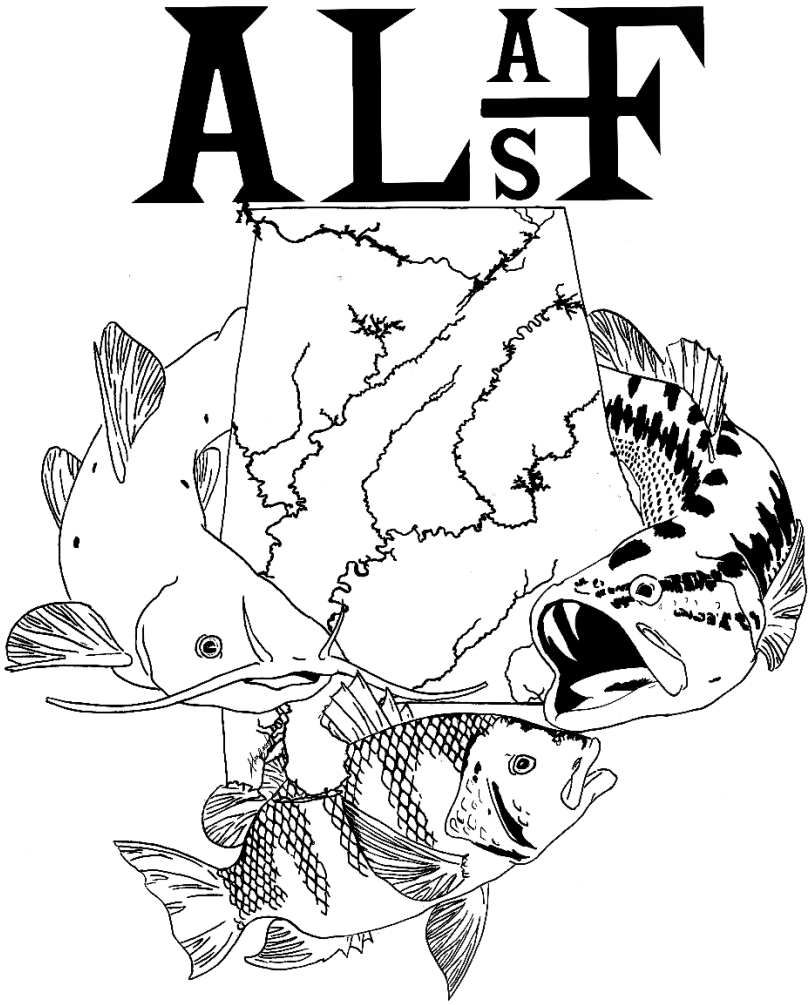
2020 Annual Meeting
Alabama Chapter of the American Fisheries Society



Joe Wheeler State Park Resort

Rogersville, Alabama
March 4-5, 2020

Current Officers

President:	Josh Yerby
President-elect:	Keith Henderson
Past President:	Dave Armstrong
Secretary:	Michael Sandel
Treasurer (Interim):	Steve Rider
AU Subunit President:	Daniel Thomas

Corporate Sponsors

Platinum Level Sponsors

ETS
Electrofishing Systems LLC

Gold Level Sponsors

Alabama Power

B.A.S.S. ALABAMA NATION

PUBLICATIONS PRESS, INC.
Est. 1998

Corporate Sponsors (Continued)

Silver Level Sponsors

Kleinschmidt

Raffle Donors

Alabama Aquarium & Pond Services est. 1987

Big Bite Baits

Team Catfish Real Catfish Gear

Tru Turn Hook More Fish!

Daiichi World's Sharpest Hooks

Road Runner by Blakemore Slow Presentation + Flash + Vibration = More Fish!

Thank you to all of the ALAFS sponsors and donors!

Program Schedule

- **All oral presentations and business meeting to be held in the Cypress Room.**
- **Poster presentations, social, and banquet to be held in the River Room.**

Wednesday, March 4

10:30 AM – 4:00 PM	Meeting Registration & Load Talks
10:30 AM – 5:00 PM	Poster Setup
12:00 PM – 12:20 PM	Opening Remarks
12:20 PM – 2:00 PM	Student Presentations – Session A
2:00 PM – 2:10 PM	Break (Snacks Provided)
2:10 PM – 3:50 PM	Student Presentations – Session B
3:50 PM – 4:00 PM	Break
4:00 PM – 5:00 PM	Business Meeting
5:00 PM – 6:30 PM	Poster Presentations & Social
6:30 PM – 8:30 PM	Banquet, Guest Speakers, & Awards

Thursday, March 5

8:00 AM – 8:40 AM	Breakfast/Meeting Registration
8:40 AM – 10:40 AM	Presentations – Session C
10:40 AM – 10:50 AM	Break (Snacks Provided)
10:50 AM – 12:30 PM	Presentations – Session D
	Adjourn

Banquet Guest Speakers:

Jason Olive, Vice President, Southern Division of AFS

Jason Olive is the Assistant Chief of Fisheries Management for the Arkansas Game and Fish Commission. He is currently serving as Vice President of the Southern Division of AFS as well as the Secretary/Treasurer of the AFS Fisheries Administration Section. Jason is a native of Florence, AL, and received BS and MS degrees in fisheries management from Mississippi State University. He has worked as a fisheries biologist for both the AR Game and Fish Commission as well as the MS Department of Wildlife, Fisheries, and Parks; and has served as an administrator for the past 5 years. Jason has served as an officer at the sub-unit, chapter, division, and section levels of AFS and a sub-committee of AFWA.

Dr. Patrick E. O'Neil, retired Deputy Director, Geological Survey of Alabama, current Adjunct Member of the Ecosystems Investigations Program at GSA.

Pat O'Neil spent his childhood living in several southeastern states, finally settling in Birmingham. He is an Eagle Scout and guided his three sons and many other young men to achieve the same distinction and remains very active in the Boy Scouts to this day. He is a graduate of the University of Alabama, where he earned an M.S. in Biology/Ichthyology, an M.S. in Environmental Engineering, and a Ph.D. in Civil Engineering. His doctoral dissertation focused on the effects of produced water from coalbed methane development on receiving waters in the Hurricane Creek system of the Black Warrior River. He is now retired from the Geological Survey of Alabama, where he served the people of Alabama for 40 years and continues to do so in 'retirement'. His contributions include original research in watershed-related issues involving complex multi-disciplinary components leading to better comprehension and protection of Alabama's vast aquatic resources. He is masterful in incorporating academic, research, regulatory, and non-governmental agencies, as well as the general public, into partnerships to find common ground to protect those resources for future generations and all interested parties. His publication list includes many Geological Survey publications that were the result of funded research projects, numerous peer-reviewed scientific journal articles, as well as informative articles in trade publications and the popular press. Some notable publications include 'Fishes of Alabama and the Mobile Basin', 'Rediscovery of the Trispot Darter, *Etheostoma trisella*, in Alabama', 'Paddlefish Movements in the Lower Mobile River Basin, Alabama', 'Standard Operating Procedure Manual for Sampling Freshwater Fish Communities and Application of the Index of Biotic Integrity for Assessing Biological Condition of Flowing, Wadable Streams in Alabama', and 'Water-quality Assessment of the Lower Cahaba River Watershed, Alabama'.

