

FLEUR DE LIS FISHERIES

US Fish and Wildlife Service



Biologist from South Carolina DNR, Orangeburg NFH, Natchitoches NFH and South Carolina Ecological Services Field Office search Flats Creek for endangered Carolina Heelsplitters.

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Natchitoches NFH Participates in Recovery Efforts for the Carolina Heelsplitter

The South Carolina Ecological Service Field Office (SCESFO) and Private John Allen National Fish Hatchery have worked closely with Lancaster County, the City of Lancaster SC, North Mississippi National Wildlife Refuge Complex, Edenton NFH, Bears Bluff NFH, Welaka NFH, Wheeler NWR and the Wadmalaw Island Fish and Wildlife Conservation Office over the past couple of years replacing a culvert in Gills Creek, South Carolina. The culvert replacement provides improved fish passage and habitat for the Carolina Heelsplitter (CHS). The CHS is one of the most endangered species in the state of South Carolina, and now that fish

small streams due to the amount of leaf litter, a total of four previously undocumented CHS were found and tagged. Two of these four CHS were gravid females. The exact location for each CHS was recorded by taking the coordinates where each mussel was found. These coordinates will be helpful this spring when biologist go back and collect these females to use to infest host fish. The SCESFO, ONFH, BBNFH and NNFH will be working with South Carolina Department of Natural Resources to collect host fish for this propagation effort, and these fish will be held in at ONFH. The initial propagation effort will call for the release of infested host fish into a designated recover site just prior to the drop off of newly metamorphosed mussels. The goal, of the “free release” of infested host fish just prior to the mussels dropping off, is to seed an area of suitable habitat with a larger number of juvenile mussels than the site would receive naturally. A subsample of host fish will be kept at ONFH to estimate the number of mussels released into the site. Juvenile CHS produced at ONFH will be used to develop intensive culture techniques for this and other mussel species that will be cultured at ONFH in the future.



The endangered Carolina Heelsplitter.
Photo by Jonathan Wardell

passage and habitat has improved in Gills Creek and other CHS streams, plans are currently being made to begin propagation efforts starting in the spring of 2015 to begin recovery. Natchitoches National Fish Hatchery (NNFH) became involved this past July when malacologist Tony Brady met with Bears Bluff National Fish Hatchery (BBNFH) and Orangeburg National Fish Hatchery (ONFH) and the SCESFO personnel to discuss options for propagation efforts for the CHS. In November 2014, Brady again visited SC to help conduct surveys for CHS and finalize propagation plans. While conditions were not optimal for surveying these



The arrow points to the gills of this Carolina Heelsplitter full of larval mussels called glochidia.
Photo by Morgan Wolf

New Butterfly Net Boat in Columbia, MO

Back in the June 2013 issue of our newsletter was an article on a Butterfly Net Boat built by the Columbia Missouri Fish and Wildlife Conservation Office to capture invasive Asian carp, specifically the Silver Carp. Those are the ones that jump into the air and sometimes hit people who are motoring along in their boats. That first Paupier (Cajun French for Butterfly) net boat had nets in two “wings” on each side and electrodes for stunning the fish for capture. The electrodes were powered by an MLES Infinity pulsator. Now the Columbia FWCO has a new Paupier net boat of a similar design but with some refinements for better operation. It is powered with either the Infinity pulsator or with an ETS MBS pulsator with high current (72 amp) capabil-

ity which should allow it to operate in higher conductivity water. Also, the boat is coated with a special paint which does not conduct electrical current. That also will allow operation in higher conductivity water. Another article in this edition of our hatchery newsletter is about a new NCTC electrofishing practicum course offered for the first time in Marion, Illinois. Some of the course attendees were going to be from the Columbia FWCO, and instructor Dr. Alan Temple was eager to see the net boat in operation, so we arranged to meet a day before class to investigate this new net boat. Alan and I both flew into St. Louis and drove just north to Alton, Illinois where we met Wyatt Doyle and members of the net boat crew: Jeremiah Smith, Em-



The Butterfly Net Boat, the Magna Carpa, with its “wings” aka net frames up for loading onto the trailer.

ily Pherigo and Skyler Schlick. Alton, IL is a historical site, and a footnote is included below about a visit by Abraham Lincoln. More about that later.

