Hatchery Highlights

U.S. Fish & Wildlife Service
Warm Springs NFH
News and Updates

April – June 2018

Aquatic At-Risk Species Recovery:

Gopher Frogs

The Warm Springs NFH engaged in a multi-year project with our partners to establish a self-sustaining breeding population on protected lands at the Nature Conservancy's Williams Bluff Preserve in Early County, GA. Gopher frogs are native to upland habitat, particularly longleaf pine ecosystems in Georgia and elsewhere in the southeast. The loss of longleaf pine habitat is the primary threat for this species. They are currently limited to fewer than 10 sites in Georgia. This rare species is now under review for formal listing by USFWS, and Georgia documents the species as vulnerable.

Vanessa Kinney Terrell, Research Coordinator at the Warnell School of Forestry and Natural Resources transferred gopher frog tadpoles to us on April 6th. These tadpoles are from a single spawn collected from a Savannah River Ecology Laboratory wetland located near Aiken SC.

Newly hatched gopher frog tadpoles counted by Carlos Echevarria prior to transfer into culture tanks.

This single spawn occurred much later than the multiple spawns obtained in 2017 when we obtained eggs in mid-February. We transferred 75 gopher frog tadpoles into each of seven covered tanks set up for culture.

As in last year, dried maidencane served as an organic fertilizer for the culture tanks. Periodically, small amounts of rabbit/guinea pig chow are added into the tanks containing tadpoles until fully transformed frogs are removed from the tanks. Frogs are then weighted and placed into individual deli containers over a bed of moistened orchid moss awaiting transfer.

We inspected the outdoor culture tanks multiple times a week to catch and remove newly transformed frogs starting in June. After 82 days of culture, the first batch of frogs was transferred to UGA on June 27th for marking, the collection of genetic tissue samples, and eventual distribution.


Josh Simons releasing tadpoles into covered culture tanks, and packing fully transformed frogs for transfer.

Through the end of June, 271 gopher frogs were transfer from Warm Springs NFH.

Date	Location	Number	Length	Wt. (lbs.)
June 27th, 2018	University of Georgia	271	N/A	2.99

A few developing tadpoles remain for distribution or transfer in July.

Gopher Tortoise

Warm Springs NFH initiated work supporting conservation efforts for Georgia's gopher tortoises. Gopher tortoises *Gopherus polyphemus* are a federally listed "candidate species" for populations east of the Mobile and Tombigbee Rivers; they are also state listed by Georgia as "threatened." Gopher tortoises are an indicator of longleaf pine ecosystem health; their burrows provide vital habitat and shelter to other imperiled species such as gopher frogs and indigo snakes.

Our conservation strategy will establish a head-starting program to raise larger juveniles through their first two years before marking and releasing them within known Georgia habitats. Partners in this expanding effort currently include GADNR, The Georgia Conservancy, and Zoo Atlanta. Head starting the tortoises should produce larger individuals with harder shells before releasing within Georgia habitat.

We have received both eggs and juvenile tortoises in this first year of culture. We received 4 tortoises donated from a Baker County, GA source on June 27th and 28th. We received three 1 year old, and one 2-year-old tortoises. Staff provides fresh greens, and vitamin enriched prepared diet for the turtles on a daily basis while we fine-tune our culture operations to meet the tortoises' needs.

Staff are feeding vitamin and mineral rich vegetables along with a commercial mixture to the tortoises.

John Jensen, a biologist with GADNR and others, delivered eggs from locations in Baker County. The eggs are incubated in two temperature and humidity controlled commercial incubators obtained for working with species. Tortoises reared and head started at Warm Springs are destined for distribution to the Lanahassee tract in Webster County, GA.