Dr. O'Neil has spent his entire professional life contributing to research involving practical approaches to water conservation and disseminating that knowledge, therefore informing the public of the extraordinary natural resources Alabama possesses. Because of Dr. O'Neil's dedication, his illustrious career and descriptive writing continues to inform Alabama's citizens, anglers, ichthyologists, and outdoor enthusiasts to those resources. His dedication to conservation of Alabama's natural resources will ensure the quality of its resources for generations to come. conservation of Alabama's natural resources will ensure the quality of its resources for generations to come.

Presentation Schedule

Wednesday, March 4

SESSION A (STUDENTS) – CYPRESS ROOM

Moderator: Cal Johnson, ADEM

12:20 pm Distribution, Abundance, and Habitat Association of Tallapoosa *Bass Micropterus tallapoosae* in the Tallapoosa River drainage, Alabama. Nathan Thompson and Steven Sammons

12:40 pm Population Genomic Variation Among Walleye (*Sander vitreus*). Alex Rakestraw et al.

1:00 pm An Aquatic Melting Pot: Mapping Genetic Homogenization Among Bullhead Minnow Populations of the Tenn-Tom Waterway. P. Kiersten Schellhammer and Michael Sandel

1:20 pm Genetic Assessment of Hybridization within the Alabama Redeye Bass Complex. Matt Lewis et al.

1:40 pm "Seasonal Post Translocation Movements of Paddlefish in the Alabama River". Daniel Thomas et al.

2:00 – 2:10 pm Break (Snacks Provided)

SESSION B (STUDENTS) – CYPRESS ROOM

Moderator: Colin Dinken, Kleinschmidt Group

2:10 pm Determination of the age of hybrid catfish *Ictalurus punctatus* ♀ x *Ictalurus furcatus* ♂ and channel catfish *Ictalurus punctatus* from commercial fish farms and evaluating economically efficient management strategies to control "Big Fish". Daniel Creel et al.

2:30 pm Performance and profitability of in-pond raceway system production trials growing hybrid catfish plus tilapia. Letícia E. Fantini et al.

2:50 pm Single Nucleotide Polymorphisms Reveal Genetic Isolation and Genetic Drift in the Imperiled Coal Darter (Percina brevicauda). Kenny D. Jones II et al

Wednesday, March 4 continued

3:10 pm The swimming performance of Freshwater Drum (*Aplodinotus grunniens*) in various temperature and dissolved oxygen treatments. Colin Laubach et al.

3:30 pm Genomic assessment of population structure in Sheepshead, *Archosargus probatocephalus.* Pearce T. Cooper et al.

3:50 – 4:00 pm Break

4:00 – 5:00 pm Business Meeting – Cypress Room

5:00 – 6:30 pm **Poster Presentation – River Room**

Evaluation of the Potential Predator-prey Relationship of *Procambarus clarkii* and *Litopenaeus vannamei* in a Low Salinity Recirculating Tank System. Jesse James et al.

Employing Acoustic Tagging Methods to Track Southern Flounder Spawning Outmigration from Mobile Bay. Dylan M. Kiene and Sean P. Powers

Metabarcoding Freshwater Fish Species of the Mobile Basin Watersheds. John Larrimore and Michael Sandel

Importance of Oyster Reef Design and Setting in Restoration Success in Mobile Bay. Merritt E. McCall and Sean P. Powers

Effects of environmental variables on spatial distribution of Greater Amberjack (*Seriola dumerili*) in the Alabama Artificial Reef Zone (AARZ). Justin McDonald and Sean Powers

Biological Condition of Fish Communities, Habitat, and Land Cover in the Bear Creek Strategic Habitat Unit, 2008-2013. Stuart W. McGregor et al.

Ichthyofaunal evidence supporting a hypothesized stream capture event between the Tennessee and Mobile River Basins and implications on conservation. Julia E. Wood et al.

Demographics and Life History of Bridgelip Sucker (*Catostomus columbianus)* in Williams Lake, Salmon, Idaho. Amber N. Young and Conor McClure

Thursday, March 5

8:00 – 8:40 am Breakfast (Biscuits and Coffee Provided) & Meeting Registration

SESSION C

Moderator: Kasie McKee, ADCNR

8:40 am The Potential of Alternative Production Systems for Raising Largemouth Bass *Micropterus salmoides.* Anita M. Kelly et al.

9:00 am Evaluation of stocking density and dietary fish meal inclusion for intensive tank production of Pacific white shrimp (*Litopenaeus vannamei*) cultured in low salinity waters of west Alabama. Luke A. Roy et al.

9:20 am Changes in physiology and stress responses of Largemouth Bass *Micropterus salmoides* naturalized with live forage diets. Colin P. Dinken et al.

9:40 am Evaluating gear type and environmental conditions to improve catch success of Alligator Gar broodfish in the Mobile-Tensaw Delta. Dave Armstrong and Tommy Purcell

10:00 am Alabama Power Company – Challenges for the Aquatic Plant Management Program. Tim McLean

10:20 am High Risk = High Reward: Dredging Long Life Lake at the Birmingham Botanical Gardens. Kyle Moon

10:40 – 10:50 am Break (Snacks Provided)

SESSION D

Moderator: Mike Holley, ADCNR

10:50 am Tag Alabama: Early Success in an Angler Based Saltwater Recreational Tagging Program. Crystal L. Hightower et al.

11:10 am Semiautomated Process for Enumeration of Fishes from Recreational-Grade Side-Scan Sonar Imagery. Katelyn M. Lawson et al.

11:30 am eDNA Surveillance and Genomic Characterization of the Threatened Trispot Darter (*Etheostoma trisella*). Kayla Fast et al.

