dresden Island and Marseilles Pools during the month of November.
- Crews collected 2,679 fish of 42 species.
- **No Bighead Carp or Silver Carp were reported captured or observed in the Lockport or Brandon Road Pools.**
- One adult Silver Carp was collected in Mobil Bay in the Dresden Island Pool, approximately 0.4 miles upstream of the I-55 Bridge. An additional nine adult Silver Carp were collected in the Marseilles Pool.

Commercial Netting:

- Contracted commercial fishers along with assisting IDNR biologists set 7.6 miles of net (61 sets) at fixed and targeted sites in the Lockport, Brandon Road and Dresden Island Pools (including Rock Run Rookery) during the month of November.
- Crews collected 226 fish of 9 species and one hybrid group.
- One Bighead Carp and one Silver Carp (both adults) were collected downstream of the I-55 Bridge. One adult Bighead Carp was also collected in Rock Run Rookery.
- **No Bighead Carp or Silver Carp were captured or observed in the Lockport or Brandon Road Pools.**

Barrier Defense Asian Carp Removal Project

Barrier Defense occurred the weeks of November 2nd and the 16th. Additionally, small mesh (5/8") and a large mesh (2") seine hauls were completed the week of November 9th (see Young of Year (YOY) Asian Carp Monitoring Downstream of the Electric Dispersal Barrier summary above). Modified from previous years, Barrier Defense specifically takes place in the Marseilles and Starved Rock Pools. Also in 2015, contracted commercial fisherman deploy and fish modified 6-foot diameter hoop nets in the main channel border and side channel habitats as conditions allow. These habitats are difficult to fish with gill and trammel nets. Below is a summary of all Barrier Defense activities for 2015 (along with 2014 for comparison): Commercial catches do not necessarily reflect pool-wide populations because gears and methods change slightly from year to year. The goal of becoming more efficient in removal efforts by fishing appropriate mesh sizes and locations is also apparent in these findings.

QUICK SUMMARY:	2014	2015
Number of Days Fished	64	72
Number of Net Crew Days	320	340
Yards of Net Fished	518,600	453,470
Miles of Nets Fished	294.7	257.7
Number of Hoop Net Sets	196	118
Number of Bighead Carp	11,483	7,549
Number of Silver Carp	62,628	119,910
Number of Grass Carp	466	794
Number of Asian Carp	74,577	128,253
Tons of Bighead and Silver Carp Harvested	333.0	437.1

Evaluation of Gear Efficiency and Asian Carp Detectability

Field sampling for the evaluation of sampling gears has concluded for the year. Work performed during November included data entry and analyses of juvenile Asian carp sampling data collected during both 2014 and 2015. Results will be reported in future months.

Understanding Surrogate Fish Movement with Barriers

These are the current tagging results. More detailed analysis is ongoing.

Fish Tagged & Recaptured

- Bigmouth Buffalo – 87
- Black Buffalo – 52
- Common Carp – 1233
- Common X Goldfish Hyb. – 35

- Goldfish – 4
- Smallmouth Buffalo – 1064

Total – 2,475

Recapture Totals

- Lockport Pool – 10 Common Carp
- Brandon Pool – 49 Common Carp, 4 Smallmouth Buffalo
- Dresden Pool – 25 Smallmouth Buffalo, 22 Common Carp, 1 Black Buffalo & 3 Bigmouth Buffalo
- Rock Run – 21 Smallmouth Buffalo, 4 Bigmouth Buffalo, 2 Common Carp & 2 Black Buffalo
- Starved Rock Pool – 1 Common carp

Total – 144 recaptures

Fish Movement

- 65 recaptures by Caudal Fin however tags were lost(No data on movement)
- 67 recaptures had tags but showed no movement between Barrier/Dam
- 12 recaptures had tags and showed movement downstream through lock and dams

