



## Southeastern Fishes Council Proceedings

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### 2018 State Reports

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## 2018 State Reports

### Keywords

State Reports

**2018 Southeastern Fishes Council State Reports**

(including: Alabama, Arkansas, Georgia, Kentucky, Louisiana, Mississippi, Missouri, North Carolina, South Carolina, Tennessee, Texas, Virginia, and West Virginia)

**Alabama:** Jeff Ray (jrray1@una.edu)

Alabama Department of Environmental Management – Submitted by Cal C. Johnson

- ADEM continues to monitor fish assemblages in rivers and streams all throughout AL by using the state-adopted method termed “30+2”. This science helps support departmental decision making for water use classification in waters of the state and to ensure water quality standards are being upheld as part of its strategic sampling plan.
- Initiated a joint research project to formulate a method in developing a protocol for sampling non-wadeable rivers to aid in assessing biological condition.
- Continue to work with stakeholders in Strategic Habitat Units and Strategic River Reach Units (SHU’s & SRRU’s) to aid in species and watershed protection.

Auburn University Museum of Natural History – Submitted by Jonathan Armbruster

- The Auburn University Museum of Natural History Fish Collection received a ~\$195k grant from the National Science Foundation to install compactorized shelving in the alcohol collections, increasing the size of the fish collection substantially.
- Milton Tan and Jonathan Armbruster published a revision of the higher-level taxonomy of the Cypriniformes.
- Carla Stout and Jonathan Armbruster along with Richard Mayden (SLU), have been working on a phylogenomic analysis of the shiners (Leuciscidae).
- Jonathan Armbruster and Carla Stout, in collaboration with Zachary Sperstad (lead author), Peter Berendzen, Andrew Simons, and Alan and Emily Lemmon have been working on an anchored phylogenomic analysis of the suckers (Catostomidae).
- Jonathan Armbruster, Edward Burrell, and Milton Tan have been examining the evolutionary ecology of North American minnows (Leuciscidae) using phylogenetic comparative methodologies with shape, size, diet, and stable isotopes.

- Jonathan Armbruster along with Pamela Hart Burress (lead author), Prosanta Chakrabarty, and Matthew Niemiller have been examining the evolution of cavefishes (Amblyopsidae) with particular attention on the Southern Cavefish (*Typhlichthys subterraneus*).
- David Werneke, Jonathan Armbruster, Brian Helms, and James Godwin were awarded an NSF RAPID grant to examine the effects of 2016's drought on fish, herps, and invertebrates. Cori Black has been examining the effects on fishes.
- Al Schotz, Jonathan Armbruster, James Godwin, David Laurencio, and Brian Helms were awarded a grant from the EPA to establish reference wetland conditions in the state of Alabama. This will cover fishes, herps, birds, bats, plants, and invertebrates.

#### Geological Survey of Alabama – Submitted by Stuart McGregor

- Recently finished statewide crayfish survey for ADCNR and in process of writing Crayfishes of Alabama book.
- Performed annual IBI monitoring in Mud Creek at Tannehill State Park and Town Creek in Jasper, AL after a restoration project.
- Completed wadeable and non-wadeable IBI surveys of Bogue Chitto (Alabama River) system with the assistance of ADCNR, APC, ADEM, and Weyerhaeuser.
- Began monitoring of the Watercress Darter population at the Watercress Darter National Wildlife Refuge after completion of a project fixing the dyke and improving the spring run.
- Prepared a report for publication as a GSA circular summarizing GSA, USFWS, and ADCNR fish IBIs in the Murder Creek (Conecuh River) system.
- Preparing a journal article discussing the current status of Tuscumbia Darters in north Alabama.
- Completed year 19 of monitoring Tuscumbia Darters in Williams Spring at Redstone Arsenal and year 25 conducting water and biological monitoring of Alabama Cave Shrimp in Bobcat Cave.
- Preparing a journal article summarizing survey efforts for the Slenderclaw Crayfish on Sand Mountain.
- Preparing a watershed assessment of the Terrapin Creek SHU for publication as a GSA bulletin.

#### USDA Forest Service, Southern Research Station, Center for Bottomland Hardwoods Research, Stream Ecology Lab – Submitted by Zanethia Barnett

- Investigation of the effects of impoundments on stream crayfishes' assemblages, distributions, and gene flow (Barnett & Adams).

- Comparison of 3 crayfish and fish sampling methods in Southern Appalachian mountainous streams (Barnett & Adams).
- Investigation of the use of fishes to sample crayfishes in large water bodies (Adams, Barnett with numerous collaborators).
- Detectable effects of impoundments on the genetic structure of crayfish (*Faxonius* spp.) in Alabama 43 years after dam closure. International Association of Astacology. 12 July. (Barnett)
- Environmental and biological impacts to crayfish populations in impounded and unimpounded streams in Alabama. Society of Freshwater Science. 23 May. (Barnett)
- Comparison of stream crayfish sampling methods. Mississippi Chapter of the American Fisheries Society. 7–9 Feb. (Barnett)
- Fish as crayfish samplers in reservoirs and large rivers: preliminary results. Mississippi Chapter of the American Fisheries Society Annual Meeting. 7–9 February. (Adams)

The University of West Alabama – Submitted by Kenny Jones

- Mr. Kenny Jones, Dr. Michael Sandel, and Dr. Bernie Kuhajda are working on a status survey using molecular strategies for the Alabama endemic Coal darter (*Percina brevicauda*). 35 trips were taken for collecting Coal darters, in which 22 of them were successful for collections of *P. brevicauda*.

University of North Alabama – Submitted by Jeff Ray

- Completed sampling for the fishes of Factory Creek (Shoal Creek system) within the biodiverse Pickwick Lake subbasin. Totals included 75 species and near-reference quality IBI scores throughout this small watershed in southern Tennessee.
- Currently sampling the fishes of Butler Creek (Shoal Creek system) in southern Tennessee and northern Alabama 2018-19.

**Arkansas:** Brook Fluker (bfluker@astate.edu)

University of Central Arkansas (Ginny and Reid Adams):

- Fish sampling in rivers of northeast Arkansas (Strawberry, Spring, Current, and Eleven Point) comparing current to historic assemblages began during 2017, and students are incorporating stream geomorphology (co-PI Matt Connolly) and variables such as number of farm ponds and number of chicken houses into analyses. This project will continue through summer 2020 and includes students Jennifer Main, George Gavrielides, and Calvin Rezac.

- The lab continues to monitor fishes in the Kings River, Arkansas using seining and snorkeling techniques following restoration of a stream section by The Nature Conservancy (Chas McCoy and John Chapman).
- The lab is coordinating with the U.S.D.A. Forest Service (Matt Anderson) to sample additional streams in the Ozark National Forest using similar methodology to those used throughout the state in the current-historic comparisons. These data will provide the Forest Service with a better comparative dataset for future monitoring.
- Arkansas lacks comprehensive data on water temperature and quantity throughout the state, particularly in ungaged headwaters and tributaries. There is a need to establish a baseline for future monitoring, to correlate with existing and future biological and hydrological data, and to examine impacts of disturbances and watershed perturbations, including climate change, on SGCN taxa. Beginning in summer 2019, Chance Garrett will be the lead graduate student on a project in collaboration with Arkansas Game and Fish Commission (Jeff Quinn), USGS (Luke Driver), and Arkansas Department of Environmental Quality (Tate Wentz, Chris Naus, and Chelsey Sherwood). We will continuously monitor water temperature (50 sites) and quantity (30 sites) for two years within priority watersheds (Ouachita, Little Missouri, Caddo, and Strawberry rivers).
- During summer 2019, we will begin a project to determine the current status and distribution of the Colorless Shiner (*Notropis perpallidus*) in Arkansas using targeted sampling of historical records. Data will be collected to provide additional details on distribution and habitat while also providing an understanding of effort needed to detect the species during future monitoring.

Arkansas State University (Brook Fluker):

- In 2016, Co-PIs Brook Fluker, Travis Marsico, John Harris and Stan Trauth began an NSF funded project to develop the Arkansas Center for Biodiversity Collections (ACBC), which will unify all eight natural history collections at Arkansas State University into common spaces and a singular database. Significant progress has been made toward restoring the collections and digitizing and georeferencing specimen data for upcoming upload into a publically accessible Arctos database. Databasing of the Ichthyology Collection is completed and the collection has 213,264 specimens (13,153 lots) from 23 of the contiguous states (approx. 75% from Arkansas). Substantial progress has also been made on the Aquatic Macroinvertebrate Collection, which has 130,000+ specimens (mostly larval aquatic insects) primarily from Arkansas and surrounding states.

Upon completion of the project in late 2020, data from all ACBC collections will be publically available and specimens will be available for research loans.

- Under the leadership of graduate student Brittany McCall, we completed a two-year status survey and conservation genetic assessment of the Paleback Darter (*Etheostoma pallididorsum*) and the Caddo Madtom (*Noturus taylori*). Several publications from this work are currently under review and the final report is available from Brook Fluker. Funding for this project was provided through the Arkansas Game and Fish Commission State Wildlife Grants Program.
- Under the leadership of graduate student Taylor Lee, we completed a two-year survey using traditional and environmental (e) DNA sampling for the federally listed Leopard Darter (*Percina pantherina*) in Arkansas. Traditional sampling via seining failed to detect the species at historical localities in the Cossatot River and Robinson Fork during the two-year project. eDNA analysis for *P. pantherina* in Arkansas was complicated by putative sample contamination, but we observed three positive detections in the lower Cossatot River from winter 2016. Several publications from this work are currently in preparation and the final report is available from Brook Fluker. Funding for this project was provided through the Arkansas Game and Fish Commission and US Fish and Wildlife Service through a Section 6 grant.
- In collaboration with Brett Timmons (Arkansas Game and Fish Commission) and Missouri Dept. of Conservation, graduate student Dustin Thomas is evaluating changes in Walleye population dynamics in the Eleven Point River following a six-year stocking gap. This project includes genetic discrimination of the native “Black River Strain” and individuals of the stocked “Northern” strain, followed by evaluation of potential differences in abundance, growth, reproduction, and diet. Ultimately, these data will be used to better conserve and manage the native Black River Strain of Walleye in the Eleven Point River.
- In collaboration with Brian Wagner (Arkansas Game and Fish Commission), graduate student Alexis Mross is assessing species boundaries among clades of the Least Darter (*Etheostoma microperca*) using multilocus species delimitation methods and morphological data.
- Graduate student Brittany McCall is currently conducting a phylogenetic re-examination of the genus *Noturus* using RADseq data, in addition to broad scale niche modeling to better understand factors promoting lineage diversification within *Noturus*.
- In collaboration with Bernie Kuhajda (Tennessee Aquarium Conservation Institute) and Hank Bart (Tulane University), undergraduate student River

Watson is conducting a taxonomic evaluation of the Goldstripe Darter (*Etheostoma parvipinne*) using species delimitation methods with molecular and morphological data.

