Volume 6 Issue 1 October 2015

FLEUR DE LIS FISHERIES

US Fish and Wildlife Service

This unique looking fish is a Lake Sturgeon that is currently being raised at Private John Allen National Fish Hatchery for conservation efforts in the Tennessee River.

Saying Goodbye to the Fish and Wildlife Service

Jan Dean

This is not easy to write. There is so much to say, yet there is limited space in our newsletter in which to encapsulate many thoughts about my years with the Fish and Wildlife Service and beyond those boundaries to a career in fisheries. Growing up on a small dairy farm in Louisiana, my family best knew work, so it is hard to say goodbye to a formal job and career that has been so much a part of my life. I do look forward to the opportunities ahead.

If I may, let me reflect just a bit. My career in fisheries began during the summer of 1974 as a senior at Louisiana Tech when I worked at the Rockefeller Refuge of the Louisiana Wildlife and Fisheries Commission, now the Louisiana Department of Wildlife and Fisheries. We conducted rotenone sampling for fish and helped rear fish in ponds, so I was exposed to fish culture and to fisheries management. We also worked with wildlife, most notably alligators, and with law enforcement that summer, so it was a good exposure to the real world. Coincidentally, I met a pretty girl a day or two before shipping off to Rockefeller and we wrote letters about every day. It was a lonely summer. Long story short, we have been married forty years. Now back to the career. There was graduate school at Mississippi State where I studied fish nutrition, then I worked at the University of Arkansas at Pine Bluff as a research associate in fish culture. I felt there was more to learn, so I went to Virginia Tech to study fish nutritional physiology. From there, my career took a different path as I became the Assistant Chief of Fisheries (Management) for the Oklahoma Department of Wildlife Conservation, a job which I really enjoyed. There was an opportunity to return near home; it was working for Northwestern State University first as Director of Aquaculture then as a professor teaching biology and some fish and fisheries courses. During that time, I conducted a small study at the Natchitoches National Fish Hatchery which is in the same town as NSU. I liked the crew, and manager Karen Kilpatrick asked if I were interested in being the assistant manager. Well, here I am over 18 years later.

My main focus at the hatchery for most of my time at the NNFH was with pallid sturgeon and to a lesser extent with paddlefish. Now we are working with alligator gar, so it seems my FWS career has involved primitive fish. Of course, there was the pond rearing and many other aspects of hatchery work. Back in 2007, I attended the FWS Principles and Techniques of Electrofishing course at Warm Springs, Georgia. That rekindled my interest since first taking the course in the 1980s in Tulsa, Oklahoma. I was hooked. Course leader Alan Temple asked me to teach with him in 2008, and I have been privileged to do that since. As I leave formal employment with the FWS, I plan to begin a business – perhaps Dean Electric Fishing or similar – to continue teaching and consulting in the field of electrofishing.

On a related note, let me say that the facets of my life have been Faith, Family, Friends, Fisheries and Fun, ideally in about that descending order. Sometimes that order gets jumbled, but I hope to get back to a better balance in retirement. As regards work, I have tried to live by Colossians 3.23 which says, "Whatever your task, work heartily, as serving the Lord and not men," and am sure that I have not always lived up to that. I have been privileged to work for five universities, for two state agencies (if you can count my summer with Louisiana) and for the Fish and Wildlife Service. All have provided input into my life, and I hope that I have made some contribution back to each. With my remaining time and health, I now want to focus on a few things in life so as to make a real and positive difference. Spending time with our five grandchildren is high on my list. I appreciate all of the good times and the friends that I've made along the way. I hope to have a business email address soon. If you want to contact me, Natchitoches National Fish Hatchery will have my address. It would be good to hear from my friends. Until we meet again.

October at the Private John Allen National Fish Hatchery

Greetings from the Private John Allen National Fish Hatchery! As most of you can tell, the leaves are falling, the temperature is dropping and fall is in the air here at Pvt. John Allen (PJA). Fall happens to be one of the busiest times of the year for us at the fish hatchery. During the month of October we will harvest our ponds, stock lakes throughout the state of Mississippi, connect people to nature through fishing rodeos and make improvements and renovations to our facility in preparation for winter. Here are some of the highlights of the work we have accoplished in October.

