2015 June Summary

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

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

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 June 8th.
- Crews collected 136 fish of 9 species during hoop net sampling and 407 fish of 18 species during mini fyke sampling.
- One Silver Carp was collected during hoop net sampling in the Dresden Island Pool, ~1.2 miles above I-55. Sixteen Silver Carp and 51 Bighead Carp were also collected during hoop net sampling in the Marseilles Pool, ~0.6 miles downstream of the Dresden Island Dam.
- **No Bighead Carp or Silver Carp were reported captured or observed in the Lockport or Brandon Road Pools**.

Seasonal Intensive Monitoring

Seasonal Intensive Monitoring (SIM) took place above the electric dispersal barrier the weeks of June 8th and June 15th. Electrofishing and commercial netting occurred in the North Shore Channel, North and South Branches of the Chicago River, CSSC, Cal-Sag Channel, Little Calumet River, Calumet River and Lake Calumet. Tandem trap nets and an 800-yard commercial seine were fished exclusively in Lake Calumet.

Electrofishing:

- Crews from IDNR, USACE and USFWS completed 204 electrofishing runs at fixed and random sites (51 hours total).
- Crews collected 9,650 fish of 60 species and 1 hybrid group.
- One hundred forty-five state threatened Banded Killifish were collected.

Commercial Netting:

- Contracted commercial fishers along with assisting IDNR biologists set 21.9 miles of net (188 sets) at fixed and random sites.
- Crews collected 626 fish of 10 species and 1 hybrid group.

Commercial Seine:

- Contracted commercial fishers along with assisting IDNR biologists completed three 800-yard commercial seine hauls.
- Crews collected 5,989 fish of 14 species.

Trap Netting

- Crews from IDNR set four tandem trap nets (8 nets total). The nets were set for four nights, totaling 32 net nights of effort.
- Crews collected 172 fish of 16 species
- **No Bighead Carp or Silver Carp were captured or observed during SIM.**

Barrier Defense Asian Carp Removal Project

Barrier Defense occurred the weeks of June 1st and June 22nd and typically only takes place in the Marseilles and Starved Rock Pools. However, due to elevated river stages the week of June 22nd, Barrier Defense took place in the Lockport, Brandon Road and Dresden Island Pools. Fifty-five Asian carp (22 Bighead Carp, 33 Silver Carp) were collected in the Dresden Island Pool that week, with **no Bighead Carp or Silver Carp captured or observed in Lockport or Brandon Road Pools**. Total effort was 35.3 miles of net. Below is a summary of all Barrier Defense activities for 2015:

QUICK SUMMARY:

Number of Days Fished	36 days
Number of Net Crews	164 crew-days
Yards of Net Fished	228,750 yards
Miles of Nets Fished	130 miles
Number of Bighead Carp	3,909 fish
Number of Silver Carp	49,726 fish
Number of Grass Carp	485 fish
Number of Asian Carp	54,120 fish
Tons of Bighead and Silver Carp Harvested	190.1 tons

Strategy for eDNA Monitoring in the CAWS

DNA (eDNA) sampling which occurred in the Chicago Area Waterway System (CAWS), Illinois, taken in June 2015. Four locations were sampled (North Shore Channel, Chicago River, Lake Calumet, and Little Calumet River). These results are presented geographically to provide an overview of the locations where each individual sample was collected. After reviewing the data, you will see that NONE of the 240 water samples collected in these efforts were found to be positive for Asian carp eDNA. We will keep you appraised as further information is collected through future sampling efforts.
Please be aware that these results will be posted on our public website, http://www.fws.gov/midwest/fisheries/eDNA.html no later than noon on July 20

Distribution and Movement of Small Asian Carp in the Illinois Waterway

USFWS Wilmington sub-office conducted 13 push trawl runs and 9 mini-fyke runs the week of June 22nd to search for small Asian carp (<200mm) in Dresden Island pool. No small Asian carp were encountered. Ten banded killifish were captured and released.

During the week of June 29th, due to high water in Marseilles and Starved Rock small Asian carp efforts were conducted in Dresden Island pool. Fifteen push trawl runs and 20 mini-fyke sets were made. No small Asian carp were encountered.