- Undergraduate student Tyler Brown is evaluating the effect of Blackspot disease on body condition of the Bleeding Shiner (*Luxilus zonatus*) in the Spring River drainage.

**Georgia:** Keith Ray (ckr@reinhardt.edu)

- Bill Ensign and Will Commins in the Department of Ecology, Evolution, and Organismal Biology at Kennesaw State University continue to investigate the movement patterns of stream fishes. Building on work done by Andrea Davis, a recent graduate of the Masters in Integrative Biology program at KSU, Commins and Ensign have been using PIT tags and an array of four instream antennas to monitor the movements of *Campostoma oligolepis*, *Lepomis auritus*, *L. megalotis*, *Micropterus coosae*, *Hypentelium etowanum*, and *Moxostoma duquesni* in a 600 m reach of Raccoon Creek in Paulding County, Georgia. The overall objective of the project is to document movement patterns before and after removal of a large box culvert on Raccoon Creek scheduled for removal and replacement with a clear span bridge in early 2019. Over 700 fish have been tagged and preliminary results indicate that the culvert is a significant impediment to fish passage for all six species. Support for the project has been provided by The Nature Conservancy, Georgia DNR, Paulding County, and the KSU Office of Research. In other KSU news, Matt Troia will be joining EEOB in 2019 as a new assistant professor. Matt worked with Keith Gido (at the other, smaller KSU) on stream fish community structure and has done post-doc work with Ryan MacManamy at ORNL and most recently, Xingli Giam at UTK. Hopefully Matt will become more deeply engaged in southeastern fishes.
- Cindy Williams reports some changes out of the Region 4 office of the USFWS. When the CBD sued the FWS over failure to list over 600 species in the multi-district litigation settlement, Cindy Dohner, Regional Director, created the AT Risk species program. Gabrielle Horner was the first coordinator to kick it off. Gabe left, and Mike Harris, formerly with GA DNR, replaced Gabe, and really grew the program by working with all the states to gather data on the species in the Service's Region 4 states (AL, AR, FL, GA, KY, LA, MS, NC, SC, TN, & PR). Mike retired at the end of 2018 and was replaced by Martha Keller, who has already transitioned into the position, and hopefully will be joining SFC soon.

- Keith Ray and Zach Felix at Reinhardt University have begun a comprehensive mussel survey of Shoal Creek in the Etowah River, after new populations were discovered on a conservation property near Waleska, GA.
- Bret Albanese reports that the GADNR Nongame Conservation Section has formally changed its name to the Wildlife Conservation Section and they have kept the same mission. The fishes probably do not care, but the new name better reflects their mission to conserve all native wildlife species and natural communities. Ani Popp was hired last fall as the first aquatic conservation biologist for the upper Coosa River system. Ani has hit the ground running and is already working on Holly Creek mussel monitoring, a Trispot Darter eDNA project with partners in Alabama, and planning for an upcoming Coosa Summit for fall 2019. Paula Marcinek continued surveys and conservation planning for Robust Redhorse. Her team documented adults in the Ocmulgee River (1<sup>st</sup> detection in 3 years) as well the Broad River. They also worked with the UGA vet school, SCDNR and Georgia Southern University (Dr. Jamie Roberts) to radio tag 11 adult Robust Redhorse in the Savannah River. The goal of this project is to determine habitat use outside of the spawning season and potentially movement upstream of the New Savannah Bluff Lock and Dam when proposed fish passage improvements are implemented. Brett Albanese and crew completed an additional year of fyke netting and PIT antenna monitoring of Sicklefins Redhorse in the Hiwassee river system. Brett and partners also completed a project to assess the status of the Holiday Darter, Bridled Darter, Trispot Darter, and Frecklebelly Madtom last year. More information on our work can be found in our annual report. Finally, we are sad to report that we lost Jason Wisniewski (aka Clambo) to the Tennessee Wildlife Resources Agency. He will be dearly missed, but this will be good for the clams of Tennessee.

**Kentucky:** Matt Thomas (matt.thomas@ky.gov)

U.S. Fish and Wildlife Services, KY Ecological Services Field Office (KFO),  
Michael Floyd

- Cumberland Darter (*Etheostoma susanae*) draft recovery plan - April 2018 (83 FR 14289); publication of final recovery plan is scheduled for 2019.
- Cumberland Darter Five-Year Review – October 2018.
- Kentucky Arrow Darter (*Etheostoma spilotum*) recovery outline – February 2017.
- Redlips Darter (*Etheostoma maydeni*) Species Status Assessment (SSA) - March 2018.

- Palezone Shiner (*Notropis albizonatus*) recovery plan amendment (Draft) – December 2018.
- Blackfin Sucker (*Thoburnia atripinnis*) SSA and 12-Month Petition Finding – December 2017 (82 FR 57562).
- From 2017-2018, the KFO completed quantitative, range-wide surveys for the Relict Darter (*Etheostoma chienense*) in cooperation with the KY Department of Fish and Wildlife Resources (KDFWR) and Office of Kentucky Nature Preserves. Completion of an updated Five-Year Review and Draft SSA is scheduled for 2019.
- The KFO continues to work with Southeastern Louisiana University (Dr. Kyle Piller) and KDFWR on a population genetics study of the Relict Darter.
- From 2016-2018, the KFO provided funding and technical/field support to Eastern Kentucky University for a graduate research project focused on the distribution, population size, and ecology of the Buck Darter (*Etheostoma nebra*). Thesis title: “Population size and habitat association of *Etheostoma nebra*, the Buck Darter, using abundance modeling in the Buck Creek system, Cumberland River Drainage, Kentucky” - Davy Black (2018).
- The KFO provided funding to Conservation Fisheries, Inc. for a multi-year propagation study for the Buck Darter and maintenance of an ark population (ongoing). CFI stocked captive spawned progeny in April 2018 for the first time in a small stream within the Flat Lick Creek (Buck Creek) drainage near Somerset, Kentucky. In September, two of the tagged fish, now adults, were observed prior to the release of additional propagated fish.
- The KFO is cooperating with Austin Peay State University (APSU, Dr. Mollie Cashner) and the KY Waterways Alliance to complete a range-wide population genetics study for the Blackside Dace (*Chrosomus cumberlandensis*). Phase I of the study included tissue collection and analyses from 10 populations in Kentucky and Tennessee. A second phase of the project is underway and will include tissue collection and genetic analyses for 9-10 additional populations, with an expected completion date of 2020.
- The KFO continues to cooperate with the US Army Corps of Engineers – Nashville District, TVA, and APSU on a long-term population monitoring and genetics study for the Tuxedo Darter (*Etheostoma lemniscatum*) and other aquatic species in the Big South Fork Cumberland River. The study was initiated to evaluate the impacts of varying lake levels (Lake

Cumberland) on aquatic communities and water quality and habitat conditions in the Big South Fork.

- Since 2017, the KFO has been partnering with the U.S. Geological Survey (Dr. Nathaniel Hitt) on a USFWS/USGS Science Support Partnership project that is modeling Kentucky Arrow Darter and Blackside Dace abundance related to elevated conductivity in eastern Kentucky. The project is expected to conclude in 2019.
- From 2014-2017, Dr. Michael Floyd authored articles on Blackside Dace, Tuxedo Darter, and Relict Darter for *Naturally Kentucky* (Biannual Newsletter of the Office of Kentucky Nature Preserves) and *American Currents* (official publication of the North American Native Fishes Association).

Kentucky Department of Fish and Wildlife Resources (KDFWR), Matt Thomas and Stephanie Brandt

- Thomas, M.R. and S.L. Brandt. 2017. Status Survey of the Goldstripe Darter, *Etheostoma parvipinne*, in Kentucky. Final Report for State and Tribal Wildlife Grant: T-60-R. Kentucky Department of Fish and Wildlife Resources, Frankfort, KY. 105 pp. (available from [matt.thomas@ky.gov](mailto:matt.thomas@ky.gov)).
- Thomas, M.R. and S.L. Brandt. 2017. Status Survey of the Redside Dace, *Clinostomus elongatus*, in Kentucky. Final Report for State and Tribal Wildlife Grant: T-60-R. Kentucky Department of Fish and Wildlife Resources, Frankfort, KY. 141 pp. (available from [matt.thomas@ky.gov](mailto:matt.thomas@ky.gov)).
- Thomas, M.R. and S.L. Brandt. 2016. Survey and Assessment of the Fish Fauna of the Clarks River National Wildlife Refuge in Marshall, McCracken, and Graves Counties, Kentucky. Final Report for U.S. Fish and Wildlife Service, National Wildlife Refuge System Inventory and Monitoring, Southeast Region, Atlanta, GA. 80 pp. (available from [matt.thomas@ky.gov](mailto:matt.thomas@ky.gov)).
- Thomas, M.R. and S.L. Brandt. 2016. Surveys for the Diamond Darter, *Crystallaria cincotta*, an Endangered Species Known Historically from the Green River in Kentucky. Proceedings for Celebrating the Diversity of Research in the Mammoth Cave Region: 11th Research Symposium at Mammoth Cave National Park. April 18, 2016; pp. 50-58. (available: [https://digitalcommons.wku.edu/mc\\_research\\_symp/11th\\_Research\\_Symposium\\_2016/Complete\\_Proceedings/1/](https://digitalcommons.wku.edu/mc_research_symp/11th_Research_Symposium_2016/Complete_Proceedings/1/)).

Morehead State University (MOSU), David Eisenhour

- A graduate student study of Bigeye Shiner (*Notropis boops*) life history in Triplett Creek, Licking River drainage, Kentucky, is in progress.

- An undergraduate project studying fish community response to stream restoration in a section of Triplett Creek is in progress.
- Eisenhour, D.J., M.R. Thomas, J.J. Culp, M.C. Compton, S.L. Brandt, and R. Pierce. 2018. Updated distributional records of selected Kentucky fishes. Southeastern Fishes Council Proceedings 58:1-19.

