TENNESSEE CHAPTER OF THE AMERICAN FISHERIES SOCIETY

2023 Newsletter

2023

A MESSAGE FROM THE PRESIDENT

Fisheries folks,

It's that time of year again, where field seasons are coming to an end, and hopefully, we are all a little less busy. As we reflect on our accomplishments and take time to laugh with and enjoy our friends and families, let's relish this moment of pause before the new year, new goals and new survey season start.

To reflect, I enjoy looking through pictures, which capture moments and memories of those that I smile at, and sometimes horse laugh over, but have impacted me and TN AFS this year. A mentor and 40+ year veteran of the field recently revealed he wished he had taken more pictures of people and less of fish at work. It's the memories of the people you work with that make it all worthwhile. Especially dedicated people, like our TN AFS Ex-Com, who dedicate countless hours keeping everything on track each year for all of us. Thank you. I remember those that I work with daily, and those that have retired this year, whom I am honored to have worked with.

I also reflect on the relaxed style of last year's meeting at Henry Horton State Park, which started with neat workshops like the mussel ID and fish photography, followed by fantastic presentations by students and professionals about rare fishes and mussels like Laurel Dace and Snail Darter, to game fish like bass and Rainbow Trout, to invasive species like Invasive Carp and Alabama Bass. This information exchange gave way to fellowship between agencies and discussions about how to manage our resources for the future. We also kicked off planning for hosting the 2024 Southern Division AFS (SDAFS) meeting in Chattanooga. Many of you volunteered to help plan this meeting, which made it a little less burdensome on everyone. Thank you!

Over the next year, I look forward to continuing to work with you, learn from you, serve with you, and make memories with you. We have put together a great team to plan for SDAFS and I challenge you to continue to be involved in TN AFS. I hope you take the time to be with family and friends during this seasonal pause, reflect on this past year and hope you dare greatly as you think about what you want to accomplish this coming year.

All the best,
Sally Petre

SOUTHERN DIVISION AFS MEETING

FEB. 1-4, 2024

ICYMI! TNAFS is hosting the 2024 Southern Division of the American Fisheries Society Meeting in **Chattanooga, TN from Feb 1st - 4th**. The meeting will be held at the Chattanooga Convention Center and will include a day for technical committee meetings, a day of workshops and a day and a half of technical sessions. There will be a welcome social at the Naked River Brewing Company, a poster social at the Convention Center and a grand social at The Tennessee Aquarium.

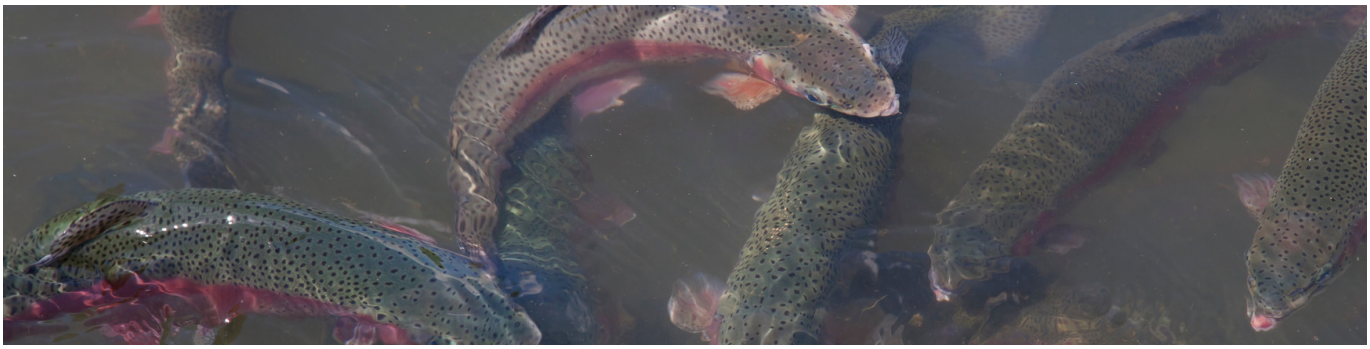
Information for late registration and to book your hotel can be found at the meeting website, https://units.fisheries.org/tn/sdafs2024chattanooga/.

TN AFS RETIREES GATERHING AT SOUTHERN DIVISION

FEB 3, 2024; 12-1:30

Have you been missing the old gang?! If you are (or wish you were) retired, please come to a luncheon for Tennessee Chapter retirees on **Saturday, February 3 (12:00-1:30) in Chattanooga** during the Southern Division AFS meeting. The Chapter is hosting the lunch to thank retirees for their many years of contributions to the Tennessee Chapter and to celebrate the anniversary of the very first Southern Division meeting held in Chattanooga in 1993. In addition, you are encouraged to stick around for the day to enjoy presentations and the evening social at the Tennessee Aquarium… or come for the entire conference. The meeting venue is the Chattanooga Convention Center. There is no cost to attend the luncheon. Single-day conference registration on Saturday (which includes the evening social at the Aquarium) is $185. That might seem a bit steep but consider it an opportunity to support the chapter.