Hatchery Renovation and Improvements

Earlier this year, we discovered that when our holding house was remodeled quite a few years ago, attention to detail was apparently something that was absent from the contractor's minds. Drip rails had not been properly installed which led to water leaking through the seams of the fascia boards, thus causing the roof to rot. Although this was a problem that could have been ignored for many years before it became evident, we, as stewards of this facility, decided that the problem should be remedied immediately. We stripped all of the old fascia and soffett from the holding house, cut any rotting wood from the roof and replaced it with new timber and finally, replaced all of soffett and fascia boards with new material. We were able to accomplish all of this without neglecting any of our other daily hatchery duties. Additionally, in October, we began construction of our brand new mussel propagation system. As you may or may not know, the culture of freshwater mussels is becoming a huge issue within the service and our goal here at PJA is to be at the forefront of this endeavor. In the coming months we will begin testing and remedying any problems with our system so that we can begin culture operations in 2016.

New tank set up for producing mussels.

Work being done to replace the rotten roof on the holding house.

Electrofishing Surveys

Another service that PJA provides is community surveys through electrofishing. In October, we performed two of these surveys on Lake George at Panther Swamp National Wildlife Refuge as well as Lake Pushmataha through our tribal management assistance program in order to determine future stocking rates to improve the fishery.

Fall Harvest and Native Sportfish Restoration
October is the time of year that we drain and harvest our redear sunfish (RSF), bluegill (BLG) and channel catfish (CCF) ponds in order to contribute to native sportfish restoration throughout the state. This has been an exceptional year for us with close to 100,000 channel catfish, 396,000 redear sunfish and nearly 650,000 bluegill produced. Furthermore, the following is a list of lakes stocked thus far and the number of fish released into them:
Trace State Park: 38,750 BLG, 21,125 RSF and 10,000 CCF
Tombigbee State Park: 31,850 BLG, 13,650 RSF and 5,000 CCF
Lake Monroe: 62,000 BLG, 60,000 RSF and 6,000 CCF
Lake Pushmataha: 216,000 BLG and 144,000 RSF
Lake Lamar Bruce: 150,000 BLG, 75,000 RSF and 15,000 CCF
Tippah County Lake: 7,500 CCF
Ballard State Park: 200 CCF
Veterans State Park: 200 CCF

Connecting People with Nature
One of the most important things that we do here at PJA is attempt to provide an avenue through which people can connect with nature. We do this either by providing fish for, or hosting fishing rodeos. In October, we supplied Dahomey and Panther Swamp National Wildlife Refuges with nearly 750lbs of mature channel catfish each to host a fishing rodeo. We were also able to supply the Choctaw tribe in Philadelphia, MS with 750lbs of channel catfish through our tribal management assistance program.

In addition to the fish mentioned above, Private John Allen NFH also produces several thousand Alligator Gar each year.

Channel Catfish are one of the most popular fish species to catch at a fishing rodeo.

Mussel Surveys Conducted in Southeast Louisiana

Most folks who have ever visited New Orleans know that southeast Louisiana is home to some of the best food found in the country. Gumbo, jambalaya, crawfish pies, and you can't forget powder sugar covered beignets. However, there is one thing you won't find on the menu in Louisiana, and that is freshwater mussels. First of all, oysters are the preferred bivalve of choice, and secondly most folks aren't willing to brave the alligators and zero visibility waters to enter the rivers where mussels are found. There are a few brave souls who in the name of science and conservation are willing to dive beneath in these murky waters to help document the mussel populations of the rivers that feed into Lake Pontchartrain.

Biologists, from the Private John Allen and Natchitoches National Fish Hatcheries (the Complex) along with biologists from the Alabama Ecological Services Field Office and Louisiana Department of Wildlife and Fisheries spent three weeks from July to October sampling mussels from the Tangipahoa and Pearl rivers. This was the first year of surveying mussels on the Tangipahoa, so the goal was to locate mussel beds and try to gain an idea of what species were located in the river. As the team was documenting mussel beds, they were also on the search for the federally threatened Inflated Heelsplitter which has been documented from the Tangipahoa River in the past. Unfortunately, no Inflated Heelsplitters were located in the Tangipahoa River, but this first year of sampling was to help us understand the requirements to conduct a more thorough search of the river. Low water and limited boat access restricted the majority of the surveys to bridge crossings. The use of kayaks may be employed in the future to help sample hard-to-reach sections of the river.

