

2015 July Summary

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

Alternate Pathway Surveillance – Urban Ponds

- Crews from IDNR and the Forest Preserve District of Cook County set 600 yards of gill net in Flatfoot Lake in Chicago on July 22nd. In addition to pounding on boats, AC electrofishing was used to drive fish into the nets. One Channel Catfish, 1 Common Carp and 1 Grass Carp were collected, with **no Bighead Carp or Silver Carp observed or collected.**

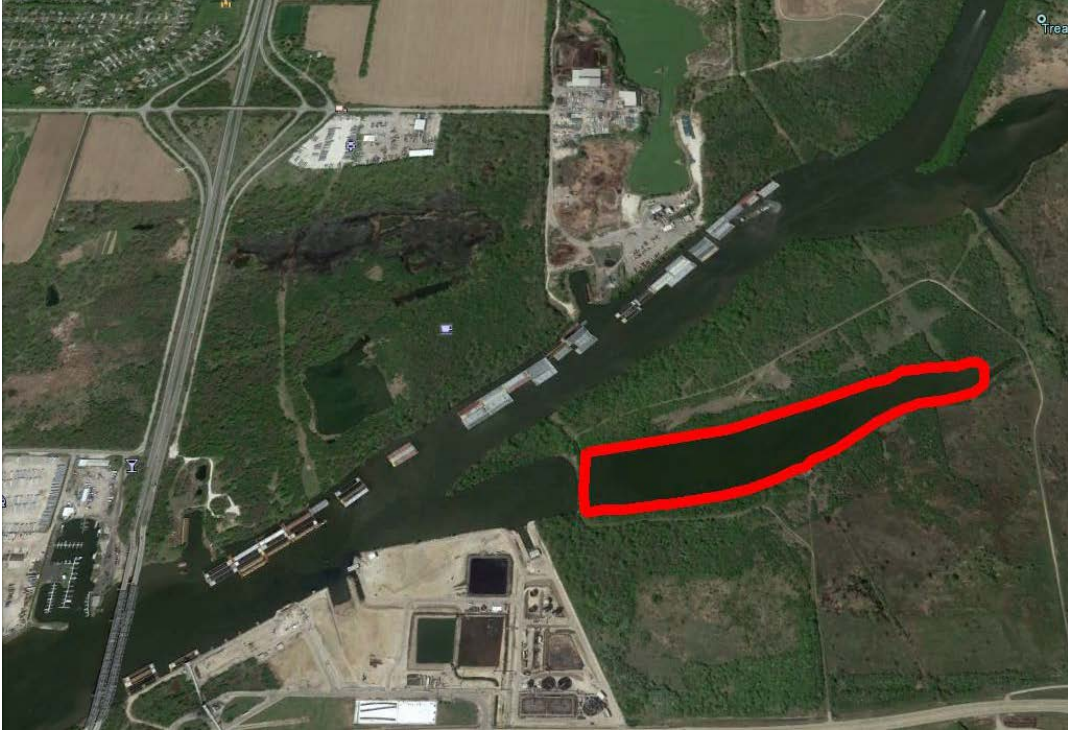
Fixed, Random and Targeted Site Sampling Downstream of the Electric Dispersal Barrier

Electrofishing:

- Crews from IDNR, USACE and USFWS completed 88 electrofishing runs at fixed and random sites (22 hours total) in the Lockport, Brandon Road, Dresden Island, and Marseilles Pools during the weeks of July 6th, July 20th and July 27th.
- Crews collected 3,016 fish of 55 species and 3 hybrid groups.
- **No Bighead Carp or Silver Carp were reported captured or observed in the Lockport, Brandon Road or Dresden Island Pools.**
- Fifty-one Silver Carp were collected and another ~ 75 were observed in the Marseilles Pool.

Commercial Netting:

- Contracted commercial fishers along with assisting IDNR biologists set 17.9 miles of net (126 sets) at fixed and targeted sites in the Lockport, Brandon Road and Dresden Island Pools (including Rock Run Rookery) during the weeks of July 13th and July 27th.
- Crews collected 188 fish of 12 species and 1 hybrid group.
- **No Bighead Carp or Silver Carp were captured or observed in the Lockport or Brandon Road Pools.**
- One Bighead Carp and three Silver Carp were collected in the Dresden Island Pool downstream of I-55.
- **Two Bighead Carp and two Silver Carp were collected 4.6 miles upstream of I-55 (0.7 miles upstream of Rock Run Rookery). One Bighead Carp was collected 0.5 miles upstream of I-55 in Mobil Bay.**
- Fifteen Bighead Carp were collected in Rock Run Rookery.
- In addition to commercial netting, crews from IDNR set a total of 1,200 yards of gill net in the Army Lake (adjacent to Mobil Bay, outlined in the image below) in the Dresden Island Pool on July 21st and 23rd. Crews collected 407 fish of 9 species, including 3 Bighead Carp and 1 Silver Carp.



