Warm Springs Fish Technology Center

May/June 2012 Activity Report

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Greg Moyer registers participants for the 2012 Kids Fish for Fun Day. Credit: USFWS

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Warm Springs Fish Technology Center

The Fish Technology Center (FTC) is a component of the Warm Springs Regional Fisheries Center (RFC) and was developed to improve and enhance fisheries management. We provide consolidated technical operational support to regional fisheries operations and technical assistance to the public. The Fish Technology Center is comprised of a cryopreservation laboratory, conservation genetics laboratory, and the National Fish Strain Registry at Warm Springs, Georgia, and a field station in Wadmalaw Island, South Carolina.

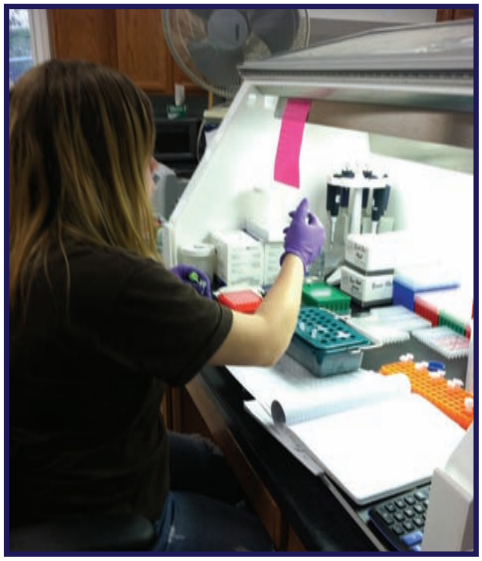
Goals:

- Provide management support of interjurisdictional coastal and riverine fishes such as robust redhorse, shortnose sturgeon, Atlantic sturgeon, Gulf sturgeon, American shad, and Gulf striped bass.
- Provide conservation genetics support for regional fishery programs.
- Maintain the National Fish Strain Registry for dissemination of information and support of private, state and federal broodstocks.
- Develop cryopreservation techniques for imperiled fish, freshwater mussels, and amphibians.
- Develop hatchery product evaluation techniques.

Cryopreservation

Cryopreservation is a process in which a living cell is frozen, stored, and thawed and remains viable. Cryopreserved sperm assists reproductive efforts by allowing spawning to take place whenever females are ready, reduces the need to hold males, and can increase flexibility and genetic diversity in spawning protocols.

Currently, the Warm Springs FTC is working on numerous species of fish, including threatened or endangered species. The program has expanded to include other aquatic species such as freshwater mussels and amphibians for conservation efforts.



SCA Intern Ashley Zrubek performing PCR on 4 black bass species. Credit: USFWS

Conservation Genetics

The Conservation Genetics lab primarily works with biologists and managers of the region to design and implement genetic research on imperiled aquatic organisms.

Current Projects include estimating genetic diversity from: alligator gar, Gulf Coast striped bass, robust redhorse, freshwater mussels, and threatened and endangered species such as spotfin chub.

National Fish Strain Registry

The National Fish Strain Registry (NFSR) is an internet -based program that assembles information on life history, genetics, reproduction, and behavior of wild populations and domestic fish strains throughout the United States. The NFSR database is available for use by public and private producers as well as resource managers of federal, state, and tribal governments through a registration process. Once registered, users are able to search, create new records, edit records, and request information. The NFSR's vision is to provide a broad collaborative program that provides access to data and information on our Nation's aquatic resources. You must be a registered user to access the NFSR website; please contact chester_figiel@fws.gov to become a registered user.

Bonytail Chub Cryopreservation

William Wayman and Jaci Zelko traveled to the Dexter National Fish Hatchery and Technology Center in New Mexico (Region 2) to conduct cryopreservation experiments on sperm of bonytail chub. The bonytail chub is native to the Colorado River, and was listed as endangered in 1980. This species is one of the most imperiled freshwater fish species in the United States and is believed to only persist in the wild through ongoing propagation and stocking efforts. The current hatchery broodstock was created in 1981, and preservation of the remaining genetic diversity is critical due to the aging broodstock population. Multiple experiments were conducted aimed at developing refrigerated storage and cryopreservation techniques for this species. The refrigerated storage study allowed storage of sperm for up to 10 days without a complete loss of motility. The cryopreservation experiments were successful with hatch rates equaling approximately 70% of fresh sperm. The use of this tool could allow the conservation of the remaining genetic diversity of this endangered species.

