

## 2015 May Summary

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

### Fixed, Random and Targeted Sampling Downstream of the Electric Dispersal Barrier

#### *Electrofishing:*

- Crews from IDNR, USACE and USFWS completed 72 electrofishing runs at fixed and random sites (18 hours total) in the Lockport, Brandon Road, Dresden Island, and Marseilles Pools during the weeks of May 11<sup>th</sup> and May 25<sup>th</sup>.
- Crews collected 2,655 fish of 49 species and 1 hybrid group.
- No Bighead Carp or Silver Carp were reported captured or observed in the Lockport and Brandon Road Pools.
- One Bighead Carp was collected in the Dresden Island Pool, 0.4 miles above the I-55 Bridge (Mobil Bay).
- One Bighead Carp and 115 Silver Carp were collected and > 500 Silver Carp were observed in the Marseilles Pool.

#### *Commercial Netting:*

- Contracted commercial fishers along with assisting IDNR biologists set 18.4 miles of net (142 sets) at fixed and targeted sites in the Lockport, Brandon Road and Dresden Island Pools (including Rock Run Rookery) during the weeks of May 11th and May 25th.
- Crews collected 575 fish of 13 species and 1 hybrid group.
- No Bighead Carp or Silver Carp were captured or observed in the Lockport and Brandon Road Pools.
- Five Bighead Carp and two Silver Carp were collected in the Dresden Island Pool, downstream of the I-55 Bridge. **One Bighead Carp was collected 4.9 miles upstream of the I-55 Bridge (2.9 miles downstream of the Brandon Road Lock).**
- Seven Bighead Carp and one Silver Carp were collected in Rock Run Rookery.

#### *Hoop and Mini Fyke Netting:*

- Crews from IDNR set and pulled 16 hoop nets (6' diameter) and 16 mini fykes in Lockport, Brandon Road, Dresden Island and Marseilles Pools during the week of May 18th.
- Crews collected 89 fish of 6 species and 1 hybrid group during hoop net sampling and 220 fish of 17 species and 1 hybrid group during mini fyke sampling.
- No Bighead Carp or Silver Carp were reported captured or observed in Lockport, Brandon Road and Dresden Island Pools.
- One Silver Carp was collected during hoop net sampling in the Marseilles Pool.

## **Barrier Defense Asian Carp Removal Project**

Barrier Defense occurred the weeks of May 4<sup>th</sup> and May 18<sup>th</sup> and one commercial fisher set additional nets the week of May 25<sup>th</sup>. Modified from previous years, Barrier Defense specifically takes place in the Marseilles and Starved Rock Pools. Also in 2015, contracted commercial fisherman will be deploying and fishing modified 6-foot diameter hoop nets in the main channel border and side channel habitats as conditions allow. These habitats have been difficult to fish with gill and trammel nets. Below is a summary of barrier defense activities for 2015:

### **QUICK SUMMARY:**

<b>Number of Days Fished</b>	28 days
<b>Number of Net Crews</b>	108 crew-days
<b>Yards of Net Fished</b>	139,650 yards
<b>Miles of Nets Fished</b>	79.4 miles
<b>Number of Bighead Carp</b>	3,521 fish
<b>Number of Silver Carp</b>	40,776 fish
<b>Number of Grass Carp</b>	441 fish
<b>Number of Asian Carp</b>	44,738 fish
<b>Tons of Bighead and Silver Carp Harvested</b>	161.1 tons

## **Strategy for eDNA Monitoring in the CAWS**

CAWS eDNA sampling was completed the week of June 1. Samples will be processed by Whitney Genetics Lab as soon as possible considering other case priorities for the lab yet to be determined.

The pre-spawn sampling event to quantify eDNA in the Illinois River below the barrier was completed and samples have been processed in the lab. Results will be reported after they have been analyzed, likely sometime after the CAWS eDNA event. The second sampling event was completed the same week as the CAWS samples and will be processed later this summer. We are hopeful we captured some evidence of the spawn that everyone reported the very next week.