At the end of the original Butterfly Net Boat article, there was mention of naming the boat. One name proposed was Magna Carpa, for multiple reasons. At the time, I thought the original boat was to receive that name, but it was later called Big John. This new boat is named Magna Carpa. The electrical connection to the various positive electrodes, anodes, is unique. There are two anode groups, called zones, on each side of the

on this ol' Louisiana boy.

The Magna Carpa was launched into a tributary of the Mississippi River near Alton so that we could conduct some testing of the electrical output. We measured the electrical current flowing to each of the four anode zones when all were turned on. Thus, we could then calculate the power going to each zone, and we also determined the overall electrical resistance and measured the water conductivity and the water temperature. The crew wanted to know how the electricity was flowing in the water near the electrodes, and they had con-



The Butterfly Net Boat with its net frame shown. In operation, the net frame opening is perpendicular to the water flow. The net frame opening is 12 feet wide x 5 feet tall.

boat. One zone is for the anodes fore of the net frame, which is the cathode or negative electrode, the other is for an anode sphere behind the net frame and situated in the net itself when the boat is under way. The four zones can be turned on or off independently at their connection to the pulsator output. This connection is called the voo-doo box, and that is a reference not lost

structed a device, called a voltage gradient probe, to measure the volts per cm at various points and depths in the water. Generally, we make such probes of short pieces of PVC pipe with wires inside. Someone has to be in the water and turn the pipe probe in order to obtain a maximum voltage reading. In this case, where the boat was deployed in deeper water, we had to make

such measurements from within the boat. Therefore, the probe they constructed was a vertical pipe with wires inside, and this was attached to a long horizontal rod with a mechanism to rotate the vertical pipe at quite a distance from those taking the measurement. One person had to strain to hold the rod and pipe in place and other people had to rotate the pipe, read the voltage, note the location from the boat (in three dimensions), make a map of the boat and measurement location and record the data. It was a team effort, for sure. We made a map of the voltage gradients, the volts per cm, and then moved the fore anodes closer to the net frame cathode and made another series of voltage measurements for a second map. Thus, we were able to document how the electrical field was intensified as the anode and cathode were moved closer together. A more intense field in front of the net frame should relate to more fish immobilization and thus to a higher catch rate of Asian carp.

Later in the week, more testing of the Magna Carpa was done in Crab Orchard Lake. The resistance was calculated for various combinations of anode configurations. These data were used to estimate upper water conductivity limits for operation of the boat in four combinations of anodes and for both the MLES Infinity and the ETS MBS pulsators. This information is the genesis of a Standard Operation Procedure guide for the Magna Carpa based on water conductivity. At one point in the testing with the Infinity pulsator, it was



Mapping the electrical field of the Magna Carpa with the unique voltage gradient probe and a lot of help.

estimated that the maximum voltage should be about 270 volts. Being inquisitive biologists, we decided to test that calculation. Sure enough, under those conditions, in that configuration, the maximum sustained voltage was 270 volts, just as we predicted. Whew. One has to be in a certain electrode configuration to produce enough power for effective fish capture. This power level is about 8000 watts or above, as determined from previous trials. On Thursday of that week, the boat was taken to a river which contained Asian carp. The crew changed the electrode configuration to get within the required resistance range, and the unit produced over 9000 watts. Now armed with all of this new information on its operating parameters, the crew is back to more testing with the Magna Carpa. The objective is more effective capture of Asian carp. The crew is well on their way to meeting that objective.