Notable movements

- 1 Smallmouth buffalo was tagged in Rock Run Rookery and recaptured in Dresden Island Pool
- 1 Bigmouth buffalo was tagged in Rock Run Rookery and was captured by a bow fisherman upstream the Kankakee river near Wilmington
- 1 Common carp was tagged in Lockport Pool and travelled downstream through the Lockport Lock and Dam and was recaptured in Brandon Pool the next day
- 1 Common carp was tagged in Dresden Pool and travelled downstream through the Dresden Lock and Dam and the Marseilles Lock and Dam before being recaptured in Sheehan Island
- 4 fish that were tagged have been recaptured more than once

Asian Carp Gear Development and Evaluation

During the week of 11/2/15, the Columbia Fish & Wildlife Conservation Office (Columbia FWCO) sampled the Marseilles and Starved Rock pools with the electrified dozer trawl targeting juvenile Silver Carp <300 millimeters (mm). The dozer trawl net is 2.1 meters (m) wide by 4.4 m long with 35 mm mesh at the opening reducing to 4 mm mesh in the cod. It is attached to a rigid frame and electrified utilizing a single boom with a spider array and an ETS box (Figure 1). The configuration is electrified to increase the likelihood of catching the target fish. The dozer trawl was designed to sample shallow (<1 meter) habitats where boat maneuverability is a priority. In 230 minutes of sampling

the Marseilles Pool, 675 Gizzard Shad measuring 50-379 mm and no juvenile Silver Carp were captured. The areas sampled were mostly backwaters and marinas including Moody Bayou, the furthest upstream location juvenile Silver Carp have been caught to date. In 29 minutes of sampling in the Starved Rock Pool, one juvenile Silver Carp measuring 171 mm and 172 Gizzard Shad measuring 111-233 mm were captured. A total of 32 species were represented during sampling efforts. Sample sites averaged 1 meter and the dozer trawl fished approximately the top 0.5 m of the water column.

On November 17 and 18, 2015, the electrified paupier was integrated into barrier defense efforts targeting adult Asian Carp in the Starved Rock and Marseilles pools. Commercial fishermen contracted by Illinois Department of Natural Resources deployed gill nets in backwater habitat and made noise to drive fish into nets. Columbia FWCO sampled the blocked off backwater with the electrified paupier driving fish into deployed nets. Fish were captured by both paupier and gill nets. In Sheehan Island backwater (Starved Rock Pool, 41.323171, -88.901342) where depths averaged 1.3 m, the electrified paupier captured 179 adult invasive carp (530-774mm), 14 juvenile Silver Carp measuring 150-190 mm, one juvenile Silver Carp measuring 340 mm, and 2,520 Gizzard Shad (154-250 mm) in 113 minutes of electrofishing. In Hansen Material Services East Pit (Marseilles Pool, 41.33788, -88.43445) where depths averaged 2.9 m, the electrified paupier captured 36 invasive carp (570-911 mm), 620 Gizzard Shad, and no juvenile Silver Carp in 85 minutes of electrofishing. One boat of commercial fishermen caught approximately 300 Silver Carp in Sheehan Island and 250-300 fish in the East Pit during these collaborative efforts.



Image 1. The electrified dozer trawl with the electrified boom out front and the dozer frame behind where the fish are scooped up and held in the net.

Larval Fish and Productivity Monitoring in the Illinois Waterway

INHS sampling for larval fish and eggs has concluded for 2015. Work performed during November included data entry and analyses of ichthyoplankton sampling data collected from 2010 through 2015. Results will be reported in future months.

Identifying Movement Bottlenecks and Changes in Population Characteristics of Asian Carp in Illinois River

Hydroacoustics

Annual fall hydroacoustics surveys were completed and are being processed.

Telemetry

VR2 stationary receivers were downloaded in the upper Illinois River (Upstream from Peoria). At most locations, old VR2 stands were replaced with new stands designed to be stronger and more likely to remain standing upright. Downstream receiver downloads were delayed due to severe weather and flooding and will be downloaded in December.