Office of Kentucky Nature Preserves (KNP), Mike Compton

- Compton, M.C., B.D. Yahn, and L.T. Phelps. 2017. Preliminary ecological assessment of the Green and Nolin rivers in Mammoth Cave National Park, Kentucky, following the removal of lock and dam #6. (available: <http://naturepreserves.ky.gov>).
- Sampling for fishes, mussels, and other aquatic invertebrates will continue on the Green River to monitor response to lock and dam #6 removal.
- Mussel surveys in Eagle Creek (Kentucky River drainage)
- Surveys for Kentucky Creekshell (*Villosa ortmanni*) in the Green River and lower Cumberland River drainage (Red River and Little River)
- Surveys for Cumberland Papershell (*Anodontooides denigrata*) in Moore Creek and Mill Branch, upper Cumberland River drainage.
- Surveys for fishes and mussels in Wild River section of the Red River (Kentucky River drainage).

Eastern Kentucky University (EKU), Sherry Harrel

- Graduate student, Isaac Bently, is working on a master's thesis project examining movement of fishes across potential barriers at East Fork Indian Creek (Red River- Kentucky River drainage) following a stream restoration project completed in 2017.
- Graduate student, Davy Black, completed his master's thesis in 2018 focused on estimating population size and habitat association of the Buck Darter (*Etheostoma nebra*) in the Buck Creek system, Cumberland River drainage, Kentucky.

Murray State University (MSU), Tim Spier

- In collaboration with KDFWR, MSU is tracking invasive Silver Carp in Kentucky Lake and Lake Barkley. Ultrasonic-tagged carp are tracked via boat-mounted hydrophones and passive receivers placed throughout the reservoirs and nearby aquatic areas. Tracking data provide information on large-scale migration patterns as well as daily movements and habitat use.
- MSU is working closely with KDFWR on the use of ultrasonic tags to track stocked Alligator Gar in western Kentucky. Gar will be followed closely at the point of capture and large-scale movement will be recorded

by a network of passive receivers in the lower Ohio and Mississippi rivers and floodplain habitats.

- Former graduate student, Bradley Hartman, now employed as a fisheries biologist with KDFWR, finished his thesis on development of a long-term monitoring program for fish communities in Kentucky Lake.

Kentucky Division of Water (KDOW), David Cravens

- During 2018, fish community sampling was conducted at 39 sites in 27 counties across Kentucky. The Kentucky Index of Biotic Integrity (KIBI) is used to assess stream health in partial fulfillment of water quality monitoring objectives.

**Louisiana:** Marty O'Connell (moconnel@uno.edu)

- Hank Bart (Tulane University) and Kyle Piller (Southeastern Louisiana University) are continuing the process of developing a book and website on Louisiana's Inland fishes which they are calling Inland and Coastal Fishes of Louisiana. Hank will be promoting the book project around the state this year in an effort to attract major State of Louisiana and private foundation funding for the project. An updated checklist, featuring the species that will be treated in the book, is in manuscript form and will be submitted to SFC Proceedings by lead author Mike Doosey. Kyle and Hank have also been awarded a State Wildlife Grant to update the conservation status of Louisiana's threatened and endangered fish species. As part of this newly funded project, Kearstin Findley, new graduate student in the Piller lab, will generate ecological niche models for a subset of the threatened and endangered species in Louisiana. This will provide a new monitoring tool for Louisiana's threatened and endangered fishes that will allow us to quantitatively assess areas that need to be targeted for particular species.
- With the support of the Louisiana Sea Grant and the Louisiana Department of Wildlife and Fisheries, Kyle Piller, and graduate students Aaron Krolow and Megan Ryba are undertaking environmental DNA studies (eDNA metabarcoding) to monitor Louisiana's artificial reefs. They are examining the diversity of species on reefs of different ages and different materials to compare fish communities. These studies should increase our understanding of artificial reefs and habitat utilization by estuarine and marine fishes in Louisiana.
- Damon Morse (M.Sc. student) is finishing his thesis research on the possible impacts of the invasive Island Apple Snail (*Pomacea maculata*) on fish assemblages and native snail assemblages in urban water bodies of New Orleans, Louisiana. He is working under the guidance of SFC

member Martin O'Connell at the University of New Orleans. Over the past two years Damon has been collecting fishes and snails at multiple sites and is currently in the laboratory processing those samples. While only preliminary results are available at the moment, Damon notes that the Island Apple Snail appears to have not yet become established in Bayou St. John even though it is present in nearby water bodies. Bayou St. John is an historical trading route through the center of the City and has been used by European settlers for over 300 years. Damon hopes his data will shed more light on why this invasive species appears to do well in some habitats and not others.

- Undergraduate student Benjamin Beasley completed his senior honor's thesis at the University of New Orleans in 2016 under the guidance of SFC member Martin O'Connell. Benjamin examined the distribution of Blackmouth Shiners (*Notropis melanostomus*) in the Pascagoula River Basin and compared these location data with flood inundation data. His research goal was to utilize remote sensing data to gain a better understanding of the habitat characteristics where *N. melanostomus* has been collected and use this information to identify other areas where populations are likely to occur during future sampling efforts. Benjamin's results reveal that there is a trend in inundation frequency among the locations where *N. melanostomus* were collected that differed from the locations where *N. melanostomus* were not collected. The relationship between the portion of the pond that maintains a continuous water level and areas that are more infrequently inundated, suggests that *N. melanostomus* occurs in water bodies that maintain a balance between how much of the pond stays wet. In other words, *N. melanostomus* appear to occur in habitats that are neither regularly inundated nor infrequently inundated. This characterization could be used to inform future site selections within the Pascagoula River Basin as well as identify other river systems that have similar inundation patterns and morphology within and proximal to the known range.

**Mississippi:** Jan Hoover (hooverj@wes.army.mil) & Todd Slack (Todd.Slack@usace.army.mil)

University of Southern Mississippi, School of Biological, Environmental, and Earth Sciences – Hattiesburg

Jake Schaefer

- We are continuing our work aimed at understanding *Fundulus* hybrid zones. A study on the timing of population divergence is currently in review. We are in the second year of our work on producing annotated and

mapped genomes for *F. notatus* and *F. olivaceus*. These genomic tools will help us better understand patterns of introgression, and the role of chromosomal rearrangements in producing diversity in the group.

- The lab has completed the second year (of five) sampling sites within Mississippi National Forest lands. In collaboration with Mel Warren and others, we are building a long term database describing fish assemblages throughout the state.
- The lab continues to monitor and study Pearl Darter populations. Samples in 2018 turned up individuals in mid-reaches of Black Creek (Pascagoula drainage), further upstream from earlier records.
- Sara Barrett completed her first year of field work documenting broad assemblage shifts in the lower Pascagoula drainage.
- Josh Hubbell completed his surveys of Yazoo Darters (2016-2018), and is currently working on next generation sequencing data to assess fine scale populations structure and connectivity.
- Austin Grieshober completed preliminary trials investigating the role of turbidity in altering trophic interactions.
- Bailey Coomes completed preliminary trials on plastic and evolutionary responses of *Gambusia* sp. to higher salinity.

#### Brian Kreiser

- Continuing collaboration with David Buckmeier, Dan Daugherty & Nate Smith (Texas Parks and Wildlife Department) on using sibship reconstruction to infer the effective number of breeders in Alligator Gar.
- Continuing collaboration with Eric Brinkman (Arkansas Game and Fish Commission) on genetic structure of Alligator Gar populations across Arkansas.
- Collaborating with a variety of colleagues on Gulf Sturgeon in the Pascagoula (Mark Peterson & Mike Andres - USM GCRL), Apalachicola (Adam Kaeser – USFWS; Peterson Lab – U. Georgia), Choctawhatchee (Dewayne Fox – Delaware State Univ.; Steve Rider – Alabama Division of Wildlife and Freshwater Fisheries), and Pearl Rivers (Kayla Kimmel – USFWS; Todd Slack - USACE).

University of Southern Mississippi, Department of Coastal Sciences – Ocean Springs

#### Mark Peterson and Michael Andres

- Continuing collaborative efforts with Todd Slack (USACE-ERDC) on acoustic tracking of Gulf Sturgeon (*Acipenser oxyrinchus desotoi*) on Ship

Island, Dog Keys Pass, and western Horn Island funded by USACE/MsCIP Mobile District.

- Beginning sampling efforts for Pascagoula River Gulf Sturgeon to estimate juvenile recruitment, mortality, and effective number of breeding adults in collaboration with Matt Roberts (MMNS) and Brian Kreiser (USM) funded by NOAA Section 6 through MMNS.

#### Publications

- Wilber, D., M.S. Peterson, and W.T. Slack. (2019). Cross-site comparisons of Gulf Sturgeon prey assemblages throughout the northern Gulf of Mexico reveal regional differences. *Fisheries Research* (Invited Special Issue). (In press).
- Vick, P.E., M.S. Peterson, and W.T. Slack. (2018). Seascape connectivity of Gulf sturgeon *Acipenser oxyrinchus desotoi* population units across the northern Gulf of Mexico. *Endangered Species Research* 37:195-205 (doi:10.3354/esr00923).
- Vick, P.E., M.S. Peterson, W.T. Slack, and P.O. Grammer. (2018). Occupancy patterns of Gulf Sturgeon, *Acipenser oxyrinchus desotoi*, associated with Ship Island, Mississippi. *Journal of Coastal Research* 34(3):640-650 (doi: <https://doi.org/10.2112/JCOASTRES-D-17-00027.1>).
- Andres, M.J., W.T. Slack, M.S. Peterson, K. Kimmel, B. Lewis, and P.O. Grammer. (2018). Growth estimation of western population segment Gulf Sturgeon, *Acipenser oxyrinchus desotoi*, using length-at-age and mark-recapture data. *Transactions of the American Fisheries Society* 147(1):139–150 (doi:10.1002/tafs.10007).
- Peterson, M.S., W.T. Slack, P.O. Grammer, and J-M. Havrylkoff. (2018). Use of non-island, shallow nearshore beach environments by Gulf Sturgeon within Mississippi Sound, USA. *Journal of Applied Ichthyology* 34:3-11 (doi:10.1111/jai.13532).

#### Mississippi Museum of Natural Science – MDWFP

##### Matt Wagner

- Conducted a concentrated Frecklebelly Madtom (*Noturus munitus*) survey during 2018 throughout the Pearl River and its tributaries indicating presence at 44 of 52 sites (85% presence) within their historic range. Frecklebelly Madtoms were collected at 16 mainstem Pearl River sites in high numbers (30 to 157 per site) and were noted at 9 new sites including 2 new tributaries. A total of 1228 individuals were reported for the overall survey.