Date	**Source Location**	**Number**	**Clutch**
June 15th, 2018	Joseph W. Jones Ecological Research Center	11	#1
June 15th, 2018	Joseph W. Jones Ecological Research Center	2	#2
June 27th, 2018	Baker County, private land	4	#1
June 27th, 2018	Baker County, Willow Nook	5	#2
June 28th, 2018	Baker County, Lanahassee tract	1	#1
June 28th, 2018	Baker County, Willow Nook	5	#2
June 29th, 2018	Baker County	5	#1
Totals:		**33 eggs**	**7 clutches**

Carlos Echevarria positioning eggs inside the incubator.

Indigo Snakes

Program staff began reviewing draft indigo snake captive propagation protocols in a draft plan for updates and use in developing our facilities and culture protocols at Warm Springs.

Shortnose sturgeon

WSNFH accepted the transfer of 25-shortnose sturgeon from the University of Georgia for continued culture and possible future work with the species on June 6th. Warm Springs NFH has a long history of successful work with the species in past years. These fish range in length between 74 and 94 inches and total 157 pounds at arrival. The fish are monitored daily to maintain continued good health and growth. Shortnose sturgeon are an endangered species with a historical range along Atlantic Basin Rivers southward from Saint Johns River in FL north into Canada.

Freshwater Mussels Research

Trent Mitchel wrapped up his mussel work on April 27th here at Warm Springs this spring having accepted a new position with BLM in the state of Idaho. This spring we worked with purple bankclimbers collected from the Spring River in southwest Georgia. Trent facilitated a study by Columbus State University graduate student Jared Harper titled: The impact of glochidia density on the transformation rate in the purple bankclimber (*Elliptoideus sloatianus)*.

Carlos and Trent collecting mussels, Trent and Jared working with host fish during the study.

Pollinator and Native Plants Habitat Project

Improvements to the habitat area included the purchase of several native Venus flytrap plants to augment our carnivorous plant display. Once the plants are larger, they will be transplanted into the established carnivorous plant display area. A replacement carnivorous plant kiosk sign was also mounted overlooking the display area.

To improve our pollinator habitat area, staff transplanted an additional 83 plants and 14 different species into the garden. Once the plants are established, they will do much better in competition with other grasses and plants.


Carlos and Alex improving the butterfly/pollinator garden.

Sicklefin Redhorse

Sicklefin Redhorse are listed by USFWS as a candidate species. We work in cooperation with partners to meet conservation goals established by the Sicklefin Redhorse Conservation Committee.

We made progress on a work plan prepared to restore Sicklefin redhorse at the Oconaluftee River in partnership with the Eastern Band of Cherokee Indian Tribe and members of Sicklefin Redhorse Conservation Committee. Haile and Carlos participated in conference calls April 2nd, May 7th and a follow call on June 4th with committee members.

Carlos and Chad traveled to NC May 7th to assist with collection and spawning of sicklefin redhorse. The collection was a joint effort of Sicklefin Redhorse Conservation Committee members. New collection and holding techniques used by the crews including the use of fyke nets to collect broodfish, larger holding and transport tanks made available during the sampling and spawning process. The crew set up staging operations on the Oconaluftee River near its junction with Tuckasegee River behind the Two Rivers Lodge in Bryson City, NC.


Staging area on the Oconaluftee, Dave Matthews and Carlos Echevarria pit tagging a sicklefin, photo by Gary Peeples, FWS

After several days of collecting and sampling two females were spawned. One female spawned produced an estimated 1,400 eggs that were transferred to CFI for culture. Each female was spawned with five different males. An estimated 7,700 eggs were obtained from the second female spawned on May 10th as inventoried back at Warms Springs. Survival and hatch of the eggs at Warm Springs was excellent with very few losses during egg incubation and hatch. Hatching was complete May 18th. First feeding began on May 26th as the fry began swimming up in the tanks. These sicklefin were averaging over 0.75 inches in length at the end of June.