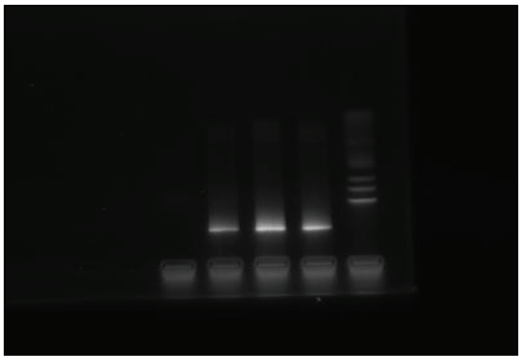
(L) Sperm stripped from a bonytail chub male was used in cryopreservation and fertilization trials.
(R) Eggs were divided into small aliquots for the experiments. Credit USFWS

Pallid Sturgeon Cryopreservation

William Wayman and Chester Figiel traveled to Garrison Dam National Fish Hatchery in Riverdale, ND (Region 6) to cryopreserve endangered pallid sturgeon sperm. Sperm from four males were collected, cryopreserved, and added to the cryopreserved sperm repository, which is held at Warm Springs FTC, Garrison Dam NFH, and Gavins Point NFH. Additionally, sperm were cryopreserved for three experiments. The first experiment was to determine how long cryopreserved sperm remains viable once thawed. The second and third experiments were to determine if 0.5- or 5-ml straws and at which extender:sperm dilution ratio produced highest fertilization rates. Unfortunately, due to the single female releasing very small amount of eggs, the fertilization experiments were not able to be conducted. They will be tried again next year.

Environmental DNA (eDNA) Protocol Enhancements

The eDNA project advanced to phase II. During May and June we conducted assays to determine temperature effects on DNA persistence using samples collected density tanks where the African jewel fish were present. This experiment showed that DNA molecules are degraded at temperatures higher than 33ºC which is an important methodological fact for our future environmental sampling (Fig 1). Also during this period, we presented our preliminary results from eDNA analysis of the African jewel fish (*Heterochromis letourneuxi*) in the International Wetlands Conference (INTECOL) in Orlando, Florida. Later in June, we set up aquariums for density trials and eDNA detection of our second AIS target, the bullseye snakehead (*Channa marulius*). We will compare different densities of fish and process tank water for eDNA (Fig. 1). We will try to determine the minimum amount or threshold level of DNA required for detection in natural freshwater systems.



Gel image of DNA extracted from water samples stored for 8 days at 4 different temperatures. The fifth lane from the right shows no band, evidence that temperature of 33C degrade DNA. Credit USFWS

Density experiments and water collection for the bullseye snakehead (*Channa marulius*). Credit USFWS

Environmental DNA Analysis for Batrachochytrium dendrobatidis—USGS Science Support Partnership

Chester R. Figiel, Jr. work with Christine Densmore, Casey Densmore, and Frank Panek from the U.S. Geological Survey (Leetown Science Center, West Virginia) examining the use of environmental DNA analysis to determine the presence and distribution of *Batrachochytrium dendrobatidis* (Bd) in Southern Appalachian headwater streams. This cooperative venture combines stream water samples with molecular screening for Bd of amphibians inhabiting these ecosystems.

Baseline Population Inventory of Amphibians at Mountain Longleaf NWR

Gregory Scull and Chester R. Figiel, Jr. began an amphibian inventorying and monitoring study on the Mountain Longleaf National Wildlife Refuge. We are collaborating with Sarah Clardy – Refuge Manager and Mark Meade, Professor, Jacksonville State University in this baseline survey that involves screening amphibians for the invasive fungus *Batrachochytrium dendrobatidis*. The USFWS Refuge Southeast Inventory and Monitoring Network provided funding for this yearlong study.

Pseudotriton ruber. Credit USFWS

Freshwater Mussel in vitro Trials

Studies are currently underway on the cryopreservation of freshwater mussel glochidia, a potential method for the preservation and recovery of imperiled unionid species. We are also investigating the effectiveness of transforming glochidia in a culture media, without the use of a host fish. The studies conducted this year used a common mussel species, the paper pondshell. Although, the glochidia collected were not used in our cryopreservation studies because of clumping, the glochidia were transformed for use in evaluating the hatchery's new juvenile rearing system. A thirty-day survival has been evaluated and the juveniles will be held for an additional 60- and 90-days to evaluate the system effectiveness.