**<http://www.fws.gov/midwest/fisheries/eDNA.html>**

## **Monitoring Fish Abundance and Spatial Distribution in Lockport, Brandon Road, and Dresden Island Pools and the Associated Lock and Dam Structures**

Preparation and installation of a fixed split beam hydroacoustic system to monitor fish passage at the Brandon Road Lock began the last week of May. The system will utilize 4- 70 kHz split beam acoustic transducers to collect data on fish density, fish length, and movement direction continuously; 24 hours a day seven days a week. Data collections are slated to begin in June.



**Monitoring Fish Abundance, Behavior, Identification, and Fish-Barge Interactions at the Electric Dispersal Barrier, Chicago Sanitary and Ship Canal, Illinois-USFWS**

Weekly mobile split beam hydroacoustic surveys of fish density directly below the electric dispersal barriers have taken place throughout May. Fish densities observed below the barriers increased from previous months this year.

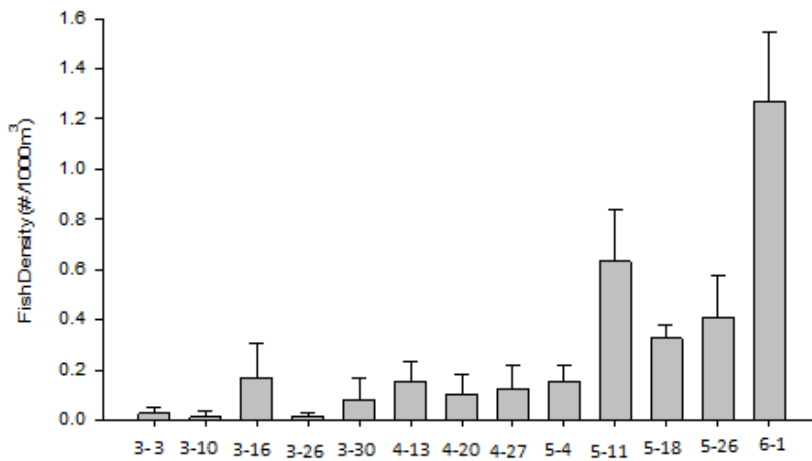


Figure 1. Fish density (# / 1000m<sup>3</sup>) observed from the downstream edge of the barrier IIA parasitic structure to 500 m below (except during 6-1; from the downstream edge of barrier IIB) during weekly split beam hydroacoustic surveys. Error bars denote S.D.

## **Distribution and Movement of Small Asian Carp in the Illinois Waterway**

USFWS Carterville FWCO, Wilmington sub-office joined Columbia FWCO the week of May 5, 2015 to search for small Asian carp (<200 mm) in Marseilles pool. Push trawl (19 runs), dozer trawl (8 runs), mini-fykes (20 sets), and boat electrofishing (5 runs) were used in backwater and channel margin habitats. No small Asian carp were encountered. Thirty-nine banded killifish were captured and released.

During the week of May 12, 20 mini-fyke sets were made in Dresden Island pool for small Asian carp detection. No small Asian carp were captured in these sets. One banded killifish was captured and released.

During the week of May 26, 17 mini-fyke sets were made in Starved Rock pool for small Asian carp detection. No small Asian carp were captured in these sets. Several banded killifish were captured and released.