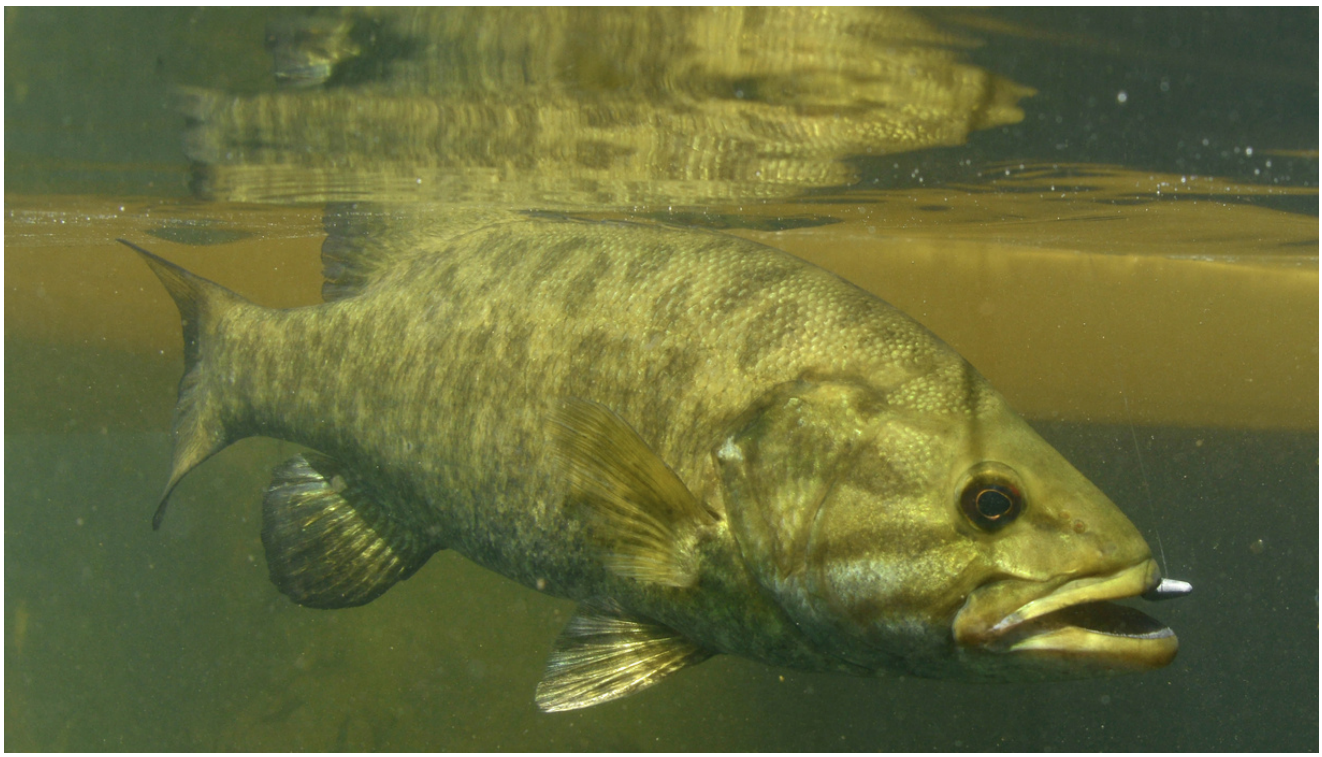
A head count for the luncheon is needed by January 22, so please respond to Mark Bevelhimer as soon as possible via email (mbevelhimer@gmail.com) or text (865-679-9242) if you will be attending or have questions. A handful of folks have already responded. If you miss signing up prior to January 22, contact Mark for the possibility of late registration. For more information on the conference and registration, go to https://units.fisheries.org/tn/sdafs2024chattanooga/. Special rates are available if cost is an issue; contact Shawna Fix, shawna@southeastaquatics.net.



A CALL FOR TN AFS NOMINATIONS:

PRESIDENT-ELECT
SECRETARY-TREASURER

Your chapter needs YOU. Please consider volunteering yourself or nominating another professional to be the next President-Elect or Secretary-Treasurer of the Tennessee Chapter of the American Fisheries Society. Send your nominations or questions to Sally.Petre@tn.gov .



TWRA REGION I

Tim Broadbent
Regional Fisheries Manager

TWRA Region I has continued maintenance of deep-water fish attractors and established additional shallow water fish attractor sites throughout the year. Although work continued with wooden structures, artificial structures were being tested in various designs. These artificial structures required less maintenance and allowed the habitat crew to expand outside traditional sites and reservoirs. The crew also participated in a project to improve Barkley reservoir habitat through a USACE grant. In addition to shallow water structures, the crew developed spawning beds which contained pea gravel in a shallow container and purchased moss backs to create a variety of habitat.

The Agency acquired Lake Halford, a 1,000 acre lake in Carroll County. TWRA Region I Fisheries is responsible for managing the fisheries, swim beaches, marina, and RV park associated with the lake. Nearly 3 acres of habitat structures were concentrated in five different locations that will provide much needed habitat. In addition to the habitat, Lake Halford has been stocked with over 50,000 Threadfin Shad and 72,000 Golden Shiners in 2023 to improve forage. These stockings were a proactive approach to improve predator food availability.

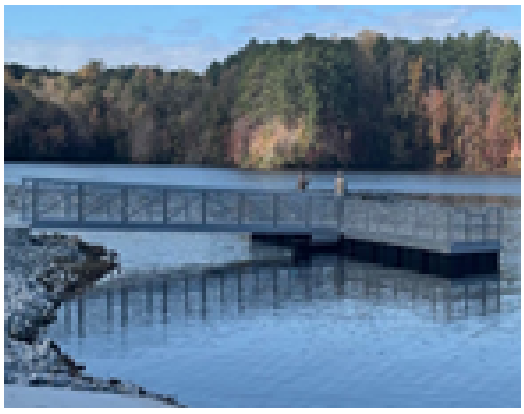
Improvements to the Bill Dance Signature lakes continued in 2023 and progress has been made installing fishing piers, courtesy docks, and boat ramp improvements. TWRA Region I has five small lakes (Herb Parsons, Travis McNatt, Browns Creek, Lake Halford, Pin Oak lake), two large reservoirs (Kentucky and Pickwick reservoirs), and Reelfoot Lake included in the program. Herb Parsons, Lake Halford, and Browns Creek are managed by TWRA and the other two by TDEC. The reservoir improvements have focused around access improvements while the state lake improvements included infrastructure improvements, forage stockings, fisheries evaluations, and angler regulation reviews.

Nearly 1.5 million FLMB fingerlings have been stocked from 2015 – 2023 in Harmon Creek, Blue Creek, and Eagle Creek. Future sampling efforts in these embayments will focus on growth rates within each stocked embayment and percent FLMB allele present compared to baseline data.

Efforts have been made during the last two years to determine the influence of Alabama Bass on the genetics and densities of native black bass in reservoirs throughout the State. Altho reservoirs on the plateau have experienced issues, the Alabama bass allele in west Tennessee reservoirs remains low in Spotted and Smallmouth bass populations.

Due to continued low Sauger population numbers and low catch by anglers, Walleye stocking was initiated in 2021 and will continue. TWRA Region III has had good success with stocking Walleye in Watts Bar Reservoir..

Silver Carp have been collected in all Mississippi River tributaries, all TWRA Region I reservoirs, and at Reelfoot Lake. Although both Kentucky and Barkley reservoirs continued to get bad press related to the fishery, data collected since 2018 has shown increased recruitment of both bass and crappie, increased densities of crappie and Largemouth Bass greater than 10- and 15-inches, respectively, and good densities of shad and other prey fish.

