

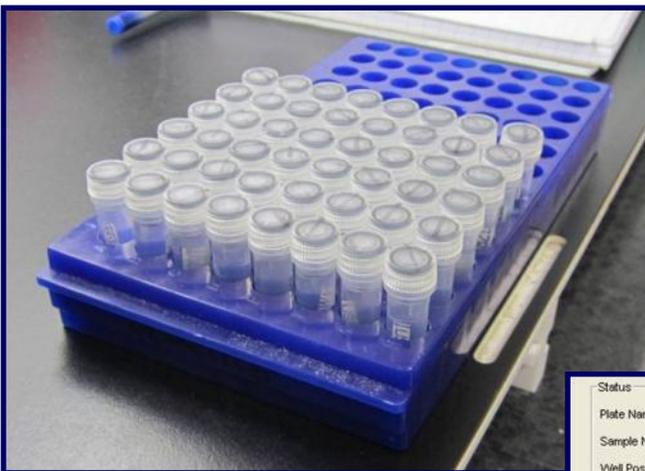


Warm Springs Fish Technology Center

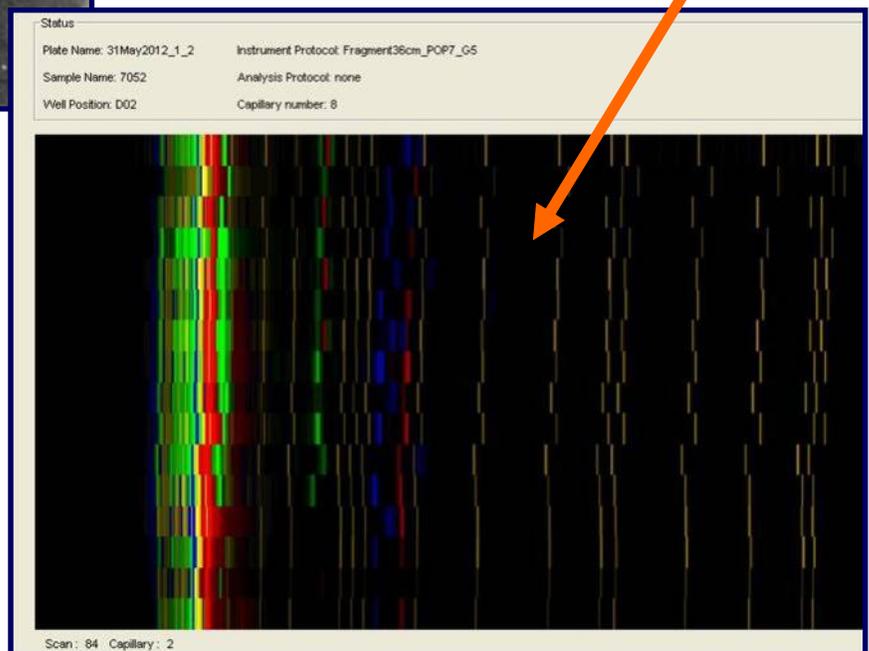
January/February 2013 Activity Report

Dr. William Wayman, Center Director
 Dr. Chester Figiel Jr., Supervisory Fish Biologist
 Dr. Gregory Moyer, Regional Geneticist
 Jaclyn Zelko, Fish Biologist
 Ashantyé S. Williams, Geneticist
 Dr. Edgardo Diaz-Ferguson, Postdoctoral Researcher
 Christie Jackson, SCA Intern

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Each horizontal row = 1 individual fish



(Left) Fin clips from wild-caught progeny of lake sturgeon are held in tissue vials. (Right) An electropherogram of 3 microsatellite loci (represented by green, red and blue dyes) being screened against the population. The picture captures 16 individuals (represented by each horizontal row) genotyped simultaneously.
 Credit: USFWS Photos

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.



Our newest SCA Intern, Christie Jackson, feeds an axolotl salamander. 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.