Now back to the mention of Alton, IL and a bit of its history. Alton is just north of the Mississippi River from the Missouri side to the Illinois bank. In 1842, the young Abraham Lincoln wrote articles criticizing and taunting Illinois State Auditor James Shields. Mr. Shields challenged Mr. Lincoln to a duel, which was legal in Missouri at the time. They met at Bloody Island in the Mississippi River at Alton but near the Missouri side. Mr. Lincoln chose calvary broadswords “of the largest size” as the weapon for the duel. Lincoln was 6 ft, 4 inches tall with a long reach, whereas Shields [he probably wish he had a shield] was 5 ft., 9 inches tall. Once on the island, Mr. Lincoln used his sword to cut through a nearby tree branch well above his head to demonstrate his strength and immense reach advantage. Evidently, this made quite an impression on Mr. Shields who reconsidered the wisdom of the duel. They agreed to call a truce. Imagine that.

Three USFWS Regions Join Forces to Teach Mussel Propagation Course at NCTC

There is no better way to end the fiscal year than to be a part of a new beginning. In September 2014, malacologists from Regions 3, 4, and 5 came together under the supervision of Matthew Patterson, Course Leader at the National Conservation Training Center (NCTC), to teach the first “Freshwater Mussel Propagation for Restoration” course. Patterson spearheaded the effort, but he couldn’t have pulled it off without the help of Region 3’s Nathan Eckert (Genoa National Fish Hatchery) and Brian Simmons (Columbia Missouri Field Office), Region 4’s Tony Brady (Natchitoches National Fish Hatchery), and Region 5’s Rachel Mair (Harrison Lake National Fish Hatchery), Julie Devers (Maryland Fisheries Resource Office), Jess Jones (Virginia Field Office), and Catherine Gatenby

Students received plenty of hands on experience in the lab learning about mussel anatomy, harvesting glochidia (larval mussels), inoculating host fish, and collecting newly metamorphosed juveniles. Thanks go to Harrison Lake National Fish Hatchery for allowing the class to drop in for a day to see first-hand their mussel culture and grow out methods. Based on the post-course evaluations, the students were very pleased with the course and would highly recommend it to others. For more information on the course, including when it will next be offered, please contact Matthew Patterson at 304-876-7473 (matthew_patterson@fws.gov).



Brady demonstrates how to extract glochidia from female mussel.

Photo by Matt Patterson

(Lower Great Lakes Fish and Wildlife Conservation Office). The team spent more than a year developing the course, writing chapters for the course manual, and preparing lesson plans. All of their hard work came to fruition the second week of September when 24 students from Federal, State and Private agencies covering 15 states and 5 U.S. Fish and Wildlife Service Regions converged on the campus of NCTC. The course was designed to be an equal mix of lecture, in class discussion, laboratory exercises, and field trips.



Jason Mays from the Asheville ES office rinses glochidia out of the mussel after extraction.

Photo by Matt Patterson

New NCTC Course Launched in Marion, IL

A new course for NCTC, Electrofishing Sampling Advanced Practicum (CSP2203), was introduced in Marion IL the last week of October. The basic electrofishing course, Principles & Techniques of Electrofishing, has been offered for several years as an on-site course (CSP2201). It is also offered as an on-line course (CSP2c01) which has been revised recently. Now, someone may take the on-site basic course or they may take the on-line course, and the certification exam, and then take the advanced course. The latter approach allows the instructors, Alan Temple and me, to tailor the practicum to the needs of the participants. The practicum involves less classroom instruction and more field work and then analysis of the data so as to answer practical questions and make con-

nections in a way which time does not permit in the basic class. Participants are able to use the available Excel tools to learn more about their electrofishing units and the electrical fields they produce. Depending upon the needs and wishes of the participants, the practicum can allow more use of Excel tools for capture efficiency, detection probability, trend analysis and other aspects of population dynamics and fish sampling.

The new course, or workshop, was hosted by the Carterville Fish and Wildlife Conservation Office and by the Crab Orchard National Wildlife Refuge. We met for class presentations at the latter, and we conducted field trips at nearby Crab Orchard Lake. Most of the class participants were from the Carterville IL FWCO



Electrofishing boats during field trip to Crab Orchard Lake near Marion, IL October 29, 2014.

or from the Columbia MO FWCO; both offices are heavily involved in study and management of the invasive Asian carps.