Banded killifish captured in Dresden Island pool. Credit: Jenna Merry USFWS

Understanding Surrogate Fish Movement with Barriers

Current Floy Tag Totals

Species Tagged

- Bigmouth Buffalo – 44
- Black Buffalo – 55
- Common Carp – 828
- Common X Goldfish Hyb. – 23
- Goldfish – 4
- Smallmouth Buffalo – 583

Total – 1,537 fish tagged

Recapture Totals

- Lockport Pool – 4 Common Carp
- Brandon Pool – 47 Common Carp, 1 Smallmouth Buffalo
- Dresden Pool – 18 Smallmouth Buffalo, 14 Common Carp & 2 Bigmouth Buffalo
- Rock Run – 10 Smallmouth Buffalo, 2 Bigmouth Buffalo & 3 Black Buffalo
  Total – 101 recaptures

Fish Movement

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

Notable Movements of Floy Tagged Fish

- 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

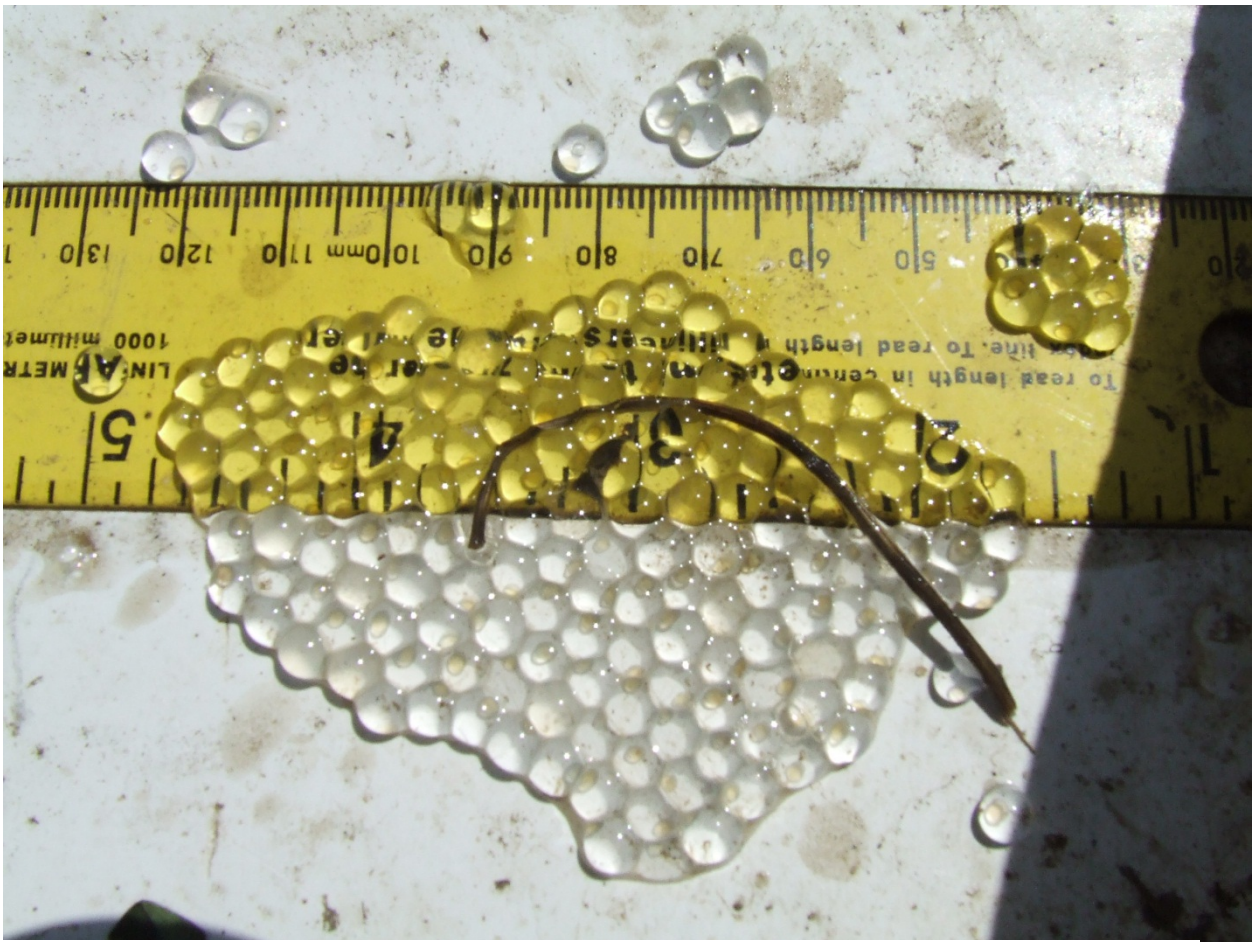
The first week of June, 2015, five staff members from the Columbia FWCO sampled 9.3 miles (mi) of the Marseilles and Starved Rock pools with push trawl, surface trawls, and Paupier butterfly frame trawl. Trawling was conducted in a variety of habitats depending on habitat size, water depth, and flow. For example, habitat best suited for Paupier butterfly trawl sampling is an open area, greater than 5 feet deep, with no-to moderate-flows. Preserved samples are still being processed, but initial field evaluation did not detect any small (<200 mm) invasive carps the week of June 1, 2015.
Overall, 2.2 mi were sampled with the benthic push trawl in the Marseilles (1.04 mi) and Starved Rock (1.13 mi) pools. Backwaters were the most sampled habitat at 1.9 mi, followed by side-channel border (0.17mi) and tributaries (0.15 mi). One gizzard shad measuring 148 mm was captured as well as a variety of other species including centrachids, pimephales, and shiners.
The Paupier sampled 4.7 mi in the Starved Rock and Marseilles pools. Habitat sampled included 2.7 mi of side channel habitat, 0.9 mi in tributaries, 0.7 mi of main-channel border, and 0.5 mi of backwater. Adult silver carp (368-789 mm) dominated the electrified Paupier samples and, of those, 82% were males expressing milt and 18% were females approaching reproductive readiness (see photo). Gizzard shad ranging from 130-180mm were also sampled.