- Continued Piebald Madtom (*Noturus gladiator*) surveys resulting in the capture of 2 individuals from the Coldwater River and 12 individuals from the Wolf River in north Mississippi. These individuals were fin clipped for range-wide population genetics being completed at APSU in TN with individuals from throughout the range in both TN and MS. The 12 Wolf River individuals are now at USFWS Private John Allen National Fish Hatchery for experimental propagation.

#### Mississippi Department of Wildlife, Fisheries and Parks

Larry Bull, Assistant Chief of Fisheries; Trevor Knight, Nathan Aycock and Dennis Riecke

- MDWFP with assistance from the USFWS and Tennessee Tech University have continued their multi-agency efforts to track the movement of Asian carp in the TN River and Tenn-Tom Waterway. A total of 50 silver carp have been implanted with acoustic telemetry tags since 2017 with acoustic receivers deployed throughout Kentucky, Barkley, Pickwick, Wilson, Wheeler, and Guntersville Lakes in addition to Bay Springs Lake and Lock E of the Tenn-Tom Waterway. Telemetry data has shown silver carp utilizing locks in order to move between lakes on the TN River. The data has also shown that silver carp can travel more than 60 miles per day with greatest movement occurring during periods of strong current and warmer water temperatures (April-June). Very little movement has occurred when water temperatures are below 50 degrees Fahrenheit (January-February).
- MDWFP has continued to evaluating the effects of Asian Carp on sport fish in Mississippi River oxbow lakes. In 2016 and 2017 MDWFP conducted rotenone sampling on three oxbow lakes of the Mississippi River to determine the current fish community composition. In two of these lakes (Lake Whittington and Tunica Lake) Asian carp were abundant, while in the third (Eagle Lake) they were not collected. This data was then compared to results from rotenone sampling conducted on the lake in the 1980s and 1990s prior to Asian carp colonization. At Lake Whittington and Tunica lake silver carp were the most abundant species by weight and comprised 31% and 42% of the total catch, respectively. Centrarchid biomass had declined over 75% at these lakes compared to historic data, and Clupeid biomass was down over 90%. These trends were not evident at Eagle Lake, lending further support to the idea that Asian carp are behind the declines. This research further quantifies the damage Asian carp can cause to native fish species and to the recreational fishery at the water bodies they colonize. In 2018, Lake Whittington was sampled again, and data analysis is ongoing.

- Ongoing Paddlefish assessment in the Pascagoula River Basin, MS. From 2014-2017, Paddlefish were gillnetted in the Bouie River gravel pits to capture brood stock. Fish were spawned at the Private John Allen NFH in Tupelo, MS and grown to a length of 6.4-18 inches. From 2014-2017 approximately 1,300 Paddlefish were stocked into the Pascagoula River and 8,500 fish were stocked into the Bouie River. Fourteen adult Paddlefish were implanted with VEMCO acoustic transmitters. Seven VEMCO receivers were deployed in the Leaf, Pascagoula and Bouie Rivers in 2017. Data were downloaded monthly from January – October 2017 and in August 2018. Two receivers are still deployed. A total of 13 Paddlefish tagged in the Bouie River were detected at six different receivers with over 579,000 detections in the Bouie River and 183 detections on the other five receivers.

#### USGS Lower Mississippi-Gulf Water Science Center

Matthew Hicks

- In June, 2018, biologist with the USGS, Lower Mississippi-Gulf Water Science Center conducted fish community sampling of the Pearl River and a few tributaries contiguous within boundary lands of the Mississippi Band of Choctaw Indians (MBCI) located in Neshoba County. The fish sampling was part of a larger effort to collect samples to characterize baseline water-quality and biological community conditions of streams in the Pearl River Community of the MBCI. Non-point source pollution abatement efforts will follow, and these baseline data will be used to track changes and improvement over time and space.

USDA Forest Service, Southern Research Station, Center for Bottomland Hardwoods Research, Stream Ecology Lab, Oxford

Susan Adams, Mel Warren, Zanethia Barnett, Gayle Henderson

#### Fish research

- Volume 2 of Freshwater Fishes of North America (M. L. Warren, Jr., B. M. Burr, Anthony Echelle, Bernard Kuhajda, and Stephen T. Ross, eds.) was submitted to Johns Hopkins University Press in November 2018. The volume covers Characins through Livebearers. Volume 3 is underway.
- Phylogeography of the Yazoo Darter using MtDNA and nuclear S7 gene is nearing completion; we expect to publish in 2019. (Warren & Sterling)
- An investigation of meristic, morphometric, and color variation within the Yazoo Darter is complete; we expect to publish in 2019. (Warren & Sterling)

- A paper describing a captive propagation protocol and early life history of the Yazoo Darter is in review in *Southeastern Naturalist*. (Warren & Sterling, collaborating with Conservation Fisheries, Inc.)
  - We are initiating studies investigating the effects of climate change on fitness in snubnose darters using an outdoor mesocosm facility; our first pilot study will commence spring 2019. (Warren & Sterling)
  - We are compiling a near-comprehensive review of life history traits in snubnose darters with the goal of estimating which traits are conserved across distinct forms within the clade and identifying research needs. (Warren & Sterling)
  - We are maintaining long-term stream temperature monitoring stations in north Mississippi streams for correlating temperatures with fish distributions. (Adams and Warren)
- Crayfish research
- Investigation of a possible new crayfish species from the Dahomey National Wildlife Refuge is ongoing. (Adams in collaboration with Jim Fetzner [Carnegie Museum of Natural History] and Becky Rosamond [USFWS])
  - Sampling and preliminary analyses completed on the effects of prescribed burning on primary and secondary burrowing crayfishes in the Mississippi Sandhill Crane National Wildlife Refuge. (Adams with Scott Hereford [USFWS])
  - Currently re-assessing distributions and densities of and threats to petitioned crayfish species in Mississippi. Field sampling is nearing completion. (Adams, for Paul Hartfield [USFWS])
  - We have an ongoing investigation of the use of fishes to sample crayfishes in large water bodies (Adams, Barnett with numerous collaborators).
  - Initiating an assessment of the fungal and oomycete pathogens carried by crayfishes from diverse habitats. (Adams with Laura Martin-Torrijos and Javier Dieguez-Uribeondo [Spain] and Colin Jackson [U of MS])
  - Adams, S. B., B. A. Davis, and D. A. Miller. 2018. *Hobbseus yalobushensis*, a crayfish of intermittent streams: biotic and habitat associations, life history characteristics, and new localities. *American Midland Naturalist* 179:126–149.
  - Adams, S. B. and R. L. Jones. 2018. Range extensions of three crayfishes (*Faxonius yanahlindus*, *F. placidus*, and *F. erichsonianus*) into Mississippi. *Southeastern Naturalist* 17:N6-N9.
  - Barnett, Z. C. and S. B. Adams. 2018. Comparison of two crayfish trapping methods in Coastal Plain seasonal wetlands. *North American Journal of Fisheries Management* 38(4):911-921.

US Army Engineer Research and Development Center (Waterways Experiment Station), Environmental Laboratory, Aquatic Ecology and Invasive Species Branch, Vicksburg

The ERDC Fish Ecology Team, now in its 31<sup>st</sup> year, consists of Jack Killgore (leader), Jay Collins, Nicky Faucheux, Nick Friedenber (Applied Biomathematics, Setauket NY), Steven George, Audrey Harrison, Jan Hoover, Alan Katzenmeyer, Lauren Leonard, Bradley Lewis, Catherine Murphy, Amanda Oliver, and Todd Slack. Most research takes place in the lower Mississippi River and alluvial plain but a few projects are underway on the Atlantic, Gulf, and Pacific coasts.

- Mississippi River Studies are sponsored by the USACE Mississippi Valley Division. These include ecohydrology studies on fishes and invertebrates of floodplain habitats, Pallid and Shovelnose Sturgeon surveys (now in their 19<sup>th</sup> consecutive year), sturgeon telemetry studies using a combination of fixed position and mobile receivers on USACE vessels, and mussel and benthic invertebrate surveys of the river and side channels. Also, benthic fish along revetted banks were sampled as part of environmental assessments for the Mississippi River and Tributaries Project; sampling took place along revetted (articulated concrete mattress), natural, and secondary channel banks in the lower Mississippi River near Greenville MS and differences in species composition among river banks was documented; Silver and Bighead Carp were 2-3 times more abundant than native fishes in summer and fall. In addition to all of the above, a community analysis of delta stream fishes for the period 1990-2015 was completed.
- Research sponsored by USACE Mississippi Valley Division enabled documentation of long-distance, long-term movements of Paddlefish from Moon Lake, a remote oxbow in the delta, to the Missouri, Middle Mississippi, and Lower Ohio Rivers. Research sponsored by the Aquatic Nuisance Species Research Program resulted in the refinement of a combined bioenergetics-demographic model quantifying impacts of Asian Carp on long term viability of Paddlefish. Studies sponsored by the Basic Military Research Program evaluated physical properties of the Paddlefish rostrum including strength, resiliency, and energy absorption/dispersion for application to personnel and infrastructure defense. A related project demonstrated a significant relationship between ventral pigmentation of Paddlefish and environmental dissolved oxygen.
- Laboratory studies of Sea Lamprey aversion to metals and swimming performance, funded by the Aquatic Nuisance Species Research Program, was used to design a field study on effects of submersed metals on

- lamprey. Work evaluated behavior (via infrared cameras) and attachment sites (metal plates) using enclosures in the Black Mallard River near Cheboygan MI. Research was conducted in collaboration with Scott Miehl, a lamprey researcher at USGS Hammond Bay Biological Station.
- Studies of extreme biology of Asian Carp, funded by the Aquatic Nuisance Species Research Program, continue. Fish are routinely sampled in the main river and tributaries; pectoral fin rays and post-cleithra are taken for aging and ovaries are removed for staging and egg counts. A study of Silver Carp leap characteristics (height, distance, angle, and escape velocity) and their correlates, was completed by Ehlana Stell at the University of Mississippi working under Glenn Parsons; Ehlana's work provides guidelines for vertical and hydraulic barriers to carp dispersal. Also for the second year in a row, fish taken by participants at the annual Silver Carp fishing tournament in Bath IL were sampled to quantify demographic characteristics of airborne fish.
  - Asian Carp research related to the electrical invasive species barrier in the Chicago Area Waterway System, sponsored by USACE Chicago and Rock Island Districts continues. Principal investigator Mike Holliman, GSI North America, is investigating environmental factors that influence barrier effectiveness, identifying optimum operational parameters, and investigating novel applications of electricity to block migrations of carp from the Mississippi basin into the Great Lakes.
  - Other ERDC Fish Ecology team studies included: 1) Gulf sturgeon monitoring and telemetry, in collaboration with Gulf Coast Research Laboratory (Slack, et al., see above report from Mark Peterson); 2) underwater acoustic studies, funded by the Ecosystem Management Restoration and Research Program, on USACE construction and navigation projects at Morro Bay CA, Marina del Rey CA, St. Luis Obispo CA, Lake Glendora IN, James River, VA; 3) habitat restoration for Emerald Shiners in the Niagara River NY, funded by and in collaboration with USACE Buffalo District; 6) population trends in aquatic snakes from 2003-2018 at Lake Providence LA in collaboration with Dena Dickerson (ERDC).
  - One member of the ERDC Fish Ecology Team completed and defended her dissertation research in 2018. Audrey Harrison, graduating from the University of Mississippi, studied effects of hydrological connectivity on the benthos of the Lower Mississippi River. Her work was funded by USACE Mississippi Valley Division and her major professor was *Cliff Ochs*.
  - Two members of the ERDC Fish Ecology Team continued with and began work on dissertations. Alan Katzenmeyer, returned to ERDC this year

from long-term training at the University of Mississippi. He is documenting salt tolerance and likelihood of coastal dispersal of Asian Carp. His work is funded by the Aquatic Nuisance Species Research Program and his major professor is Glenn Parsons. Nicky Fauchaux, departed ERDC for Mississippi State University to investigate effects of demonstration erosion control projects on fish communities in low-order streams. Her work is funded by USACE Vicksburg District and her major professor is Steve Miranda.