Standardized Sampling

Post-cleithra collected in August during standardized sampling are currently being sectioned and aged. Fin clips from Silver and Bighead Carp were sent to Western Illinois University and are currently being processed for genetic identification (hybrid or parental species).

Gear Development for Asian Carp monitoring in the Illinois Waterway

During the month of November, USFWS Wilmington Substation conducted the following efforts, using gill and trammel nets in conjunction with sound to enhance gear efficiency to search for Asian carp in the Illinois Waterway. In Brandon Road, a floy tagged common carp measuring 610 mm was captured with the ID 2811 at location 41.53176, 88.08405 on 11/16/2015. The fish was released and the Illinois DNR was informed of its capture. No Asian carp were collected during the month of November in Brandon Road and Dresden Island pools.

River/Pool	Gear	Effort	Fish Captured	Asian Carp
Brandon Road	Gill/Trammel Nets (yds)	1,200	18	0
Dresden Island				

Gill/Trammel 1,800 39 0
 Nets (yds)

Distribution and Movement of Small Asian Carp in the Illinois Waterway

During the month of November, USFWS Wilmington Substation conducted the following efforts using boat electrofishing to search for small Asian carp (<200mm) in the Illinois River. No small Asian carp were collected.

River/Pool	Gear	Effort
Dresden Island	Electrofishing (runs(mins))	17(218)
Marseilles	Electrofishing (runs(mins))	19(274)

Fish Suppression and Clearing in Support of Barrier Maintenance

18-19 November 2015

No Asian carp were observed or captured during the effort and 48 fishes less than 6 inches in total length were cleared from between the Barrier IIA and IIB.

Participating Field Crew and Vessel Support:

Electrified Paupier Boat

1. Sarah Ettinger-Deitzel – USFWS Columbia
2. Skyler Schlick – USFWS Columbia
3. Mike Wilson – USFWS Columbia
4. Jimmie Garth – USFWS Wilmington

Electrofishing Boat 1

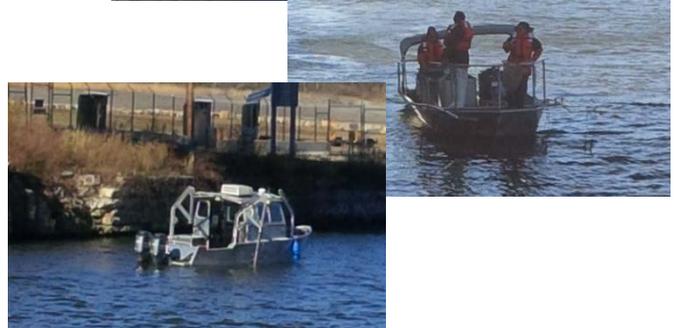
1. Nick Barkowski – USACE
2. Rebecca Neely – USFWS Wilmington
3. Kjetil Henderson – USFWS Columbia

Electrofishing Boat 2

1. Justin Widloe – IDNR
2. Luke Wilson – IDNR
3. Brooke Bryant – INPC

Sonar/Safety Boat

1. Kyle Fronte – USFWS Wilmington
2. Joseph Wagner – USFWS Wilmington



Gill Net Boat

1. Brennan Caputo – IDNR
2. Ryan Young – Contracted Commercial Fisherman
3. Tracy Seidemann – Contracted Commercial Fisherman
4. Brent Pregracke – Contracted Commercial Fisherman

Safety Spotters

1. Matthew Shanks – USACE
2. Greg Shaw – USACE

Effort and Catch Summary:

Wednesday, 18 November – Two IDNR contracted commercial fishing vessels deployed 2300 yards of 30 foot deep gill nets within the Lower Lockport Pool downstream of the Electric Dispersal Barriers. One vessel spread effort over the entire pool while the second vessel focused efforts immediately south of the 135th Street Bridge to Hansen Material Services. Efforts from all day produced one Common Carp (*Cyprinus carpio*) and one Yellow Bullhead (*Ameiurus natalis*). Thirty to forty dead Gizzard Shad were observed floating just below the Electric Dispersal Barriers with a size range well mixed above and below six inches in total length.