Checking glochidia viability. Credit USFWS

Genetic Assessment of Hybridization Among Black Bass Species

The Conservation Genetics Lab (CGL) assisted the Tennessee Wildlife Resource Agency (TWRA) and the Alabama Department of Natural Resources in the management and conservation of black bass subspecies in various systems throughout Tennessee and Alabama. Florida bass and northern largemouth bass co-exist in a natural zone of introgression that extends through the southeastern and mid-Atlantic coastal states. While genetic distinctiveness has been identified with several allozyme markers, subsequent introgression makes the detection of backcrossed individuals difficult with these markers. This uncertainty poses problems for state hatcheries that assume purity of strain based on morphological comparisons for hatchery augmentation or reintroduction efforts. Stocking activities and subsequent introgression have led to an extended range for each subspecies, and an expansion of the hybrid zone, which has created difficulties for TWRA in quantifying the success of stocking events or resolving the identity of individuals. CGL established a rapid screening technique to identify several black bass species with the use of genetic markers. The objective is to evaluate the ability of genetic markers developed from Florida bass to generate successful amplification in shoal bass, spotted bass and their hybrids. The genetic markers would aid TWRA in genetically distinguishing samples into their respective categories of hybrids.

Partnerships and Accountability

A Science Emphasis for Imperiled Crayfish—a Collaborative Effort for Conservation Needs

Warm Springs FTC and Chester R. Figiel, Jr. hosted our science partners on May 9, 2012 to discuss and establish conservation objectives for crayfish species (and their habitats) in southeast Georgia. In attendance were James Stoeckel and Brian Helms - Auburn University; Troy Keller and George Stanton - Columbus State University; and Chris Skelton - Georgia College and State University. Our approach targets conservation activities on a broader spatial scale as increasing demands for water impact these aquatic organisms.

Cambarus harti Credit USFWS

Strategic Habitat Conservation and Landscape Conservation Cooperative Efforts

One of the primary missions of the U.S. Fish and Wildlife Service is to conserve our living natural resources and their habitats. CGL is currently restructuring its research program to better serve the Service's move to SHC and LCC designs. CGL's approach is to place more emphasis on aspects of the SHC model primarily focusing efforts on the characterization of populations, designation of critical habitat for such units, and prediction of global climate change scenarios on these units and their habitat. May 21-25th, 2012 Greg and Ashantye attended the 2012 Region 4 GIS training seminars in Cookeville,TN. During their attendance they brought awareness and excitement about the role CGL plays in collaborating with the LCCs. With the training received, the goal is to assist with the knowledge and expertise of integrating genetic diversity with geographical information in the South Atlantic Landscape Conservation Cooperative (SALCC) research projects.

News and Notes

Safety Site Visit by Washington Office Staff

Washington Office Safety staff conducted an on-site visit in May. The visit focused on record keeping and supervisory understanding of role and responsibilities. It included interviews, an inspection of our existing written plans, safety self inspection documents, and examining supporting documents we have on file such as hazardous chemical inventory lists. This was followed by a short walking tour to the Alkalinity building, Fish Health Center, Tech Center and related facilities in that area, and Aquarium building. Several suggestions were made that will be incorporated into our safety program.

Public Use and Outreach

A New Touch Screen at the Aquarium

A new Turn-Key Kiosk System has been installed in the Aquarium. This multimedia computer system with an integrated LCD-touch monitor replaces a 15-year old interactive kiosk. The original touch screen was out-of-date in regards to technology and content. Jaci Zelko and the Outreach Team worked on re-designing the content and outreach messages to be included in the new program. The new kiosk has an integrated microphone that detects the level of ambient noise in the area around the speaker system and automatically matches the output volume to the ambient level, so that visitors get the best sound quality while interacting with the kiosk. The new program includes information on our Fisheries Programs, Facility History, our Mission, and much more!

Main Screen of the new interactive touch screen.
Credit USFWS

Kids Fish for Fun Day

The Warm Springs RFC and Friends Group hosted the 2012 Kids Fish for Fun Day to teach children the enjoyment of fishing. Five FTC employees and one SCA intern helped staff this event held on June 9, 2012. This year, 291 children participated and had the opportunity to catch and take home five catfish. Greg Moyer, Greg Scull, Ashantye Williams, and Chester Figiel, Jr. greeted and registered participants at the Pre-Registration and On-Site Registration tables. SCA intern Ashley Zrubek also assisted in this area. Jaci Zelko and Fish Health Center employee Allison Hernandez recorded the number of catfish each participant caught. This year, members of the Ft. Benning Bass Club were on hand to teach the kids knot tying and casting skills. Thanks to the Friends Group for providing food, beverages, and prizes for this event.

(L) Ashantye Williams places a wrist band on a participant. (R) A father teaches his son to reel in the line. Credit USFWS