Publications (not listed in prior accounts)

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- Stell, E., J.J. Hoover, D. Hardesty, B.A. Cage, and G.R. Parsons. 2018. Long-distance movements of Paddlefish from a remote oxbow lake in the lower Mississippi River Basin. *Southeastern Naturalist* 17(2): 230-238.
- Trump, B., and 18 co-authors. 2018. Development of Community of Practice to Support Quantitative Risk Assessment for Synthetic Biology Products: Contaminant Bioremediation and Invasive Carp Control as Cases. *Environment Systems and Decisions* 38(4), 517-527
- Harrison, A. B., Slack, W. T., Lewis, B. R., Collins, J. A., & Murphy, C. E. 2018. Reliable and effective sampling gear type for large river substrate dwelling macroinvertebrates. *River Systems*.

**Missouri:** Robert A. Hrabik (Robert.Hrabik@mdc.mo.gov)

The following excerpts were provided by Dr. Jacob Westhoff, Missouri Department of Conservation as part of the Department's on-going, long-term monitoring program for state and federal-listed species: Niangua Darter, Neosho Madtom, and Longnose Darter.

- Range-wide monitoring for Niangua Darters (*Etheostoma nianguae*) based on summer snorkeling surveys and an occupancy modeling approach has occurred annually from 2011 through 2018. In this design, we visit ~75 habitat patches in each of five Osage River basin watersheds (each watershed once every two or three years) and sample each patch at least twice during a visit. Tavern Creek and Little Niangua Rivers were sampled in 2018. Niangua Darters were detected in 35% of sites visited in the Tavern Creek and in 68% of sites in the Little Niangua River. Both detection rates slightly exceed those from previous sampling events in those systems. Occupancy estimates are not complete for 2018 data yet but are generally around 0.75 (Little Niangua River), 0.30 (Tavern Creek),

0.45 (Maries River), 0.35 (Pomme de Terre), and 0.25 (Niangua River). Niangua Darter populations within all five monitored watersheds appear to be stable or slightly increasing.

- Ongoing monitoring has shown that Niangua Darter populations and stream habitat have responded positively to the improved road crossings. Seven bridge replacement sites were sampled in 2018. Proportions of occupied habitats and abundances of Niangua Darters have increased upstream of most crossings as the historical effects of impoundment and accumulated sediment diminish. Niangua Darter populations declined downstream of some crossings following replacement likely associated with the transfer of fine materials; however, evidence from monitoring suggests this is a short-term response.
- We monitored populations of the Neosho Madtom (*Noturus placidus*) in the Spring River of southwestern Missouri seven times in the past 9 years (2010 – 2014, 2016, 2018). Our approach using kick seining methods allows for evaluating dynamic occupancy models that estimated changes in probabilities of occupancy, colonization, extinction, and detection based on spatial replication of samples in approximately 80 patches of suitable habitat. Neosho Madtoms have commonly been detected in 27 – 36% of sites but were detected in 64% of sites in 2014. Estimates of occupancy are typically near 0.60, with detection probabilities ranging from 0.22 – 0.46. The population of Neosho Madtom in the Missouri portion of the Spring River appears stable.
- The Longnose Darter (*Percina nasuta*) was petitioned for listing under the ESA. There are several efforts underway in Missouri to collect data to inform the listing decision. Prior to 2017 fewer than 100 individuals had been observed in Missouri. Snorkeling efforts in the St. Francis River over the past two summers have yielded detection of over 100 individuals. We sampled 28 sites in the St. Francis River using eDNA and snorkeling methods in 2018. Longnose Darter were detected at eight sites via snorkeling, and we await the results of the eDNA samples. The Missouri Department of Conservation also funded a project through Tennessee Tech University to study the life history, habitat use, and population genetics of Longnose Darter in the St. Francis River in Missouri.
- Northern Madtom, *Noturus stigmosus* was captured for the first time in Missouri. The first captures occurred on 17 July 2018 at two locations at the confluence of the Ohio and Mississippi Rivers using the Mini-Missouri Trawl. They were first reported to Robert Hrabik as *N. eleutherus* but upon visual inspection, Hrabik determined them to be *N. stigmosus*. To verify the latter determination the specimens were sent to Dr. Matt Thomas (Kentucky) who concurred with the diagnosis. A third specimen

was captured on 2 August 2018 once again near the confluence of the Ohio and Mississippi Rivers. The collectors for all three specimens were Josh Abner, James Stoddard, and Wes Sleeper, all with the Missouri Department of Conservation. These captures are being treated as waifs from populations further upstream in the Ohio River. Matt Thomas reported that he and his crews captured *N. stigmosus* at multiple locations in the lower Ohio River between Paducah, Kentucky and Cairo, Illinois also using the Mini-Missouri Trawl. Despite the possibility the captures were waifs, it is the first time that *N. stigmosus* has been captured and collected from the Mississippi River. A specimen reported as *N. stigmosus* from the Mississippi River between Tennessee and Arkansas was later determined to be *N. gladiator* that probably came from the Hatchie River, Tennessee.

- Missouri welcomes two new professors and native fish enthusiasts to the university system: Dr. Dave Duvernell is Chair and Professor of Biological Sciences at Missouri University of Science and Technology in Rolla. His previous appointment was at Southern Illinois University-Edwardsville, where he also chaired the Biological Sciences Department. Duvernell and his students and Hrabik coauthored a paper accepted for publication in *Proceedings of the Southeastern Fishes Council Proceedings* in 2019 on changes in *Fundulus* distribution in the Meramec River basin. Our other newcomer we are excited about is Dr. Aaron D. Geheber, School of Natural Sciences, University of Central Missouri, Warrensburg. Dr. Geheber's interests include ichthyology, biogeography, evolution, and community ecology. He earned his doctorate under Dr. Edie Marsh-Matthews, University of Oklahoma.
- Hrabik is completing the 3<sup>rd</sup> edition *Fishes of Missouri*. First draft to be submitted to book editor in June 2019.

**North Carolina:** Bryn Tracy (bryntracy12558@att.net)

- Fritz C. Rohde is striving to finish the descriptions of the four species of Broadtail Madtoms with much assistance from Joe Quattro, Chip Collier, and Dustin Smith. Fritz has still been trying to find live material but has not been successful in many years and Hurricane Florence may have eliminated the few populations hanging on in the Cape Fear, Waccamaw, and Lumber river drainages.
- From Luke Etchison and Dylan Owensby, North Carolina Wildlife Resources Commission – Aquatic Wildlife Diversity Section, Mountain Region:

- 28 fish surveys were completed in tributaries of the Little Tennessee River Basin searching for Smoky Dace, *Clinostomus* sp. nov., and other North Carolina Species of Greatest Conservation Need.
- 5 snorkel surveys searching for State Endangered Sharpnose Darters, *Percina oxyrhynchus*, were completed in the South Fork New River in the New River basin. Three Sharpnose Darters were found at one site. This was the first Sharpnose Darter sighting in the state since 2012.
- 16 surveys for Federally Threatened Spotfin Chub, *Erimonax monachus*, were completed in the restoration section of the Cheoah River (Little Tennessee River basin).
- Spotfin Chub were abundant with multiple year classes present.
- 1,830 Spotfin Chub were stocked by Conservation Fisheries Inc. into the restoration section of the Cheoah River.
- Fish were translocated from Cowee Creek, Scott Creek, and Savannah Creek (Little Tennessee Basin) to the restoration section of the Cheoah River in an effort to increase biodiversity. Species translocated included Gilt Darter (*Percina evides*), Greenfin darter (*Etheostoma chlorbranchium*), Banded darter (*Etheostoma zonale*), Tennessee shiner (*Notropis leuciodus*), Mirror shiner (*Notropis spectrunculus*), Telescope shiner (*Notropis telescopus*), Fatlips Minnow (*Phenacobius crassilabrum*), and River chub (*Nocomis micropogon*).
- A total of 6,198 juvenile Lake Sturgeon, *Acipenser fulvescens*, were stocked into the French Broad River downstream of the town of Marshall. Lake Sturgeon have been stocked annually in the French Broad River in North Carolina since 2015. Population surveys will begin in Fall 2019.
- Sicklefin Redhorse, *Moxostoma* sp. nov., augmentation and research efforts have continued in the Little Tennessee and Hiwassee river basins. Approximately 6,000 juvenile Sicklefin Redhorse were stocked into the upper Oconaluftee River sub-basin from broodstock collected in the Tuckasegee River in Spring 2018.
- From Thomas Russ, North Carolina Wildlife Resources Commission – Aquatic Wildlife Diversity Section, Western Piedmont Region:
- 2018 will be remembered as a very wet year throughout most of North Carolina. As a result of prolonged high flows, few long-term fish monitoring survey sites were completed and the majority of our work was crayfish and mussel surveys with Duke Energy staff, mostly in their reservoirs.

- Hoping that 2019 will be a drier year, our main priority will be focusing on the fine-scale distribution and genetic make-up of Orangefin Madtom, *Noturus gilberti*, then other Dan River system state-listed species such as Rustyside Sucker, *Thoburnia hamiltoni*, Bigeye Jumprock, *Moxostoma ariomum*, and Cutlip Minnow, *Exoglossum maxillingua*. Time and weather permitting, additional surveys will be conducted in the middle reaches of the Dan River to locate new populations of Roanoke Logperch, *Percina rex*.