Leadership in Science and Technology

Assessment of Genetic Diversity of Yellowfin Madtom Populations

The North Fork of the Holston River has been designated as a nonessential experimental population for yellowfin madtoms, and restoration plans are currently being established. For restorations to be successful, the source population should have a high degree of genetic diversity, and genetic and environment similarity to that of the new or recipient population (Miller and Kapuscinski 2003). Unfortunately, little is known about the distinctiveness of yellowfin madtom populations; therefore, questions regarding choice of brood stock origin, number of brood to use, and length of reintroduction effort remain difficult to quantitatively address. As such, Warm Springs Conservation Genetics Laboratory (CGL) in collaboration with Virginia Tech University were asked to provide an estimate of the degree of genetic diversity within and among putative populations of yellowfin madtom. Genetic diversity estimates will then be used to identify discrete populations and assess the relationship (similarity) among distinct populations. Estimates will also serve as a baseline for future monitoring efforts and quantification for success of the reintroduction effort.



Yellowfin madtom, *Noturus flavipinnis*.
Credit: Florida Museum of Natural History

Identification of evolutionary hotspots across the SALCC

While geographic patterns of species diversity are often considered in conservation assessments, the consideration of patterns of genetic diversity and recognition of conservation genetic concerns in practical management are largely lacking. CGL (with the aid of post-doc John Robinson) conducted a study to assess the representation of evolutionary hotspots in protected lands across the SALCC using gap analysis. An evolutionary hotspot was defined as an area with high evolutionary potential and measured by atypical patterns of genetic divergence, genetic diversity, and to a lesser extent genetic similarity across multiple terrestrial or aquatic taxa. John's survey of the primary literature produced 16 terrestrial and 14 aquatic genetic datasets for estimation of genetic divergence and diversity (this was more than double the expected value). Results showed the use of genetic datasets for identifying cross- species patterns of genetic diversity and divergence in aquatic and terrestrial environments for use in conservation design and delivery across the southeastern US. It is worth mentioning that Greg wrote a fascinating blog on the SALCC website.



To read Greg's Blog go to:

<http://www.southatlanticlcc.org/>



State and ecological boundaries of the South Atlantic Landscape Conservation Cooperative. Credit: USFWS

Leadership in Science and Technology

Standardized Protocols for eDNA are Established

During January and February we finished a standardized protocol for eDNA detection that will be the reference for eDNA detection in our Region. We also optimized and finished the primer and probe development for two species of the Savannah National Wildlife Refuge eDNA project (Figure 1A-B). The primers were developed for the Mayan cichlid (*Cichlasoma urophthalmus*) and the swamp eel (*Monopterus albus*) using COI and 16S rRNA mitochondrial genes as template sequences for the internal marker design. Once the primers and probes were developed, we tested them for sensitivity using known quantities of tissue and for specificity using tissues of other fish species. In addition, we established the lower level of detection for both species. This objective was accomplished by conducting serial dilutions of known quantities of DNA from the target species and running a standard quantification curve protocol in the qPCR machine. The standard curve protocol provided the minimum value of DNA that is possible to detect using the marker and also gave us the minimum value or PCR threshold cycling value (CT) that is required to amplified eDNA from the target species (Figure 2A-B).