Caption: Ovary of female Silver Carp captured by electrified Paupier in the Marseilles Pool of the Illinois River on 6/1/2015.

Surface trawls sampled a total of 2.4 mi in the Starved Rock and Marseilles pools with effort split equally among both pools. Side channels were the most sampled at 1.3 mi, followed by backwaters, which included one marina (0.9 mi), main channel borders (0.3 mi), and tributaries (0.3 mi). Overall catch rates were low and Emerald Shiner (*Notropis atherinoides*) was the most sampled species.

Three staff from Columbia FWCO sampled the Peoria and LaGrange pools with push trawl and mini-fykes the week of June 9-12, 2015. One small (84 mm) invasive carp was captured by mini-fyke at the entrance to a backwater upstream of the Peru boat ramp (41.3219, -89.1247). Laboratory processing of preserved samples is ongoing; however, no other invasive carp have been detected from these efforts.

Minifykes were deployed as overnight sets in tributaries, backwaters, and channel borders. Flooding during the week deposited eggs (presumably carp) on minifykes set just upstream of the Peru Sportsman boat ramp and in the entrance to Lake DePue (see photo). Invasive carp spawning activity was observed upstream of these captures.



Caption: Eggs were deposited on top of minifykes set in the entrance to DePue Lake backwater and just upstream of the Peru Sportsman boat ramp in the Peoria Pool, Illinois River.

The benthic push trawl, an 8' envelope style 4 mm mesh net attached to otter boards, was used to sample 1.6 miles in the lower LaGrange and Peoria Pools the week of June 9, 2015. No invasive carp were captured; however, flooding allowed sampling in a variety of habitats, including areas not normally under water.

The Columbia FWCO has been testing net configurations and the abilities of a new boat outfitted with dual Gator Tail mud motors. Testing the twin trawl configuration in a local state-managed wetland resulted in the capture of a multitude of young-of-year common carp. This boat set-up looks promising for sampling shallow, muddy backwater habitats common in the Illinois River system.