**South Carolina:** Brandon Peoples (peoples@clemson.edu)

- Savannah River Sturgeon. SCDNR and Clemson recently completed a study on movement and abundance estimation of sturgeons in the Savannah River. Spawning migrations were cued by a combination of discharge and temperature, and cues differed for species (Atlantic and Shortnose) and spawning season (spring and fall). We used side-scan sonar to non-invasively estimate number of spawners.
- Bartram's Bass. Collaborative work between Clemson, SCDNR, and the Southeast Aquatic Resources Partnership (SARP) is ongoing on Bartram's Bass—the Savannah River's endemic black bass. We have quantified nesting microhabitat selection by Bartram's Bass, and preliminary genetic results indicate that hybridization is related to a lack of forest cover and proximity to reservoirs.
- Flounder. The Farmer lab at Clemson is also working with the Alabama Marine Resources Division to assess flounder species in Mobile Bay. We are entering the second field season, and data is rolling in.
- Yellow Perch. Dr. Farmer's team is also conducting experiments aimed at assessing climate change effects on Yellow Perch. Fish have just started spawning, and we are looking forward to the results.
- Finally, we are conducting several projects using large datasets for conservation prioritization, stream classification, and metacommunity ecology. These studies are in early stages, and we look forward to reporting more next year.

**Tennessee:** Jeff Simmons (jwsimmons0@tva.gov)

- Pat Rakes with Conservation Fisheries, Inc. (CFI) provided several updates on their work with rare Tennessee fishes during 2018. Propagation, stocking, and monitoring of Smoky Madtoms (*Noturus baileyi*), Yellowfin Madtoms (*Noturus flavipinnis*), Citico Darters (*Etheostoma sitikuense*), and Spotfin Chubs (*Erimonax monachus*) *continued* in the Tellico River. Evidence of reproduction was observed for

all of the aforementioned species except Spotfin Chubs. However, considerable numbers of adult Spotfin Chubs were observed occupying more of the suitable habitats in the Tellico River. Small numbers of Ashy Darters (*Etheostoma cinereum*), Sickie Darters (*Percina williamsi*), and Blotchside Logperch (*Percina burtoni*) have also been stocked into the Tellico River over the past couple of years and plans for continued propagation of these species for introduction are ongoing.

- Quantitative snorkel monitoring of restored Citico Darter, Smoky Madtom, and Yellowfin Madtom populations in Abrams Creek was continued for a sixth year by Great Smoky Mountains National Park and CFI. Similar monitoring was conducted by CFI in Citico Creek for the fourth year. Numbers in both streams were still reduced following a drought in 2016, but all species have persisted and are slowly rebounding.
- Efforts to propagate and restore the Boulder Darter (*Etheostoma wapiti*) to Shoal Creek continued in 2018, with higher than average numbers produced and released. Monitoring in Shoal Creek during 2018 was minimal due to water conditions and time availability. However, several Boulder Darters were observed at three sites and limited recruitment of wild-spawned individuals was documented. Reintroductions of Spotfin Chubs in Shoal Creek are considered to be unsuccessful since none have been seen in several years. Broodstock for these reintroductions were from the Emory River. Discussions with the U.S. Fish and Wildlife Service and the Tennessee Wildlife Resources Agency (TWRA) are ongoing to determine if an alternate source population should be used for future propagation and reintroduction efforts.
- In early May 2018, CFI collected three Tuxedo Darter (*Etheostoma lemniscatum*) nests from the Big South Fork with reasonable hatching success (64%). However, as fish developed into juveniles, mortality accelerated. Several moribund fish were taken to the University of Tennessee Veterinary School where it was determined that the fish were succumbing to a mycobacterium infection which is untreatable in fishes. The system was disassembled and sterilized. No other fish in the hatchery were affected, suggesting that this may have been brought in from the Big South Fork. New broodstock was collected during October to continue propagation attempts.
- Bluemask Darter (*Etheostoma akatulo*) propagation was successful this year and individuals produced will be released into the Calfkiller River during early 2019. This will represent the third release into the Calfkiller River in an attempt to restore this extirpated population. Snorkel surveys at the reintroduction site and downstream did not detect any individuals. There are potential water quality problems that may be limiting

survivability of stocked individuals. A new release site upstream of the potential impacts has been selected for future releases.

- Lastly, recent equipment upgrades in the CFI facility have allowed for remediation of water chemistry issues which resulted in greater production and subsequent juvenile survivability of Spotfin Chubs *this* year. They are hoping that this will also increase propagation success for other species in 2019.
- Dr. Brian Alford's Fisheries Research Lab (University of Tennessee, Knoxville) has been busy with several projects this year. The Pigeon River Recovery Project has yielded some notable observations that bring good news. Snorkel surveys during 2018 documented natural reproduction and recruitment of Tangerine Darters (*Percina aurantiaca*), Mountain Madtoms (*Noturus eleutherus*), and River Chubs (*Nocomis micropogon*) for the first time since translocation or stocking began in the late 1990's. During 2016, the first natural reproduction of the Spiny River Snail (*Io fluviialis*) was seen since it was first translocated from the Nolichucky River in the late 1990's. In addition, Gilt Darters (*Percina evides*) continue to disperse to new riffle habitats in the lower Pigeon River. In 2019, 3 mussel species are going to be transplanted or stocked into protective silos in areas where potential glochidial host species are present. The TWRA provided 100 juvenile Muskellunge (*Esox masiquingy*) which were stocked into the lower Pigeon River during October.
- Marginal fin ray sections of reintroduced Lake Sturgeon (*Acipenser fulvescens*) in the Tennessee River are being collected to develop a better ageing technique. Previous age estimates were conducted by detecting the placement of a removed scute that was taken in the hatchery prior to initial reintroduction, which led to a large amount of uncertainty when fish were recaptured and aged. Undergraduate students Emily Collins and Jeff Stevens have been instrumental in this research and have gained valuable experiences.
- A diet study is continuing on reintroduced juvenile Lake Sturgeon in the Tennessee and Cumberland rivers. Thus far, it has been determined that fish from Ft. Loudoun Reservoir eat predominately *Chironomus* midges (95% by number of prey items from colonic flush samples), whereas fish from Watts Bar Reservoir immediately downstream eat mostly *Hexagenia* mayfly larvae (90% by number). Samples were taken in the Cumberland River during December 2018 and sampling is planned in Chickamauga Reservoir (Tennessee River) in January 2019.
- Doctoral student Kyler Hecke is developing an ecological niche model of the Sickle Darter and in 2019 will be studying movement of this species in

the Little River and Emory River using PIT tags. He is also developing spatio-temporal occupancy models of over 60 species of non-game fish and mussel species in the Clinch River drainage using historical datasets going back to the pre-TVA dam era.

- Masters student Grant Fisher is finishing up a study evaluating the degree of functional lift that can be achieved by stream habitat restoration in Ridge and Valley wadeable streams in east Tennessee. He is looking at functional traits of bimonthly benthic macroinvertebrate samples and semi-annual fish assemblage samples collected from four restored streams, four impaired streams, and four reference streams.
- Working as part of the “One Health” initiative at UTK, and with the assistance of faculty and students at the Center for Veterinary Medicine, continued investigation of trends in intersex severity among male fish from the upper Tennessee River system is being conducted by histological examinations of testes. Species examined were black bass (*Micropterus* spp.), Central Stoneroller (*Campostoma anomalum*), Whitetail Shiner (*Cyprinella galactura*), Greenside Darter (*Etheostoma blennioides*), and the Banded Darter (*Etheostoma zonale*). Thus far, it appears that Smallmouth Bass (*M. dolomieu*) have a very high prevalence of intersex (85% of males examined) and on average they have mild levels of intersex (based on the density of oocytes in a section of testis), whereas we have observed minimal or no intersex in the other species collected from the same environments. Smallmouth Bass may be more sensitive to endocrine disruptors than other species, or perhaps there is a natural or background level of intersex that occurs in the species, even in the absence of endocrine disruptors.
- Dr. Hayden Mattingly (Tennessee Technological University) communicated that he will be the coordinator and editor of a Special Issue of *Southeastern Naturalist* that will focus on the ecology and conservation of aquatic fauna on the Barrens Plateau of Tennessee. He welcomes contributions from any authors who have research pertaining to this topic and can be contacted at [hmattingly@tntech.edu](mailto:hmattingly@tntech.edu).
- Dr. Mattingly also noted that he will be receiving funding from TWRA to conduct an updated status survey for the Striated Darter (*Etheostoma striatulum*), that he and his students will be conducting an inventory of aquatic resources at Arnold Air Force Base during March-October 2019, and that he has a new student who will be researching life history aspects of the narrowly distributed Brawley's Fork Crayfish (*Cambarus williamsi*).
- Masters student Valerie Jones is conducting the data analyses for her thesis project which investigates summer and autumn habitat use of the Bluemask Darter with implications for reintroduction in the Calfkiller

River. Doctoral student Grady Wells recently defended his Pygmy Madtom (*Noturus stanauli*) dissertation and will be working for Dr. Mattingly until his graduation in May 2019.