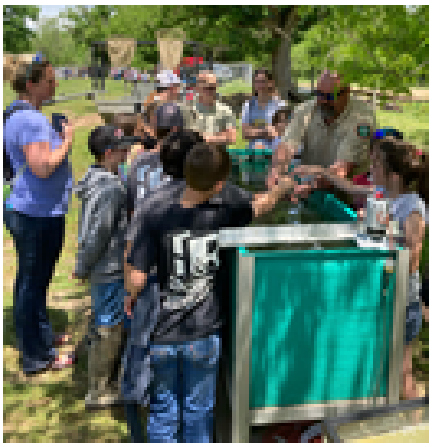


The TCHIP program has contributed to the price/pound of invasive carp harvested by commercial fishers and has continued to provide increased incentives for commercial fishers to harvest invasive carp. Federal grants have also been obtained to assist the wholesale fish markets with improvements including building walk-in freezers, storage buildings, improved road surfaces and loading docks for delivery trucks, and purchasing large ice machines, storage totes, forklifts, and pallet jacks. The total harvest of invasive carp from Kentucky and Barkley reservoirs in the states of TN and KY has exceeded 25 million pounds.

TWRA Region I obtained funding from the USFWS to hire two interns to conduct larval light trap surveys, larval egg tows, and mini-fyke net sampling on Kentucky and Barkley reservoirs in 2017 - 2023. Although spawning patches have been observed on silver carp and silver carp may have actually spawned in Kentucky and Barkley reservoirs, recruitment to larger sizes has not been documented in either reservoir nor have larval fish been collected to date.

The Region I TWRA invasive carp crew have conducted gill net surveys, electrofishing surveys, and dozer trawl collections to gather data related to recruitment, growth, and mortality of invasive carp in Kentucky, Barkley, Pickwick, Cheatham, Old Hickory reservoirs and Reelfoot Lake. In addition to the standardized sport fish sampling in TWRA Region I waters, the invasive carp crew has developed standardized sampling protocols to monitor carp densities over time. Since the management of Kentucky and Barkley reservoirs was shared by the states of Tennessee and Kentucky, similar standardized sampling protocols were developed by each state. Although Silver Carp from the 2015 year class have continued to dominate the population, collections have revealed continued migration of Silver Carp thru the locks. The locks at Kentucky and Barkley dams experience over 6,500 lock openings per year. During these lock cycles, carp swim upstream into Kentucky and Barkley reservoirs which has increased the percentage of younger carp collected during surveys. Invasive carp continued to be our biggest management issue. The invasive carp crew has also tagged Silver Carp above and below the spillway at Reelfoot Lake. Receivers have been placed in the Obion River, above and below the spillway, and in Reelfoot Lake to monitor Silver carp movement.

The invasive carp crew has also tagged Silver Carp above and below the spillway at Reelfoot Lake. Receivers have been placed in the Obion River, above and below the spillway, and in Reelfoot Lake to monitor Silver carp movement.



The Biological Acoustic Fish Fence (BAFF), which utilizes sound, light, and bubbles as a barrier, continues operation at Barkley Dam and Lock. Fish tagging and receiver deployment continued throughout both Kentucky and Barkley reservoirs (main lake and tailwater) to determine movements of invasive carp. Several state and federal agencies have been developing plans to establish additional BAFF systems throughout the Tennessee and Cumberland river systems.

The reservoir crew conducted spring and fall electrofishing surveys for sport fish and prey fish, fall trap netting, temperature-DO profile measurements, and creel surveys on Kentucky, Barkley, Pickwick reservoirs and Reelfoot Lake. The crew also continued collection of Spotted Bass and Smallmouth Bass to determine presence of Alabama Bass alleles in the population on Pickwick and Kentucky reservoirs.

The stream crews completed assigned surveys (sampled 20 streams and four small rivers) and have established the "leading edge" of Silver Carp distribution in the major rivers, creeks, and streams feeding Kentucky Reservoir. The stream survey crew has also collected Skipjack Herring the last three years to determine length at age and abundance estimates and partnered with NRCS to conduct surveys to evaluate the success of stream and riparian restoration efforts.

The Stream and Reservoir crews participated in several Outreach and Communication activities involving 4H camps and school programs. These R3 efforts have contributed to the education and understanding of the fisheries resources and will hopefully attract more individuals to the outdoors.

The state lakes and hatchery crews have worked to improve state lake facilities and evaluate fish populations thru spring and fall electrofishing surveys on 11 Agency lakes. The Humboldt Hatchery is the largest in Tennessee and has produced over one million Florida LMB fry each year in 2020 - 2023. Walleye, catfish, Blacknose Black Crappie, sunfish, and Florida LMB were the primary species raised at Humboldt and trout were also received and stocked from the hatchery. The state lakes crew also stocked over 12,500 catfish for the 29 fishing rodeos held during 2023.

The winter trout program has also been a success in Region I and the Agency stocked 14 small ponds in both December and January throughout Region I with over 12,000 Rainbow Trout. Stocking strategies and fishing pressure have been monitored utilizing trail cameras to evaluate usage.

TWRA REGION III:
STREAMS AND TELLICO HATCHERY CREWS

Will Collier

The last year has been a year of transition for the Region 3 Streams and Tellico Hatchery Crews. Our duties cover hundreds of miles of warmwater streams, three major tailwaters, dozens of state or municipal owned small impoundments, native and wild trout, and seasonally stocked trout fisheries. Travis Scott promoted to Regional Fisheries Program Manager, Will Collier promoted into Travis' former position as the Wildlife Manager 3 supervising the Tellico Hatchery and Streams Survey programs, Justin Spaulding promoted to Manager 2 overseeing tailwater trout and warmwater river fisheries management. We also hired recent TTU graduate Connor Ballard as our new Manager 1. Connor will coordinate the small impoundment and wild and seasonal trout fisheries in the region. At Tellico Hatchery, Fisheries Technician Rob Theurer retired, Casey Osborn was promoted to Technician 2, and Blake Miller joined the crew from Buffalo Springs Hatchery as the new Technician 1.

Justin Spaulding holding a PIT-tagged Collins River Muskellunge

With the help from Cleveland State Community College and the Region 3 Reservoir Crew, we have wrapped up (or about to conclude) year-long creel surveys on Hiwassee River, Tellico River, and Falls Creek Falls Lake. This adds up to 1230 interviews of over 2,200 anglers. Creel is an important part of our program because it allows us to study a major predator on the fishery (anglers) and receive valuable human dimensions input. A catastrophic flood in August on the Tellico River and US Forest Service's Bald River Bridge demolition and reconstruction project has greatly affected the daily commute to and from Tellico Hatchery and its operations, but despite the adversity, quality trout are still being raised and stocked throughout the state. A new Gas Infusion System was installed at the hatchery and has proven beneficial during this fall's drought, increasing dissolved oxygen in raceways while eliminating nitrogen-related mortality. Southern Appalachia Brook Trout (SABT) brood were collected from Sycamore Creek and have been successfully spawned at the Tellico facility. Fingerlings will be stocked next year in nearby streams to continue SABT recovery efforts.

