



Aquatic At Risk Species Recovery:

Gopher Frogs

Warm Springs NFH is working in partnership with the University of Georgia, Zoo Atlanta, Georgia Department of Natural Resources, The Amphibian Foundation, Inc., and others to expand conservation efforts for gopher frogs, which is currently listed by USFWS as a candidate species. They are native to longleaf pine ecosystems in Georgia and elsewhere in the southeast.

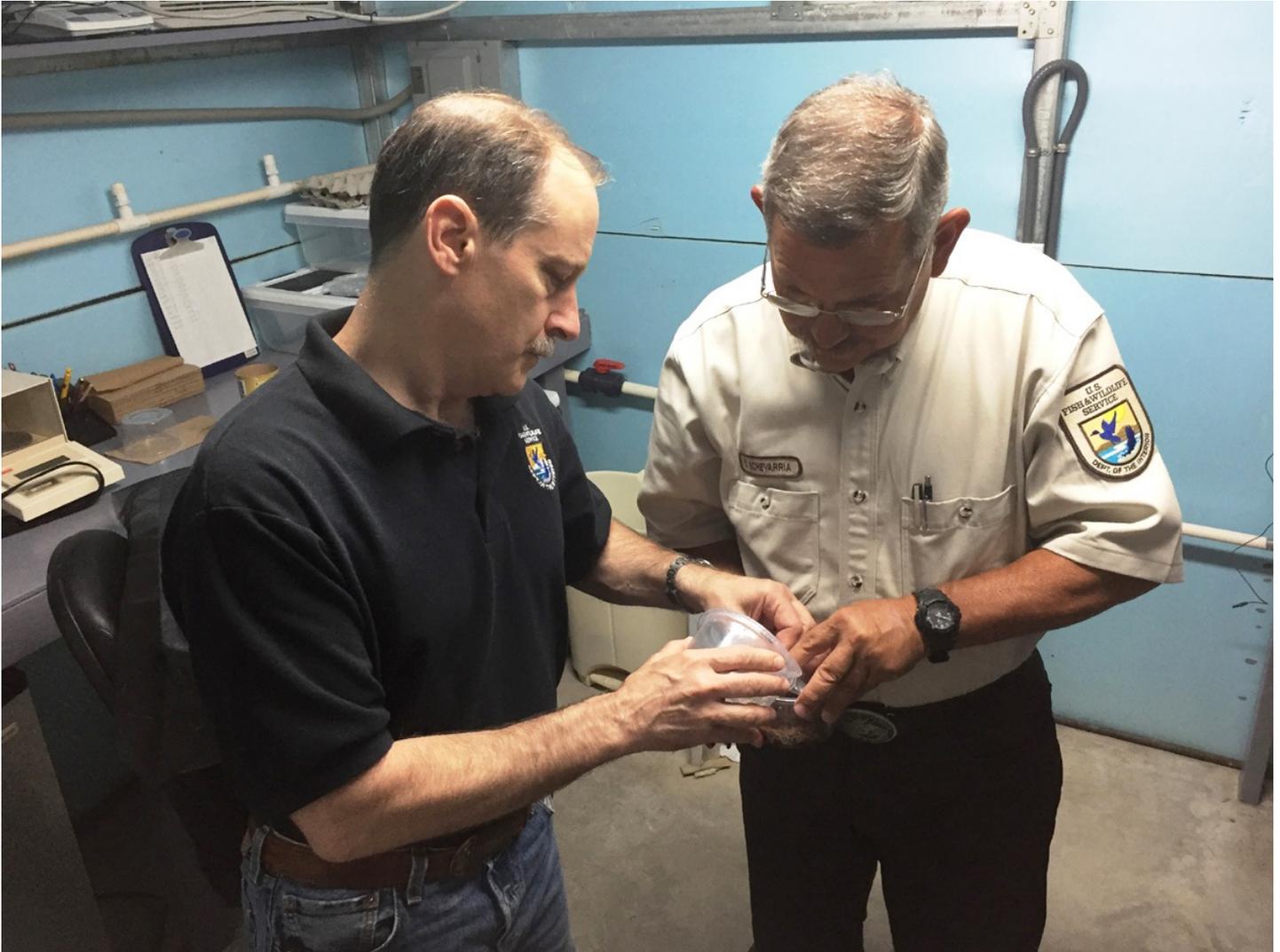


Juvenile gopher frog contained over moistened orchid moss, ready for a meal of crickets: Photo by Stephen Jackson, FWS