Thursday, March 5 continued

11:50 am Cooperative Survey of Tributaries in Bankhead National Forest for Federally Endangered Rush Darter (*Etheostoma phytophilum*). Dylan Shaw et al.

12:10 pm Fish Passage Enhancement for Trispot Darter (*Etheostoma trisella*). Chad Fitch

ADJOURN

ABSTRACTS

ORAL PRESENTATIONS (STUDENT SESSIONS)

Nathan Thompson (Student), ngt0006@auburn.edu, 970-901-2122

Distribution, Abundance, and Habitat Association of Tallapoosa *Bass Micropterus tallapoosae* in the Tallapoosa River drainage, Alabama.

Nathan Thompson[1] and Steven Sammons[1]

[1]Auburn University, School of Fisheries, Aquaculture, and Aquatic Sciences, Auburn, AL 36849

The diversity of freshwater fishes and the black bass *Micropterus* spp. in the United States are concentrated in the southeastern region. Dams, anthropogenic land use, fragmentation, invasive species and other factors are contributing to decreasing distributions and increasing imperilment in the number of native fishes in this region. Some black bass, such as the Tallapoosa Bass *Micropterus tallapoosae* have recently been elevated to species status and their exact distributions are unknown. The goal of this study was to determine the distribution of Tallapoosa Bass and examine the land use, habitat, abiotic variables, and interactions that contribute to the presence and absence of Tallapoosa Bass. Fifty-one creeks were sampled from May-August of 2019. Preliminary results indicate Tallapoosa Bass prefer more rocky substrate, less large woody debris, cooler temperatures, less turbid streams, less conductive streams, higher DO levels, moderate amounts of pools and runs, and stream segments with more stable and vegetated banks. Further analyses will determine significance of these relationships and construct a predictive distribution model to identify populations in need of conservation.

Bio: I grew up in Montrose, Colorado. I graduate in May 2014 (B.S. in Wildlife and Fisheries Biology and Management) from the University of Wyoming and spent several field seasons with Colorado Parks and Wildlife and Wyoming Game and Fish. My project is on the distribution of Tallapoosa Bass in the Tallapoosa River drainage under Dr. Steven Sammons and Dr. Terry Hanson.

Alex Rakestraw (Student), rakestrawa@uwa.edu, 256-339-0814

Population Genomic Variation Among Walleye (*Sander vitreus*)

Alex Rakestraw[1], University of West Alabama; Dominique Dawson[1], University of West Alabama; Steve Rider[2], Alabama Department of Conservation and Natural Resources; Michael W. Sandel[1], University of West Alabama

[1]University of West Alabama, Department of Biological and Environmental Sciences, Livingston AL 35470
[2]Fisheries Annex Conservation Warehouse 3608 Fairground Road Montgomery, AL 36110

Sander vitreus, commonly referred to as the walleye, is a North American game fish native to eastern waterways that drain into the Atlantic. This broad range covers the various climate and habitat types stretching north-to-south across the contiguous United States, which has given rise to rich genomic diversity amongst the species. Of this genomic diversity, the Mobile River Basin has previously been found to have a unique haplotype, which is also supported by our evidence. Our objective was to investigate the genetic variation amongst the various walleye populations, specifically within the Mobile River Basin, and determine if there were any significant differences in the genetic composition of those populations. We extracted DNA from 188 samples caught in areas extending from Lake Eerie to the Mobile Basin, which were then sequenced using dartR to create a library of nuclear single nucleotide polymorphisms (SNPs). Vetting the library yielded 6,503 high quality SNPs to provide insight pertaining to the genomic composition of the populations. Results indicate populations of genetically distinct southern strains isolated to the Mobile River basin, as well as some loss of southern strain genetic diversity by the stocking of northern strains in southern watersheds.

Bio: I grew up in Cullman, AL. Graduated from The University of Alabama (B.S. Biology) in 2017. My thesis is on South American guppie ecology under Dr. Sandel.

P. Kiersten Schellhammer (Student), schellhammerp@uwa.edu, 205-614-8879

An Aquatic Melting Pot: Mapping Genetic Homogenization Among Bullhead Minnow Populations of the Tenn-Tom Waterway

P. Kiersten Schellhammer[1], Michael Sandel[2]

[1]The University of West Alabama, Department of Natural Sciences and Mathematics, Livingston, Alabama 35470
[2]The University of West Alabama, Department of Natural Sciences and Mathematics, Livingston, Alabama 35470

The Tennessee-Tombigbee Waterway maintained by the Army Corps of Engineers through the use of various locks and dams, has greatly influenced the biodiversity of the Tombigbee River, altering its flow, increasing its range, and connecting it to the Tennessee River. Previously, the Tennessee and Tombigbee Rivers had not come into contact with each other since the early Cenozoic Era, giving the fish in these systems time to become distinct populations and species, from the ancestral fishes. This project investigates the genetic impact brought about by this hydrological change. The Bullhead Minnow, *Pimephales vigilax*, is the indicator species used for this project due to its broad range, low specificity, and relative abundance. The range of the Bullhead Minnow is largely the Mississippi River System; the Tennessee population had little, to no contact with the Mobile Basin population, until the construction of the Tenn-Tom Waterway. Thereby making the Bullhead Minnow suitable for study. The Bullhead Minnow is easily distinguished from other minnows due to its crowded pre-dorsal scales, dark caudal spot separated from the longitudinal streak, and a dark dorsal spot. Using the Bullhead Minnow is economically, and biologically more sustainable than other imperiled fishes. We collected minnows using traditional seining methods at boat ramps. Mitochondrial Cytochrome Oxidase I gene was sequenced along with Single Nucleotide Polymorphisims, SNP's, which were processed by Diversity Arrays Technologies. The mitochondrial and SNP data so far suggests a rapid change in genetic diversity within a short amount of time. After extensive collection along the Tennessee and Tombigbee Rivers, there emerged three populations, the Tennessee population, the Tombigbee population, and an introgressed population. The loss of diversity promised by the disruption of habitat, particularly riverine habitat, portends extinction in many of these events.

Bio: I am from Tuscaloosa, Alabama, my B.S. in Biology (Medical Comprehensive) was completed from The University of West Alabama in 2018. I am currently researching the Bullhead Minnow, with Dr. Michael Sandel.