Thursday, 19 November – The USFWS Columbia crew performed three mid-channel, open water runs with a discreet deployment between Barriers IIA and IIB from 10:00 to 11:15. These electrified paupier trawls did not capture any fishes. The IDNR electrofishing crew performed three 15 minute electrofishing surveys along both canal walls in the area between Barriers IIA and IIB in conjunction with the USACE/USFWS electrofishing crew. Electrofishing runs were conducted from 09:45 to 10:55 and captured a total of 48 fishes under six inches total length from nine species. No Asian carp were captured or identified in the effort. The catch totals are as follows:

Species (<i>Scientific name</i>)	Individuals Captured
Gizzard Shad (<i>Dorosoma cepedianum</i>)	3
Freshwater Drum (<i>Aplodinotus grunniens</i>)	1
Bluegill (<i>Lepomis macrochirus</i>)	20
Green Sunfish (<i>Lepomis cyanellus</i>)	9
Bluntnose Minnow (<i>Pimephales notatus</i>)	1
White Perch (<i>Morone Americana</i>)	1
Banded Killifish (<i>Fundulus diaphanous</i>)	12
Fathead Minnow (<i>Pimephales promelas</i>)	1
Mosquitofish (<i>Gambusia affinis</i>)	1
Total	48

A hydroacoustics survey was completed by USFWS staff following the event. The survey began at approximately 11:50 and completed runs between Barriers IIA and IIB. Results from the survey are being processed and will be shared upon completion.



Juvenile Silver Carp Tag Retention & Mortality Pilot Study

The Columbia FWCO conducted a tag retention study on juvenile Silver Carp (<215 mm) November 3-5, 2015, in the Starved Rock Pool of the Illinois River. The questions asked in this pilot study were: 1) will juvenile Silver carp <215 mm retain injected Passive Integrated Transponders (PIT) and acoustic transmitters? 2) will juvenile Silver Carp, tagged and non-tagged (control) survive overnight in a large containment tank? 3) will there be a difference in mortality rates between tagged and control groups of juvenile Silver Carp?

A total of 25 juvenile Silver Carp were tagged: 17 were injected with PIT tags (13mm x 2mm) and eight were implanted with both PIT and JSATS acoustic tags (15mm x 3mm; Figure 1). PIT tags were injected while acoustic tags were inserted into the body cavity through an approximately 5 mm incision made with a sterile 2.5Mrad surgical scalpel. Twenty-five fish were not tagged and kept as the control group.

In the first 24 hours, one PIT tagged individual and six of the control group died. At 48 hours, an additional eleven tagged individuals and none of the control group were dead. Of the total 17 individuals tagged with PIT only, 53% died. Of the total 8 individuals tagged with PIT and acoustic, 37% died. Mortality of all the juveniles, both tagged and not, was 36%. During the forty-eight hour study, only one PIT tag was shed. The high mortality rate of tagged juvenile Silver Carp at 48 hours may be due to the loss of aerator function, increased water temperature, and/or tagging.

This pilot study shows great promise for the application of injectable telemetry transmitters in small (<215mm) Silver Carp to monitor their movements in the Illinois River system. Before transmitters are purchased and implanted in juvenile Asian Carp, it is recommended to do a more thorough tag retention study.



Figure 1. Images of both the PIT tag (left) and JSATS acoustic tag (right) used in the retention and mortality pilot study of juvenile Silver carp.

Alternate Pathway Surveillance in Illinois - Law Enforcement

Invasive Species Unit (ISU) concluded their investigation into the illegal sale of Asian Swamp Eels in Chicago. With the help of USFWS and New York's Environmental Police it was determined the eels were being delivered alive from New York to Chicago through Southwest Airlines. The New York company does not have an import permit or aquatic life dealer's license. Upon USFWS interviewing the owner of the New York company it was determined they unaware of Illinois regulations and ISU is in the process of getting them into compliance.

