

2015 October Summary

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

Fixed and Targeted Site Sampling Downstream of the Electric Dispersal Barrier

Electrofishing:

- Crews from IDNR and USACE completed 48 electrofishing runs at fixed and random sites (12 hours total) in the Lockport, Brandon Road, Dresden Island and Marseilles Pools during the month of October.
- Crews collected 1,417 fish of 39 species.
- **No Bighead Carp or Silver Carp were reported captured or observed in the Lockport, Brandon Road or Dresden Island Pools.**
- One adult Silver Carp was collected in the Marseilles Pool.

Commercial Netting:

- Contracted commercial fishers along with assisting IDNR biologists set 12.5 miles of net (98 sets) at fixed and targeted sites in the Lockport, Brandon Road and Dresden Island Pools (including Rock Run Rookery) during the month of October.
- Crews collected 208 fish of 13 species
- Fifteen Bighead Carp and five Silver Carp (all adults) were collected in Rock Run Rookery.
- Seven adult Silver Carp were collected in the Dresden Island Pool upstream of the I-55 Bridge in Mobil Bay.
- **No Bighead Carp or Silver Carp were captured or observed in the Lockport or Brandon Road Pools.**

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 month of October.
- Crews collected 16 fish of 7 species during hoop net sampling and 512 fish of 20 species during mini fyke sampling.
- One adult Silver Carp was collected during hoop net sampling in the Marseilles Pool.
- **No Bighead Carp or Silver Carp were captured or observed in the Lockport, Brandon Road or Dresden Island Pools.**

Barrier Defense Asian Carp Removal Project

Barrier Defense occurred the weeks of October 6th and the 20th. 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):

QUICK SUMMARY:	2014	2015
Number of Days Fished	55	60
Number of Net Crew Days	291	296
Yards of Net Fished	492,150	399,670
Miles of Nets Fished	279.6	227.1
Number of Hoop Net Sets	196	118
Number of Bighead Carp	10,850	7,057
Number of Silver Carp	53,790	103,840
Number of Grass Carp	433	595
Number of Asian Carp	65,073	111,492
Tons of Bighead and Silver Carp Harvested	306.0	378.0

Evaluation of Gear Efficiency and Asian Carp Detectability

Field sampling for the evaluation of sampling gears has concluded for the year. Work performed during October included summarization and analysis of data collected during previous months. Gears used in 2015 (floating small-mesh gill nets, mini-fyke nets, beach seines, small-mesh purse seines, pulsed-DC electrofishing, hydroacoustic transects) captured a total 531 Asian carp, including 163 juveniles (both age-0 and age-1). Pulsed-DC electrofishing captured predominately adult Asian carp (n = 330), although it did capture some age-1 individuals in each season (n = 5 total) and began capturing age-0 Asian carp during August and September (n = 21). Mini-fyke nets captured the highest number of juvenile Asian carp, producing age-1 individuals in April (n = 16) and capturing exclusively age-0 individuals in August and September (n = 64). Small-mesh gill nets captured both age-0 (n = 19; all in September) and age-1 (n = 16) Asian carp. Small-mesh purse seines captured a small number of age-1 Asian carp in all seasons (n = 7 total), and captured some age-0 Asian carp (n = 14) during August and September. Beach seines were largely ineffective at capturing Asian carp during 2015, producing only a single age-0 individual in September. Additional analyses of size distributions, differences between main channel and backwater sites, and examination of combined 2014 and 2015 data are ongoing. Further results will be reported once available.

Understanding Surrogate Fish Movement with Barriers

Current Floy Tag Results

Fish Tagged & Recaptured

- Bigmouth Buffalo – 78
- Black Buffalo – 52
- Common Carp – 1134
- Common X Goldfish Hyb. – 29
- Goldfish – 4
- Smallmouth Buffalo – 926

Total – 2,223

Recapture Totals

- Lockport Pool – 11 Common Carp
- Brandon Pool – 50 Common Carp, 4 Smallmouth Buffalo
- Dresden Pool – 22 Smallmouth Buffalo, 20 Common Carp & 3 Bigmouth Buffalo
- Rock Run – 16 Smallmouth Buffalo, 3 Bigmouth Buffalo, 3 Common Carp & 3 Black Buffalo
- Starved Rock Pool – 1 Common carp

Total – 136 recaptures

Fish Movement

- 56 recaptures by Caudal Fin but didn't have tags (No data on movement)
- 70 recaptures had tags but showed no movement between Barrier/Dam
- 10 recaptures had tags and showed movement downstream through lock and dams

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
- 4 fish that were tagged have been recaptured more than once

Asian Carp Gear Development and Evaluation

During the month of October, 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. No Asian carp were captured.