The Pearl and Bogue Chitto rivers have had more attention paid to their mussel populations since a chemical spill in 2011 caused a large mussel and fish kill. In preparation for a larger mussel survey set for 2016, previously unsearched habitat types of the two rivers were being sampled to determine if they contained mussels or if they could be removed from the 2016 survey. One habitat, the main channel, was determined to be mostly shifting sand that did not contain a significant number of mussels; therefore, that habitat type could be skipped in the 2016 survey. Surprisingly, some of cut banks on the outside bends in the Pearl River did hold a large number of freshwater mussels, and in one sample the team found a new species, the Unicolor Mussel, that they had not found since beginning their surveys in 2011. On the Bogue Chitto River, the team thought they had struck gold when they found a heelsplitter; however, it turned out to be either an Alabama Heelsplitter or White Heelsplitter. The mussel was sent off to the University of Florida to be positively identified using genetic analyses.

The data collected, not only on the mussel population but also on the conditions of the rivers, will help the team develop better protocols in order to sample the mussel populations of these rivers in a more safe and efficient manner.

Using our new GoPro camera, here is a photo of a what it looks like to snorkel for mussels in the Tangipahoa River. The green arrow is pointing to the mussel.

Here is the mystery heelsplitter that was found in the Bogue Chitto River.

Zebra Mussel Shocking in Wisconsin

Zebra mussels *Dreissena polymorpha* and related quagga mussels *D. rostriformis* bugensis are aquatic invaders which can cause significant ecological disruption to aquatic environments, and their range continues to expand. They were first introduced into the Great Lakes in the 1980s, and they have since expanded to over 750 inland lakes. The search is on for ways to control their spread and to reduce their populations. Jim Luoma, Research Fisheries Biologist with the Upper Midwest Environmental Sciences Center (UMESC) of the US Geological Survey in La Crosse, Wisconsin, proposed

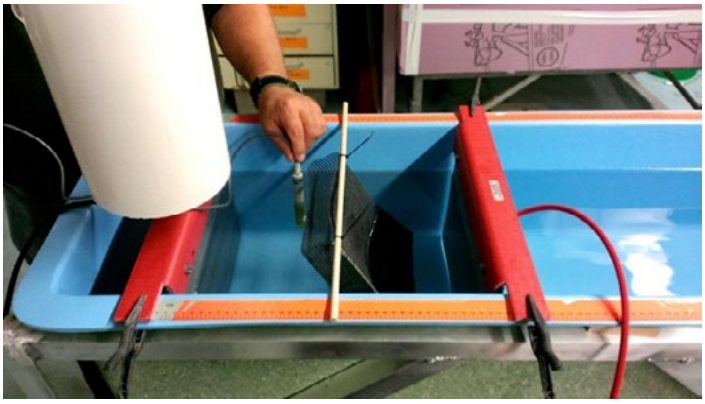
Experimental setup for shocking invasive zebra mussels. The test tank and gas removal pipe are shown in the background. In the foreground are Fisheries Research Biologist and Principle Investigator Jim Luoma, the MLES Infinity pulsator and the Fluke oscilloscope.

a study to determine if electrical current could be used to control these mussels.
Specific objectives of the study are to compare multiple electrical waveforms and parameters (voltage gradient, duty cycle, pulse width, exposure duration, etc.) for inducing zebra mussel mortality; and to determine the optimal electrical waveform and minimum voltage gradient required to induce 100% zebra mussel mortality. Jim contacted me for assistance with the study as regards required electrical power, needed electrofishing equipment and other design details.