Fully developed sicklefin feeding on brine shrimp and commercial fry rations

We are holding fingerling sicklefin for longer periods than in previous years to produce larger sized fish for stocking. All distributed fish will be marked with oxytetracycline (OTC) with larger fish scheduled for coded wire tagging later in the year. We OTC marked the sicklefin redhorse for the first time this year. Treatment rates and durations we successfully used with other species such as striped bass will be used with the sicklefin this year. We will evaluate marking efficiency and adjust for future years based on this first effort. We obtained a prescription from an area veterinarian after he conducted a required site visit to Warm Springs NFH on June 27th. Pennox 343 OTC is an approved product for skeletal marking of finfish.

Aquatic Species Restoration Programs:

Alligator Gar Restoration Program

Nothing to report

Gulf Coast Striped Bass Restoration

We experienced a much-delayed start to the typical striped bass production schedule this year. We fertilized striped bass fingerling production ponds with organic fertilizers, an application of agricultural limestone and started filling with water several weeks later than normal, April 20th – 22nd. Spring water at Warm Springs is typically low in mineral content and is subject to pH shifts occurring during photosynthesis without increasing the alkalinity of the water.

Agricultural limestone increases buffering capabilities of the water.

Haile traveled to pick up 4-day-old fry produced by Welaka NFH on April 27th. We received fry produced from three different females, lot # 108, 105 and 107. The fry were in excellent shape at stocking. We received and stocked 775,000 fry into nine ponds.

Josh Simmons and Haile Macurdy stocked the fry at sunset and were fortunate to have Chattahoochee River Warden Henry Jackson and his family assist us during the long evening as we stocked out fry into the production ponds.

All ponds were harvested and distributed between May 22.-25th. We produced 148,412 fish, representing a 19.1% return.

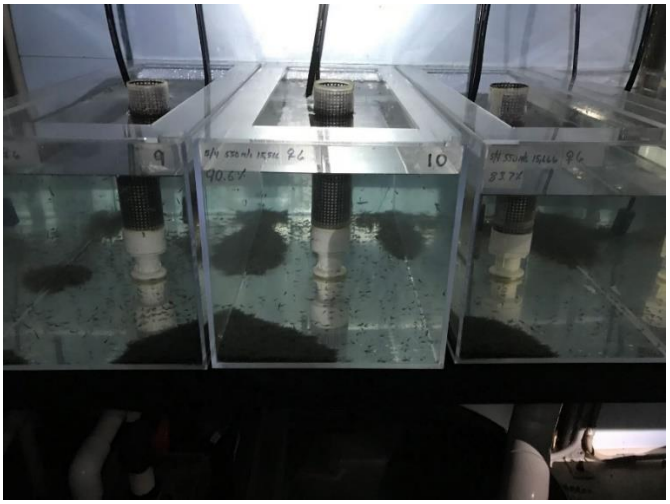
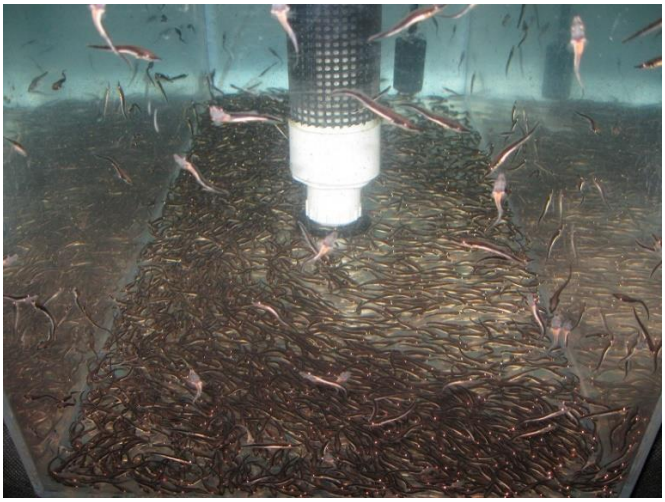
Date	Location	Number		Length	Wt. (lbs.)
May 22, 2018	West Point Reservoir, GA	55,215		1.0	22.3
May 23, 2018	Bartlett's Ferry Lake	47,806		1.0	19.3
May 24, 2018	Lake Blackshear, GA	31,896		1.05	13.2
May 25, 2018	Lake Oliver, GA	13,495		0.74	2.4
Totals:		**148,412**	**fish**		**57.2 lbs.**

