Warm Springs Fish Technology Center

June/July 2008 Activity Report

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Female pallid sturgeon releasing eggs. Credit: USFWS Photo

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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.

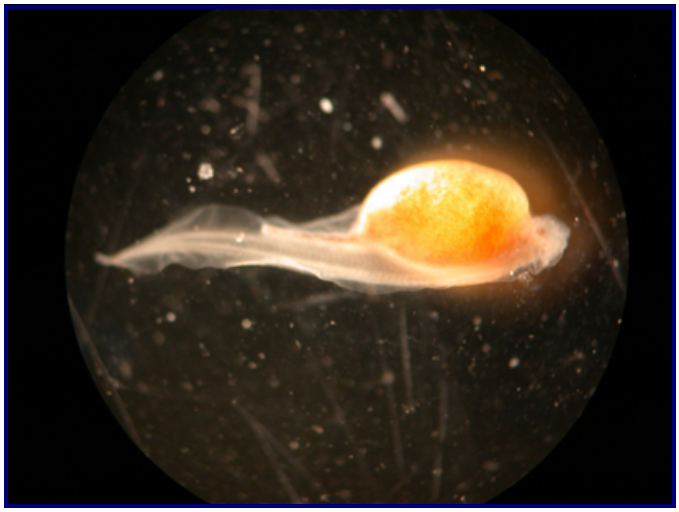
Goals:

- Provide management support of interjurisdictional coastal and riverine fishes such as robust redhorse, shortnose sturgeon, Gulf sturgeon, 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 and mussels.
- 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. In the near future, the FTC will expand cryopreservation research to include other aquatic species (e.g., freshwater mussels, amphibians) for conservation efforts.



Five-day old hatched pallid sturgeon. Credit: USFWS Photo

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 is an internet-based program that assembles performance information on over 1100 strains of both wild populations and domestic broodstock. These strains are managed by state and federal agencies and cultured by private growers. The database enables fishery leaders and producers to make sound decisions regarding management and culture of species. The goals of the NFSR are: 1) to protect the nation's aquatic resources through information management, 2) to promote responsible use of fish strains for recreational opportunities, 3) to advance scientific knowledge, and 4) to be accountable, functionally integrated, and result-oriented.

Partnerships and Accountability

Impacts of Drought on Southeastern Aquatic Resources

Chester R. Figiel, Jr. attended a two day meeting/ workshop on the impact of drought on Southeastern aquatic resources. Hosts for the meeting were the U.S. Fish and Wildlife Service Region 4 Atlanta office and the U.S. Geological Survey. The goal of the meeting was to develop near-term research and monitoring needs related to drought. In addition participants identified long-term research and monitoring priorities for species affected by climate change, as well as for species affected by the increased water demands resulting from urban, industrial and agricultural development in this fast-growing region. We explored and identified mechanisms for cooperation to address research, natural resource management, and information management to best respond to water shortages.

Southeast drought continues. Credit: USFWS Photo

Regional Geneticist Reviews Propagation and Translocation Guidelines

Regional geneticist, Gregory Moyer, participated in drafting the Southeastern Fishes Council's guidelines for the Propagation or Translocation for Reintroduction or Augmentation of Imperiled Fishes (PTRA). This document outlines steps for minimizing demographic and genetic risks associated with hatchery propagation and augmentation. He provided recommendations to minimize risks associated with artificial selection due to propagation techniques and genetic founder effects and provided examples of management strategies in Gulf Coast striped bass reintroduction efforts.

Tech Centers Join Forces to Battle Amphibian Disease

Gray Tree Frog. Credit: USFWS Photo

An inter-regional partnership, between the Warm Springs FTC (Southeast Region) and the Dexter National Fish Hatchery and Technology Center (Southwest Region), is investigating the invasive chytrid fungus, *Batrachochytrium dendrobatidis*. Chester R. Figiel, Jr. visited Southwest region biologists to develop and standardize protocols for analyzing this fungus that has been implicated in the decline of amphibian populations worldwide. Quantitative polymerase chain reaction (qPCR) protocols were developed to detect, amplify and quantify the DNA of the fungus. Additionally, recovery and management scenarios for amphibians were discussed in an effort to meet the U.S. Fish and Wildlife Service Fishery Program's broad responsibility to address national, regional, and ecosystem level aquatic resource needs and priorities.

Partnerships and Accountability

Invited Speaker to International Conference in Tennessee

The Freshwater Mollusk Conservation Society, in collaboration with the Society for Conservation Biology (SCB), sponsored a symposium as part of the SCB 22nd Annual Meeting in Chattanooga, Tennessee from July 13-18, 2008. The symposium was an opportunity for individuals to share their latest research, monitoring approaches, and natural resource management information to support the conservation of freshwater mussel species, habitats and ecosystems. Invited speaker, Gregory Moyer, had the opportunity to present a talk pertaining to risks associated with hatchery propagation and reintroduction. He also participated in round table discussions regarding the role of conservation genetics in freshwater mussels.