Region 3 Streams and Tellico Hatchery Staff collecting Southern Appalachia Brook Trout brood from Sycamore Creek

Staff spent a significant amount of time providing comments to the US Army Corps of Engineers Revision to the 1998 Water Control Manual of Center Hill Dam. This revision is a once in a generation opportunity to improve minimum flows and water quality in the Caney Fork Tailwater. Also of note, Will Collier travelled to Grand Rapids, Michigan to present on Collins River Muskellunge age and growth at the American Fisheries Society national meeting. Several outreach events were hosted for school, civic, and angler groups including Tellico Trout Festival and the Wildlife Society's Southeastern Student Conclave. Students from TTU and UTK also assisted us with SABT recovery stockings, 3-pass depletion samples, and construction of fish habitat. Our program is dependent on the generous help from students, volunteers, and other professionals across the state. Thank you all very much for your help if you came to one of our projects and we look forward to seeing you again in 2024!

Connor Ballard showing off a nice Redear Sunfish during a small impoundment electrofishing survey.

Casey Osborn unloading Rainbow Trout at North Chickamauga Creek

TWRA REGION IV:

Region IV Personnel

Regional Fisheries Program Manager Bart Carter and Regional Fisheries Technician and Crayfish Expert Carl Williams were retired this year. Bart and Carl have more than 70 combined years of service to the state's fish and wildlife resources, and both were awarded TWRA's Lifetime Achievement Awards this year. Bart and Carl started working together in 1994, when Bart was hired as the Region 4 Warmwater Stream Biologist in the work unit where Carl had been working regional technician since 1988. Both scientists made monumental impacts on TWRA, their colleagues, and the states resources.

During Bart's 33-year career, Bart went above and beyond in every aspect of his role as a fisheries biologist and regional program manager. Some of his work included improving hatcheries, enhancing fish habitat, restoring streams to native fish fauna, helping discover new species, adding public access areas, and mentoring countless employees in their careers. Bart improved access on our region's rivers and streams, designed and built backpack electrofishers, and mentored many biologists over the years.

Carl (left) Bart (right)

Region 4 Reservoirs Fisheries Biologist John Hammonds says, "Bart is known for his ability to develop partnerships within and outside TWRA that will continue long after his retirement. He worked diligently to manage high-quality

fisheries and made contributions to aquatic conservation that will have a lasting impact."

Carl Williams began working with TWRA in August 1979 working with wildlife, however, moved around to creel surveys, hatcheries before landing in the Streams and Rivers unit in 1988. He remained there for the next 35 years conducting surveys of anything aquatic (fish, crayfish, macroinvertebrates, etc.)

Williams is considered a crayfish expert by his peers and colleagues and was routinely conferred with by colleges and universities, as well as National Geographic and the Smithsonian Natural History Museum. He is also renowned for his ability to photograph crayfish with intricate detail and realism and has been painstakingly photographing crayfish for a book he is coauthoring, The Crayfish of Tennessee. Williams's work has directly led to the conservation of multiple endemic Tennessee crayfish species, a tremendous accolade for any biologist.

Region 4 Fisheries Program Manager Jim Habera had the privilege of working with Williams over the past 33 years on a variety of fisheries monitoring and management projects in East Tennessee. Jim Habera noted, "along with his considerable knowledge, Carl's dedication, dependability, and quick wit made him a pleasure to work with and an integral part of Region 4's fisheries program during his long career."

SOUTHEAST AQUATIC RESOURCES PARTNERSHIP (SARP)

Shawna Fix

SARP hosted two road-stream trainings in West TN and Middle TN this year. Between the two trainings, we were able to train 34 people on the SARP road-stream crossing protocol for fish passage. This protocol is a rapid assessment for fish passage and provides a score for how much of a barrier to fish passage a road-stream crossing is. Scores range from no barrier to severe barrier. You can see the raw data of surveys utilizing this protocol throughout the country here:
https://fws.maps.arcgis.com/apps/instant/attachmentviewer/index.html?appid=0e60c1c7da4d469d9cb7fd07aa6dd6af.
These scores are uploaded into the National Aquatic Barrier Inventory & Prioritization Tool, https://aquaticbarriers.org/, where partners across the country can download barrier inventory, search for information on barriers and prioritization barriers for replacement utilizing a range of filters. If you are interested in being a part of fish passage work in Tennessee, please reach out to Shawna Fix, Shawna@southeastaquatics.net, to join the Tennessee Aquatic Connectivity Team (TACT).

TENNESSEE VALLEY AUTHORITY (TVA)

Jon Michael Mollish, Justin Wolbert, Aaron Coons, & Kevin Parr; Fisheries Biologists

TVA biologists had another busy year, Below are some of the highlights from 2023.

Monitoring

For streams and rivers, 131 monitoring sites throughout the seven-state region of the Tennessee River watershed were completed as part of TVA's Index of Biotic Integrity (IBI) program in 2023! This effort collected a total of 96,210 individuals representing 184 species, of which 68,586 individuals representing 161 species occurred in Tennessee from 84 monitoring sites.

For reservoirs, 38 fish community monitoring sites on 14 reservoirs were completed in the Fall as part of the TVA Vital Signs Monitoring program. This program, started in 1990, developed the Reservoir Fish Assemblage Index (RFAI) to describe the health of resident fish communities in TVA reservoirs. The fish community is one of five components of TVA's Ecological Health Determinations program used to assess the overall ecological health of TVA reservoirs.

Spring Sportfish surveys are conducted on nine, main-stem reservoirs of the Tennessee River to primarily assess black bass and crappie populations. The 2023 surveys resulted in over 7,500 bass and over 1,700 crappie individuals collected of which Guntersville Reservoir recorded the most Largemouth Bass (1,146), Wheeler Reservoir recorded the most Smallmouth Bass (119), and Chickamauga recorded the most Spotted Bass (182). Catch per unit effort (fish/hr) was highest on Chickamauga (71), Guntersville (68.1), and Nickajack (65) reservoirs

The primary focus of the spring surveys is to assess the quality of the black bass (largemouth, smallmouth, and spotted bass) and crappie (black and white) fisheries, the dominant sport fish species in Tennessee Valley reservoirs.