Lake Sturgeon Restoration

Carlos Echevarria, Chad Shirey from WSNFH and Bill Wayman, WSFTC, traveled to WI in the latest trip to obtain fertilized lake sturgeon eggs from WI. This marks the 18th year of spawning lake sturgeon intended for restoration efforts among southeastern watersheds. Staff assisted WIDNR personnel on May 3rd with their annual sampling efforts then collected and spawned six females, each with five males on May 4th. They transported 176 thousand fertilized eggs back to Georgia. Fertilization rates ranged from 57.2% to 90.6%.

TVA Fish Biologist Dave Mathews and Sturgeon for Tomorrow volunteer Amanda Homberg caring for fertilized lake sturgeon eggs as they water harden.

This year's successful hatch of lake sturgeon at Warm Springs represents the most fry we have reared to date.

Recently hatched lake sturgeon fry and full aquariums one month later

We transferred fingerling lake sturgeon hatched at Warm Springs to other stations during the week of June 13-15th following approximately a month of culture. GADNR personnel picked up and distributed 22,983 fingerlings to a tributary of the Coosa River on June 13th. Two other GADNR hatcheries received 14,778 fingerlings for continued culture and future distribution to the Coosa River. We also transferred a few lake sturgeon eggs and fingerlings for a research study conducted at the University of West Georgia by graduate student Rachael Hicks and professor Janet Genz. Fish were for research purposes only, not for redistribution. A total of 53,109 fingerlings were transferred to other hatcheries for continued culture and eventual distribution into the Upper Tennessee and Cumberland rivers in TN.

Date	**Location**	**Number**	**Length**	**Wt. (lbs.)**
May 6th, 2018	University of West Georgia	750	Eggs	N/A
Totals:		**750**	**Eggs**	
June 29th, 2018	University of West Georgia	192	1.35”	0.06
June 13th, 2018	Edenton NFH	12,002	1.23”	2.90
June 13th, 2018	Coosa River, GA (GADNR)	22,983	1.16”	5.57
June 13th, 2018	Summerville SFH (GADNR)	8,270	1.10”	2.37
June 13th, 2018	TN Aquarium, TN	2,611	1.10”	0.63
June 13th, 2018	Private John Allen NFH	12,274	1.23”	2.97
June 14th, 2018	Go Fish Center SFH, GA	6,508	1.10”	1.86
June 14th, 2018	Table Rock SFH, NC	4,612	1.10”	1.32
June 15th, 2018	Orangeburg NFH	16,829	1.10”	4.82
June 19th, 2018	Mammoth Springs NFH	4,781	1.31”	1.47
Totals:		**91,062 fish**		**23.97 lbs.**

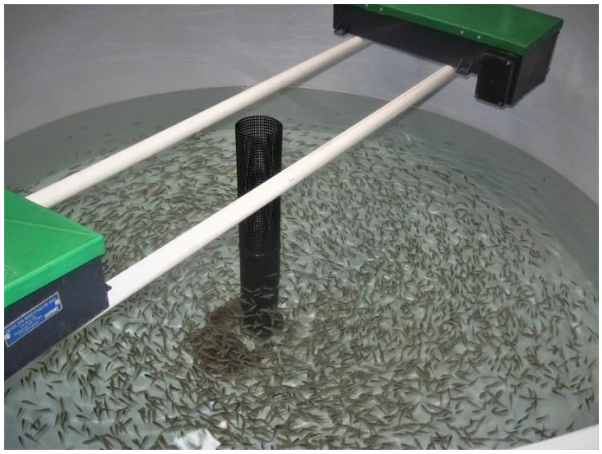
Warm Springs NFH retained approximately 5,600 fingerlings for continued culture and future distribution.