ISU completed a random commercial inspection on a McHenry County aquaculture facility. No violations were detected and a report was completed with updated photographs and information about the facility.

ISU executed a search warrant on a Lake County residence after investigating the illegal purchase of a venomous Gila monster from the homeowner. The Gila monster was seized and the individual was charged with the unlawful possession of a special use herptile without a permit.

ISU assisted the Missouri Department of Conservation with an investigation into an Illinois resident selling Illinois protected wildlife without a permit at an Exotic animal auction in Missouri. The investigation is ongoing.

Impacts of carbon dioxide on non-target species – Suski Lab

Behavioral impacts to freshwater fishes

The goals of our projects have been to determine if fish behavior is altered by exposure to elevated CO₂. During November, work was undertaken to test behavioral (i.e., personality, lateralization) traits for Bluegill exposed to elevated CO₂ and will finish by early 2016. As the study is still currently active, preliminary data will be shared at a later date. An exploratory test to determine whether accelerometers could be used to understand energy expenditure of fish exposed to prey cues before and after exposure to elevated CO₂ was undertaken. We are currently analyzing the data from the tags.

Behavior and physiology of fish exposed to ozone

Ozone has been explored as another non-physical barrier to fish movement in freshwater. We added ozone to a range of freshwater sources to gain an understanding of the maximum attainable level of ozone using a commercially available generator. We then exposed bluegill to this level of ozone and measured behavioral responses and have taken physiological samples to test for potential tissue-level changes in stress indicators. Laboratory work will occur this fall/winter and data will be presented in the final report.

Behavior of CO₂ in water

To inform potential deployment of CO₂ at a large scale to be used as a fish barrier, we have recently explored how CO₂ behaves in a variety of settings. We have injected CO₂ into tanks of multiple sizes, and under varying conditions (e.g., air bubbles, no bubbles, static, flowing, temperature etc.) and have measured water pCO₂ over set periods of time. A draft report is currently being prepared. Furthermore, we completed a short study to compare three techniques for measuring CO₂ in water and have begun to understand the amount of CO₂ potentially needed to raise ambient water to barrier levels of CO₂. We are currently also completing a similar study to test whether dissolved oxygen is directly influenced from the injection of CO₂.

Physiological effects of CO₂ exposure on mussels

Through collaborations with UMESC, we have also been tasked with understanding how CO₂ exposure affects the physiology of freshwater mussels. Two experiments have begun to first assess the impacts of two levels of CO₂ on

Lampsilis siliquoidea and *Amblema plicata* over a 28 d period with a 14 d recovery, and second, to assess the effects of fluctuating levels of CO₂ on three species of freshwater mussels.

These studies have now been completed and laboratory work is ongoing. Experimental work is ongoing to understand metabolic rate and mortality rates of juvenile mussels. In addition, we have been researching other assays to look at physiological endpoints including total alkalinity, and the enzyme activity of key players involved in ion and acid base regulation. The studies are currently ongoing and we anticipate a completion by late fall/early winter.

Assessing Movement and Behavior of Asian Carp at a Lock and Dam Structure to Inform Control Strategies

Hydroacoustics

Two surveys (4-Nov and 23-Nov) from 1 km downstream to 1 km upstream of Starved Rock Lock & Dam were completed to assess distributions of Asian carp around this potential barrier. All hydroacoustics data from these surveys around Starved Rock Lock & Dam have been processed in Echoview, with the exception of the most recent survey, but still need to be analyzed for fish counts and species identification.

Telemetry

VR2 stationary receivers were downloaded around Starved Rock Lock & Dam in early October and data continues to be processed. The VR2 receiver within the lock was downloaded in late November.