- Tennessee Valley Authority (TVA) reservoir biologist Kurt Lakin reported that fish community sampling was conducted at 36 sites on 14 reservoirs within the Tennessee River system and at four sites on two Cumberland River reservoirs during autumn 2018. Of significance was collection of a Blue Sucker (*Cycleptus elongatus*) in Pickwick Reservoir inflow downstream of Wilson Dam (Tennessee River Mile 259). This is the only location where this species has been collected in the mainstem Tennessee River during the past 26 years of TVA reservoir monitoring. Two individuals were collected from this site during 1994 and one individual was collected here in 2010. A large adult American eel was collected in Nickajack Reservoir inflow downstream of Chickamauga Dam (Tennessee River Mile 470) during autumn 2018. This species is occasionally encountered in surveys in Kentucky Reservoir, the lowermost reservoir on the Tennessee River, but is rarely seen in the upper Tennessee River. A Nile tilapia (*Oreochromis niloticus*) was collected during autumn 2018 in Barkley Reservoir at Cumberland River Mile (CURM) 102. This species was first encountered by TVA biologists during 2013 in Old Hickory Reservoir (CURM 240). Both of these locations are near a heated power plant discharge which allows for winter survival. Silver Carp (*Hypophthalmichthys molitrix*) continue to be collected regularly in Barkley and Kentucky reservoirs.
- During 2018, TVA stream biologists sampled 102 stream sites throughout the Tennessee River drainage resulting in collection of 181 species, comprising 63,225 fish. Notable records include collection of eight Highfin Carpsuckers (*Carpiodes velifer*) and seven Blue Suckers from Duck River Mile 23.5. Aside from the Nolichucky River in the upper Tennessee River system, this is the only sampling location where these two species are regularly collected in Tennessee.
- Jeff Simmons reported that in July 2015, he and other TVA biologists collected Snail Darters (*Percina tanasi*) at two separate locations in Bear Creek, a tributary to the lower Tennessee River in Mississippi and Alabama. During a TVA survey three weeks later, individuals were collected in the Elk River which also drains to the lower Tennessee River. These were surprising discoveries since the previous most downstream record of Snail Darter in the Tennessee River system was from the Flint River located 152 river miles from the nearest Bear Creek collection site and 108 river miles from the Elk River locale. Furthermore, distances between the Elk River and Bear Creek locations were > 128 river miles

and are separated by two large Tennessee River reservoirs. It was assumed that these previously undetected tributary populations were a result of larval drift through Tennessee River reservoirs and that there was potential of reproducing populations in the mainstem. During 2017 and 2018, sampling efforts for Snail Darters in the Tennessee River were conducted using a benthic trawl. To date, individuals have been detected in sections of five Tennessee River reservoirs which span 272 river miles. In each reservoir, at least two age classes were collected. Flowing males and gravid females were collected during the spring, indicating that reproduction is occurring in the Tennessee River. During 2019, trawling will continue to learn more about population structure and abundance and to document the extent of occurrence in the mainstem Tennessee River.

**Texas:** Steve Magnelia *stephan.magnelia@tpwd.texas.gov*

- *Restoring Guadalupe Bass* - The Guadalupe Bass Restoration Initiative, which started in 2010, continues on as a priority project for the TPWD Inland Fisheries Division. Stockings of pure Guadalupe Bass have brought hybridization rates down to less than one percent in the south Llano River and pure populations have been re-established in the Blanco and San Antonio Rivers. Research studying effects of urbanization on Guadalupe Bass populations in the Colorado River Basin was completed in 2017. In January 2018 a new Guadalupe Bass Conservation Plan was released by TPWD. Efforts to restore Guadalupe Bass have now shifted to the Little River Basin, a sub-basin of the Brazos River. An annual report highlighting activities from 2018 is available. Contact Tim Birdsong (*timothy.birdsong@tpwd.texas.gov*) for more information.
- *Texas Instream Flow Program*—An instream flow report for the middle and lower Brazos River basin was published in June 2018; for six sites, recommendations were made for subsistence flows, base flows, and high flow events to address instream flow needs for fish, mussels, riparian areas, water quality, and fluvial geomorphology (i.e, sediment transport and channel maintenance). A summary of results will be presented at the Southern Division AFS meeting in Galveston. Instream flow studies are still ongoing in the Trinity and lower Guadalupe rivers and final reports are expected by December 2019. Data from this effort will be used to inform instream flow recommendations for maintaining a sound ecological environment. Study results will be used as best available science for water management to guide state agencies in managing rivers and streams. The lower Brazos River instream flow report is available here:  
[http://www.twdb.texas.gov/surfacewater/flows/instream/middle\\_lower\\_brazos/doc/BrazosRiverBasin\\_FinalRecommendationsReport\\_180615.pdf?d=](http://www.twdb.texas.gov/surfacewater/flows/instream/middle_lower_brazos/doc/BrazosRiverBasin_FinalRecommendationsReport_180615.pdf?d=)

14748.500000001513 Contact Kevin Mayes

([kevin.mayes@tpwd.texas.gov](mailto:kevin.mayes@tpwd.texas.gov)) for more information.

- *Research to Inform Prescribed Releases for Blue Sucker in the Lower Colorado River, Sabine and Rio Grande*—TPWD Inland Fisheries staff collaborated with the TPWD Water Resources Branch, Lower Colorado River Authority, and Texas Tech University on movement, population dynamics, and habitat occupancy studies of the state threatened Blue Sucker. A dissertation based on the lower Colorado River study was completed in January 2019. The upper boundary of population size in the 292-rkm study area was estimated at only 1,089 individuals, and recruitment since 2009 appeared weak. For more information, and additional study results contact Dr. Matt Acre ([Matthew.acre@ttu.edu](mailto:Matthew.acre@ttu.edu)).
- *BioBlitz Initiative*— Since 2013 the TPWD River Studies Program has been leading bioassessments on rivers and streams adjacent to State Parks and Wildlife Management Areas. This initiative was intended to support management needs of these properties, expand recreational initiatives such as the Texas Parks and Wildlife Department’s Texas Paddling Trails and River Access and Conservation Area Programs, and inform future research and conservation efforts through TPWD’s Native Fish Conservation Area initiative. Thus far this effort has resulted in the collection of fishes at 168 locations during eight bioassessments, resulting in over 25,000 records added to the University of Texas Fishes of Texas dataset. Bioassessment reports include fish, aquatic macroinvertebrate, freshwater mussel, riparian, and instream habitat data, as well as recommendations for improving conditions for aquatic and riparian species and recreational use. The latest bioassessment was completed on the San Bernard River, a Texas coastal stream. Reports are available on-line at the River Studies publications page on the TPWD web site <https://tpwd.texas.gov/landwater/water/conservation/fwresources/reports.phtml>.
- *Development of Floodplain Inundation Models to Inform Management of Alligator Gar*— Inland Fisheries Division staff finished development of a stage-specific floodplain inundation model for the middle Trinity River which is being used to correlate the extent of floodplain inundation with Alligator Gar year class strength were published in the 2018 Transactions of the American Fisheries Society special section titled “Angling for Dinosaurs”. Contact Clint Robertson ([clint.robertson@tpwd.texas.gov](mailto:clint.robertson@tpwd.texas.gov)) for more information.
- *Collaborative Research to Inform Conservation Decisions for Imperiled Freshwater Mussels*—River Studies staff are leading efforts to coordinate research on freshwater mussel species in Texas. Fifteen species are state-

listed threatened and eleven are petitioned for federal listing under the Endangered Species Act. Staff worked with leading experts to identify critical data gaps in our understanding of these species and to develop research projects for filling those gaps. Seven projects were selected and funded with State Wildlife Grant monies. Two projects are slated for funding in 2019 using Section 6 funding. Contact Clint Robertson ([clint.robertson@tpwd.texas.gov](mailto:clint.robertson@tpwd.texas.gov)) for more information.

- *Maintaining instream flows and building public support for native fish and mussel conservation and river recreation in the Devils River Basin* — The Devils River in southwest Texas is a unique desert river and considered the most pristine river in the state. It is home to many imperiled endemic species such as the Devils River Minnow; however, groundwater pumping poses an imminent threat of reduced spring flows. Baseflow reduction would negatively impact many already imperiled species and degrade one of the state's most remote and scenic paddling and angling destinations. TPWD is engaged in a number of technical studies such as groundwater-surface water interaction and fish habitat availability modeling, as well as building relationships with landowners to help ensure the rivers future. Contact Sarah Robertson ([sarah.robertson@tpwd.texas.gov](mailto:sarah.robertson@tpwd.texas.gov)) for more information.
- *Upper Brazos River Salt Cedar Control Project* — TPWD, in partnership with 50+ local landowners, USFWS Partners for Fish and Wildlife Program, and others, have been working for the past three years to implement salt cedar control in the Upper Brazos River beginning in the Double Mountain Fork and Salt Fork watersheds. Salt cedar infestation poses issues for water, but also degrades habitat for fish and wildlife, including two imperiled fishes. Research studies are underway at sites throughout the upper watershed to evaluate the effects of salt cedar control on water budget, water quality, river channel shape, and the riverside plant communities that provide important habitat for wildlife. For more information, see: <https://tpwd.texas.gov/landwater/water/aquatic-invasives/saltcedar-upperbrazos.phtml>
- *River Access and Conservation Areas Program*— With more than 95% of the land in Texas privately-owned and the state's population expected to potentially more than double by 2050, the public's access to land for recreational use, especially land close to major urban areas where demand is greatest, is in increasingly short supply. In 2011-2012, TPWD developed the River Access and Conservation Area Program (RACA) to address the need for increased access to the state's rivers and streams. This program has leased 19 public river access sites along the banks of the Brazos, Colorado, Devils, Guadalupe, Llano, Neches, Nueces, Sabine, and

South Llano rivers. These leases provided access to more than 45 miles of new bank and wade fishing opportunities and have increased access to more than 180 additional miles of river. Contact John Botros ([john.botros@tpwd.texas.gov](mailto:john.botros@tpwd.texas.gov)) for more information.

- *American Eel Study* — TPWD is partnering with the University of Texas at Austin, University of Houston-Clear Lake, USFWS, and numerous citizen-science volunteers to assess the status of American Eel in Texas to better inform conservation and management decisions. The primary objectives of this study are to assess the distribution and abundance, habitat use, movement patterns, and population structure (genetics and demographics) of American Eel across all life stages. Field sampling is primarily focused on the Coastal Plain with a concerted effort to collect glass and elver eel using a variety of gear types (including small-mesh fyke nets and eel mops). Yellow eel is the only life stage that has been documented in Texas and, to date, we've processed approximately 80 yellow eel, but no glass eel or elver have been collected despite extensive effort. The non-native nematode, *Anguillicoloides crassus*, has been documented from the swimbladder of American Eel at three locations. Contact Stephen Curtis ([Stephen.curtis@tpwd.texas.gov](mailto:Stephen.curtis@tpwd.texas.gov)) for more information.
- *Frio River Sand and Gravel Permit Study*— Due to an increasing volume of sand and gravel permits requests within the Frio River, coupled with growing opposition to them by downstream landowners; the Texas Parks and Wildlife Department has suspended issuance of any Sand and Gravel permits until a biology and geomorphology (sediment and hydrology) study has been completed in order to make better informed permitting decisions. This is a collaborative study between TPWD, the Texas Forest Service and Texas Water Development Board. The study area covers approximately 26 miles. A final report is tentatively planned to be completed by March 2019. Contact Melissa Parker ([melissa.parker@tpwd.texas.gov](mailto:melissa.parker@tpwd.texas.gov)) for more information.
- *Effects of Energy Production on the Balmorhea Springs Complex*— Freshwater springs contribute substantially to the west Texas regions water quantity and quality. Springs in this arid area of the state are also ecologically important as they provide habitat for numerous rare and federally listed endemic aquatic species. These species are dependent on the maintenance of spring flows. San Solomon Springs, entirely within Balmorhea State Park, is the largest spring in the region. While much of far west Texas has experienced petroleum exploration and production over the last half century a newly discovered gas and oil field in the proximity of the Balmorhea Springs complex, and the groundwater needed to drill

new wells, has raised concern about the future of flows at the springs. Many springs in Texas have ceased to flow as a result of groundwater pumping. It is estimated that as many as 5,000 new wells, requiring an estimated 4-15 billion gallons of water, will be drilled in the next 20 years. This water will likely be pumped from local aquifers. In the past two years Texas Parks and Wildlife Department and regional partners have established baseline monitoring for species of the Balmorhea Springs Complex, installed continuous real-time streamflow and water quality monitoring stations at San Solomon Springs, and assisted others with ongoing research in the region with regard to groundwater-surface water interaction. A baseline information report is slated for completion by summer of 2019. Contact Megan Bean ([megan.bean@tpwd.texas.gov](mailto:megan.bean@tpwd.texas.gov)) for more information.