Electrical resistance and power allocation was determined for each boat, and a map of voltage gradients was made for each boat to determine the extent of its electrical field for fish capture. We were able to make such field maps for the same boat using both our regular Fluke 124 scopemeter (~ \$2000) and a Velleman pocket oscilloscope (~ \$100). Both scopes provided data for making virtually identical voltage gradient graphs, so that was useful information. Also, we made field maps using two frequencies (30 and 300 Hz) of pulsed direct current, and the two maps were the same. The finding demonstrated that field sizes are independent of frequency.

One boat used a Smith-Root GPP 5.0 pulsator, which lacks a voltmeter, so we used an oscilloscope to measure peak voltage at various percent of range settings so as to create a voltage calibration curve for that pulsator under those conditions and for two common frequencies, 60 and 120 Hz. We were able to check current with both the Fluke scopemeter and the Velleman pocket oscscope. Participants determined power thresholds for successful fishing at Crab Orchard Lake with four electrofishing boats. Pulsators for producing pulsed direct current included the MLES Infinity, the ETS MBS and the Smith-Root GPP 5.0. A

bonus for me on the last day was testing a high frequency setting for fish capture using an Infinity pulsator. Typical frequencies used for electrofishing often include 60 Hz or some fraction of multiple of that, such as 30 Hz or 120 Hz. For this trial, we used 300 Hz at low duty cycle (percent of time on) settings of 10, 15 and 25%, and all were successful for fish capture.

In the basic electrofishing class, we often set up an

aquarium and demonstrate the effects of changing frequency, duty cycle or even fish size. In this advanced practicum, we were able to spend more time with such trials. Besides frequency and duty cycle, we also tested the effects of water conductivity change on fish immobilization and later evaluated other waveforms on fish immobilization and on attraction to the anode, positive electrode. Attraction, or taxis, is a fish capture-prone response. We even tested high frequencies and found that 400, 500 and 1000 Hz pulsed direct current resulted in attraction to the anode.

Lastly, we spent more time that last morning on the Excel files for aspects of fish sampling and population dynamics than we have time for in the basic class. Each advanced practicum may be slightly different because they can be tailored for the needs of the participants. We learned from this class some information which will be useful in guiding future practicums. Overall, we thought it was a successful launch, and we appreciate the Carterville FWCO and the Crab Orchard NWR for hosting us. Anyone wishing to host or to offer the Electrofishing Sampling Advanced Practicum should contact Dr. Alan Temple of NCTC via alan_temple@fws.gov or via 304-876-7440.



The infamous Silver Carp, the target species of many participants in the new efishing class at Marion, IL.

Bayou Bartholomew Mussel Survey Complete: Boat Ramp Construction Continues

Chemin-A-Haut State Park (Park) is located just north of Bastrop, LA and is bordered by Bayou Bartholomew. Kayaking and canoeing on Bayou Bartholomew is one of the favorite activities visitors to the Park enjoy. Access to the bayou is limited, therefore the Park has plans to build a new boat ramp for visitors to launch and retrieve their boats. Bayou Bartholomew is home to two federally listed mussel species, the Pink Mucket and the Rabbitsfoot mussels. The Park requested technical assistance from the Louisiana Ecological Services Field Office (LESFO) to determine potential impact to the listed mussel species. The LESFO requested Tony Brady (Natchitoches National Fish Hatchery NNFH) to conduct a mussel survey at the boat ramp site. On 9 October, Brady and Monica Sikes from the LESFO met on the banks of



Brady and Sikes identify, count and record the mussels that were collected during this survey.



Brady and Sikes snorkel Bayou Bartholomew for mussels at the future boat ramp site.



Brady points out identifying characteristics to distinguish between similar mussel species found in Bayou Bartholomew.

Bayou Bartholomew and surveyed the site. Snorkeling in zero visibility water for an hour produced seven mussel species at the proposed boat ramp site. No listed species were collected. The mussels that were collected were moved upstream of the site to ensure their survival. After the survey was completed, the Park began the final construction of a boat ramp that will help connect many with the great outdoors.