## **Understanding Surrogate Fish Movement with Barriers**

### Fish Tagged

- Bigmouth Buffalo – 33
- Black Buffalo – 41
- Common Carp – 662
- Common X Goldfish Hybrid. – 22
- Goldfish – 1
- Smallmouth Buffalo – 480

Total – 1239 fish tagged

### Recapture Totals

- Lockport Pool – 4 Common Carp
- Brandon Pool – 30 Common Carp, 1 Smallmouth Buffalo
- Dresden Pool – 9 Smallmouth Buffalo, 7 Common Carp
- Rock Run – 7 Smallmouth Buffalo, 2 Bigmouth Buffalo & 3 Black Buffalo

Total – 63 recaptures

### Fish Movement

- 31 recaptures by Caudal Fin but didn't have tags (No data on movement)
- 28 recaptures had tags but showed no movement between Barrier/Dam
- 2 recaptures had tags and showed movement downstream through lock and dams (1 fish moved downstream through 2 lock and dams)
- 2 recaptures had tags and demonstrated movement within Dresden Island pool

Notable

- 1 Smallmouth buffalo was tagged in Rock Run Rookery and travelled through the connection into Dresden before recaptured
- 1 Bigmouth buffalo was tagged in Rock Run Rookery and travelled through the connection 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 in Starved Rock Pool

### **Monitoring for Asian Carp in the Upper Des Plaines River and Upper Des Plaines River Overflow**

USFWS spent 2.36 hrs electrofishing, 13 gill net sets covering 2300 yards; No Asian carp were seen or observed.

### **Asian Carp Gear Development and Evaluation**

In May 2015, Columbia Fish and Wildlife Conservation Office staff evaluated techniques for the capture of small (<200 mm) Asian carp, participated in barrier defense efforts, and used sidescan sonar to evaluate various surface trawl configurations.

One staff member from the Columbia FWCO joined the Wilmington FWS office in sampling 32 kilometers (km, 20 miles) of the Marseilles pool on Tuesday, May 5 and Wednesday May 6, 2015. No small (<200 mm) invasive carps were captured. Using a jet boat outfitted with mechanical wenchers and customized outriggers, staff were able to sample 4 km (2.6 miles) of backwater habitats with the benthic push trawl and dozer trawl.

The benthic push trawl, a 2.5 meter (m) net attached to otter boards with 35 mm mesh at the opening reducing to 4 mm mesh in the cod, was used to sample 2.6 km of backwater habitat in the lower 32 km of the Marseilles pool on Tuesday and Wednesday, May 5-6, 2015. No invasive carp were captured; however, 33 gizzard shad ranging from 105 to 134 mm were sampled.

The dozer trawl, a 2.1 m net attached to a rigid frame (see picture below) with 35mm mesh at the opening reducing to 4 mm mesh in the body and 450 micron mesh in the cod, was used to sample 1.6 km of backwater habitat in the lower 17.8 km of the Marseilles pool on Wednesday, May 6, 2015. The dozer trawl successfully sampled 15 gizzard shad, 102-126 mm. Larval fish were captured, preserved, and identified as percids in laboratory. Identification as non-Asian carp was confirmed by Amy George at USGS – Columbia Environmental Research Center.



*Caption: The dozer trawl in action on Lake Depue. The net can also be attached to a rigid frame and towed.*

Three staff from Columbia participated in Barrier Defense Efforts in the Starved Rock Pool with the electrified Paupier. The Paupier butterfly trawl is equipped with 4mm mesh in the cods and successfully captured gizzard shad 120-165 mm and emerald shiners. The electrified Paupier sampled deep, flowing (0.28-0.49 m/s or 0.6-1.1 mph) side channels and the Fox River, a tributary of the Illinois River.

The majority of adult silver carp captured with the electrified Paupier were males, although both sexes were captured. Gonad observation revealed adults were approaching reproductive readiness (see pictures below). Water temperatures were 18°C and rising and the hydrograph was also rising due to rain in the region.



