



Warm Springs Fish Technology Center

November/December 2012 Activity Report

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Erwin National Fish Hatchery Biologist David Teague (left) and Hatchery Manager John Robinette transfer fertilized rainbow trout eggs into mini-hatching jars especially made for this work. Credit: USFWS. Credit: USFWS

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.



Staff photo from our December All-Staff Meeting.
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

Initial Genetic Assessment of Lake Sturgeon in the Upper Tennessee River

Since 2005, the USFWS Warm Springs Fish Technology Center's Conservation Genetics Lab has been a tissue repository for the upper Tennessee River lake sturgeon reintroduction effort. The repository includes tissues from both broodstock and sample progeny. In 2011, there were enough tissue samples to perform initial genetic evaluation of the reintroduction effort for the Tennessee River Lake Sturgeon Working Group. The goal of this study was to provide an initial assessment of genetic parameters for genetic monitoring of lake sturgeon in the upper Tennessee River. We accomplished this by establishing an estimate of genetic diversity for lake sturgeon broodstock from 2005-2011, estimating relatedness among broodstock year classes as well as between broodstock and progeny, and estimating both the theoretical and observed effective population size for the reintroduced population.

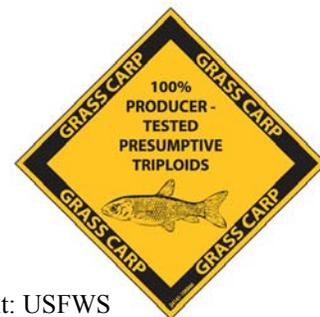


Adult lake sturgeon spawning in the Wolf River, WI.
Credit: USFWS

The genetic diversity available in the Wolf River lake sturgeon source population appears to have been successfully captured by TRLSRWG's reintroduction program in the Upper Tennessee River. Estimates of genetic diversity appeared similar among broodstock years and between a comparison of broodstock and wild-caught progeny. The upper Tennessee River has been stocked for many years now; the result of which should be a genetically diverse and self-sustaining lake sturgeon population. Our study provided an initial evaluation of the "genetically diverse" population. Genetic results indicated that spawning, rearing, and stocking strategies appear to adequately lower the risk of inbreeding depression and sufficiently capture the genetic diversity necessary to determine success from a genetics perspective; however further monitoring and assessment will be needed to determine if the genetic diversity is maintained in the population.

Preliminary Grass Carp Parentage Analysis Study

Grass Carp (*Ctenopharyngodon idella*) has been labeled an invasive species due to its ability to reproduce and establish wild populations, causing a reduction in food supply and shelter for the native species present. As such, the U.S. Fish and Wildlife Service have formalized a Legal Policy for the National Triploid Grass Carp Inspection and Certification Program. Warm Springs Conservation Genetics Laboratory (CGL) was asked to participate in the December 2012 National Triploid Grass Carps Inspectors Meeting to explore genetics as a forensic tool for law enforcement in the genetic identification of grass carp across state lines. Greg explained the science behind genetic parentage analysis and the potential high degree of power that can be attained with sufficient marker alleles. His work demonstrated that there is potential to discriminate between progeny from different brood animals. Greg showed both the strengths and weaknesses of the methodology for forensic purposes.



Triploid Testing Sign. Credit: USFWS

Environmental DNA Project Update

During the months of November and December 2012 we completed the final report for the Loxahatchee eDNA project and conducted the eDNA analysis of environmental samples from Loxahatchee National Wildlife Refuge and the adjacent canals to the refuge. These samples were tested using primers and probe developed in the conservation genetics lab. The analysis of these samples demonstrates that designed primers and probe are reliable for detection of the African jewel fish (Fig 1). In this period, we initiated a literature review and Genebank search in order to select the target genes for the Savannah eDNA project that encompass the development of markers for eDNA detection of three new species: the Mayan ichlid (*Cichlasoma urophthalmus*), the swamp eel (*Monopterus albus*) and the lion fish (*Pterois volitans*) (Fig 2a-c). We started the DNA extraction and primer development assays for two new species: Mayan cichlid (*C. urophthalmus*) and the swamp eel (*M. albus*).