Gopher frog eggs brought to Warm Springs NFH in mid-February hatched and were transferred outdoors into nineteen 5 foot diameter covered tanks previously filled with approximately 216 gallons of spring water and

dried maidencane serving as organic fertilizer March 3rd. Periodically, small amounts of rabbit / guinea pig chow were added into the tanks containing developing tadpoles through the last week in May when the first fully transformed frogs were removed from the tanks, weighted and placed into individual containers over a bed of moistened orchid moss beginning May 20th.

The outdoor culture tanks were then inspected multiple times a week to catch and remove additional newly transformed frogs through June and into July.



Steve Jackson and Carlos Echevarria teaming up to feed live crickets to a frog.

Live juvenile crickets were ordered from area bait suppliers, and then dusted with calcium and other minerals as a vitamin supplemental prior to figuring out how to actually add live crickets to a container with a frog that wants out. Needless to say no frogs got away but we do have a few escaped crickets about the lab area where we held the gopher frogs.

Our thanks to all our partners who provided valuable insights towards our first year raising gopher frogs!

Mark Mandica with The Amphibian Foundation posted additional photos and an article online showing gopher frog culture at Warm Springs NFH and release photos at Georgia DNR's Fall Line Sandhills WMA located near Butler, GA.



Gopher frogs borrow into the moistened orchid moss awaiting crickets and transport to release sites.

Through the end of June, 842 gopher frogs have been distributed or transferred from Warm Springs NFH.

Date	Location	Number	Length	Wt. (lbs.)
June 16 th , 2017	The Amphibian Foundation, Inc., GA	45	N/A	0.46
June 7 th , 2017	Fall Line Sandhills WMA, GA	746	N/A	7.77
June 28 th , 2017	Fall Line Sandhills WMA, GA	51	N/A	0.44

A few developing tadpoles remain for distribution in July.

Freshwater Mussels Research

Trent Mitchell, obtained largemouth bass for additional host fish studies this spring from the Georgia Go Fish Hatchery. Trent along with Carlos Echevarria and Andrew Hartzog from the Panama City Field Office collected purple bankclimbers in the Flint River for work this season. The most successful host fish for the purple bankclimbers observed during preliminary trials were from lake sturgeon reared at Warm Springs National Fish Hatchery and blackbanded darters collected from Hannahatchee Creek near Lumpkin Georgia. Juvenile mussels collected from aquariums holding individual fish were fed daily and inventoried to evaluate survival of the young mussels.



Trent Mitchell evaluating viability of packets prior to infecting host fish.



Lake sturgeon during infection with purple bankclimber glochidia

Pollinator Habitat Project

Establishing native plants beneficial to monarch butterflies is a continuing goal at Warm Springs NFH. This year we have revived our butterfly sanctuary project. Starting on May 8th, 2017, the butterfly milkweed were bedded and while it is in the beginning stages, the plants are doing well. The small area of over 100 butterfly milkweed plants has regular visitors, such as bees, and Gulf Fritillary Butterflies. Most of the plants have started to bloom and attract many species of pollinators; we are hoping to see the Monarch.



Obsevation deck above pollinator area.

The only ongoing problem is the aphids, sometimes referred to as plant lice. This issue is being controlled using a non-toxic method with mild hand soap and water by being sprayed on the infected areas. The aphids had cause stunted growth in approximately seven plants and killed approximately 15 plants. Additional plants are planned to be planted in the fall, as it is the best time to plant them. We currently have a variety of native plants that are established and beneficial to a wide variety of butterflies as we continue to work on plant species critical for monarchs.