Significant finds and highlights from our monitoring programs in 2023 included,

First known records:

- Ashy Darter, *Allohistium sp. cf. cinereum*, Forty-eight Creek, Buffalo River system, Wayne County, TN
- Northern Studfish, *Fundulus catenatus*, Piney River, Direct tributary to Watts Bar Reservoir, Rhea County, TN
- Taillight Shiner, *Notropis maculatus*, Tennessee River system, West Forks Clark River, Graves County, KY

Records of significance:

- Bluntnose Darter, *Etheostoma chlorosoma*, Duck River, Maury, TN
- Highfin Carpsucker, *Carpiodes velifer,* young of year, Duck River, Maury, TN
- Slabrock Darter, Kentucky Reservoir above Kentucky Dam, Marshall County, KY
- Slenderhead Darter, *Percina phoxocephala*, 15 individuals total with ~8 young of year observed, Duck River, Maury, TN
- Slenderhead Darter, *Percina phoxocephala*, and Harlequin Darter, Etheostoma histrio, Kentucky Reservoir, Humphreys County, TN
- Streamline chub, *Erimystax dissimillis*, Kentucky Reservoir below Pickwickwick Dam, Hardin, TN

Invasive Species (Reservoirs):

- Kentucky Reservoir, RFAI Fall 2023 surveys: Less than 5 individuals total of Silver Carp were observed (TN River Mile 23 & 85). Less than 5 individuals total of Grass Carp and no Bighead or Black Carp were observed.
- Redbreast sunfish continue to thrive in our mainstem reservoirs and distribution continues to spread.
- Mississippi silverside abundance and distribution continues to increase

Pigeon River/Little River annual monitoring involving Tennessee Wildlife Resources Department, Tennessee Department of Environment and Conservation, University of Tennessee, and TVA marked its 35th year of cooperation!

TVA continues to support Lake Sturgeon (Acipenser fulvescens) monitoring through partnering and participating in planning and multiple monitoring efforts annually with the Southeastern Lake Sturgeon Working Group. These efforts focus on capturing and PIT (Passive Integrated Transponder) tagging fish in the Cumberland and Tennessee River systems.

TVA has been a partner and contributor to the Sicklefin Redhorse (Moxostoma sp.), Candidate Conservation Agreement by recording catch data and PIT tagging fish for population estimates. This is another example of a long-term collaborative effort with State and Federal agencies with a goal of restoring this species back to a healthy vibrant population.

Outreach & Education

Our fisheries team led or partnered at over 30 different educational outreach events in 2023. These outreaches ranged from outdoor classrooms to public display tanks to discuss biodiversity, conservation, and TVA programs with students, stakeholders, and members of the public.

In May, TVA biologists partnered with National Geographic, TWRA, TDEC, Alabama Department of Wildlife and Freshwater Fisheries, and Alabama department of Environment and Conservation to lead their third National Geographic Photo Ark Expedition in Shoal Creek near Florence, Alabama.

The Photo Ark, headed by National Geographic's Joel Sartore, uses the impact of photography to inspire and educate stakeholders and the public to protect biodiversity and charge conservation efforts by documenting animals found throughout the Southeast and across the world. Nearly 100 species including fish, freshwater mussels, aquatic insects, crayfish, and snails from 28 different stream sites were added to the Photo Ark.

The Photo Ark, headed by National Geographic's Joel Sartore, uses the impact of photography to inspire and educate stakeholders and the public to protect biodiversity and charge conservation efforts by documenting animals found throughout the Southeast and across the world. Nearly 100 species including fish, freshwater mussels, aquatic insects, crayfish, and snails from 28 different stream sites were added to the Photo Ark.

TVA supported and co-authored 5 publications in 2023. These publications included work with the Greenfin Darter which was featured in Science, as well as work with Bowfin, Stripetail Darter, Spottail Darter, and the Bigclaw Crayfish.

TVA and Friends of Seven Islands State Birding Park also hosted the largest Sturgeonfest on record which was attended by over 1000 people. It was held on the banks of the French Broad River at Seven Islands Park where participants had the opportunity to release juvenile Lake Sturgeon provided by the US Fish & Wildlife Service's Warm Springs, GA hatchery.

GEOLOGICAL SURVEY OF ALABAMA

Stuart McGregor

An updated checklist of the marine and freshwater fishes of Alabama was published in the online publication Zootaxa in October. The list includes historic and recent records of fishes with more than a single occurrence in Alabama's inland freshwater as well as coastal brackish and marine environments and may be a good resource for researchers in Tennessee. It also includes a discussion of current taxonomic issues. Here is the full citation: Bagley, J.C., Johnson, C.C., McGregor, S.W., Breitman, M.F., Armbruster, J.W., Harris, P.M., & O'Neil, P.E. (2023). Marine and freshwater fishes of Alabama: a revised checklist and discussion of taxonomic issues. Zootaxa, 5357(3), 301–341. Any of the authors can provide a pdf of the article if you don't have a Zootaxa membership.

Rebecca Bearden introduces a crayfish to the Alabama Stormwater Association and Clear Water Alabama Symposium.

The Tennessee River Basin Network (TRBN) met at the Marriott Shoals Hotel and Conference Center in Florence, Alabama, on the banks of the Tennessee River adjacent to Wilsom Dam at the famous Muscle Shoals this past August. A broad spectrum of participants joined from several states and were treated to excellent talks, participation activities, door prizes, silent auction items, as well as tasty food and drinks. Following the meeting Daniel West of GSA led a canoe trip down a lovely stretch of Cypress Creek, which maintains very clear water due to the still abundant riparian borders upstream and relatively cool temperature year-round due to

Significant groundwater influence. Cal Johnson of the Alabama Department of Environmental Management (ADEM) in Decatur relinquishes his position as President of TRBN in December, and we thank him for his excellent leadership and his dedication to his profession and his cooperative spirit. Daniel West will assume that role thereafter. Rebecca Bearden of GSA later spoke about the biological aspect of clean/clear water at the annual Alabama Stormwater Association Symposium and Clear Water Alabama Seminar, also held at the Marriott Shoals in Florence.