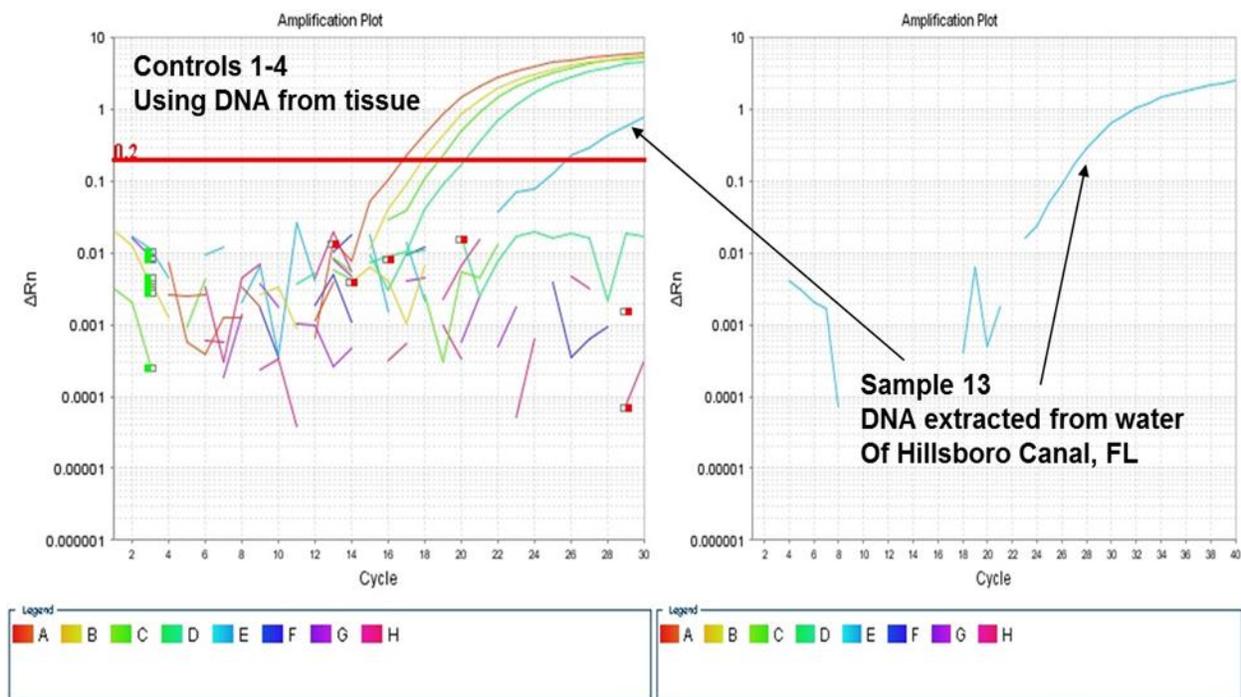


Figure 1. Analysis shows that designed primers are reliable for detection of African jewel fish. Credit: USFWS