Fortunately, Larry Kolz and colleagues had studied in 1996 the problem of killing zebra mussels with alternating current over extended time periods. Larry Kolz is a gifted electrical engineer who developed the theory of maximum power transfer for electrofishing and who developed and taught for many years with Jim Reynolds the Fish and Wildlife Service course called Principles and Techniques of Electrofishing. Alan Temple and I have been teaching the course in recent years. Jim Luoma wanted to use Larry's information to develop a technique for killing zebra mussels in a shorter time period. Therefore, the proposal included using higher voltage gradients and power densities so as to cause mussel mortality more quickly. Besides the obvious advantage of a quicker control, a quick treatment may also allow less harm to other species in the area. The calculated electrical power levels required to control zebra and quagga mussels is huge, so treatments may be confined to small areas at a time. The immediate purpose of the study was to determine efficacy in a controlled lab setting of various electrical waveforms and to quantity the required electrical dosages.

Zebra mussels for the study were hand collected from Lake Minnetonka, Minnesota and transported to a lab at the UMESC where they were fed algae and maintained in aquaria before and after exposure to the electrical treatments. The rectangular fiberglass test tank contains about 140 liters (37 gallons) of water with a full standpipe, though it was operated at a slightly lower volume. Metal plates placed parallel to one another and at right angles to the length of the tank were used as electrodes to produce a homogeneous electrical field inside the tank for shocking the mussels which were suspended in a plastic mesh bag.

This setup produces a field with a constant voltage gradient (measured in volts per cm) everywhere inside the tank. That constant voltage gradient was confirmed with a voltage gradient probe connected to a Fluke 124 portable oscilloscope or scopemeter. The water conductivity, temperature and pH were checked for each experimental trial, and the overall peak voltage



Test tank showing plate electrodes and placement of plastic mesh bag for study trial.

was monitored in real time with the oscilloscope. For a frame of reference, fish can be immobilized in about 3-4 seconds at the test conductivity (300 µS/cm) using a peak voltage gradient of approximately 0.4 volts per cm. For these trials, much higher voltage gradients were used and for a much longer time in an attempt to kill zebra mussels within their protective shells. While I was there, we used 16, 20, 25 and 30 peak volts per cm, sometimes for several hours. Since then, trials have lasted 24 and 48 hours. The trials I witnessed were conducted at a relatively low temperature of about 8°C.

What are the findings? It is early in the process, and Jim Luoma will be the one to report the findings. Let me just say that there has been limited mussel mortality to this point, and they are extremely difficult to kill with electricity under these conditions. Some trials will be performed at a higher temperature in an attempt to cause them more metabolic stress and to kill them more quickly.

Overall, this experience has been like extreme electrofishing in a tank. Several human safety precautions were implemented to prevent harm to the research personnel. A boat electrofisher (Midwest Lake Electrofishing Systems Infinity pulsator) was used to supply the power to plate electrodes sometimes separated by only 20 cm or eight inches, so this was tremendous power in a confined space! We expected a high rate of electrolysis – splitting of water into hydrogen and oxygen – so a chemical hood in the room was modified to remove potentially dangerous gases above the test tank. Personnel operating the pulsator or oscilloscope stood on a non-conductive platform and wore electrically-insulated boots during the trials. An isolation transformer was attached to line voltage of 240 volts of alternating current to supply the pulsator which increased the voltage and modified the electrical waveform so that pulsed direct current, continuous direct current and alternating current could be used for the trials. For example, 1000 volts of pulsed direct current was used for some trials while I was there. Tank trials for fish typically use 20-30 volts; this was a tank trial on steroids and growth hormone.

Close-up of MLES Infinity pulsator as used during actual test to shock mussels. Note the peak voltage was 1002 volts, and the applied power was over 7100 peak watts!

This was a new experience for us all. It was off the charts in terms of voltage gradients and power density and overall electrical dosage applied to organisms. The study continues as I write this. It was a privilege for me to be involved with such an interesting project, and my hope is that much is learned about the control of these aquatic invaders.