Evaluation of Gear Efficiency and Asian Carp Detectability

No gear evaluation sampling occurred during the month of June. With the observations of Asian carp spawning and the subsequent presence of substantial numbers of larval fish in the LaGrange and Peoria Pools, sampling with gears targeting juvenile Asian carp will occur at multiple sites throughout the Illinois River in July.

Larval Fish and Productivity Monitoring in the Illinois Waterway

INHS conducted ichthyoplankton sampling at 12 sites located throughout the Illinois Waterway during the weeks of June 8, June 15, June 22, and June 29. Four larval fish samples were taken at each site, and zooplankton and water quality samples were also collected. Substantial numbers of silver carp were observed spawning at multiple locations during the week of June 8, and large numbers of large-diameter eggs were collected in ichthyoplankton samples near this time. Substantial numbers of larval fish were also collected from multiple sites in the LaGrange and Peoria Pools in the following weeks. Processing and identification of larval fish samples is ongoing. The presence of Asian carp eggs and/or larvae will be reported once identification and verification of collected specimens is completed.

Unconventional Gear Development Project

INHS set pound nets at Lily Lake during June 1 - 12 as part of the food attractants study being conducted by USGS. Results will be reported by USGS.

Telemetry Monitoring Plan

On the week of 22 June, USACE biologists tagged and released a total of 12 Common Carp in the Brandon Road Pool. All fish were captured from within the Brandon Road Pool and released just upstream of the Lock and Dam at the Railroad Street boat launch. These fish were tagged to maintain a proportional number of transmitters in the water within each pool of the study area as old transmitters expire. On 10 June, USACE biologists completed range testing of receivers in and around the Brandon Road Lock and Dam in conjunction with the commencement of a USFWS hydroacoustics monitoring project. Test transmitters were used to gather detection frequency data in and around the Lock with the hydroacoustics system running to ensure significant transmission shadowing did not occur.
Vemco Positioning data was received for barrier detections from November 2014 through March 2015 and is currently being analyzed. Preliminary analysis revealed a total of nine individual transmitters implanted into Common Carp approaching the barriers. No fish were observed to cross upstream of Barrier IIA. One fish was observed to cross downstream through the barriers from the upstream direction which was a Common Carp. Further data analysis is ongoing and results will be included in the end of year summary report.

Fish Suppression and Clearing in Support of Barrier Maintenance

Within the month of June 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 16 severe weather reports and one generator maintenance event in June 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 on 2 June due to technical difficulties with equipment and is awaiting currently awaiting repair. Barrier IIA underwent annual maintenance on 1-4 June in which it was deactivated. Barrier IIB was online and operational throughout the Barrier IIA 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 June. On 1 June, the barriers were changed from 45 Hz to 30Hz frequencies and increased the voltage input at the electrodes to 2000V. On 8 June, the barriers frequencies were changed from 45Hz to 34 Hz. The current operational settings for Barriers IIA and IIB are 2000 V input at the narrow array electrodes (800 V wide array), 34 Hz and 2.3 ms pulse duration. 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

Hydroacoustics

A hydroacoustic survey took place in the East Pit on Jun-1, prior to commercial fishing the following day. The SIU crew also took measurements of fish captured by the commercial crews, to assign acoustic targets to appropriate size and species categories. Due to elevated water levels, additional surveys were not undertaken in June. Hydroacoustic data is currently being processed.

Telemetry

Following the implantation of telemetry tags in May, June focused on maintenance and testing of the stationary receiver (VR2W and VR2TX) array. In total, 17 of the stationary receivers were downloaded and a new receiver was installed just upstream of Marseilles Lock and Dam. Range testing was completed during high water levels (Jun - 9 and Jun-10) on the stationary receivers surrounding Starved Rock Lock and Dam to determine the detection radius of each of these receivers. Because changes in water level can influence detection radius, range testing will be performed again when water level reach a moderate value.