Last April Nate Sturm and Chris Haynes of GSA assisted ADEM, The Nature Conservancy (TNC), and U.S. Fish and Wildlife Service (USFWS) staff perform a fish IBI in the vicinity of a potential streambank restoration project on Shoal Creek along the AL/TN state line that turned up 37 species, including a Boulder Darter, Etheostoma wapiti, and a Highland Stonecat, Noturus sp. cf. flavus. Cal Johnson recently met with USFWS and the landowner to further the discussion on that possible project. Nate and Tyler Poe, also of GSA, assisted the Alabama Department of Conservation and Natural Resources and other groups with long-term mussel population monitoring in the Paint Rock River near the AL/TN state line this summer. Daniel is performing habitat quality assessments pre- and post-streambank restoration in the Paint Rock River system with The Nature Conservancy (TNC) that will hopefully document improvements in the habitat for fishes and mussels found there after the restoration is completed.

GSA along with ADEM, USFWS, and possibly other entities will continue assessing stream/road crossings to document and evaluate passage barriers in stream systems along the AL/TN state line, specifically Cypress and Shoal creeks, for the betterment of the migratory Slackwater Darter.

GSA staff also assisted TVA with Tuscumbia Darter population assessments in the Wheeler Branch system in Lawrence County, AL, and assisted U.S. Army staff at Redstone Arsenal with an assessment of a population of Tuscumbia Darters on that post in Madison County. GSA staff are preparing a bulletin summarizing the status of the Tuscumbia Darter based on historic and recent research.

USFWS, GSA, and TNC staff prepare to execute a fish IBI in Shoal Creek at the AL/TN state line.

GSA along with Carla Atkinson and Kendra Abbott of the University of Alabama Biology Department produced a poster of Alabama Mussels this year. That poster has photos of mussels endemic to different drainages superimposed over a map of the state with those drainages outlined, as well as photos of some that are widespread in the state and includes details of the fauna in the different river systems found in the state. That diversity, of course, is led by the Tennessee River. The poster is available free from the Geological Survey of Alabama Publications office, but with a modest shipping charge: publications@gsa.state.al.us, or (205) 247-3636.

A crayfish species that to date is found only in the Shoal Creek system near the AL/TN state line, the enormous Tennessee Bottlebrush Crayfish, Barbicambarus simmonsi, has been petitioned for listing by the USFWS. It's chosen habitat includes niches under very large slab rocks and boulders, much like the Highland Stonecat, and it is paramount that streambanks and instream habitats be protected to prevent release of sediments that would inundate that habitat. Additional surveys for that species in streams in the region that have similar habitat should be initiated.

A view of Cypress Creek during the post-TRBN float trip.

TENNESSEE AQUARIUM CONSERVATION INSTITUTE

Adam Kennon

Reintroduction Programs

Brook Trout spawning was successful this year. We raised roughly 1300 fry. In May, TNACI biologists hiked into Cherokee National Forest to release 1,300 fry into North Fork Citico, Ike Camp Branch, and Sugar Cove Creek, with help from TWRA and Trout Unlimited. This is our third year stocking these streams and will wrap up our time releasing brookies into this southern region for now, because releases from the Aquarium and TWRA have brought back 3.2 additional miles of Brook Trout in an area that previously only had 10 miles of occupied streams! The adult Brook Trout used for spawning have been sent to the Aquarium to go on exhibit.

Brook Trout fry training for the swim team.

In July, we collected new broodstock from Region 4 for the fall spawning period 2023. TNACI staff traveled to Phillip's Hollow to help with brook trout collection. TNACI staff, along with TWRA staff and volunteers, used electrofishing techniques to survey the population in Phillip's Hollow. This is the only population of Brook Trout in Tennessee in the Nolichucky River drainage, and offspring will be used to create other population in this drainage. Thirty five Brook trout were caught, and 10 were brought to TNACI to be used as broodstock for the 2023 spawning season. After arriving at TNACI, the brook trout received quarantine treatments. In September, propagation staff along with veterinary staff PIT tagged these brook trout to better track individuals during spawning and promote genetic diversity. Spawning took place this fall and we are hoping for good results.

Partners collecting brood stock in the Cherokee NF

A crayfish species that to date is found only in the Shoal Creek system near the AL/TN state line, the enormous Tennessee Bottlebrush Crayfish, Barbicambarus simmonsi, has been petitioned for listing by the USFWS. It's chosen habitat includes niches under very large slab rocks and boulders, much like the Highland Stonecat, and it is paramount that streambanks and instream habitats be protected to prevent release of sediments that would inundate that habitat. Additional surveys for that species in streams in the region that have similar habitat should be initiated.

Tangerine Darters spawned from April to June, producing about 350 juvenile Tangerine Darters that were sent to Cumberland River Aquatic Center to contribute to propagation of endangered mussels. It has been a successful spawning season and we've learned a lot about darter spawning in human care.

Tangerine Darters need no caption

This past winter, TNACI took the opportunity to modify the Lake Sturgeon systems to improve water quality for our fish. Two round tanks have been added to replace two raceway tanks, in hopes the round tanks will provide more space and water depth for larger juveniles that we hold over for a spring release. Four additional fluidized beds have been added along with new bead filters as well.

With all the improvements made to the lake sturgeon system over the winter the water quality parameters have improved greatly from last season and that has reduced the water usage for the system. Each year the lake sturgeon working group removes a different pattern of scutes. Scute removal indicates the year that sturgeon hatched and that they were raised in a hatchery setting rather than hatched in the wild. In August, 20 lake sturgeon were sent to Warm Springs Fish Health Lab for disease screening and the results showed that the fish we will release this fall are healthy. In October of 2023 800 Lake Sturgeon were released into Nickajack Reservoir.

Biodiversity Research

TNACI teamed up with the Auburn University Cooperative Fish Disease Lab to start the second year of sampling Laurel and Western Blacknose Dace for parasites and disease in four streams on Walden Ridge. In March, we were joined by Baylor Science teacher Ben Holt and four of his students who filtered creek water to detect the presence of Laurel Dace with environmental DNA.

This spring, TNACI collaborated with Britney Firth, a PhD student from the University of Waterloo in Ontario, to expand her research on thermal tolerances of the Eastern Sand Darter in Canada. During her time here, Britney worked closely with TNACI to collect and run thermal trials on five species of Sand Darters to determine what was the maximum temperature at which these individuals could maintain buoyancy control. They collected thermal tolerance data on the Eastern Sand Darter at the southern portion of its range in Kentucky, the Naked, Southern, and

Florida Sand Darters in Alabama, and the Scaley Sand Darter in Mississippi, to see if populations in the southern extreme of their ranges had higher thermal tolerances than those in the northern parts of the range.