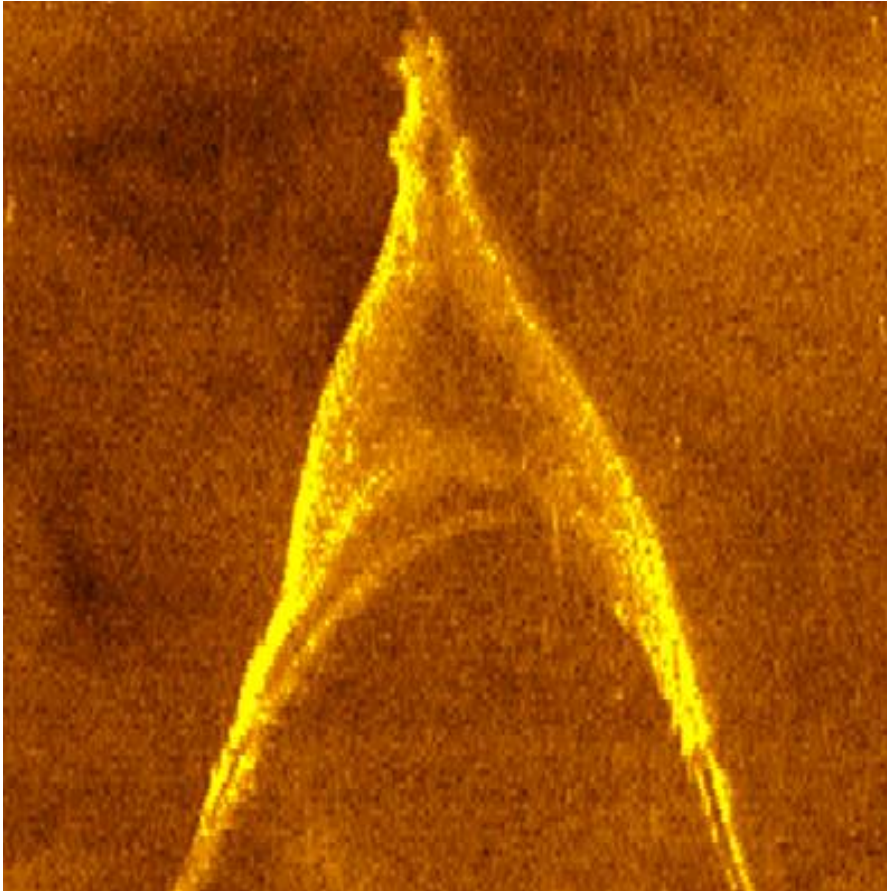
*Caption: Teste of male silver carp captured by electrified Paupier in the lower Starved Rock Pool of the Illinois River on 5/5/2015.*



*Caption: Ovary of female silver carp captured by electrified Paupier in the lower Starved Rock Pool of the Illinois River on 5/5/2015.*

The week of May 26<sup>th</sup>, Columbia FWCO borrowed sidescan sonar equipment from SIU to measure fishing widths of surface trawls. Preliminary results indicate that shorter trawl tow-lines resulted in narrower fishing widths. More testing is planned to compare fishing widths as related to various door designs. The goal is to achieve a 75% fishing width.





*Caption: Sidescan sonar image of mamou surface trawl with mullet doors and 75' of tow-lines at 2.2 mph.*

### **Evaluation of Gear Efficiency and Asian Carp Detectability**

No gear evaluation sampling occurred during the month of May. Sampling that occurred throughout the LaGrange Pool during April captured 2800 total fish, including 121 silver carp. These included 22 age-1 ( $\leq 158$  mm) silver carp from the 2015 year class. Mini-fyke nets captured the highest number of age-1 silver carp ( $n = 16$ ). Age-1 silver carp were also captured in small-mesh floating gill nets, small-mesh purse seines, and by pulsed-DC electrofishing. Cast nets and beach seines failed to capture any age-1 Asian carp.

### **Larval Fish and Productivity Monitoring in the Illinois Waterway**

INHS conducted ichthyoplankton sampling at 12 sites located throughout the Illinois Waterway during May 12 – 15 and May 26 – 28. Four larval fish samples were taken at each site, and zooplankton and water quality samples were also collected. Processing of larval fish samples is ongoing. No Asian carp larvae have been identified from any samples collected thus far during 2015. Updates to any locations where Asian carp

eggs or larvae are collected will be made available as samples are processed and identifications are verified.