Spawning d/s of Starved Rock L & D

Spawning of Silver and Bighead Carp was observed beginning around 9:00 AM on Jun-9 and activity increased throughout the day downstream of Starved Rock Lock and Dam (Figure 1), and was still occurring at 7:30 PM. On Jun-10 spawning was again observed but activity was much reduced (≈1% of previous day). Spawning individuals are estimated as 90-99% Silver Carp with only a small number of Bighead Carps observed. Fish were not as reactive to stimulus and could easily be netted from the water.

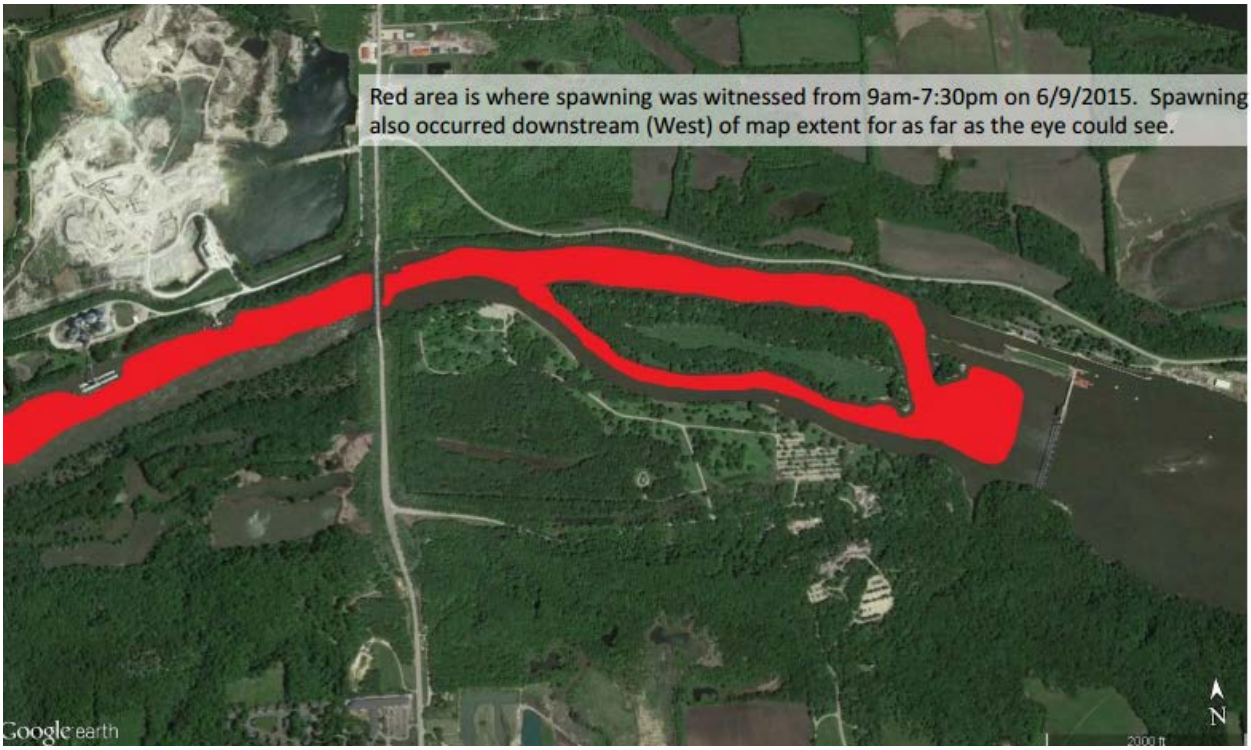


Figure 1. Location where spawning of Silver and Bighead Carp was observed on the Illinois River just downstream of Starved Rock Lock and Dam.

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 has been collecting data on fish density and movement directly above the Brandon Road Lock chamber 24 hours a day throughout June.

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

Weekly mobile split beam hydroacoustic surveys of fish density directly below the electric dispersal barrier have taken place throughout June.