Smallmouth Bass Restoration Program in Georgia

We are entering our third year working with Georgia and Tennessee in augmenting the smallmouth bass population by producing and stocking 1.5-2.0” fingerlings in Blue Ridge and Chatuge reservoirs. Native populations of smallmouth bass are affected by the introduction of spotted bass throughout the region.

We adjusted water temperatures during April in two raceways holding thirty-four adult smallmouth bass (20 females and 14 males) to emulate optimum spawning conditions. Staff monitored water temperatures and inspected the raceways daily for spawns among the nests placed in the raceways.

This year's multiple spawns represent a marked increase in fry produced compared to 2017. We transferred sixteen spawns to the wetlab so we could monitor egg development under controlled conditions. Typically, we transferred at day three post spawn, hatching fry to culture tanks. We evaluated several methods to reduce fungus buildup during egg incubation including the use of hydrogen peroxide, and improving techniques to streamline the transfer process.



Rearing fingerling smallmouth bass for distribution

All spawns produced fry, except three spawns were eggs did not get fertilize by the male. We obtained most of the spawns from a single raceway, 12 versus 4 spawns. The first spawn was collected on April 26th and the last on June 20th. We are rearing smallmouth bass to lengths exceeding 1.5 inches prior to distribution.

Fingerling smallmouth bass will be distributed to Blue Ridge Reservoir, an impoundment of the Toccoa River in northern Georgia later this year.

Aquatic Habitats:

Nothing to Report

Aquatic Invasive Species:

Nothing to report.

Recreational Fishing and Public Use:

Received replacement channel catfish fry from GADNR's Cordele hatchery in June. We placed these week old fry into a raceway for culture until they are large enough to stock into a pond.

We canceled our annual fishing event in June due to the ongoing demolition and construction project for a new Holding House.

Educate and Engage Public & Partners:

Alex submitted an E-Grits article for the work done in our butterfly garden this April. He also began updates for new WSNFH brochure. We obtained new fish information and identification panels in April for use at our display pool.

Haile provided a June 5th site tour for a person interested in madtom conservation efforts underway by the Service.

Carlos provided a station tour June 19th to an Auburn Universities fisheries class.

Carlos provided a station tour June 27th to Taylor Pool, FWS Congressional/Legislative Affairs Specialist.

Allan Brown Fisheries ARD and Taylor Pool holding a young gopher tortoise during their visit to the hatchery.

Staff facilitated a station visit by a science camp group visiting June 20th.

Volunteers:

We submitted an E-Grits article for Marilyn Kircus a widely traveled volunteer who reached a 10,000-hour service mark while helping us this spring. We hope she will return this fall to continue earning hours for the next milestone.

We had several new volunteers who assist us during the busy spring production season. All were students on or in-between classes starting later in the summer or fall.

Christopher (Cole) Gainey volunteered three days a week this spring while on summer break from university studies. He started April 13th. He helped in all aspects of fish culture work while here. We especially appreciate the help with sicklefin redhorse, lake sturgeon, and pond management during his work with us.

Twin brothers Jason and Joshua Castillo volunteered with us on Mondays helping greatly with pond and station management before classes started back up this summer.


Cole helping count lake sturgeon, Jason and Joshua removing leaves from drainage ditches

Also providing valued assistance to us this year was Brandon Sorrell, not pictured, who started volunteering May 14th. He volunteered two days a week until summer classes restarted in July. Brandon drove two hours one way to work with us!

General Maintenance and Operations:

Alex submitted updates for 2018 All Hazards Disaster Plan updates, with the approved version signed June 6th.

Demolition of the existing building and reconstruction for a new holding house got underway.

Construction crews were on site removing the existing Holding House, reworking levees for the adjacent water supply pond and placing pipework for the project during the quarter.

We purchased ten dump truck loads of clay to widen a nearby levee for better vehicle access once the new building is up.

We put up for surplus a number of pieces of worn heavy equipment for sale or transfer, including a bulldozer, small farm tractor, bush hog, and backhoe.

Alex assisted fish health personnel performing several triploid grass carp inspections during the quarter.

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