Matt Lewis **(**Student)**,** mrl0004@auburn.edu**,** 334-449-1770

Genetic Assessment of Hybridization within the Alabama Redeye Bass Complex

Matt Lewis[1], Auburn University; Honggang Zhao[1], Auburn University; Mike Holley[2], Alabama Department of Conservation and Natural Resources; Chris McKee[2], Alabama Department of Conservation and Natural Resources; Dr. Eric Peatman[1], Auburn University

[1] 559 Devall Dr, Auburn, AL 36849
[2] ADCNR: 64 N Union St, Montgomery, AL 36130

Hybridization among black bass has been well established among co-evolved species and following non-native introductions. Conservation of endemic populations of black bass requires an understanding of genetic diversity and structure and accurate determination of hybridization status. The redeye bass (REB) complex is composed of seven cryptic black bass species and forms endemic to the southeastern United States. Alabama contains a large portion of the native range of redeye bass, however, little effort has been directed toward understanding genetic relationships among these range-restricted groups and between sympatric Alabama Bass (*Micropterus henshalli*). Working together with Alabama DCNR, we have utilized a previously developed SNP panel to screen REB samples for purity and hybridization. Initial results from 45 different streams indicate that the Tallapoosa River drainage has population-specific hybridization rates varying from 0% to 70%. Furthermore, confirmed, pure specimens collected across each species range will be vouchered and utilized for genotyping-by-sequencing. Resulting genome-wide SNP markers will be filtered to obtain an informative subset for future panel-based REB genetic analyses, both within and across species groups. This study and associated SNP resources should facilitate future, routine monitoring of Alabama REB populations to quantify hybridization status and to help guide and inform management decisions focused on their conservation.

Bio: Matt grew up in Geneva, AL and completed his master's in fisheries at Auburn in 2010. After a short career in biomedical research, he has returned to his passion of fisheries with hopes of applying his experiences in human genetics to apply genetics in the conservation of native fish species. Current project is working under Dr. Eric Peatman to assess the genetic population structure of Alabama's Redeye Bass and to quantify their hybridization with sympatric Alabama Bass.

Daniel Thomas[1] (Student), bdt0013@auburn.edu, 706-562-4083

“Seasonal Post Translocation Movements of Paddlefish in the Alabama River”

Daniel Thomas[1], Dennis R. DeVries[1], Russell A. Wright[1]

[1]School of Fisheries, Aquaculture, and Aquatic Sciences, Auburn University Auburn, Alabama, 36849

Dams can impede spawning migrations, and in the Southeastern U.S., most dams have no structures to allow controlled fish passage. Additionally, the process of tagging fish during migration can result in them abandoning spawning (sometimes referred to as ”fallback”). To quantify both the potential for fallback and the effects of translocation on paddlefish, we collected fish during prespawn and spawning periods in the tailrace of the lowermost structure on the Alabama River (Claiborne Lock and Dam) to quantify movement of fish after translocation, as well as any effects due to spawning condition. Fish were translocated approximately 6.5 km upriver to the mouth of a small tributary, tagged with a combined acoustic/radio tag, and then released. Manual tracking occurred at 24 hours, 48 hours, one week, and one month post-translocation, and stationary acoustic receivers located throughout the river provided additional movement data. Up-river movement of 16-80.5 km occurred within the first week in 53% of prespawn fish, and in 58% of spawning fish. After one month post-translocation 47% of prespawn paddlefish had moved upstream 96.6 river km to the next lock-and-dam structure (Millers Ferry Lock and Dam) compared to only 8% of spawning paddlefish. Prespawn and spawning fish that were not detected upriver were found in a backwater area at the translocation site, and only one was found downstream (in a tributary). Our findings support that manually translocating paddlefish represents a viable option for passing fish across a dam during prespawning periods with minimal risk to fallback.

Bio: I grew up in Harris County, GA just 8 miles from Callaway Gardens. I graduated from The University of Georgia in 2013 with a degree in Fisheries and Wildlife with an emphasis on aquatic sciences from the Warnell School of Forestry and Natural Resources. Current second year Masters student working on the impacts of tagging and translocation of paddlefish and southeastern blue suckers under Dennis DeVries and Rusty Wright at Auburn University.

Daniel Creel (Student), jdc0037@auburn.edu, 334-422-5177

Determination of the age of hybrid catfish Ictalurus punctatus ♀ x Ictalurus furcatus ♂ and channel catfish Ictalurus punctatus from commercial fish farms and evaluating economically efficient management strategies to control “Big Fish”

Daniel Creel[1], Terrill R. Hanson[1], Luke A. Roy[1], Steve Sammons[1]

[1] Auburn University, School of Fisheries, Aquaculture, and Aquatic Sciences, Auburn, AL 36849

In 2017 and 2018, catfish processing plants desired a fish between 0.5 – 1.8 kg and paid a premium price for fish within this size category. Fish beyond this range are too large for the mechanized fillet machines at the processing plant and have to be filleted by hand at the expense of more labor. For this reason, farmers may receive a reduced price or no compensation at all for “Big Fish” (catfish > 1.8 kg). In the summer of 2018, 287 catfish (153 channel catfish and 134 hybrid catfish) ranging from 0.5 - 21 kg were collected from commercial catfish ponds and from a catfish processing plant to determine the ages of catfish of different size classes using otolith aging techniques. This data was used to compare the growth rates of channel and hybrid catfish to determine which species would become “Big Fish” in the shortest amount of time. In production years 2017 and 2018, “Big Fish” decreased gross revenue from catfish sales by $12 million and $9 million dollars, respectively. This loss did not take into account the increased production costs associated with oversized fish or the kg of “Big Fish” that the farmer received no money for making the true cost of “Big Fish” in reality much higher. A survey titled *2019 “Big Fish” Survey of the Alabama Catfish Industry* was mailed to the catfish producers in Alabama to determine what methods farmers utilize to control “Big Fish” in their ponds. Three control strategies were developed from the survey results to determine their effectiveness at controlling “Big Fish”. Partial budgets were developed for each control strategy to analyze the cost and benefits of each strategy.

Bio: I grew up in west Alabama in the heart of catfish country. I graduated from Auburn University with a BS in Agricultural Business and Economics. My graduate work is on the economic cost of “Big Fish” on the west Alabama catfish industry under Dr. Terry Hanson.