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 July 13th.
- Crews collected 34 fish of 6 species during hoop net sampling and 1,015 fish of 25 species during mini fyke sampling.
- **No Bighead Carp or Silver Carp were reported captured or observed in the Lockport, Brandon Road or Marseilles Pools.**
- Two Bighead Carp were collected during hoop net sampling in the Dresden Island Pool downstream of I-55.

Barrier Defense Asian Carp Removal Project

Barrier Defense typically occurs exclusively in the Marseilles and Starved Rock Pools. However, due to continued elevated river stages the week of July 6th, Barrier Defense took place in the Lockport, Brandon Road and Dresden Island Pools. Fifty-one Asian carp (20 Bighead Carp, 31 Silver Carp) were collected in the Dresden Island Pool (downstream of I-55), with **no Bighead Carp or Silver Carp captured or observed in Lockport or Brandon Road Pools.** Total effort was 15.2 miles of gill/trammel net and 25 48-hour hoop net sets. Below is a summary of all Barrier Defense activities for 2015 (along with 2014 for comparison):

QUICK SUMMARY:	2014	2015
Number of Days Fished	32	40
Number of Net Crews	172	184
Yards of Net Fished	296,050	255,550
Miles of Nets Fished	168.2	145.2
Number of Hoop Net Sets	103	68
Number of Bighead Carp	7,119	3,929
Number of Silver Carp	28,985	49,757
Number of Grass Carp	393	486
Number of Asian Carp	36,497	54,172
Tons of Bighead and Silver Carp Harvested	186.4	190.4

Strategy for eDNA Monitoring in the CAWS

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

Telemetry Monitoring Plan

On the week of 13 July, USACE biologists completed 31 VR2W receiver downloads and mobile tracking in the CAWS and Upper Illinois Waterway from the Cal-Sag Confluence to the Dresden Island Lock and Dam. Additionally, VR4 downloads at the barriers was completed from the previous month and data has been sent to Vemco for processing of the positioning data.

Preliminary analysis of the VR2W data has been completed which encompassed the period from 5 May to 13 July 2015. Three Common Carp were observed to pass downstream through Barrier IIA into the Lower Lockport Pool with no tagged fish observed moving upstream through the barriers. Inter-pool transfer of Common Carp was also observed to occur in both directions through the Lockport Lock and only downstream through the Brandon Road Lock. There was no inter-pool transfer observed at the Dresden Island Lock with available data but further information will be reviewed in cooperation with SIU and receivers in the Marseilles Pool. There were a total of 31 tagged Bighead Carp and 5 tagged Silver Carp detected within the Dresden Island Pool. Analysis of the data is ongoing.

Fish Suppression and Clearing in Support of Barrier Maintenance

Within the Month of July 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 8 severe weather reports 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. Quarterly maintenance was completed by Smith Root

Inc. at Barrier IIB from 29 June to 2 July. Quarterly maintenance was completed at Barrier IIA from 20 to 23 July. There was no loss to power in the water during either quarterly maintenance event. The current operational settings for Barriers IIA and IIB are 2000 V input at the narrow array electrodes (800 V wide arrays), 34 Hz and 2.3 ms pulse duration. Heavy monitoring of the waterway continues with efforts from multiple resource agencies which indicate that Asian carp presence within Lower Lockport pool remains low.

Understanding Surrogate Fish Movement with Barriers

Current Floy Tag Totals

Species Tagged

- Bigmouth Buffalo – 51
- Black Buffalo – 49
- Common Carp – 1004
- Common X Goldfish Hyb. – 28
- Goldfish – 4
- Smallmouth Buffalo – 673

Total – 1,809

Recapture Totals

- Lockport Pool – 8 Common Carp
- Brandon Pool – 50 Common Carp, 3 Smallmouth Buffalo
- Dresden Pool – 20 Smallmouth Buffalo, 19 Common Carp & 3 Bigmouth Buffalo
- Rock Run – 7 Smallmouth Buffalo, 1 Bigmouth Buffalo & 3 Black Buffalo

Total – 114 recaptures

Fish Movement

- 51 recaptures by Caudal Fin but didn't have tags (No data on movement)
- 59 recaptures had tags but showed no movement between Barrier/Dam
- 4 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

The Columbia Fish and Wildlife Conservation Office continues to test various trawling methods for their ability to detect and monitor invasive carp populations in the Illinois River system. Approximately 25 miles of trawls were conducted in July 2015 targeting a variety of habitats. Following is a week-by-week breakdown of field efforts.