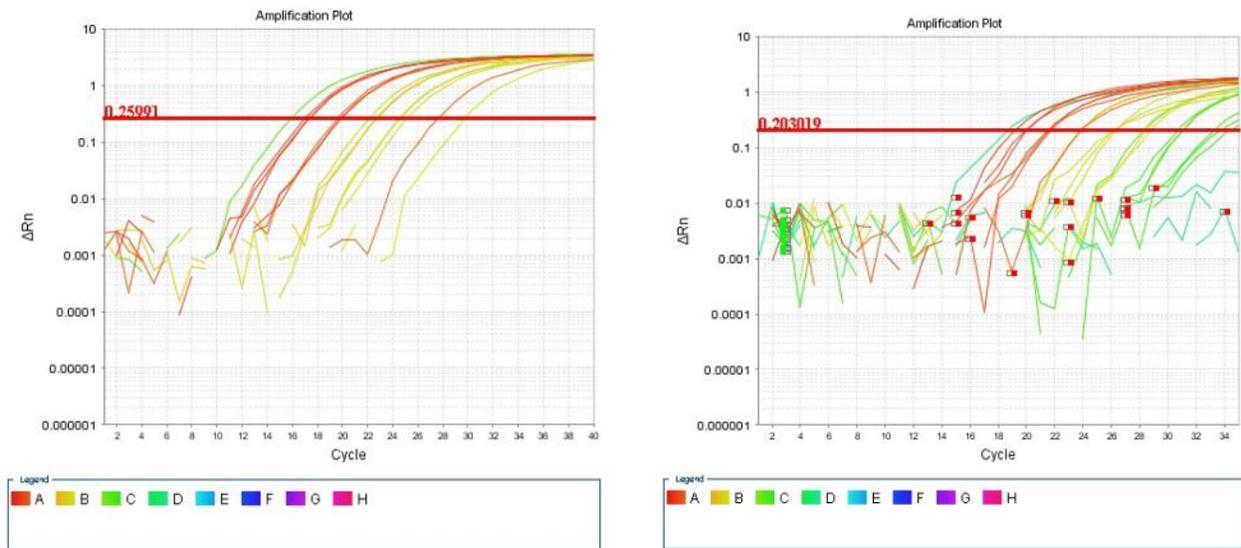


Figure 1. Amplification curves showing positive amplification using the recently designed primers and probes for A) *Cichlasoma urophthalmus* B) *Monopterus albus*. Credit: USFWS

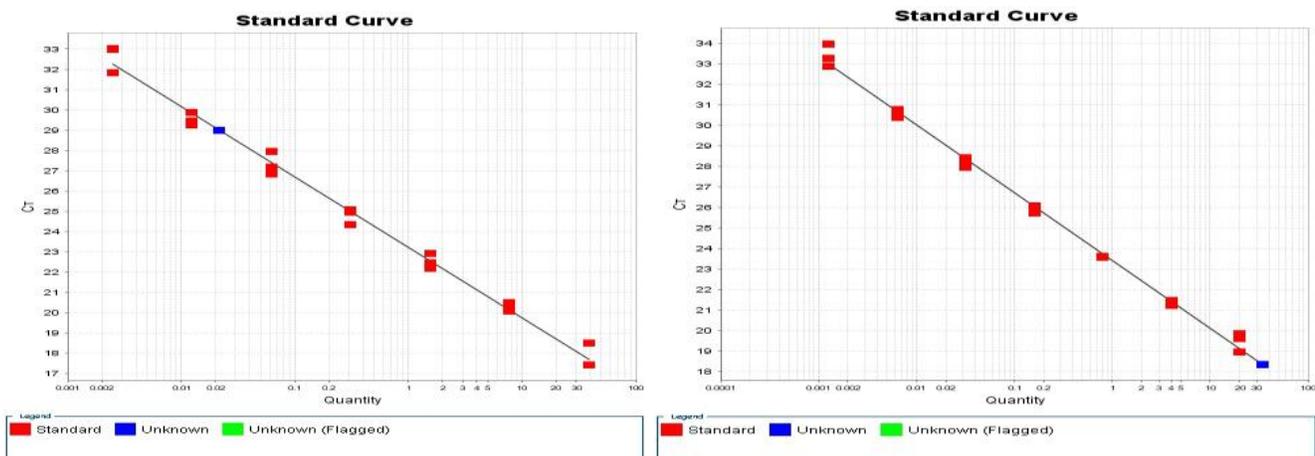
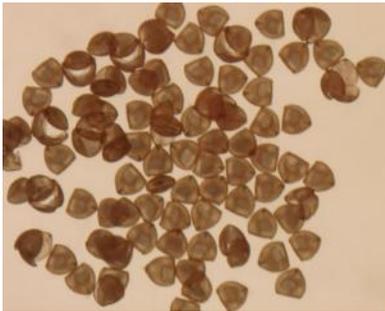


Figure 2. Standard curves for *Cichlasoma urophthalmus* (Mayan cichlid) and *Monopterus albus* (Swamp eel). Credit: USFWS

Aquatic Species Conservation & Management

Collecting Freshwater Mussels for Research



Studies are currently underway on the cryopreservation of freshwater mussel glochidia, a potential method for the preservation and recovery of imperiled unionid species. Recently, biologist Jaci Zelko and Warm Spring Fish Hatchery biologist Bill Bouthillier collected 25 paper pondshell (*Utterbackia imbecillis*) mussels from a nearby pond. The private pond is owned by local resident, Janet Lawand, and she has granted us access to her pond in the past. The mussels were transported back to the hatchery and placed in the quarantine building. Jaci will be collecting viable glochidia to use in cryopreservation studies.