Leticia Fantini (Student), lef0022@auburn.edu, 334-444-4730

Performance and profitability of in-pond raceway system production trials growing hybrid catfish plus tilapia

Letícia E. Fantini, Jesse Chappell, Terry Hanson

School of Fisheries, Aquaculture and Aquatic Science, Auburn University
203 Swingle Hall, Auburn, AL, USA 36849;

Hybrid catfish (channel catfish, *Ictalurus punctatus*, ♀ x blue catfish, *I. furcatus*, ♂) were raised in In-Pond Raceway Systems (IPRS) and Tilapia (*Oreochromis nilotica*) grown in cages. Four ponds of 0.4 ha had a large raceway (these units grew stockers to foodsize, called “growout”) and a smaller raceway (these units grew fingerlings to stocker size, called “stocker generator”). Once growout units were harvested, the stockers would be harvested and placed into the vacated, adjacent growout unit for growth to foodsize fish. Additionally, a tilapia cage was placed into 2 of the 4 ponds and were used to reduce blue-green algae populations and large daily dissolved oxygen variations. Each pond had a total of 5 HP of aeration keeping the dissolved oxygen above 3 mg L^{-1}. Hybrid catfish (stocker + growout) had yields ranging from 14,600 to 17,382 kg/ha with FCR averaging 1.59 and 1.70 for stocker and growout, respectively. Total production equaled or surpassed production yields from conventional catfish pond production systems. A total of 1,739 kg of tilapia were harvested, increasing total production by 11%, with no additional feeding. An investment of $138,530 was necessary to install the IPRS systems and water movers in the four 0.4 ha ponds. Enterprise budget fixed and variable costs were developed using actual investment and production data. The economic profit was calculated using the monetary value of all inputs, including opportunity costs for non-cash items and risk premiums along with an accounting profit (net return calculated without the value of non-cash inputs) that may be closer to what adopters of this technology would actually encounter. Costs of production varied among raceway and were influenced by survival and FCR. Economic enterprise budgets indicated negative net return when combined catfish + tilapia production and only catfish production, however, in ponds with tilapia production included, had a positive net return. Accounting enterprise budgets showed positive net returns above variable cost and above all costs for Catfish + tilapia combined and for catfish and tilapia separately.

Bio: I am from Brazil, I graduated in 2012 and I am a current Master student in the School of Fisheries, Aquaculture and Aquatic Sciences at Auburn University, Auburn, AL. My thesis research evaluates the performance and profitability of IPRS systems.

Kenny Jones (Student), jonesk4066@uwa.edu, 870-316-3496

Single Nucleotide Polymorphisms Reveal Genetic Isolation and Genetic Drift in the Imperiled Coal Darter (Percina brevicauda)

Kenny D. Jones II[1], Bernard R. Kuhajda[2], Michael W. Sandel[1]

[1]The University of West Alabama, Department of Biological and Environmental Sciences, Livingston, AL 35470
[2]Tennessee Aquarium Conservation Institute, Chattanooga, TN 37402

The Coal Darter (*Percina brevicauda*) is an imperiled freshwater fish endemic to just three watersheds of the Mobile River basin in Alabama. In 2015 the Alabama Department of Conservation and Natural Resources listed *P. brevicauda* as a species of high conservation concern due to current threats throughout its range. This study used Single Nucleotide Polymorphisms and mitochondrial DNA sequence data to assess population genomic structure and diversity within the disjunct populations of *P.brevicauda*. Mitochondrial DNA analyses indicates retention of ancestral polymorphisms and that unique haplotypes are present within each watershed. Population genomics analyses reveal three evolutionarily significant units within *P. brevicauda*. Overall, genetic variability is low in all populations, but the Hatchet Creek population is the most vulnerable to extirpation based upon genetic data. In terms of conservation, each population of *P. brevicauda* should be protected according to the unique threats present in each watershed to assure long term viability of this endemic species.

Bio: I grew up in the Arkansas and Mississippi Delta. Graduated from Arkansas State University (BS Wildlife Ecology and Management). My thesis is assessing population genomics and environmental DNA detection of the imperiled Coal Darter (*Percina brevicauda*) with Dr. Michael Sandel.

Colin Laubach (Student), czl0127@auburn.edu,

The swimming performance of Freshwater Drum (*Aplodinotus grunniens*) in various temperature and dissolved oxygen treatments

Colin Laubach, Dennis R. DeVries, and Russell A. Wright

School of Fisheries, Aquaculture and Aquatic Sciences
Auburn University, AL 36849

Alterations to temperature and dissolved oxygen (DO) regimes in the tailwaters below dams can cause harmful stress to fish. Although Freshwater Drum (*Aplodinotus grunniens*) are widespread in rivers across North America, they have received little attention relative to effect of these potential stressors. Quantifying their swimming performance in tailwaters can provide insight to how riverine species are affected by these alterations. I quantified critical swimming speed (U_{crit}), tail-beat frequency, and tail-beat amplitude under all combinations of hypoxic (4 ppm), normoxic (9), and hyperoxic (14) conditions at low (10°C), intermediate (20°C), and warm (30°C) water temperatures in a 90-L swim flume. While we found that dissolved oxygen did not significantly affect U_{crit} (all $P>0.05$), fish at 30°C had a significantly higher U_{crit} versus fish in either 10°C (0.93 BL/s higher) or 20°C (0.43 BL/s higher), with fish at 20°C also having a significantly higher U_{crit} than fish at 10°C (0.49 BL/s higher). Interestingly, U_{crit} decreased significantly with fish size. As water velocity increased, tail-beat frequencies increased and amplitudes decreased across all treatments. In addition, fish in warm water had significantly more tail-beats and smaller amplitudes when compared to other treatment temperatures. There was no effect of DO concentration on tail-beat frequencies or amplitudes. Temperature affected Freshwater Drum swimming performance, suggesting that the depth at which water is withdrawn at dams can impact the potential for fish to hold position or even pass that structure.

Bio: I grew up in rural Pennsylvania outside of Harrisburg. I graduated from Juniata College in 2017 with a degree in Biology. I am currently a second year master's student under Dennis DeVries and Rusty Wright at Auburn University. My work investigates the swimming abilities of fish residing in the tailraces below dams. In my free time I enjoy skiing, hiking, fishing, and playing rugby.

Pearce Cooper (Student), pcooper@disl.org, (540)-247-1707

Genomic assessment of population structure in Sheepshead, *Archosargus probatocephalus.*

Pearce T. Cooper[1], Shannon J. O'Leary[2], David S. Portnoy[3], and Sean P. Powers[1]

[1] University of South Alabama and the Dauphin Island Sea Lab, 101 Bienville Blvd Dauphin Island, AL, 36528
[2] Department of Integrative Biology and AgBio Research, Michigan State University, East Lansing, MI 48824
[3]Texas A&M University Corpus Christi, 6300 Ocean Drive Unit 5869, Corpus Christi, TX, 78412

Sheepshead are euryhaline, sparid fish that are recreationally and commercially exploited in the coastal southeastern United States. There is a great deal of environmental variation across the managed range of sheepshead in the United States that could lead to local adaptation. To assess levels of gene flow and local adaptation across their range in the United States, genomic variation was characterized in 12 geographic samples of Sheepshead from the Lower Laguna Madre, TX to the Lower Chesapeake Bay, VA. Double digest restriction-site associated DNA (ddRAD) sequencing was used to characterize a reduced representation of the genome in order to assess the partitioning of genomic variation across this range. Results indicate the presence of reduced gene flow across Apalachee Bay and the tip of the Florida Peninsula. Patterns of divergence observed in markers putatively affected by directional selection indicate that regional adaptation may contribute to the observed restriction in gene flow across Apalachee Bay. Implications to management and conservation are discussed.