### **Unconventional Gear Development Project**

INHS assisted with removing fish from a Great Lakes trap (pound) net set at the Material Service pit during May 13 and 15. During these dates, 1,347 fish were removed from the net, including 291 silver carp and 27 bighead carp. The pound net also captured numerous white bass (n=346), smallmouth buffalo (n=177), river carpsucker (n = 167), and smaller numbers of other native species, which were returned to the water.

### **Telemetry Monitoring Plan**

On the week of 5 May, USACE biologists conducted a download of 31 receivers from the Cal-Sag confluence to the Dresden Island Lock and Dam. Receivers were also downloaded in the Kankakee River as far upstream as the Wilmington Dam, Hickory Creek and the Des Plaines River. Mobile tracking occurred between all receivers within the main channel of each waterway. Additionally, HOBO temperature loggers were added to five receiver locations within the system including three within the Lower Lockport pool, one within the Kankakee River and one at the Dresden Island Lock and Dam.

Preliminary analysis of the data was completed which covered tagged fish detections from 10 March through 8 May 2015. One Common Carp was detected moving through the electric dispersal barriers in the downstream direction in April. No other passage between pools was detected. A total of 54 Asian carp (45 BH, 9 SV) were detected in the Dresden Island Pool. The furthest upstream detection occurred at a navigation marker island at RM 283 approximately 3 miles south of Brandon Road Lock and Dam. There were zero detections at the downstream lock gates at Brandon Road. The furthest upstream detection in the Kankakee River was approximately 3.6 miles upstream of its confluence and zero detections were recorded at the Wilmington Dam.

### **Fish Suppression and Clearing in Support of Barrier Maintenance**

Within the Month of May the Dispersal Barrier System continuously maintained power to the water at one or more barrier arrays resulting in no direct opportunities for fish passage. There were 6 severe weather reports in May which triggered a transfer of power from utility to generator power at Barrier IIB. A manual switch to generator power at Barrier IIB during these events includes a 30 second delay in power to the water but is a precautionary measure to ensure a longer outage time does not occur in the case of an unexpected loss of utility power. The Demonstration Barrier was shut down a total of 4 days during normal working hours (0700-1500) to maintain safe working conditions for construction activity in support of permanent Barrier I. An additional 9 days of Barrier IIB shutdowns during normal working hours were required for permanent Barrier I

construction activities. Barrier IIB was also shut down from 18 to 21 May continuously for annual maintenance on internal components. Barrier IIA was online and operational throughout the Barrier IIB and Demo Barrier shutdowns. Due to continued coordination with the BNSF railroad to reduce crossing signal interference there were two operational changes made to the barriers operating parameters within the month of May. On 14 May, the barriers were changed from 30 Hz to 45 Hz frequencies. On 27 May, the barriers narrow arrays were increased from 1700 V input at the canal electrodes to 1900 V. Unfortunately, this was quickly returned to 1700 V as railroad crossing signal interference was identified after the modification. Further modifications to the barriers operating parameters were made in early June which will be detailed in next month's summary but the barriers are now operating back at historical voltage levels of 2000 V. All Barrier operational changes were communicated to the Monitoring and Response Workgroup and no clearing actions were determined to be required. Heavy monitoring of the waterway continues with efforts from multiple resource agencies which indicate that Asian carp presence within Lower Lockport pool remains low.

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

### *Telemetry*

Acoustic receivers nearest to Starved Rock Lock and Dam (SR L&D) were downloaded to determine movements of recently tagged fish. Of the 23 Silver carp tagged downstream of SR L&D in March-April 2015, at least two approached the downstream end of the dam as flow increased on May 7, 2015. None of the 23 fish were detected upstream of SR L&D.