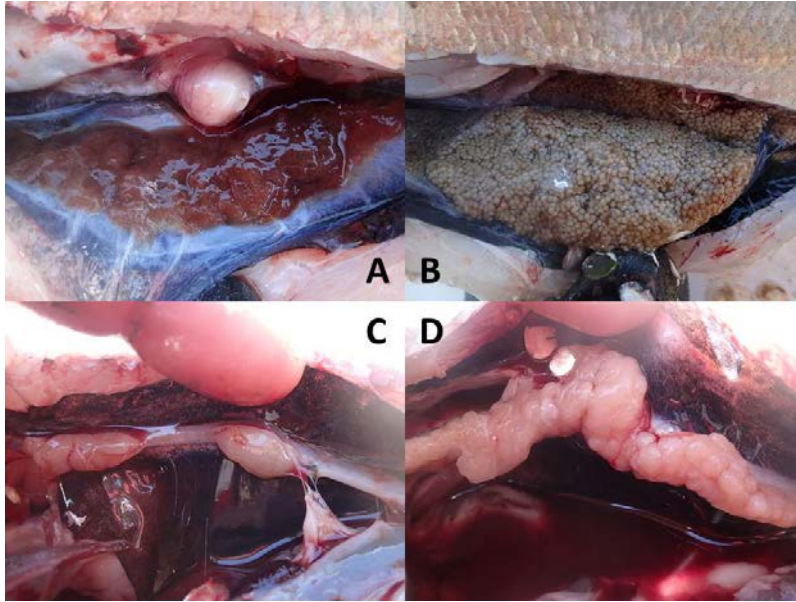
The week of July 6, 2015, one crew from the Columbia FWCO sampled seven miles in the Starved Rock (4.2 miles) and Marseilles (2.9 miles) pools using the Paupier butterfly frame trawl and the surface trawl. Trawls were deployed in backwaters, marinas, side channels, and the Fox River near it's confluence with the Illinois River. The Paupier was used to sample three miles, including nearly two miles of side channel habitat, 0.6 miles of backwater, 0.3 miles in marinas, and 0.3 miles in the Fox River. Adult invasive carp were captured in all habitats, with the Fox River having the highest catch rates. The surface trawl was used to sample four miles, including two miles of side channel habitat, 0.8 miles of backwater, 0.4 miles in marinas, and 0.5 miles in the Fox River. Surface trawls captured few adults and zero small invasive carp; however, young-of-year gizzard shad were captured in backwaters and marinas (see image below).



Caption: Clupeids, primarily gizzard shad, captured in backwater habitat in the Marseilles pool on July 9, 2015.

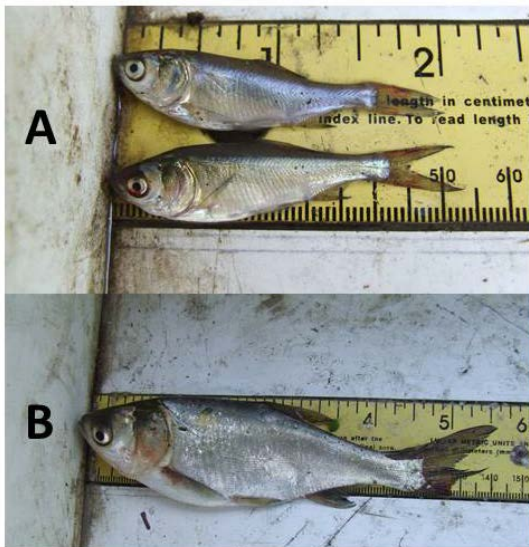
Two crews from the Columbia FWCO sampled the Starved Rock, Lockport, and Peoria pools of the Illinois River for invasive carps July 21 - 23, 2015. Three different trawling methods (the Paupier butterfly frame trawl, surface trawl and dozer trawl) were used to target the 2014 and 2015 year classes in the Starved Rock and Peoria pools while the Paupier and dozer trawl were used to capture small fish challenging the electrical barrier in Lockport. All three trawling methods captured silver carp, but detection and size varied with location.