Aquatic Species Conservation and Management

Cryopreservation Experiments on Endangered Pallid Sturgeon

Bill Bouthillier handling a pallid sturgeon. Credit: USFWS Photo

Bill Wayman, Bill Bouthillier, and two Student Conservation Association (SCA) interns, Sharon Clemmensen and Sandra Dietz, traveled to Garrison Dam National Fish Hatchery (NFH) in Riverdale, North Dakota for two weeks to help in the recovery of the endangered pallid sturgeon. The project began nine-years ago with the initiation of cryopreservation experiments on pallid sturgeon sperm and has grown into a major component of the recovery effort. This year, the research focused on improving production-scale cryopreservation methods for the creation of additional family crosses. Sperm were shipped from Gavins Point NFH in South Dakota and Miles City State Fish Hatchery in Montana to Garrison Dam NFH. Cryopreservation experiments and fertilization trials were conducted to evaluate the cryopreservation methods. Additionally, two new techniques were used to analyze sperm quality. Computer-assisted sperm analysis and fluorescent staining were evaluated to examine correlations between sperm quality and fertilization rates. Pallid sturgeon sperm from 24 males were cryopreserved and added to the repository, bringing the total number of males to over 90 individuals. This year's effort was partially funded by the U. S. Army Corps of Engineers.

Conducting fertilization trials with pallid sturgeon sperm. Credit: USFWS Photo

Female pallid sturgeon releasing eggs. Credit: USFWS Photo

Aquatic Species Conservation and Management

Evaluating Fish Passage Success in Great Smokey Mountain National Park

Cataloochee Creek in the Great Smokey Mountain National Park. Credit: NPS Photo

The Conservation Genetics Lab received a $40,000 grant to evaluate gene flow between source and founder populations for four federally threatened/endangered fish species, the spotfin chub, smoky madtom, yellowfin madtom, and duskytail darter. Population monitoring of these species from introductions in the mid-l980s indicate that hatchery propagation and translocation efforts were successful; however there is concern that migration/colonization between source and introduced populations is impeded by the Chilhowee Dam, which provides a formidable barrier to gene flow between Abrams and Citico creek. This study will quantitatively evaluate the effectiveness of the Chilhowee Dam fishway passage strategy pursuant to the Federal Power Act for the Tapoco Project.

Leadership in Science and Technology

Improving Methods for Pallid Sturgeon Sperm Cryopreservation

This year's research focused on developing a technique to allow cryopreserved sperm to be used at a production scale to create family lots for stocking. The project was designed to determine the ability of three different extender solutions to aid sperm in surviving the freezing process in larger 5-ml production scale macrotubes. The first extender, Hanks' balanced salt solution (HBSS), was used in initial experiments with pallid sturgeon sperm and worked fairly well with 0.5-ml straws. The second extender, modified Tsvetkova extender, provided slightly higher post-thaw motility and fertilization rates than HBSS, based on 0.5-ml straw results. The third extender, Chapman extender, was recently developed at the University of Florida for refrigerated storage of sturgeon sperm but had not been tested for cryopreservation. Results indicated the modified Tsvetkova solution had the highest post-thaw motility and fertilization rates of the extenders tested. This project helped make a small but critical improvement in the cryopreservation protocols for pallid sturgeon sperm.

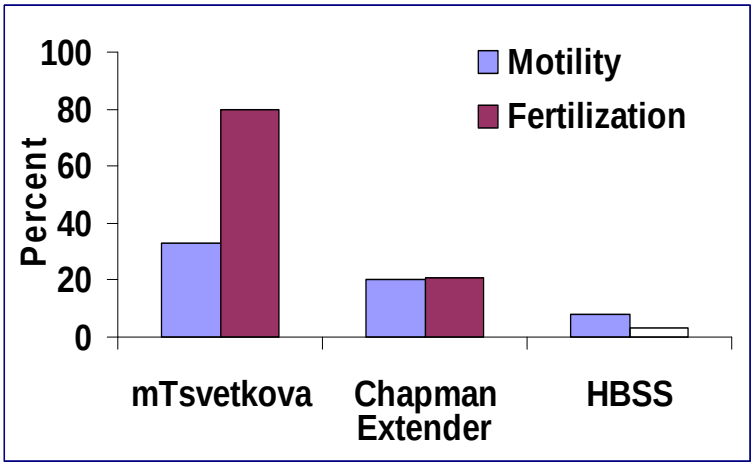


Figure: Percent motility and fertilization for three different extender solutions. Credit: USFWS Photo

Leadership in Science and Technology

Evaluating Mussel DNA Extraction Techniques

Bill Bouthillier and Gregory Moyer assisted personnel from the Georgia Department of Natural Resources and the University of Georgia in conducting mussel surveys in several tributaries of the lower Flint River. The surveys assessed macro habitat selection among several species of freshwater mussels. Several non-listed, native mussels were collected for cryopreservation and genetic studies to be conducted by the FTC. At stream side, several mussels were swabbed to collect cells from the viscera and foot to evaluate DNA extraction techniques and mussel mortality rates. Results from this study will determine which sampling technique is the most efficient in providing high quality DNA for application in conservation genetics of threatened and endangered freshwater mussels.