Three acoustic receivers were installed; two within the downstream lock chamber approach and one on the first mooring cell upstream of the lock chamber. These receivers are intended to provide more detail on passage through the lock chamber. Range testing was performed on nine of the 15 receivers in the SR L&D array. Additional range testing will be conducted throughout the year to determine receiver range in various conditions.

77 Asian carp (50 Bighead carp, 27 Silver Carp) were tagged with acoustic transmitters in the Peoria pool from SR L&D downstream to Spring Valley, IL. Length of Bighead and Silver carp tagged ranged from 591-840mm and 465-597mm respectively. Additionally, we tagged 126 Silver carp and 10 Bighead carp with "\$5 REWARD" jaw tags for the mark-recapture portion of our study. All fish were tagged between SR L&D and Spring Valley, IL.

### *Hydroacoustics*

SIU undertook hydroacoustic surveys in the vicinity of SR L&D on May 31, 2015. Transects extended from the L&D structure approximately one mile downstream (in the Peoria pool main channel) and one mile upstream (Starved Rock pool main channel). Electrofishing and gill net sampling on May 29 and May 30 will be used to assign acoustic targets to appropriate size and species categories.

## **Alternate Pathway Surveillance in Illinois - Law Enforcement**

The Invasive Species Unit organized a detail and simultaneously inspected two fish trucks from a non-resident aquatic life dealer at two separate delivery locations. The detail involved four uniformed CPOs and the Invasive Species Unit. The aquatic life dealer sells fish for pond stockings, but failed to properly submit restricted species applications to import Grass Carp and did not submit health certifications for several VHS species which he initially requested to import. The ISU wanted to check the dealer's trucks to ensure the company wasn't illegally importing the fish without permits. A testing protocol and a course of action to get any illegally imported fish to a testing facility was put in place prior to the inspections. Both trucks were found in compliance and a verbal warning was issued to one truck for not having VHS permits with the shipment.

## **Impacts of carbon dioxide on non-target species**

### *Behavioral impacts to freshwater fishes*

Our main goal has been to determine if fish behavior is altered by exposure to elevated CO<sub>2</sub>. In the month of May, we have finalized plans to begin behavioral trials on juvenile Largemouth Bass and Bluegill. This included the construction of an I-maze and a circular tank. Fish that will be used to conduct preliminary assessments are currently acclimated to lab conditions and will be tested shortly. Additionally, we have finished preliminary studies to use an acoustic telemetry system deployed in a small pond to understand fish movement in response to exposure to elevated CO<sub>2</sub>, and fish will be tagged and treated with CO<sub>2</sub> in early June.

### *Behavior of CO<sub>2</sub> in water*

In order to inform potential deployment of CO<sub>2</sub> at a large scale to be used as a fish barrier, we have recently explored how CO<sub>2</sub> behaves in a variety of settings. We have injected CO<sub>2</sub> into tanks of multiple sizes, and under varying conditions (e.g., air bubbles, no bubbles, static, flowing, etc.) and have measured water pCO<sub>2</sub> over set periods of time. In May, we began preliminary analysis of our results and shared some data during a conference call with the United States Army Core of Engineer's Brandon Road Lock CO<sub>2</sub> modelling group. A draft report is currently being prepared. Furthermore, we completed a short study to compare three techniques for measuring CO<sub>2</sub> in water.

### *Physiological effects of CO<sub>2</sub> exposure on mussels*

Through collaborations with UMESC, we have also been tasked with understanding how CO<sub>2</sub> exposure affects the physiology of freshwater mussels. In May, we have continued to develop tools to assess expression of genes associated with acid-base regulation and stress in two species of freshwater mussels. We have also secured adult mussels for our summer and fall studies. In addition, J.D. Jeffrey presented our results showing changes in hemolymph ion levels in response to elevated CO<sub>2</sub> exposure at the Canadian Society of Zoology Annual Meeting on May 28, 2015.