Assessing Natural Recruitment Constraints on Asian Carp in River Reaches with Established and Potentially Emerging Populations: Implications for Control (USGS-CERC)

Larval light trapping

On June 17-18, 32 light traps were set from shore (due to high water levels and lack of boat access) at the Rice Lake boat ramp and Beebe Lake in the Duck Creek Conservation Area (Just east of Rice Lake) near Havana, IL. Traps were set for approximately one hour and placed in different habitats (e.g., open water, aquatic vegetation, structure) of varying depths (range= 35 cm – 115 cm). Larvae were preserved and are currently being sorted from other sample debris. Identification of larvae is forthcoming. Larval sampling will continue bi-monthly through July.

Picture of light traps

Flooded Rice Lake Boat Ramp

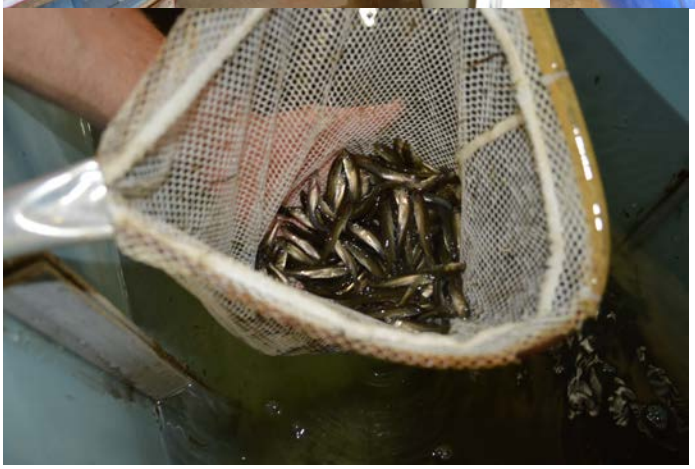
Flood waters over gravel road in Rice Lake State Conservation Area South of Duck Island which was packed full of silver carp trying to swim or jump up over the road

Alternate Pathway Surveillance in Illinois - Law Enforcement

The Invasive Species Unit developed a lesson plan and instructed the recruit Conservation Police class invasive species enforcement techniques at the Conservation Police Academy.

The Invasive Species Unit attended the Association of Midwest Fish and Game Investigator's Conference in St. Louis, Missouri and discussed relevant Illinois invasive species cases and methods used to detect illegal shipments and trade of invasive species.

The Invasive Species Unit conducted an aquaculture facility inspection in Kane County, IL. The facility had a minor record keeping violation and was provided information to be brought into compliance. The Unit will conduct a follow up investigation of the source hatchery importing and delivering salmonids to the facility.



Impacts of carbon dioxide on non-target species

Behavioral impacts to freshwater fishes

The goals of our projects have been to determine if fish behavior is altered by exposure to elevated CO_2. In the month of May, we finalized plans to begin behavioral trials on juvenile Largemouth Bass and Bluegill to determine the potential for personality and behaviorial impairments caused by elevated CO_2. This included the construction of an I---maze and a circular tank. Fish that will be used to conduct preliminary assessments have been put through preliminary testing, and results indicate that the methods are sound, reliable and valid. Additionally, we have undertaken a study that uses an acoustic telemetry system deployed in a

small pond to understand movement of fishes in an outdoor setting in response to exposure to elevated CO_2. Twenty fish were tagged and treated with CO_2 in early June.

Behavior of CO_2 in water

To inform potential deployment of CO_2 at a large scale to be used as a fish barrier, we have recently explored how CO_2 behaves in a variety of settings. We have injected CO_2 into tanks of multiple sizes, and under varying conditions (e.g., air bubbles, no bubbles, static, flowing, temperature etc.) and have measured water pCO_2 over set periods of time. In June, we met with the United States Army Core of Engineer's Brandon Road Lock CO_2 modelling group to assist with their CO_2 modelling efforts. A draft report is currently being prepared. Furthermore, we completed a short study to compare three techniques for measuring CO_2 in water and have begun to understand the amount of CO_2 potentially needed to raise ambient water to barrier levels of CO_2.

Physiological effects of CO_2 exposure on mussels

Through collaborations with UMESC, we have also been tasked with understanding how CO_2 exposure affects the physiology of freshwater mussels. In June, we have continued to develop tools to assess expression of genes associated with acid--base regulation and stress in two 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. We have also secured juvenile mussels for our summer studies.