Elephant ear (*Elliptio crassidens*) mussels collected to conduct genetic studies. Credit: USFWS Photo

Swab kit for extracting genetic material. Credit: USFWS Photo

IPP Completed for the National Fish Strain Registry

An Investment Performance Profile (IPP) was completed for the National Fish Strain Registry (NFSR) as part of the Fish and Wildlife Service's efforts to refine the IT Portfolio Management process. This IPP assists the Information Resources and Technology Management program in assessing the status and performance of current FWS investments in the government's Electronic Capital Planning and Investment Control system. Additionally this process ensures that the NFSR is aligned with the Department of the Interior's Strategic Plan and Enterprise Architecture and that customers receive full value for the investment.

Public Use

Educational Outreach at Camp Viola

Gregory Moyer provided educational outreach for a youth camp near Lagrange, GA on July 7th. Camp Viola is a summer camp for youth from high-risk neighborhoods and economically challenged homes. Gregory provided career-oriented outreach aimed at informing the thirty-six youth about careers in biology and USFWS. He talked about how he became interested in biology, his love for the outdoors, and why and how he chose a career in the USFWS. The children also had a chance to view live fish, crayfish, and salamanders and discuss how we as humans can impact the environment.

Public Use

Conservation Day Camp in Columbus, GA

The FTC participated in a conservation day camp for approximately 1,500 children at the home field of the Columbus Catfish, a single A baseball team affiliated with the Tampa Bay Rays. Staff set up a display table with brochures about recreational fishing and endangered species. Staff displayed fish and mussel species of the Chattahoochee River which flows through Columbus, Georgia. Children enjoyed identifying relic mussel shells of the Apalachicola, Chattahoochee, and Flint Basin and examining several preserved darter species from the Coosa River Basin. Many of the children also got fish tattoos for answering questions about mussels and fish.

Nicole Rankin educating children about fish and freshwater mussels. Credit USFWS Photo

Other Outreach Opportunities

Four FTC employees and one SCA intern helped staff the Warm Springs National Fish Hatchery Kids' Fish for Fun Event on June 7, 2008. Over 200 children participated and approximately 740 catfish were caught.

On July 21, 2008, FTC staff gave an in-depth tour of the Conservation Genetics lab, NFSR office, and Cryopreservation lab spaces to Dr. Bill Daniels and students from an undergraduate class from Auburn University.

Gregory Moyer presented information to Warm Springs Regional Fisheries Center staff in a brown bag seminar on July 23, 2008. His presentation emphasized the importance of minimizing genetic risks associated with hatchery propagation.

Workforce Management

Warm Springs FTC Welcomes New Biologist

Nicole Morris Rankin joined the staff of the FTC on March 16th, 2008. Nicole's role as a fish biologist involves data management and expanding the horizons of the National Fish Strain Registry (Registry). Nicole will be challenged with two tasks: (1) updating Registry data for all fish broodstocks (hatchery and wild); and (2) expanding the Registry to include new parameters --- other aquatic species (e.g., mussels, amphibians) and *ESA-listed* species. Nicole brings with her valuable federal experience through working with the National Oceanic and Atmospheric Administration's Office of Ocean Exploration and Research as a Knauss Sea Grant Fellow.

Nicole graduated from the University of West Florida with a Master of Science in Biology. She received a Bachelor of Science in Biology from Jacksonville State University in Alabama.

Workforce Management

Bye Bye Sharon

Sharon checking cryopreserved samples in a liquid nitrogen storage dewar. Credit USFWS Photo

Sharon Clemmensen, a Student Conservation Association intern, completed her appointment at the Warm Springs FTC on July 31st. She is heading to the University of Florida to start work on a Master of Science degree. Sharon will be studying the physiology and evolution of apple maggots with Dr. Dan Hahn. In June 2007, Sharon started at the FTC shortly after graduating from McGill University in Montreal, Canada with a Bachelor of Science in Biology. During her tenure, she provided assistance to the Cryopreservation and Conservation Genetics laboratories. Her responsibilities included performing water quality analysis, feeding and caring for research animals, maintaining the recirculation systems, conducting fish passage barrier assessments, assisting in cryopreservation experiments, and collecting and analyzing samples for genetic analysis.

Congratulations Sharon! You will truly be missed by the Warm Springs FTC staff. We hope you consider coming back to the Service after completing your degree.

Sharon removing anesthetized striped bass from tank. Credit USFWS Photo

Sharon performing wild fish stream surveys. Credit USFWS Photo

Training

Bill Bouthillier assisted other RFC staff with updating the RFC's Environmental Management System Status Assessment, Self Declaration and External Review as required by environmental policies and directives.

Nicole M. Rankin attended Introduction to Management Skills training held at NCTC in July.

All FTC employees completed the web-based Travel Authorization Vouchering System training for GovTrip on July 21st, 2008.