Over 4 miles of backwater habitat was trawled in the Starved Rock Pool and no "small" (<200 mm) invasive carps were captured however adults measuring 502-721 mm were collected, primarily with the electrified Paupier. Physical observation of adult silver carp gonads revealed a variety of reproductive stages (see images below).



Caption: Gonads of adult silver carp captured by electrified Paupier in the Starved Rock Pool of the Illinois River on 7/21/2015. A. Post-spawn ovary; B. Ovary with eggs; C. Post spawn teste; D. Lobed teste expressing milt.

In the flooded Peoria Pool, over 11 miles of trawling was completed and 54 "small" silver carp measuring 33-150 mm were captured. The 150 mm silver carp was most likely from the 2014 year class while the remaining fish measuring 33-78 mm most likely hatched in 2015 (see images below).



Caption: Silver carp <200 mm were captured by three trawling methods in the Peoria Pool the week of 7/20/2015. A. Probable 2015 year class specimens around 50mm; B. Probable 2014 year class specimen approximately 150mm.

Sampling at the electrical barrier on July 22, 2015, was in support of the Wilmington Office hydroacoustic study. DIDSON identified small fish challenging the barrier and trawling efforts captured over 350 fish, the majority of which were gizzard shad between 70-100 mm (see image below). Sampling repeated on July 30, 2015 produced very different results: no gizzard shad and only nineteen fish representing five species.



Caption: Gizzard shad captured by dozer trawl at the electrical barrier in Lockport, July 22, 2015.

The dozer trawl was used to sample over three miles in the Marseilles pool on July 29, 2015. Habitats sampled included backwaters (1.4 miles), side channels (one mile), main channel border (0.4 miles), marinas (0.3 miles), and tributaries (0.2 miles). No small (<200 mm) invasive carp were captured. However, eleven other species were captured including Gizzard Shad, Threadfin Shad, Spotfin Shiner, Emerald Shiner, and Brook Silverside. The majority of fish were captured in backwaters and marinas.

Evaluation of Gear Efficiency

INHS conducted pulsed DC electrofishing to monitor for the presence of age-0 and age-1 Asian carp at sites in the LaGrange, Peoria, Starved Rock, Marseilles, and Dresden Island Pools of the Illinois Waterway during the weeks of July 6, July 20, and July 27. During the week of July 27, an electrified trawl was also used to sample main channel habitats for Asian carp. Only small numbers of age-0 and age-1 Asian carp were captured by electrofishing in the LaGrange and Peoria Pools, although field personnel reported that numerous age-0 Asian carp were observed in very shallow areas containing flooded vegetation where electrofishing boats were unable to access. A small number of age-0 Asian carp (approximately 30 mm) were also captured in the electric trawls at Havana. With Illinois River water levels falling below flood stage, sampling with a full complement of gears targeting juvenile Asian carp is planned for August.

Larval Fish and Productivity Monitoring in the Illinois Waterway

INHS conducted ichthyoplankton sampling at 12 sites located throughout the Illinois Waterway during July 1-2, July 7-10, and July 20-22. Four larval fish samples were taken at each site, and zooplankton and water quality samples were also collected. Processing and identification of larval fish samples is ongoing. Preliminary data indicate that numbers of larval fish from July samples are considerably lower than those collected during May and June. The presence of Asian carp eggs and/or larvae will be reported once identification and verification of collected specimens is completed.

Unconventional Gear Development

Due to widespread flooding throughout the Illinois River, INHS did not conduct pound net monitoring during the month of July. Pound netting will resume in August in cooperation with USGS and USFWS partners.

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

Hydroacoustics

Four hydroacoustic surveys were completed one mile upstream and one mile downstream of Starved Rock Lock and Dam at varying river stages. Due to elevated water levels, additional surveys were not undertaken in July. Hydroacoustic data is currently being processed.

Telemetry

Acoustic receivers were downloaded from the HMS pits in the Marseilles pool downstream to Havana, IL. Some receivers in this stretch and receivers downstream of Havana were not downloaded due to high water levels. We detected multiple passage events by both Silver and Bighead Carp through Starved Rock Lock and Dam. The majority of passage occurred when the dam gates were either skimming or completely open. We did not detect any passage through the lock chamber.

The second of three range tests was conducted at Starved Rock Lock and Dam. Preliminary results indicate increased detection range at high water; even so, receivers appear to be spaced far enough from each other that overlap should not be an issue when attempting to determine fine scale movement patterns.