Butterfly/Pollinator Garden at WSNFH in the beginning stages. Credit: USFWS Image

Sicklefin Redhorse

Sicklefin redhorse are a *Moxostoma* species currently listed by USFWS as a Candidate species. We work to address conservation goals established within the Sicklefin Redhorse Conservation Committee. Partners include fisheries programs at Warm Springs, the Eastern Band of Cherokee Indians, USFWS Ecological Services (ES), Asheville, NC, Conservation Fisheries Inc. (CFI), and North Carolina Wildlife Resource Commission (NCWRC), Tennessee Valley Authority (TVA), University of North Carolina and others.



Going into our fourth year of active participation, we aim to provide active support for stocking programs and research within the species historical range. We are currently rearing a few 2014 and 2015 year class sub-adult sicklefin redhorse for evaluation of prospective formulated rations and for marking and tagging studies.

This year, boat crews from NC Wildlife Resource Commission began sampling and collection efforts April 17th and continued multiple times a week through the first week of May. Cold weather with lows in the 30 – 40 degree range (F) and heavy rains through this critical time resulted in fluctuating water temperatures and turbid waters which adversely affected development of good spawning runs by sicklefin into collection areas. As a result only a few females were collected and very few fry were produced this year. Warm Springs NFH and RFC staff remained on standby to assist with spawning and propagation work throughout this period, but were not called upon due to limited numbers of potential good broodfish being caught in sampling efforts. NCWRC biologists do report collecting juvenile sicklefin redhorse in areas previously stocked by Warm Springs NFH and CFI.

Aquatic Species Restoration Programs:

Alligator Gar Restoration Program

Warm Springs NFH participates in the Alligator gar restoration program covering the Mobile basin in Alabama and the Mississippi River basin in Tennessee. Alligator gar are among the largest freshwater fish species and are a top level predator within the systems they are found. Warm Springs NFH began involvement in regional conservation efforts for the species in 2005. We are working to achieve management objectives for this top level predator, in cooperation with Private John Allen NFH and other State and Federal agencies under American Fisheries Society (AFS) Alligator Gar Technical committee guidance. While the most abundant populations of alligator gar occur in Texas and Louisiana, inland numbers are in decline. As of 2008 the species is considered as vulnerable in many reaches. Our stocking efforts are directed to the Hatchie River, a tributary of the Mississippi river in TN. The state of TN lists alligator gar as critically imperiled