River/Pool	Gear	Effort
Lockport	Gill/Trammel Nets (yds)	3,500
Brandon Road	Gill/Trammel Nets (yds)	2,070
Dresden Island	Gill/Trammel Nets (yds)	4,500

Larval Fish and Productivity Monitoring in the Illinois Waterway

INHS sampling for larval fish and eggs has concluded for 2015. Work performed during October included completion of sample processing and identification of specimens. Summarization of ichthyoplankton sampling data from 2015 is ongoing. Additional fish eggs and larvae collected from throughout the Illinois Waterway were submitted for genetic analysis to verify identifications and identify Asian carp eggs and larvae as either bighead carp or silver carp. Results of these analyses will be reported once available.

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

Hydroacoustics Surveys

Annual hydroacoustic surveys were conducted in the Peoria (10/5 – 10/8), LaGrange (10/12 – 10/15) and Alton (10/19 – 10/22) pools of the Illinois River. Selected main channel and backwater habitats were surveyed in all reaches, as per 2012, 2013 and 2014 surveys. Detailed analysis is ongoing.

Telemetry

All acoustic receivers were downloaded around Starved Rock Lock and Dam (SRLD) and detection data are beginning to be processed. All receivers around SRLD have been prepared for winter and will not be revisited until early spring 2016.

A commercial fisherman was contracted on October 11th to fish the Peoria pool between the Vermilion River and SRLD, in an attempt to capture small (200 – 400 mm) Asian Carp. However, the nets were overloaded with buffalo, and because of this we were only able to collect and tag 19 Silver Carp that were between 520 mm and 802 mm. In 2016, we will continue to target small Asian Carp for tagging.

Hourly gate openness data from SRLD were collected and we are in the process of converting it into an electronic format. These data will be used to determine how gate openness influences Asian Carp movement around and through SRLD.

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

A stationary split beam hydroacoustic system utilizing 430 and 120 kHz transducers was removed from upstream of the Brandon Road Lock chamber. Data processing and analysis occurred during October.

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

Sonar data post processing and report preparation associated with the barge-fish interaction study occurred during October.

Distribution and Movement of Small Asian Carp in the Illinois Waterway

During the month of October, USFWS Wilmington Substation conducted the following efforts, using mini-fykes, boat electrofishing, and dozer trawls to search for small Asian carp (<200mm) in the Illinois River. Two small Asian carp were captured in Moody Bayou (41.32724, -88.54382) of the Marseilles Pool (168 – 171 mm TL).

River/Pool	Gear	Effort
Dresden Island	Mini-fykes (net nights)	11
Marseilles	Mini-fykes (net nights)	9
	Electrofishing	62(11.63)

(runs(mins))

Starved Rock

Electrofishing (runs(mins))	17(3.14)
Dozer Trawl (meters)	2,413



Telemetry Monitoring Plan

USACE biologists focused on implanting transmitters into additional fishes within the Brandon Road and Dresden Island Pools in the month of October. A total of nine Common Carp with a mean total length of 642 mm were implanted with depth sensor transmitters on 15 October. These fishes were released in groups of three in and around the Brandon Road Lock. Two groups were released inside the lock chamber during a down-bound lockage and an up-bound lockage respectively. These lockages included the survey boat which the fish were released from and did not include barge traffic. The third group was released within the approach channel to the Brandon Road Lock within the Dresden Island Pool. All Common Carp used within this tagging event were captured from the upper Brandon Road Pool near the Ruby Street Bridge. It is expected, based on previous trials with Common Carp captured in Brandon and released in Dresden, that these fish will be more likely to attempt an upstream migration back into the Brandon Road pool than if they were originally captured in the Dresden Island Pool. A receiver network of VR2W stationary receivers is in place above, below and within the Brandon Road Lock chamber to assess the movements of these fish in response to lock gate operation and barge traffic.