Bio: I grew up in Lovettsville, Virginia, which is in rural northern Virginia. I graduated with my undergraduate degree in 2013 with B.S. Fisheries Science from Virginia Tech. My dissertation focuses on Sheepshead genomic population structure in the United States and combining salinity residency proxies in otolith chemistry with genomic data to examine how genetics influences low salinity residency and tolerance throughout the life of the fish. I work under Dr. Sean Powers in the Fisheries Ecology Lab at the University of South Alabama and the Dauphin Island Sea Lab.

POSTER PRESENTATIONS

Jesse James, jbj0023@auburn.edu, 334-624-4016

Evaluation of the Potential Predator-prey Relationship of *Procambarus clarkii* and *Litopenaeus vannamei* in a Low Salinity Recirculating Tank System

Jesse James[1], Luke A. Roy[1], Sunni Dahl[1], David Teichert-Coddington[2], Anita M. Kelly[1], Daniel Creel[1], Benjamin H. Beck[3]

[1]School of Fisheries, Aquaculture & Aquatic Sciences, Auburn University, AL 36849
[2]Greene Prairie Aquafarm, Boligee, AL 35443
[3]United States Department of Agriculture – Agricultural Research Service, Aquatic Animal Health Laboratory, Auburn, AL 36832

Polyculture of Pacific white shrimp (Litopenaeus vannamei) and red swamp crawfish (Procambarus clarkii) is a new production strategy being explored by commercial shrimp farmers in west Alabama. The main area of concern is that crawfish are known to feed on small fish and insects in addition to detritus and plant material. This feeding strategy raises the question of whether crawfish would feed on juvenile shrimp, causing a negative impact on shrimp production. In order to investigate the potential for these two species to develop a predator-prey relationship, a controlled experiment was set up using a low salinity recirculating 24 aquaria system. Three treatments (8 replicates) were used to evaluate the impact of crawfish presence on shrimp survival including a Treatment A - Control (20 shrimp + daily feed ration), Treatment B (20 shrimp and one crawfish both receiving a daily feed ration), and Treatment C (20 shrimp and one crawfish with only the shrimp receiving a daily feed ration). Shrimp and crawfish were fed a calculated ration twice daily. Following 21 days of culture the tanks were harvested. Shrimp and crawfish were enumerated and group weighed to determine growth, feed conversion ratio, and survival. Shrimp survival (Fig. 1) in the control group was significantly higher (91.9%) than the other treatments ($P<0.001$) (Treatment B = 58.8%, and Treatment C = 40.6%). These results indicate a reduction in shrimp survival in the presence of crawfish. This negative effect was further increased in the treatment where feed rations intended for crawfish were absent.

Bio: I am originally from Greensboro, Alabama, and I work as a Research Assistant for the Auburn University School of Fisheries, Aquaculture, & Aquatic Sciences.

Dylan Kiene (Student), dkiene@disl.org, 251-861-2141 X2384

Employing Acoustic Tagging Methods to Track Southern Flounder Spawning Outmigration from Mobile Bay

Dylan M. Kiene[1] and Sean P. Powers[1]

[1] University of South Alabama, Department of Marine Sciences, Mobile, Alabama

Southern Flounder (*Paralichthys lethostigma*) is a species of great importance both commercially and recreationally throughout the northern Gulf of Mexico. Recent landings by both commercial and recreational fishers indicate a low abundance of Southern Flounder in Alabama coastal waters. The objective of this study is to quantify and provide a foundation for understanding all aspects of Southern Flounder spawning dynamics in Alabama State waters. Southern Flounder have a complicated life history and very little is known about their reproductive cycle. As water temperatures decrease, mature female Southern Flounder migrate to the lower portion of estuaries where they congregate in large numbers to begin a mass migration to spawning grounds between mid-October and December. To understand more about the timing and driving factors behind the migration, Southern Flounder were captured via hook and line during the mid to late Fall and tagged with acoustic tags. Prior to tag deployment, a double-gated acoustic receiver array was installed to encapsulate Mobile Bay and the surrounding tributaries. In the Fall of 2019, 55 Southern Flounder were successfully tagged and released. Data from the acoustic release receivers that gate the mouth of Mobile Bay between Dauphin Island, AL and Fort Morgan, AL were retrieved and downloaded in early February 2020. Preliminary analysis of this southernmost gate data shows detections from several unique fish tagged during this study. By describing the reproductive biology of a popular recreationally and commercially harvested species, this study will provide a missing link to the comprehensive examination of Southern Flounder's life history with information specific to the Alabama region. Once fully understood, management practices can be implemented to protect and rebuild the population.

Bio: I grew up in Mobile, AL and graduated from Spring Hill College with a B.S. in Health Science. I am now a Ph.D. student in the Fisheries Ecology Lab at the University of South Alabama under the advisement of Dr. Sean Powers.

John Larrimore (Student), larrimorej2@uwa.edu, (205) 652-3572

Metabarcoding Freshwater Fish Species of the Mobile Basin Watersheds

John Larrimore and Dr. Michael Sandel

University of West Alabama, Department of Biology, Livingston, AL, 35470

Alabama is home to a high number of freshwater fish species, many of which are endangered. It is vital to gather as much information as possible about these species in order to properly establish methods for conservation and monitor their status. Traditional methods to survey fish species rely on manually collecting individuals from a local environment and using the information that has been obtained to extrapolate the biomass and relative abundance of fishes in that local environment. Instead of spending countless hours and funds to traditionally sample, aquatic ecologists can now utilize a tool called environmental DNA (eDNA) to detect species in their habitats without having to collect physical specimens. Through the use of environmental DNA (eDNA), genetic material can be obtained from sources such as the sediment or water. The sample contains genetic material from various species, which can be identified through the use of a database of sequences to match to the DNA within the sample. By extracting the eDNA, we will be able to efficiently survey locations without interfering with the habitat. In addition to being able to determine the presence or absence of a particular species through the use of eDNA, metabarcoding can be used to determine the presence or absence for multiple species and their relative composition within the area. However, metabarcoding requires the use of a metabarcoding database containing a chosen sequence for each species that would need to be detected. My project will focus on creating a metabarcoding database for the freshwater fish species of the Mobile River Basin, which is constituted by the Tombigbee, Black Warrior, Cahaba, Coosa, Tallapoosa, Alabama, and Mobile river watersheds. The databases for this project will be made with a focus on the mitochondrial genome, specifically the Cytochrome Oxidase I (COI) and the 16S rRNA regions.