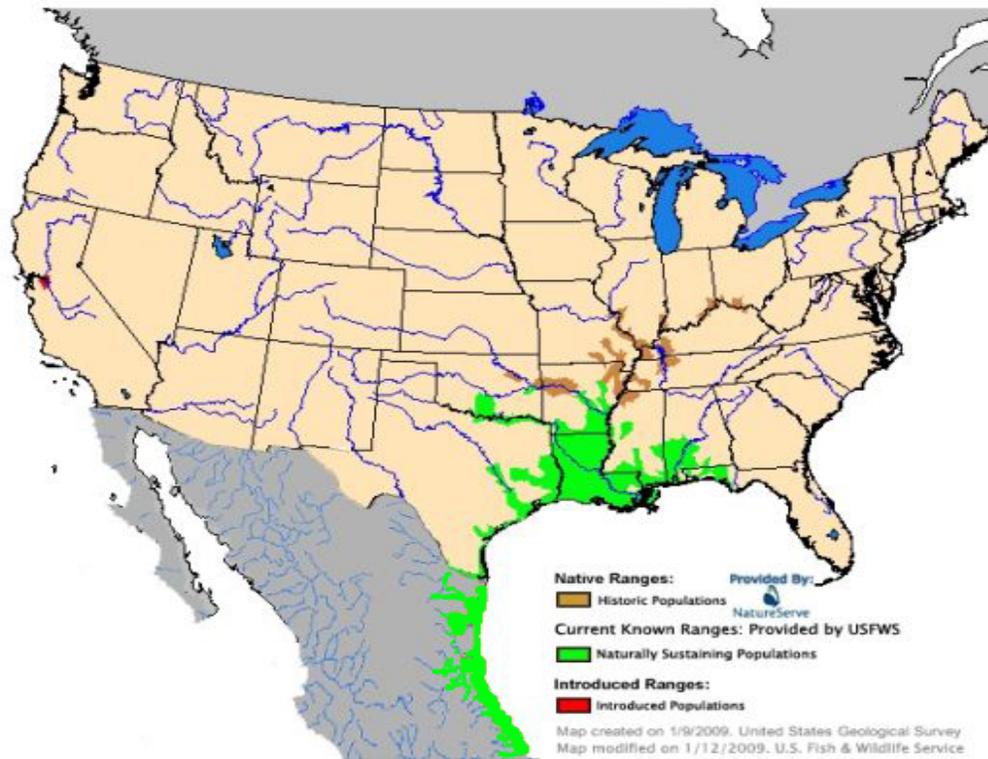


Alligator gar grew uniformly and with few mortalities.

On May 8th 2017 we stocked 6,474 fry hatched at Private John Allen NFH. Following early losses typically experienced in transitioning the fry to commercial feeds, we've gotten a 41% return through June. Once we trained the fish to take commercial rations, scheduled feedings and use of 24 hour automatic feeders helped ensure continued good growth and survival rates expected at the water temperatures we maintained for the gar.

Through the end of June we had approximately 2,660 alligator gar in the 4 to 6 inch range gar targeted for release in mid-July. At that time they will be marked with coded wire tags and distributed to the Hatchie River, a Tennessee tributary within the Mississippi River Basin.

Mapped collection data for *Atractosteus spatula*



Gulf Coast Striped Bass Restoration:

Warm Springs NFH distributed Gulf Coast Striped Bass fingerlings in support of restoration objectives set for the species. This year the striped bass we produced were distributed to Lake Seminole a reservoir within the Apalachicola Chattahoochee Flint watershed at the Georgia / Florida line.



Fingerling striped bass ready for distribution

This year was a difficult year production wise. We received fry from Blackwater SFH, FL on April 11th and from Welaka NFH on April 16th. While we produced nice sized fish for distribution, the return from the 6 ponds we stocked was low. We only used than half the available space set aside for phase I fingerling production this year as fry were also hard to come by.

Date	Location	Number	Length	Wt. (lbs.)
May18, 2017	Lake Seminole, GA	29,701	1.38	29.1

Lake Sturgeon Restoration:

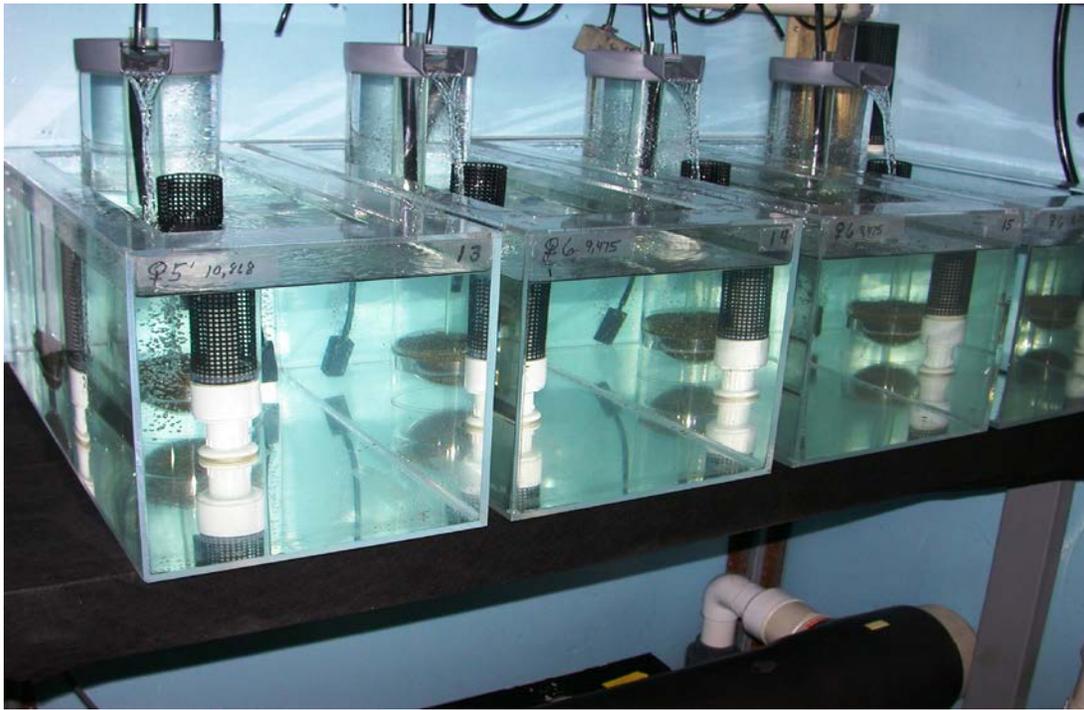
Entering the 17th year of production, WSNFH staff traveled on short notice April 18th to the Wolf River in Wisconsin, below the Shawano Dam in order to spawn lake sturgeon and return the fertilized eggs back to Georgia for culture. Our program supports restoration programs by Georgia DNR for the Coosa River, and work in Tennessee and North Carolina on the Lower French Broad, Holston and Cumberland Rivers under guidelines of the Southeastern Lake Sturgeon Working Group.