Zebra mussels placed in test bag and submerged into test tank, ready for shock treatment

Second Freshwater Mussel Propagation Course Held in Bozeman, MT

The United States is home to the most diverse assemblage of freshwater mussel species in the world. However, it is estimated that nearly 70% of these unique mussels are listed as extinct, endangered or threatened at either the state or federal level. Over the past decade, the U.S. Fish and Wildlife Service hired several biologists, stationed in different Regions, to develop techniques to propagate and culture freshwater mussels. In this time, the field of freshwater mussel culture has grown in leaps and bounds and is now a viable option in the recovery efforts of many of these endangered species.

A couple years ago, Matthew Patterson of the National Conservation Training Center (NCTC) and former mussel propagation biologist , consulted with the other mussel propagation biologists around the country to design a new NCTC course to teach others how to propagate mussels. These mussel biologists from Regions 3, 4, and 5 spent a year designing the course manual and the laboratories for the class. The instructors for the class were Patterson, Nathan Eckert (Genoa NFH), Jess Jones (Virginia Ecological Services), Rachel Mair (Harrison Lake NFH) and Tony Brady (Natchitoches NFH), and the first class was taught in September 2014 at NCTC. After the first class, the instructors assessed the class, talked about improvement, and redesigned the manual with updates, all to improve the class.

After all the improvements were added, the instructors were ready for round two. The course was invited to be taught at Bozeman

Mussel hunting in the Montana mountians.

Class time at the Bozeman Fish Tech Center.

One team digs up a quadrat sample in search of freshwater mussels.

Fatmucket mussel collected from the Jeffereon River, Montana.

Fish Tech Center, because of the interest the folks in the Northwest had expressed in learning mussel propagation techniques. Students from Washington State to the Carolinas gathered in Bozeman to be a part of this class. The instructors mixed in classroom instruction and hands-on labs exercises to help the class members become familiar with the process of culturing mussels.

The class was divided into teams with an instructor assigned to each team. These teams were then given two mussel species that they had to write propagation plans for as though the team would be growing mussels at the Bozeman Fish Tech Center. The purpose of these propagation plans were to help the class members critically think about all the step that goes into designing a new propagation program and the challenges that a mussel program provides when introduced at operational fish hatcheries.

The course also included a field trip to the Jefferson River located just west of Bozeman where the class got a chance to play in the water learning how to monitor mussels after they are successful in culturing them. Techniques like time searches, transect lines, and quadrat sampling were taught and the pros and cons discussed among the class. All in all, the class went very well; the instructors would like to thank Bozeman Fish Tech Center for hosting the class and making the arrangements for the lab space and the field trip.

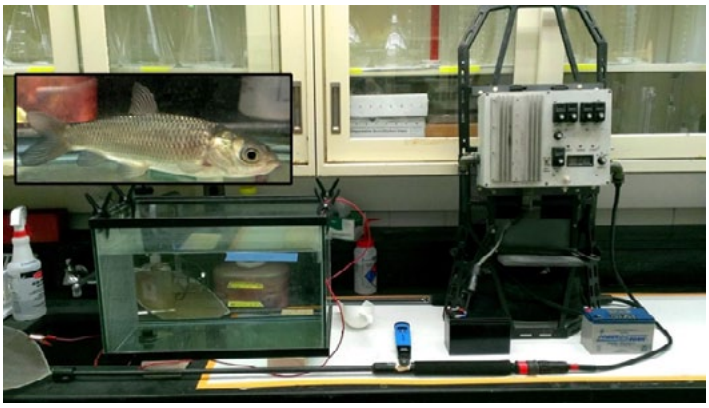
No trip to Montana would be complete without Rainbow Trout.

From unique looking birds like the Magpie to the scenery of the hills, Montana has lots to offer, even mussels as the class found out.

Asian Carp Shocking in Wisconsin

Elsewhere in this same issue of our hatchery newsletter is an article about shocking zebra mussels at the Upper Midwest Environmental Sciences Center (UMESC) of the US Geological Survey in La Crosse, Wisconsin. When I arrived in La Crosse on a Sunday evening, Research Fisheries Biologist Jim Luoma picked me up at the motel and took me to see the research lab where we would be shocking zebra mussels. As a visual learner, I like to see my work area early, if possible, so that I can visualize the opportunities and challenges.