Bio: I grew up in Thomasville, AL and graduated in 2020 (B.S. Biology) from the University of West Alabama, where I am currently working on my thesis, which focuses on eDNA metabarcoding under Dr. Michael Sandel.

Merritt McCall (Student), mmccall@disl.org, 251-861-2141 X2384

Importance of Oyster Reef Design and Setting in Restoration Success in Mobile Bay

Merritt E. McCall and Sean P. Powers

University of South Alabama, Department of Marine Sciences, Mobile, Alabama

Oyster reefs support an important commercial fishery as well as provide estuarine ecological services such as filtration, creation of refugia, and provision of feeding habitat for mobile and sessile species across a spectrum of life stages. Consequently, there have been increased efforts to restore and enhance the oyster reef environment in the Mobile Bay area of Alabama. A field project initiated in January 2004 was designed to determine the impact of reef design and placement along a bio-physical gradient on Eastern Oyster (*Crassostrea virginica*) and sessile invertebrate recruitment. Eight oyster reefs (625 m^2 each), divided into four high relief (1.0 m vertical relief) and four low relief (0.1-0.2 m vertical relief), were deployed in three different areas of Mobile Bay (Cedar Point, Sand Reef, Shellbank), each varying in water quality and presence of existing oyster reefs. Initial semiannual quadrat surveys showed that recruitment and abundance *of C. virginica* varied with location (Cedar Point > Sand Reef > Shellbank) and reef type (high relief > low relief). Fifteen years after reef deployment, preliminary findings suggest persistence of the established bio-physical gradient *of C. virginica* abundance. Understanding the extent of the success of this restoration design will help inform future restoration decisions.

Bio: I grew up in Austin, TX and attended Auburn University (B.S. Marine Science) for undergrad. I am now a master's student in the Fisheries Ecology Lab at the University of South Alabama under the advisement of Dr. Sean Powers.

Justin McDonald (Student), jmcdonald@disl.org, 251-861-2141 x2384

Effects of environmental variables on spatial distribution of Greater Amberjack (*Seriola dumerili*) in the Alabama Artificial Reef Zone (AARZ)

Justin McDonald[1,2] and Sean Powers[1,2]

[1]University of South Alabama, Department of Marine Sciences, Mobile, AL 36688
[2]Dauphin Island Sea Lab, 101 Bienville Boulevard, Dauphin Island, AL 36528

The Greater Amberjack (*Seriola dumerili*) is a widely distributed pelagic, epibenthic member of the Carangidae family found in warm temperate waters. They are typically found around reefs and other habitats that exhibit high vertical relief, such as pyramids, shipwrecks, and rocky outcrops. These fish are the largest carangid in the Gulf of Mexico and are known for having high endurance and fighting capability, making them highly desirable to recreational fisherman. In Alabama, recreational catch of Greater Amberjack has historically dominated landings, with a peak catch near 2.5 million pounds in 2003. Greater Amberjack were declared “overfished” in a 2006 stock assessment conducted by the SouthEast Data, Assessment, and Review (SEDAR) and have retained that designation through the latest stock assessment in 2016. This report indicated that the stock will no longer rebuild by 2019 as previously projected and triggered a reduction in acceptable biological catch (ABC) limits. The purpose of this study is to examine the spatial distribution of Greater Amberjack throughout the Alabama Artificial Reef Zone (AARZ) to determine habitat preferences among different environmental variables. This will be achieved through analysis of remotely operated vehicle (ROV) video footage obtained from fishery independent vertical longline sampling from 2011 through 2017. Results from this study will provide insight into habitat suitability which will aid in future management decisions.

Bio: I graduated in 2011 from Troy University (B.S. Marine Biology). I am currently a research technician under Dr. Sean Powers working on an age and growth study of Greater Amberjack collected from Alabama waters.

Stuart W. McGregor, smcgregor@gsa.state.al.us, 205-247-3629

Biological Condition of Fish Communities, Habitat, and Land Cover in the Bear Creek Strategic Habitat Unit, 2008-2013

Stuart W. McGregor[1], E. Anne Wynn[2], Rebecca A. Bearden[1], Patrick E. O'Neil[3], and Cal C. Johnson[4]

[1]Geological Survey of Alabama, P.O. Box 869999, Tuscaloosa, Alabama, 35486
[2]Formerly Geological Survey of Alabama
[3]Geological Survey of Alabama, retired
[4]Alabama Department of Environmental Management, Field Operations, 2715 Sandlin Road, Decatur, AL 35603

Bear Creek drains 942 mi^2 of Tennessee River in Alabama and Mississippi. In the 1970s the Tennessee Valley Authority (TVA) reported land use as 70 percent forest, 20 percent miscellaneous, and 10 percent agricultural; in 2001 Auburn researchers reported little change to 1992; and in 2011 the USGS National Land Cover dataset reported essentially the same. Pickwick Reservoir and four dams within the system reduced 43 stream miles to impoundments, and a 9-mile-long floodway further affected the stream. In 2003 the Alabama Soil and Water Conservation Committee provided information on sources and rates of sedimentation, pesticides, animal and domestic waste, and urban nonpoint source pollution. Streams with highest pollution potential included Buzzard Roost, Cedar, Rock, and Upper Bear Creeks. About 2.7 million tons of sediment are introduced into the system annually, with 58 percent in Bear, 20 percent in Cedar, and the remainder in Little Bear, Rock, and Buzzard Roost Creeks. Biological condition at 38 stations based on fish IBIs varied from poor (Bear Creek, U.S. Hwy. 43) to excellent (Buck Branch, CR 1). Most (36) scored fair to good, indicating generally acceptable habitat and water quality conditions. Number of species collected ranged from 9 (Buck Branch, CR 1) to 30 (Bear Creek, CR 86). Catch per sample ranged from 125 (Bear Creek, CR 93) to 790 (Cedar Creek, CR 63). Although most stations scored fair to good, reservoir and floodway development caused population declines of nongame species while populations of tolerant species became more common and abundant. Efforts by TVA to improve reservoir discharges may show positive results evidenced by the recent discovery of the Snail Darter, *Percina tanasi*. Continued improvements to shoreline and instream habitats, reduction of sediments and nutrients, and a balanced approach to regulating reservoirs and flows could result in significant improvements in the system.