An additional 12 Asian carp (8 Bighead, 4 Silver) were tagged with standard V16 Vemco transmitters within the Dresden Island Pool. USACE biologists worked with contracted commercial fishermen and Illinois DNR biologists to capture and tag fish within the Rock Run Rookery backwater on 16 October. The four Silver Carp had a mean length of 742

mm while the eight Bighead Carp had a mean length of 979 mm. All fishes were both captured and released within the Rock Run Rookery backwater.

Fish Suppression and Clearing in Support of Barrier Maintenance

Within the Month of October the Dispersal Barrier System continuously maintained power to the water at one or more barrier arrays resulting in no direct opportunities for fish passage. Although the Barriers always had power to the water there were several instances of loss of power to Barrier IIA for maintenance of equipment and one instance of a rogue barge sitting over Barrier IIB which may have temporarily altered electric field outputs in the vicinity of the metal hull during that time. The barge was reported by on-site engineers to have been free floating without a tow vessel and sitting over the narrow array of Barrier IIB on 9 October at approximately 19:30. The US Coast Guard was contacted immediately and the barge was moved in approximately 20-30 minutes. During this time, Barrier IIA was operating the narrow array at 2000 V (2.0 V/in max at the canal surface) and the wide array at 800 V (0.8 V/in max at the canal surface).

Barrier IIA was powered off for maintenance from 22 September to 7 October. Barrier IIA wide and narrow arrays were put back into operation on 7 October at 2000 V, 34 Hz and 2.3 ms (approximately 2 V/in voltage gradient maximum at water surface). There were three maintenance events which required a complete power down (wide and narrow arrays) at Barrier IIA for greater than one hour which occurred on 8, 23 and 26 October. There were two additional losses of power to both wide and narrow arrays for less than one minute on 12 and 14 October as power was transferred between pulser equipment. The Barrier IIA narrow array was increased from 2000 V to 2200 V on 15 October to ensure a maximum voltage gradient of 2.3 V/in could be attained at the surface of the water. The wide array of Barrier IIA was offline and only the narrow array operational from 12-14 October, and again on 31 October to 2 November. Barrier IIB wide and narrow arrays were operational throughout the month of October with settings at 2200 V, 34 Hz and 2.3 ms (approximately 2.3 V/in maximum voltage gradient at canal surface).

The periodic outages at Barrier IIA throughout the month of October provided an opportunity for fishes downstream of the Barriers to move between Barrier IIA and Barrier IIB. This situation triggered a Monitoring and Response Workgroup discussion on 29 October to assess the level of threat for presence of Asian carp at the Barriers and the appropriate response actions to take for clearing fish between the Barriers. As a result of that meeting, USFWS conducted a hydroacoustic sweep between Barrier IIA and IIB on 3 November which found low abundance of fishes and no fish greater than 150 mm in total length. Furthermore, USFWS biologists observed bird predation of Gizzard Shad during the survey of approximately the same size as those targets identified in the hydroacoustic data. Although the MRWG came to a consensus that Asian carp of this size are at a low risk of being present at the Dispersal Barriers a clearing action is scheduled to occur on the week of 16 November including a Paupier Net boat from USFWS Columbia. This gear type is capable of sampling between the barriers for small fish.

The operational settings for Barriers IIA and IIB are currently 2200 V input at the narrow array electrodes, 800 V input at the wide array electrodes, 34 Hz frequency and 2.3 ms pulse duration. These settings provide a maximum voltage gradient at the canal surface of 2.3 V/in. Heavy monitoring of the waterway continues with efforts from multiple resource agencies which indicate that Asian carp presence within Lower Lockport pool remains low to no presence. No Asian carp have been observed or captured above Brandon Road Lock and Dam with the exception of one Bighead Carp in Lower Lockport in 2009 and the one Bighead Carp in Lake Calumet in 2010.

Alternate Pathway Surveillance in Illinois - Law Enforcement

Invasive Species Unit (ISU) is investigating a New York company for importing live Asian Swamp Eels and American Eels without a Restricted Transportation Permit and/or VHS Import Permit to Chicago's Chinatown Markets. It is the belief of ISU and USFWS that the Asian Swamp Eels shipping records are falsely labeled. The company does not have a non-resident aquatic life dealer's license.

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

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 September, work was undertaken to test behavioral (i.e., personality, lateralization) traits for Bluegill exposed to elevated CO₂. As the study is still currently active, preliminary data will be shared at a later date. We are also exploring whether accelerometers to understand energy expenditure of fish exposed to prey cues is a viable tool to understand potential effects of exposure to elevated CO₂.

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. 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.