During the tour of the facility, we saw other lab and fish culture areas. In one fish culture room were multiple tanks containing Asian carp; there were tanks with fingerling Grass Carp (Ctenopharyngodon idella), and others with fingerling Silver Carp (Hypophthalmichthys molitrix) and fingerling Bighead Carp (H. nobilis). It is very rare to have access to these species in such numbers, of the same size and cultured in tanks so that they are in good physical condition. Only once before have I had the opportunity to conduct studies with Bighead and Silver Carp fingerlings; that was back



Set-up for experiment to determine the effective conductivity of fingerling Grass Carp. One of the fingerlings is shown in the inset photo.

in September of 2011 at the USGS CERC lab in Columbia, Missouri. Dr. Tracy Hill of the Columbia Fish and Wildlife Conservation Office set up that study, and Duane Chapman of the CERC lab allowed us to shock their fish in a tank to determine electrical settings for capture of Asian carp from the wild. That was reported in a fall 2011 hatchery newsletter article. I mention all of that so that you could understand my excitement at the potential for more study of Asian carp. I asked Jim about the use of a few fish for some shocking trials; he said that we might be able to shock a few Grass Carp. The next day, we secured permission to conduct a preliminary study with a few Grass Carp.

After taking care of the main trip purpose, i.e. setting up the study for shocking zebra mussels, Jim and I obtained an aquarium, found an ETS ABP-2 backpack electrofisher as a power supply, and constructed suitable plate electrodes for the study. The objective was to shock a couple of fingerlings at each of several different water conductivity levels so as to determine the effective conductivity of Grass Carp fingerlings. I knew of similar studies with Silver and Bighead Carp by Dr. Mike Holliman, but I was unaware of a study with Grass Carp, so this was a perfect opportunity to conduct a small study in our "spare" time while zebra mussel trials were underway. The purpose was to define parameters which may increase capture of Grass Carp in the wild. The UMESC had the ability to produce or mix water of any conductivity desired, so all of the requirements were in one location. Sweet. After setting up the test aquarium, we added some distilled water and left if for the next day.

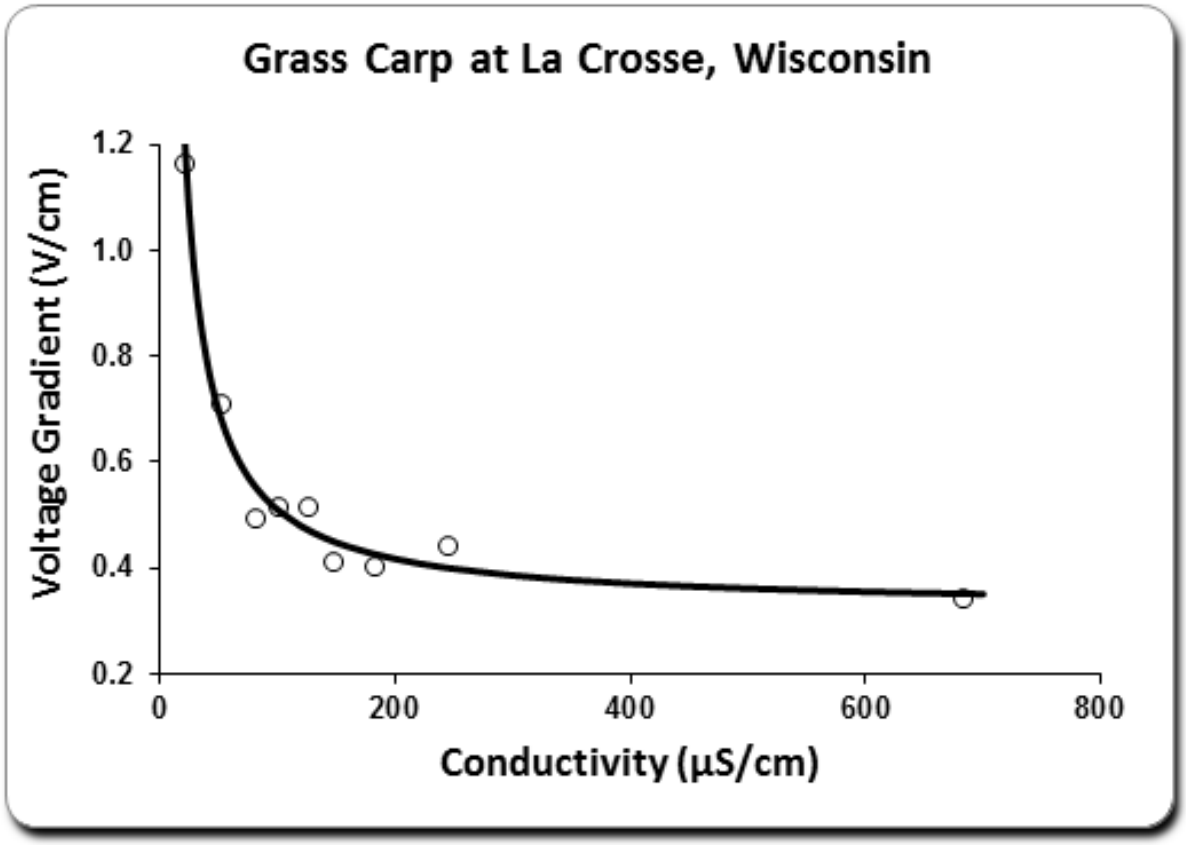
The next day, after the zebra mussel work, we conducted the small study using two fish at each of eight water conductivity values. The fingerlings averaged 12.0 cm in total length with a standard deviation of 0.89 cm. The data produced a pretty good fit to the power transfer model equation of Kolz (1989); the calculated effective conductivity was 57 µS/cm. The following day, we tested various waveforms which might produce taxis, or attraction, to the positive electrode, the anode. Taxis is a capture-prone response of fish, so we wanted [okay, I wanted] to evaluate a variety of waveforms and to determine voltage gradients and power densities needed to elicit taxis. Can you tell I was excited? We were able to use a few fish to determine thresholds for taxis using various combinations of pulsed direct current frequency and duty cycle (percent on time).