A detailed bathymetric map was made of all water between Starved Rock Lock and Dam (downstream of restricted area) and the Route 178 Bridge. This information may eventually be linked to movement patterns of Asian carp.

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 July.

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 barrier have taken place throughout July.

Stationary dual DIDSON and underwater camera deployments were made at the EDB IIB narrow array during July to observe fish behavior near the barrier. Two hundred and

seventy-four 10 minute observation events occurred this month. Data processing is ongoing. In addition; Columbia FWCO conducted fish sampling events during the weeks of July 20 and 27 in association with this work.

Distribution and Movement of Small Asian Carp in the Illinois Waterway

During the month of July, USFWS Wilmington sub-office conducted the following efforts, using push trawls (PT), mini-fykes (MF), and boat electrofishing (EF), to search for small Asian carp (<200mm) in the Des Plaines, Illinois, and Fox rivers. No small Asian carp were captured or positively observed. Twenty-seven western banded killifish were captured and released during these efforts.

River/Pool	Gear	Net nights/runs
Des Plaines River		
Dresden Island	PT	9
	EF	6
Illinois River		
Marseilles	MF	10
	PT	21
	EF	21
Starved Rock	PT	14
	EF	36
Peoria	MF	10
Fox River		
	EF	6

Alternate Pathway Surveillance in Illinois - Law Enforcement

Illinois Department of Natural Resources Invasive Species Unit (ISU) contacted a commercial fisherman who was advertising live fish for sale on craigslist. The ad said, "LIVE FISH FOR SALE 2015 Licensed by City of Peoria to Sell Fish! June: Catfish July: Asian carp, Grass Carp & Buffalo POND STOCKING AVAILABLE!" ISU interviewed the fisherman who explained he wasn't planning on stocking fish, but only selling Asian Carp for consumption. ISU informed the fisherman of Asian Carp, VHS, and IDNR license regulations. The fisherman was advised on how to obtain the licenses required by IDNR and how to contact his local Conservation Police Officer should he have questions in the future. He said he was not aware of the additional State requirements and thanked ISU for contacting him.

ISU conducted a random commercial retail minnow dealer inspection on a Chicago area bait shop. The bait shop also possessed an aquaculture license and a letter of authorization to possess live Rusty Crayfish. The letter is in the name of the bait shop

and the original owner, who died in 2012. According to the letter dated June 5, 1990, it is invalid when the applicant ceases to do business at the location, violates the conditions listed, or no longer has a valid permit. The letter is under review. There were no violations.

ISU conducted a random commercial retail minnow dealer inspection on a Chicago area bait shop. The bait shop also possessed an aquaculture license and a letter of authorization to possess live Rusty Crayfish. The letter is in the name of the bait shop and a subject who died in 2006. According to the undated letter on Illinois Department of Conservation letterhead, the letter of authorization is invalid when the applicant ceases to do business at the location, violates the conditions listed, or no longer has a valid permit. The letter is under review. During the inspection of the Rusty Crayfish records, ISU learned an out of state subject was importing crayfish alive to the bait shop without an injurious species permit. The bait shop and owner were issued written warnings for not submitting their 2014 aquaculture annual report by January 31, 2015, and failing to have wholesale minnow dealer's records available for inspection.

ISU conducted a random commercial inspection of an aquaculture facility in McHenry County and discovered only a minor record keeping violation. ISU then investigated the supplier who sold Tilapia to the facility and discovered a facility associated with that supplier was raising and selling live Tilapia in Dupage County without an aquaculture permit. Five violations were documented at the Dupage County location. Interviews at the aquaculture facility identified 4 additional non-permitted aquaculture facilities in the Chicago area, and an Asian market purchasing and transporting live Tilapia from the Dupage County location. This Asian market was issued a written warning in 2014 for selling aquatic life without an aquatic life dealer's license and currently does not have a license. Follow up investigations will be done.

Conservation Police Officers stopped and inspected two fish trucks in the month of July. No violations were found, but the inspections indicate an interest and willingness of field CPOs to stop and inspect these trucks to ensure compliance.





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 CO₂. 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 behavioral impairments caused by elevated CO₂. 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 CO₂. Twenty fish were tagged and treated with CO₂ in early June.

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. In June, we met with the United States Army Core of Engineer's Brandon Road Lock CO₂ modelling group to assist with their CO₂ modelling efforts. 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.

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. 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.