Left to right: Abbey Holsopple, Fellow Isabelle Duncan, Fellow Alonso Angel, Fellow Garrett Guillard, and Adam Kennon

We also started a fish movement study on Duskin Creek where TNACI will be replacing a stream crossing that has a failing culvert, creating a fish passage barrier and adding sediment to the stream. The goal of the study is to document movement of fishes before and after replacement of the culvert to determine if the culvert replacement helped fish passage. For three months, the team marked 50 fish from three separate study sites using Visible Implant Elastomer tags and sampled for recaptures. The study will continue for several months after replacement to document any changes in fish movement and will hopefully highlight the importance of designing road-stream crossings that are safe for aquatic life. It also builds on TNACI's efforts to raise awareness about the native fish and conservation on the Cumberland plateau. We are continuing our monthly Mark-Recapture sampling on Duskin Creek to quantify movement of fishes through a failing vented ford. It has been fun to watch the seasonal changes of the stream since we began the project in April.

New (And Returning) Faces

Abbey Holsopple rejoined TNACI as our new Reintroduction Biologist in January! Abbey was a George Benz Fellow during summer 2017 and has continued to grow her passion for conserving

imperiled fishes ever since. She graduated with a M.S. degree in Biology from Tennessee Technological University and was excited for the opportunity to work with everyone at the Tennessee Aquarium again.

As Abbey knows, it's impossible not to fall in love with a Smallmouth Buffalo.

Helaina Gomez started as the Watershed Coordinator a few weeks after Abbey. Helaina received her Bachelor of Science in Ecology and Field Biology with a minor in General Biology at Shorter University in Rome, Georgia. After graduation Helaina dedicated her time to field work with Southeast Conservation Corps, working alongside the Forest Service in many National Forests of the Southeast, and was a Guest Engagement Educator prior to joining TNACI.

Helaina Gomez - TNACI Watershed Coordinator

CONSERVATION FISHERIES, INC.

Shannon Murphy

In 2023, Conservation Fisheries, Inc. worked with 15 species representing 19 wild populations. We've released a total of 16,025 fish into the wild for restoration projects. Species that we have released this year include Boulder Darters (453), Buck Darters, (433), Carolina Madtoms (453), Duskytail Darters (386), Roanoke Logperch (190), Spotfin Chub (12,800), Tennessee Dace (998), and Yellowfin Madtoms (302). Some young of year fish that were not released were either transferred to other facilities (or will be) or are kept back to be used as potential breeders for the upcoming breeding season. We are proud to have many ongoing projects, many of which we have been working on for over 10 years, but are glad to have the opportunity to take on new restoration projects as well! Next year we look forward to welcoming 5 new species/populations into the hatchery: Marbled Darters and another population of Yellowfin Madtoms to be introduced into the French Broad River, Pearl Darters for restoration into the Pascagoula River, Blackside Dace for Cumberland Gap National Park restoration and another population of Tennessee Dace for a Little Citico Creek restoration project.

Male Boulder Darter, *Nothonotus wapiti*

While our main focus is always on the propagation and restoration of non-game, native freshwater fishes, CFI has taken great strides this year to have a more robust outreach program. Within our facility we have ramped up our Volunteer Program, allowing the chance for us to work with 15 volunteers this year totalling nearly 2,000 volunteer hours. Our next volunteer season is from February-April 2024, and applications will be available on our website starting the first week of January 2024. CFI has also created several outreach opportunities outside of the hatchery! This summer we hosted a panel discussion with a local native landscaping and design company about impacts on urban streams. The first weekend of December we hosted an art gallery to showcase underwater photography and other freshwater ecologies as a way to both support our biologists and colleagues who are photographers and to allow our community members an opportunity to experience the beautiful fish that we are so fortunate to work with every day.

Snorkeling in Shoal Creek

WEST TENNESSEE RIVER BASIN AUTHORITY

Kayla Key

The West Tennessee River Basin Authority (WTRBA) was created and established in 1996 within the department of environment and conservation to preserve the natural flow and function of West Tennessee's streams and rivers through environmentally sensitive stream maintenance. The WTRBA has completed many of the largest stream and wetland restoration projects in the State of Tennessee. To date, WTRBA has successfully restored over 200,000 linear feet of stream and thousands of acres of floodplain and wetland habitat.

WTRBA Efforts:

West Tennessee Native Species Initiative; a deliberate effort to facilitate the success of restoration projects in west TN through an investment into understanding and restoring native species populations. Investments through the Initiative will be used to strategically design research projects that learn from current species habitat requirements and to better understand the responses of west Tennessee's native species to restoration activities. Join us on facebook at "West TN Native Species Group" and stay updated on the initiative!

- Total investment to date = $1.4M
- List of projects and partners:
    - Increasing stream crossing inventory in west TN (SARP)
    - Mussel restoration in west TN (TWRA/C-RAC)
        - Surveying in Forked Deer River system and future planning for survivability studies in Middle Fork Bottoms State Park wetland ponds
        - Survey and habitat assessment in the Hatchie River (TTU)
        - Expansion of State of TN's freshwater mussel database into west TN drainages (TTU)

- Comparing eDNA metabarcoding with conventional electrofishing sampling to monitor fishes in headwaters of Western Tennessee (TTU)
- Biomonitoring responses for Deloach Creek restoration (UTM)
- Fish Passage, Assemblage Composition and Microhabitat use in Response to Ecological Restoration of Cub Creek (UTK)
- Using conservation genomics to determine the effectiveness of fish passages for restoring riverine connectivity (Miami University)
- Monitoring pre-restoration flora, microbial, and macroinvertebrate communities at Big Muddy restoration site (U of M)

West TN Floodplain Task Force; a collaborative initiative comprising various agencies, organizations, and stakeholders, united by the common goal of conserving and managing floodplains in West Tennessee. Recognizing the significance of clean water, adequate water quantity, and the preservation of natural habitats for both ecological sustainability and human well-being, a multi-agency memorandum of understanding (MOU) is being drafted that will serve to formalize the shared understanding of the objectives and activities undertaken in pursuit of this collective endeavor.

- In an effort to facilitate restoration success in west TN streams, WTRBA has proposed the development of a decision support tool that will help guide and prioritize on the ground efforts. This tool will also provide a centralized blueprint for all partners working on floodplain restoration activities and will promote across agencies to maximize resources and results.