**Virginia:** Steve Powers ([powers@roanoke.edu](mailto:powers@roanoke.edu))

- Mike Pinder, Virginia Department of Game and Inland Fisheries Aquatic biologist conducted surveys for the Blackbanded Sunfish (*Enneacanthus chaetodon*) in the Nottoway and Blackwater River systems of Prince George, Southampton and Sussex counties. The Blackbanded Sunfish is a state endangered species known to inhabit swamps, beaver ponds, and mill ponds. In 2014, only two sites were known to have extant sunfish populations. Since then, 58 sites have been sampled. During 2018, 11 ponds were sampled uncovering two additional sites for the species bringing the number of known locations in Virginia to 12.
- Mike Pinder, Virginia Department of Game and Inland Fisheries Aquatic biologist led a meeting of governmental agencies, academia, and nonprofit organizations interested in the conservation and protection of the Copper Creek's biodiversity. Copper Creek is a 61-mile long tributary of the Clinch River located in Scott and Russell counties. Historically, it contained the greatest number of native fish (64 species) and mussels (26 species) of any Clinch River tributary in Virginia. Additionally, many species in Copper Creek are listed as threatened and endangered. In recent decades, biologists have become alarmed by the declines to many of these species and increased threats within the drainage. The meeting participants discussed ongoing monitoring and restoration efforts in the watershed and focused on future research, monitoring and restoration to help this biologically important system.
- Over the last two summers, Mike Pinder, Virginia Department of Game and Inland Fisheries Aquatic biologist has sampled seven sites on Indian Creek to better ascertain Blotchside Logperch (*Percina burtoni*)

abundance and distribution. Only six individuals have been found in a 400 m long reach of Indian Creek indicating that the population is extremely small and highly localized. All specimens had a small section of their caudal fin excised to assess their DNA for genetic diversity and population structure. Samples from Indian Creek will be compared to those collected in the mainstem Clinch River. Results will be used to determine which source population will be used propagate into the Powell River. Further work will involve surveying the mainstem Powell River and other tributaries to determine logperch presence and assess suitable habitat if reintroduction is deemed necessary.

- Mike Pinder, Virginia Department of Game and Inland Fisheries Aquatic Biologist assisted a biology class from the Virginia Highlands Community College (VHCC) to remove an invasive fish from a stream that flows into Hungry Mother Reservoir, Smyth County. In 2015, Aquatic biologists discovered the presence of the Mountain Redbelly Dace (*Chrosomus oreas*) in the fore mentioned stream while participated in a biological survey of Hungry Mother State Park (HMSP). Mountain Redbelly Dace are known from the New River and Atlantic Slope tributaries of Virginia but are invasive in the Tennessee River drainage, where the survey was conducted. A sister species to the Mountain Redbelly, the Tennessee Dace (*Chrosomus tennesseensis*) is state endangered and found in the headwaters of Hungry Mother Creek above the reservoir. In situations where the two dace species have come together, the Mountain Redbelly interbreeds and displaces the Tennessee. To prevent this scenario, VDGIF and Dr. Kevin Hamed, VHCC instructor) partnered to prevent the further spread of Mountain Redbelly Dace and find ways to permanently remove it from its occupied stream. Our most recent survey uncovered over 150 dace within 0.10 miles of stream using backpack electroshocking. All dace were preserved and will be examined by the students at a later date. The total stream length is over 1.9 miles so more work to remove the dace and determine its occupied area is planned. In addition to surveys, biologist will be partnering with HMSP staff to develop an outreach program to inform local anglers not to release their unused bait.
- Mike Pinder, Virginia Department of Game and Inland Fisheries Aquatic Biologist sampled nine sites on Back Creek, a small tributary of the New River, Pulaski County. Most of Back Creek is agricultural in cattle and row crops. Fish were sampled using a combination of electroshocking and seining. Multiple meso-habitats (riffles, pools, runs) were sampled including large woody debris piles and back channels. Area sampled, average depth, and substrate was estimated

during each sampling event. Of the 35 species, 16 are nonnative to the New River drainage. Most notable introductions are the Redline Darter (*Etheostoma rufilineatum*), Snubnose Darter (*Etheostoma simotenum*) and Fathead Minnow (*Pimphales promelas*). Survey information will be used to assist in stream restoration projects in this heavy impacted system.

- Mike Pinder, Virginia Department of Game and Inland Fisheries Aquatic biologist in partnership with Conservation Fisheries, Inc. continued efforts to reintroduce the Yellowfin Madtom into the North Fork Holston River (NFHR), Smyth County. On 29 August 2017, the two reintroduction sites were snorkeled to assess survivorship and successful recruitment of the stocked fish (2015 and 2016 age-class). Two tagged (2015 and 2016 year-class) Yellowfin Madtoms were observed at NFHR mile 106, just upstream of the VA 629 Ridge Road Bridge; and one tagged 2016 year-class YFM was observed at NFHR mile 97.8, behind the Northwood Middle School. During the third year of releasing propagated madtoms, 310 were released at two sites in June 2018. Prior to release monitoring efforts, biologists detected two active Yellowfin Madtom nests at both sites.
- Mike Pinder, Virginia Department of Game and Inland Fisheries Aquatic Biologist continued stream restoration activities to benefit the Roanoke Logperch (*Percina rex*), a federally endangered species. In coordination with partners, approximately 0.75 mi of the North Fork Roanoke River, Montgomery Co., will be restored. River restoration activities will include bank stabilization, installation of in-stream structures for grade control and aquatic habitat, riparian buffer establishment, riparian fencing for livestock exclusion along waterways, grazing system and livestock watering infrastructure development, and shallow water wetland establishment and enhancement. The project will also include the removal of a low water bridge acting as a low head dam to improve connectivity and distribution of aquatic species within the NFRR. Project implementation will be December 2019.
- Mike Pinder, Virginia Department of Game and Inland Fisheries Aquatic Biologist responded to a fish kill on Garden Creek, a tributary of the Levisa Fork, Buchanan Co. The spill occurred the previous morning and was caused by a release of an unknown substance from a coal mine stormwater pond. Biologists assisted staff from the Virginia Department of Environmental Quality (DEQ) to conduct the fish kill investigation. The most significant find was the presence of Variegated Darter (*Etheostoma variatum*), a state endangered species. Variegated

Darter was previously only known in the Levisa Fork approximately 2 miles downstream of its confluence with Garden Creek. An estimated total of 8,931 individuals of 15 species were killed as a result of the spill. It included an estimated 109 Variegates, which is probably an underestimate due to the difficulty in detecting small benthic species. Biologist went upstream of the kill zone and sampled a tributary of Garden Creek. In a 100 m stream reach, biologists found 7 live Variegate Darters (4 males and 3 females). DGIF staff are cooperating with DEQ to determine the extent of damages and fines that will be placed upon the responsible party.

- Zach Martin here from Virginia Tech in the Angermeier Lab. This year I brought physical habitat surveys in Copper Creek of the Clinch River basin to a close and began modeling benthic habitat response to the sediment dynamics (e.g. transport, filtration, and delivery) and the agricultural best management practices (BMPs) implemented throughout the drainage. This work will provide Copper Creek stakeholders information on the spatial distribution of benthic habitat quality, priority areas for erosion control management, and potential efficacy of BMP implementation throughout the drainage. I also conducted lab experiments in Spring 2018 to pair with Spring 2016 and 2017 field-based spawning surveys; these projects both use *Etheostoma flabellare*, Fantail Darter, to test the effects of substrate embeddedness on spawning effort. Even without these dissertation-specific projects, the Angermeier Lab was quite busy this past year. We marked the 10-year anniversary of monitoring the Roanoke logperch population upstream of Philpott Dam in Smith River (trib. to Dan River), Joe Buckwalter and an army of technicians collected and processed larval fishes from upper Roanoke River, Mallory Hirschler (also w/ Plymouth University) lead a community-sampling effort in the Dan River drainage, and Katie McBaine began to wind down her status assessment of *Etheostoma osburni*, Candy Darter, populations in Virginia drainages of the New River.
- Steve Powers at Roanoke College continued investigations of microhabitats of darters in the Roanoke River resulting in the following publication: Powers, S.L., and P. Whitlow. 2018. Microhabitat of the Chainback Darter, *Percina nevisense* (Actinopterygii: Percidae), in the Upper Roanoke River in Salem, VA. *Banisteria*. 50:10-14.
- A georeferenced, electronic database for the Roanoke College Ichthyological Collection is also now available at his faculty profile page (<https://directory.roanoke.edu/faculty/238>) as are images of Virginia fishes electronically archived in the Roanoke College library originally photographed by Robert Jenkins and Noel Burkhead.

**West Virginia:** Stuart Welsh ([swelsh@wvu.edu](mailto:swelsh@wvu.edu))

- The Candy Darter was federally-listed by USFWS:
- U.S. Fish and Wildlife Service (USFWS). 2018. Endangered and threatened wildlife and plants; designation of critical habitat for the Candy Darter. Federal Register 83:59232–59268.
- U.S. Fish and Wildlife Service (USFWS). 2018. Endangered and threatened wildlife and plants; endangered species status for the Candy Darter. Federal Register 83:58747–58754.
- The following study on the Candy Darter was completed recently:
- Gibson, I., A.B. Welsh, S.A. Welsh, D.A. Cincotta. 2018. Genetic swamping and possible species collapse: tracking introgression between the native Candy Darter and introduced Variegated Darter. Conservation Genetics DOI 10.1007/s10592-018-1131-2.