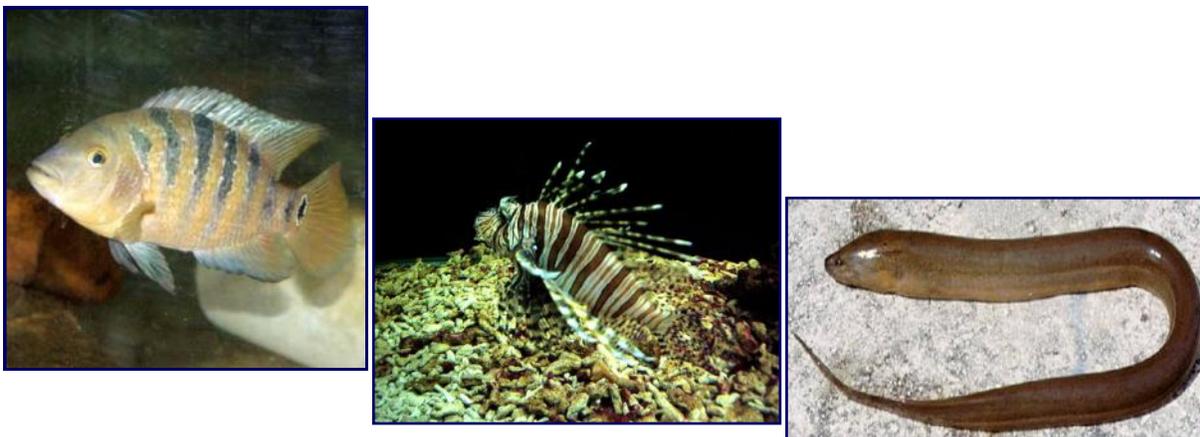


Figure 2. Savannah National Wildlife Refuge target species for eDNA marker development. A. Mayan Cichlid (*Cichlosoma uruphthalmus*) Credit: USGS, B. Lion Fish (*Pterois volitans*) Credit: Public Domain Pictures.net, C. Swamp Eel (*Monopterus albus*) Credit: USGS

Leadership in Science and Technology

Rainbow Trout Cryopreservation Fertilization Trials At Erwin National Fish Hatchery, TN

William Wayman and Jaci Zelko traveled to Erwin National Fish Hatchery, TN to cryopreserve sperm from 2-year old rainbow trout broodstock. Sperm from 10 males were frozen for 24 hours and then used in a fertilization trial. This effort is a repeat of an earlier experiment to determine the optimum number of eggs that can be fertilized with one 0.5-ml straw of frozen sperm. The earlier experiment had issues with poor eye-up survival due to a malfunction with the mini-hatching jars that were designed especially for this



A row of mini hatching jars. Credit: USFWS

Sycamore Creek, TN Brook Trout Spawning



A snowy field location. Credit: USFWS

Jaci Zelko and William Wayman assisted Tennessee Wildlife Resource Agency biologists with the collection and spawning of native wild brook trout in November. The objective of this project was to assist Tennessee with conserving and maintaining existing southern Appalachian brook trout populations, which is one goal of the “Trout Management Plan for Tennessee 2006-2016”. We accomplished our objectives by initiating the development of short-term storage and cryopreservation techniques for brook trout. We conducted our work on Sycamore Creek. Even though collection of gametes from these wild fish is difficult because of extremely small amounts of sperm, we were able to freeze gametes from 4 males.

Partnerships and Accountability

Programmatic Meeting at Bears Bluff NFH

William Wayman traveled to the Bears Bluff National Fish Hatchery near Charleston, SC to participate in a Fisheries programmatic planning meeting. The meeting included a prospectus for Bears Bluff fisheries work in FY 2013, an update on the Atlantic and shortnose sturgeon permit progress, and a site review. The meeting also included a day of field sampling for red drum. Fin clips were taken from all red drum collected in order to genetically determine the percentage of hatchery produced fish.

National Triploid Grass Carp Inspection and Certification Program Meeting

The Warm Springs Regional Fisheries Center hosted a meeting of the inspectors of the National Triploid Grass Carp Inspection and Certification Program. The meeting was designed to focus on issues to improve the implementation of the inspection and certification program. One such issue was a suggestion to lower the incidence rate used in the calculation of how many fish from a lot need to be tested in order to be 95% confident that it is free of diploid grass carp. William Wayman provided updates on the statistics involved in making these calculations and on how many fish would need to be sampled for various lot sizes.

News and Notes

All-Staff Meeting and Holiday Party



All Warm Springs Regional Fisheries Staff participated in the Annual Holiday Party in December. This is fun time for all the staff to get together and eat good food!



Credit: USFWS Photos

Southeastern Fishes Council Meeting

Ashantye' Williams attended the Southeastern Fishes Council Meeting November 8-11, 2012 in New Orleans, LA to present the lake sturgeon work conducted in 2012.

Field Data Management for Natural Resource Professionals Using Access Training

Ashantye' Williams and Jaci Zelko attended a NCTC training course on field data management for natural resources from December 4-6, 2012. The course covered the principles of data organization, including types of hierarchical data typically collected by natural resource professionals, development of relational databases, data management and manipulation, and formatting data for use in other statistical analysis software packages. Ashantye' and Jaci also developed a MS Access database using their own data.

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