Wisconsin crews collecting mature lake sturgeon spawning below the Shawano dam assisted by Warm Springs NFH staff.

Timing of their arrival was spot on as Carlos Echevarria, Chad Shirey and Bill Wayman (WSRFC) arrived the next day and fertilized eggs from 6 females each with 5 different males. The following link highlights this spawning operation and the publics' interest and support involved in seeing full grown lake sturgeon.

<http://fox11online.com/news/local/northwoods/sturgeon-spawning-below-shawano-dam-attracts-spectators-and-scientists>



Incubating lake sturgeon eggs at Warm Springs NFH

A batch of fertilized eggs was transferred directly to GADNR staff upon the crews return to Georgia.

The remaining lots of eggs were incubated at Warm Springs following genetic, culture and quarantine production protocols established for the species. Fertilization rates varied among the different batches of eggs but plenty of fry were produced for continuing culture work by all the partners working together for the benefit of this species.



Lake sturgeon during quarantine period approaching 30 days old ready for transfer.

Between May 31st and June 6th we transferred 45,359 lake sturgeon to participating FWS hatcheries, State and University partners for continued culture and eventual distribution later in 2017. An additional 5,721 were transferred to GADNR for direct release into the Coosa River. A total of 51,080 lake sturgeon were distributed or transferred. We are currently holding 6,084 lake sturgeon at Warm Springs for distributions targeted in September and later this year.

Date	Location	Number	Length	Wt. (lbs.)
April 21, 2017	Summerville SFH, GA	69,128	Eggs	N/A
Totals:		69,128	Eggs	
May 31 st , 2017	Orangeburg NFH	10,458	1.19"	3.21
May 31 st , 2017	Private John Allen NFH	8,228	1.21"	2.13
June 1 st , 2017	Table Rock SFH, NC	2,423	1.23"	0.71
June 1 st , 2017	Edenton NFH	9,109	1.23"	2.57
June 2 nd , 2017	TN Aquarium, TN	2,359	1.34"	0.83
June 2 nd , 2017	Coosa River, GA (GADNR)	5,721	1.26"	1.74
June 5 th , 2017	Go Fish Center SFH, GA	4,100	1.11"	0.81
June 6 th , 2017	Mammoth Springs NFH	8,682	1.53"	4.53
Totals:		51,080	fish	16.53 lbs.

Smallmouth Bass Restoration Program in Georgia



FWS Photo

We are entering into our second year working in cooperation with Georgia, Tennessee and North Carolina to produce fish for Blue Ridge and Chatuge reservoirs. Blue Ridge is located at the border of Georgia and Tennessee, and Chatuge is located at the border with North Carolina. Native populations of smallmouth bass have been affected by introduced spotted bass though-out the region.