We tested from 30 to 400 Hz or pulses per second and from 10 to 40% duty cycle. Promising taxis waveforms (frequency/duty cycle) were 70/35, 80/40, 300/40 and 400/10. Waveforms producing immobilization but not taxis were 30/25, 60/25 and 120/20. 120 Hz and 95% duty cycle produced taxis but required more power. We had only few fish with which to experiment, so this was not an exhaustive study, but we did obtain some results which may be useful to those trying to collect Grass Carp from the wild.

This study was done at a higher water conductivity than the study the prior day, so we also took the opportunity to test a couple of Grass Carp at the same frequency and duty cycle as used in the prior day's study so as to add a data point to the graph and allow recalculation of the fish effective conductivity. The combined results also indicated a Grass Carp fingerling effective conductivity of 57 µS/cm.

Lastly, we were able to conduct taxis trials with a very few Silver and Bighead Carp on the next day. We tested some of the same waveforms as for the Grass Carp taxis trials and found taxis with Bighead Carp fingerlings using 70/35, 80/40, 300/40 and 400/10 as with Grass Carp but also some taxis with 60 Hz and 25% duty cycle, unlike the Grass Carp results. We also determined the threshold for immobilization with each of those waveforms. The findings for Silver Carp were dramatically different. We found immobilization thresholds using 70/35, 80/40, 300/40 and 400/10, but the Silver Carp did not exhibit taxis! We were only able to test eight Silver Carp and eight Bighead Carp at the same combinations of frequency and duty cycle, but the lack of taxis with the Silver Carp using any waveform was unexpected. Bighead Carp averaged 10.0 cm total length, and Silver Carp averaged 12.1 cm.

It was so fortunate to have access to all three species of Asian carp in one place, of uniform size per species and in good physical condition. Many thanks to Jim Luoma and to Biological Science Technician Jeremy Wise for assisting with these preliminary Asian carp lab studies. We found useful results in a short time with small numbers of fish.



Results of study to determine the effective conductivity of 12.0 cm total length Grass Carp. Voltage gradient versus conductivity data were fit to the power transfer model of Kolz (1989) as used by Miranda and Dolan (2003). The calculated effective conductivity was 57 µS/cm.