Glochidia, the larval form of mussels. Credit: USFWS

Amphibian Survey Update

Christie Jackson traveled to the Mountain Longleaf NWR in Alabama to help Greg Scull (a U.S. Fish and Wildlife law enforcement agent) conduct a survey of amphibians on the Refuge. They captured and released a number of amphibians including Southern leopard frogs, spotted dusky salamanders, spring salamanders, and the previously elusive upland chorus frog. This trip marked the maiden voyage of one new call recorder that makes recordings of frog calls. Christie will return periodically throughout the year to collect the recorded data and identify calls.



An upland chorus frog. Credit: USFWS

Workforce Management

New SCA Intern Joins the Fish Technology Center



Christie assists with scute removal of lake sturgeon. Credit: USFWS

The Warm Springs FTC welcomes their newest SCA intern, Christie Jackson. Although she may be new to the Tech Center, she is not a new face around here. Christie was a fisheries biologist intern last semester at the hatchery. There she learned aquaculture management techniques and began conducting research on the on-site amphibian population. The skills she learned from her previous internship will assist her during her current internship.

The projects at the FTC with which Christie will assist are as follows: the development of eDNA techniques for the sampling of the endemic crayfish *Cambarus harti*, the biological competence demonstration of cryopreserved amphibian spermatozoa, and the baseline survey and chytrid screening of amphibians at Mountain Longleaf NWR in Anniston, AL. In addition to these projects, she will continue her on-site amphibian research.

Christie will receive her Bachelor's of Science degree in Biology from Gordon State College in Barnesville, GA in May 2013. She plans to continue her education this fall as a student in Columbus State University's Environmental Science graduate program.

News and Notes

Greg Moyer and Ashantye' Williams attended the Tennessee River Lake sturgeon Reintroduction Working Group (TRLRSG) on January 23-24, 2013 in Knoxville, TN.

Greg Moyer attended the Bluemask Darter Management meeting February 11-14, 2013 in Cookville, TN.

Ashantye' Williams attended the 30th Annual Morone Workshop February 13-14, 2013 in Crawfordville, FL.

William Wayman assisted the Appalachian LCC by reviewing and providing constructive criticism of the Appalachian LCC's Science Needs Portfolio. The Portfolio was developed from a Science Needs Workshop that was held in Blacksburg, VA in November of 2011 and brought together over 150 scientists and managers from across the geography. The review also contained a listing of the top science needs for the aquatics theme within the LCC.

William Wayman assisted the South Atlantic LCC by helping to review the LCC's potential resource indicators. The ecosystems in the South Atlantic LCC are complex, and the use of resource indicators or "surrogates" will potentially allow the monitoring of a set of critical indicators that will represent a much larger set of conditions, simplifying monitoring and modeling. The initial list of resource indicators was developed through a series of workshops and through a team of individuals.

Jaci Zelko completed an online course offered by Columbus State University entitled "Advanced Grant Proposal Writing."

William Wayman participated in the National Animal Germplasm Program (NAGP) meeting in Baton Rouge, LA from February 26th – 27th. The mission of the NAGP is to provide secure long-term preservation and documentation of the diverse genetic resources of U.S. food and agriculture. The collections not only safeguard commercially important crops and livestock, but also rare and endangered varieties and breeds. The NAGP also serves as a secure back-up storage location for sperm cryopreserved by the U.S. Fish and Wildlife Service at the Warm Springs Fish Technology Center. In addition to attending the meeting, William transferred pallid sturgeon sperm that was frozen at the Genex Cooperative in Baton Rouge back to Warm Springs for storage, and picked up a storage dewar that was excess to the needs of the LSU Aquaculture Research Station.

Warm Springs Regional Fisheries Center

2013 Outreach Calendar

Backyard Bird Count – February 16-18

National Fishing Day – June 8

Open House – TBD in October

Candlelight Parade – November 17