Current & On-going Restoration Projects

- Middle Fork Bottoms in Three Way, TN
  - Previously, this area consisted of 4,700 feet of perennial streams and 2,450 feet of existing intermittent streams that were channelized, leveed, over-widened, and incised with no floodplain connectivity. WTRBA restored 15,100 linear feet of meandering stream and ~870 acres of floodplain habitat. The main goals of this project were floodplain reconnection, sediment capture/reduction, to improve water quality, and to improve wildlife habitat by implementing dimensions and features of a naturally functioning, stable, and healthy stream system. This area is now one of the newest state parks in TN, now called Middle Fork Bottom State Park.
  - WTRBA interns constructed and deployed 4 bat boxes on the property in summer 2023.
  - WTRBA staff conducted mussel surveys in the wetland pond to identify potential mussel species for caged experiments. Four mussel cages were deployed for testing site and material suitability for future introductions
  - Ongoing site monitoring with 3 stream gage stations on the property
  - Ongoing habitat management on prairies and oak savannah habitats
  - New Park manager has been hired and construction of restrooms and other visitor signage is underway.
- Cub Creek
  - The West Tennessee River Basin Authority partnered with UT Institute of Agriculture and Tennessee Wildlife Federation (TWF) to restore a large, channelized section of Cub Creek, a tributary to the Hatchie Scenic River in Hardeman County, TN. Approximately 14,500 ft of Cub Creek canal was relocated and restored to a more natural meandering stream totaling 20,500 ft, adding approximately 6,000 ft of stream length to Cub Creek. Along with adding habitat on the landscape, longitudinal connectivity of the stream was restored with the installation of 2 grade control structures that allow for organism passage. Nature-based erosion control structures were also installed to provide protection and act as initial aquatic habitat features during the initial restoration phase. WTRBA has partnered with multiple university partners to study the impacts and improvements to habitat and aquatic organism communities.

TENNESSEE TECH STUDENT FISHERIES ASSOCIATION

Eduardo Toala-Hidalgo

2023 has been proven to be a successful and exciting year for the Student Fisheries Association at Tennessee Technological University. We have been able to provide our membership with valuable volunteer opportunities, professional development opportunities, and socialization with like minded individuals. Thanks to our members and collaborators, we have held various events on campus and in the surrounding communities. Additionally, with the help of campus wide events and our previous officers, we have gradually increased membership and student involvement within the association.

In January, we kicked off the year by participating in the university's ORG-Stravaganza. Here, some of our members spoke with various interested students and showcased our association and its presence on campus. We also held our first joint meeting of the year with The Wildlife Society and discussed our association among an auditorium of wildlife and fisheries students. Additionally, some of our members attended the 2023 Cooperative Fishery Research Unit Meeting and displayed their research.

In February, The Student Fisheries Association and The Wildlife Society held a joint graduate panel. Several graduate members from both associations graciously shared advice on getting into graduate school, finding graduate programs, and answered other related questions with our undergraduate members. Later in the month, SFA also assisted The Wildlife Society with their annual Beast Feast Fundraiser.

SFA Vice President, Joelle Ciriacy, at the 2023 Nature Rally

March was a busy month for SFA and its members. Several of our members attended the Tennessee American

Fisheries Society Chapter Meeting held in Chapel Hill, TN. This included two sponsored undergraduates who attended the meeting for the first time. Many of our graduate members were able to present their research. Our Vice President, Joelle Ciriacy, won an award for "Best Student Presentation" with her presentation titled When Push Comes to Shove and you Pick a Fight with a River Chub. Later in the month, SFA held elections for the 2023-2024 officers and elected Eduardo Toala-Hidalgo (President), Alex Marquez (Vice-President), Andrew Gable (Treasurer), and Ian Williams (Undergraduate Representative).

During the rest of the Spring semester, we held several monthly meetings including a meeting with Jeff Simmons with the Tennessee Valley Authority. He kindly provided our membership with important advice and insight into working for state agencies. SFA also assisted Fred Heitman with American Aquatics in the construction and dispersal of artificial habitat at several lakes in Crossville, TN. Lastly, four of our members attended the 2023 Nature Rally in Standing Stone State Park. Here, members were able to hold educational demonstrations related to aquatic invertebrates with the hope of instilling a lifelong appreciation of all stream inhabitants in the youth present.

Several SFA members at our Kid's Fishing Derby at Cane Creek Park in Cookeville, TN

During the summer, a great number of our undergraduate and graduate members remained busy with fisheries related research and work opportunities that would provide applicable field and lab experience. SFA members also assisted TWRA with restocking Southern Appalachian Brook Trout in the Cherokee National Forest. Members backpacked Southern Appalachian Brook Trout reared by the Tennessee Aquarium Conservation Institute into the Citico Creek wilderness to increase native populations. Excitingly, SFA also held the first Kids Fishing Derby at Cane Creek Park in Cookeville, TN since Covid-19 began. We, alongside TWRA and Cookeville Leisure Services, experienced a prosperous event with an encouraging number of participants bearing countless happy faces.

We began the Fall semester in August, by participating in the University's Mix and Mingle campus wide event and displaying our association to incoming freshmen. We also held our second Joint Meeting with The Wildlife Society and welcomed students interested in Wildlife, Fisheries, Ecology, and more. In September, we held a social event for our members at The Boils WMA and learned how to identify common nongame species of fish and aquatic invertebrates. Additionally, some of our members assisted Justin Spaulding with TWRA with three pass electroshocking surveys at the Bald River and Sycamore Creek.

With the field season coming to an end and classes ramping up, our involvement slowed down a bit. However, members continued to volunteer their time with varying entities. Some examples include helping the U.S Corp of Engineers plant native tree species at Cordell Hull Reservoir, saving important native plant species on the Universities Native Plant Garden, and assisting in cleanups at Cane Creek Park in Cookeville, TN.

SFA members assisting with Southern Appalachian Brook Trout restoration in Citico Creek

In October we were able to hold a successful SFA Fish Fry, our main fundraiser for the year. Here we served Fried Silver Carp, provided by TWRA, to our campus and locals within the community. Not only did this provide us with funds to use for next year's Kids Fishing Derby, it also served to educate the public on destructive invasive species, and break the stigma surrounding the palatability of these fish. In November, several of our graduate members also presented at the Southeastern Fisheries Council in Chattanooga, TN.

As the year ends we are beginning efforts to plan for the Kids Fishing Derby, SFA Fish Fry, and attendance at the Southeastern Division American Fisheries Society Meeting in 2024. Additionally, we are excited to begin preparations for three new outreach programs with local middle school and highschool students as well as a local STEM Center with the aim of inspiring a future generation of fisheries professionals. SFA looks forward to remaining an active subunit of the Tennessee Chapter of the American Fisheries Society.

SFA members at the SFA Fish Fry