We were successful in producing five separate spawns from the 16 broodstock we divided between two secured and water temperature controlled raceways this year. Each raceway held 5 females and 3 males. Egg clutches were observed in the raceways on April 22nd, 26th, May 27th, June 3rd and June 8th.



20' Raceway inside the Alligator gar pen was rehabilitated to hold smallmouth brooders.

Each pan with eggs was moved to a secured tank supplied with buffered spring water prior to the eggs hatching. Of the two types of artificial spawning substrate provided, all nests of eggs were collected from river rock placed into shallow pans. No spawns were collected off of spawning mats. Staff experimented with timing of fry transfer into culture tanks. Fungus control was facilitated by removing the pans with gravel and eggs into secure raceways within a day of observing the nest. Once fry were observed within the submerged pans they were gently siphoned out and into traditional culture tanks.



Smallmouth bass eggs laying in the gravel.

As the fry's yolk sacs were absorbed, we began offering feed. A transition of brine shrimp, Otohime feeds, freeze dried copepods and crumbled freeze dried krill were accepted by the growing smallmouth bass over the several months we held them prior to distribution.



Smallmouth bass awaiting their rations, they are fed four times a day.

Following the end of spawning activities broodfish were consolidated into a single secured raceway, maintained in cool water and fed goldfish.

Georgia DNR fisheries biologists picked up the first two spawns on June 29th. We are culturing an additional several thousand smallmouth from the later spawns. These will be released as they reach 1.25 inches in length later in 2017.



Smallmouth bass averaging 1.25” in length after inventorying ready for stocking.

According to GADNR biologists, Blue Ridge Lake is known as the last stronghold for smallmouth bass in Georgia.



Georgia DNR biologist Mark Bowen releasing smallmouth bass in Blue Ridge Reservoir. Photo Credit: Danny Johnson (GADNR).

Date	Location	Number	Length	Wt. (lbs.)
June 29 th , 2017	Blue Ridge Reservoir, GA (GADNR)	860	1.18''	1.29

Aquatic Habitats

Nothing to report.

Aquatic Invasive Species

Nothing to report

Recreational Fishing and Public Use

Nothing to report, see next section for distributions for fishing rodeos.

Educate and Engage Public & Partners

National Fishing Week-Warm Springs National Fish Hatchery 2017 Kid's Fishing Day

The ever increasingly popular annual Kids Fish for Fun Day at the Warm Springs National Fish Hatchery went off with a bang! Our event is held in conjunction with National Fishing Week. Our event this year was held on Saturday, June 10, 2017, with over 300 enthusiastic and smiling children attending, ages 3 to 12 years old, that set out to cast their fishing poles and catch some good ole catfish. Volunteers from our Friends Group, Benning Bass Club, parents and staff all worked together to ensure the kids had a good time.



Benning Bass Club member assisting children during the event. Credit: USFWS Image.

The children had the opportunity to fish in one of two of our catfish ponds filled with thousands of fish. We had 17 first time fishers this year. The event continues to increase in popularity as people from surrounding cities, and as far as Auburn, AL continue to attend.

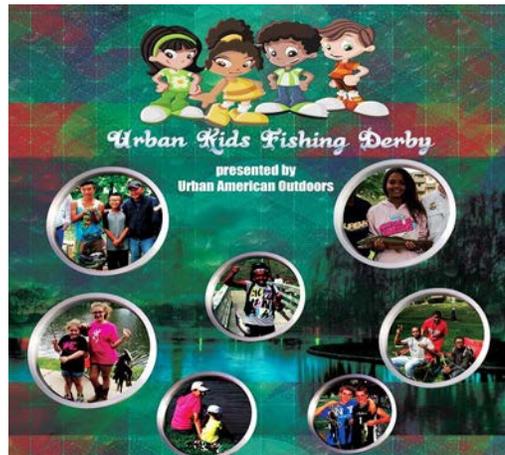
A total of 14 volunteers, Fish and Wildlife Service employees, and Friends of Warm Springs National Fish Hatchery Group participated in the event. This year's event had the Fort Benning Bass Club members teaching children how to bait and cast.



Big smiles all around on Kid's Fishing Day. Credit: USFWS Image.

This year Kevin R. Wiley, Georgia Power Area Manager and Meriwether County Chamber of Commerce Board of Directors member, generously donated over 800 water bottles for the event. The Friends Groups provided all of the snacks and goodie bags for the children.

We delivered 300 catfish averaging 16 inches in length in our second year of support for Atlanta's Urban American Outdoors fishing derby, held this year on April 3rd at Sweetwater Creek State Park. We wish to ensure the kids have success and to support fishing as an outdoor pastime.



We've upgraded our public use area, replacing some dying weeping willows with Cyprus trees, replacing faded American alligator and cavernous plant display boards with new ones.

We facilitated two onsite film visits with Jeremy Monroe, Freshwaters Illustrated. He obtained stock footage of catfish seining operations in April then returned to film many aspects of our lake sturgeon and other programs over several days around the first of June.



Carlos speaking with a visiting Auburn University fish culture science class June 20th.

We had the opportunity to provide in depth programs to several groups and visitors. Carlos gave a station tour and answered questions for a visiting Auburn University fisheries science class on June 20th. Haile provided a tour to Mr. Marcus Cloud, a Seminole Tribal ecologist interested in lake sturgeon culture techniques. He also forwarded information on Tribal Educator workshops to Michael LaVoie, fisheries biologist with the Cherokee Tribe in North Carolina. Online resource information on stream gauge sites, watersheds, and water quality testing equipment was forwarded to Manchester High School science teachers.

Alex submitted articles for FAC Highlights and Egrits, including updates on mussel, lake sturgeon and smallmouth bass programs. The information and images were forwarded for use by the Regional and Washington offices.

We had a chance to visit with John Schmerfeld, USFWS Deputy AD on May 22 during an afternoon visit while in the region for another meeting.

Alex updated our station's Hurricane Disaster Plan on May 7th. We're in the planning process of supporting a hatcheries CDSO workshop at Warm Springs sometime next year. We're working with Tyler Henderson towards that goal.

Volunteers:

Carlos coordinated with Gilbert Flores with the Benning Bass Club for environmental project ideas this fall at Warm Springs NFH. Upgrades and maintenance on our boardwalk are an option at this date.



Haile participated in a Region 4, Friends Group conference call April 18th.

Staff and perspective new members for Friends of Warm Springs NFH met in May to talk about the upcoming fishing rodeo and other friends group activities.

General Maintenance and Operations

Warm Springs NFH utilizes an upwelling water treatment system to moderate the pH, and increase the hardness and alkalinity of our otherwise soft water coming out of cold spring. Carlos is a listed coauthor on Barnaby Watten's paper: [Performance and Application of a Fluidized Bed Limestone Reactor Designed for Control of Alkalinity, Hardness and pH at the Warm Springs Regional Fisheries Center](https://dx.doi.org/10.1016/j.aquaeng.2017.03.003) and was published in Aquacultural Engineering. Several Warm Springs staff facilitated work on this article which is available online at:

<https://dx.doi.org/10.1016/j.aquaeng.2017.03.003>

A replacement control board for the transfer switch for the generator located at our lake sturgeon / mussel building complex was replaced. Without the transfer switch operating power had to be manually transferred. Staff met with Georgia Power representative Mark Horne on April 19th to evaluate solutions for supply line voltage issues.

Considerable effort is now being directed in moving forward the project to construct a replacement Holding House this year at Warm Springs NFH. Several onsite meetings including a Design Kickoff Meeting on May 16th, and several follow up site visits by contractors dealing with floor plans, electrical supply options, geotechnical surveys and hydraulic profile work have taken place. Carlos and Billy Edwards, Region 4 Civil Engineer, are coordinating these efforts with contractors.

Staff worked on a variety of administrative projects, training classes, evaluations, budgeting and purchasing activities during the quarter.



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