Bio: Born in Huntsville and reared in Florence, AL. Graduated from the University of North Alabama earning a B.A. double majoring in History and Environmental Biology, and from Tennessee Technological University with an M.S. in Biology focusing on fisheries. Worked for USFWS in Cookeville, TN, and USACE in Louisville, KY, before GSA. My work focuses on faunal surveys of fishes, mussels, cave shrimp, and crayfishes, with relevant associated aspects focusing on watershed-level assessments.

Julia Wood (Student), woodj11038@uwa.edu, 571-286-0692

Ichthyofaunal evidence supporting a hypothesized stream capture event between the Tennessee and Mobile River Basins and implications on conservation

Julia E. Wood[1], M. Worth Pugh[2], Phillip M. Harris[2], Thomas J. Near[3], Richard C. Harrington[3], Michael W. Sandel[1]

[1] The University of West Alabama, Department of Natural Sciences and Mathematics, Livingston, AL 35470
[2] The University of Alabama, Department of Biological Sciences, Tuscaloosa, AL 35487
[3] Yale University, Department of Ecology and Evolutionary Biology, New Haven, CT 06511

Alabama and Tennessee exhibit the greatest freshwater biodiversity in the United States. The Tennessee River and Mobile River basins are physically divided, but historical and recent natural history collections reveal evidence for inter-basin transfer of aquatic fauna. We report recent collections of three cold-water fish species (*Etheostoma nigripinne, Chrosomus tennesseensis,* and *Rhinichthys obtusus*) from headwaters of the Locust Fork of the Black Warrior River, Alabama. The headwaters of the Black Warrior River and tributaries to the Tennessee River are in close proximity and our results suggest that these species may have colonized the upper Locust Fork either through avulsion of surface streams or flow diversion within the subterranean aquifer. We conducted preliminary genetic analyses using two mitochondrial genes (COI and *cytb*). Results suggest there are differences between the populations in the headwaters of the Locust Fork and the respective previously established distributions of each fish. Furthermore, we discuss the implications of these collections on the mechanisms that drive biodiversity, including how stream capture may have isolated these populations leading to potential speciation events. We outline further areas of investigation and conservation efforts.

Bio: I grew up in Fairfax, Virginia and completed my B.S. in Biology in 2019 from the University of Alabama. I currently attend the University of West Alabama working towards my Master's in Conservation Biology with Dr. Michael Sandel.

Amber N. Young (Student), azy0019@auburn.edu, 706-280-3680

Demographics and Life History of Bridgelip Sucker (*Catostomus columbianus)* in Williams Lake, Salmon, Idaho

Amber N. Young[1] and Conor McClure[2]

[1] 203 Swingle Hall Auburn University, 36848
[2] Idaho Fish and Game, Salmon Regional Office, 99 US-93, Salmon, ID 83467

Bridgelip Sucker *Catostomus columbianus* are native to the Columbia River Basin including the Salmon River drainage in Idaho. Bridgelip Sucker are widely distributed in the Salmon River and many of its tributaries. However, in 2014 they were discovered in Williams Lake, a naturally occurring and popular sportfish lake in Salmon, Idaho. It is unknown if Bridgelip Sucker are native to Williams Lake or if they were introduced as they are not generally found in lacustrine systems. Since the documentation of Bridgelip Sucker in Williams Lake, no further population studies have been conducted. Thus, we sought to describe the age, growth, weight and fecundity of Bridgelip Sucker in Williams Lake. Fish were collected in May 2019 using fyke and experimental gill nets (i.e., floating and sinking). Total length and weight was recorded for each fish. Additionally, skeins and otoliths were collected and processed later in a lab setting. The findings of this study are important to managers as the results provide demographics and life history data for Bridgelip Sucker in Williams Lake.

Bio: Amber is from Dalton, Georgia and she received her B.S. in Biology from Dalton State College in 2016. Following graduation, Amber worked for several state and federal agencies out West and recently she has started working on her Master's degree at Auburn University under Drs. Steve Sammons and Terry Hanson.

ORAL PRESENTATIONS (PROFESSIONAL SESSION)

Anita M. Kelly, amk0105@auburn.edu; 334-624-4016

The Potential of Alternative Production Systems for Raising Largemouth Bass *Micropterus salmoides*

Anita M. Kelly[1], Herbert Quintero[2], Luke Roy[1], Jeonghwan Park[3] and David Heikes[4]

[1] School of Fisheries, Aquaculture and Aquatic Sciences, Auburn University, Alabama Fish Farming Center, 529 Centreville Street, Greensboro, AL 36744
[2] Department of Aquaculture and Fisheries, University of Arkansas at Pine Bluff, Pine Bluff, AR 71601
[3] Department of Maine Bio=Materials and Aquaculture, Pukyong National University, Busan, South Korea
[4] Dunn's Fish Farm, Monroe, AR

Largemouth bass *Micropterus salmoides,* (LMB) have been raised for stocking recreational ponds for decades. However, markets exist for LMB as food for human consumption. Traditional LMB production practices could be improved to meet the growing demand for the foodfish market. This study examined three production systems, traditional ponds (TP), intensive aeration ponds (IAP) and split-ponds (SP). The TP and SP were aerated at 9.3 hp/ha while the IAP was aerated at 18.6 hp/ha. Feed trained fingerlings were stocked into each system (three replicates per system) at 12,500 fish/ha for the IAP and SP and 7500 fish/ha for TP. Fish were fed for 157 days, four times/day for a total of 3% of the body weight/day. Feeding rates were adjusted for growth every two weeks. Survival rates did not differ significantly between all treatment groups. As expected, the biomass of the LMB raised in the SPS and the TP was significantly higher than the TP. The yield of LMB (kg/ha) was similar in IAP (4,569.3 $\pm$ 95.6; mean $\pm$ SE) and SP (4665.8 $\pm$ 105.2) systems. This study demonstrated that alternative production systems can produce greater yields than the currently used traditional earthen pond production systems.

Bio: I am an Extension/Research Professor located at the Alabama Fish Farming Center, Auburn's satellite facility located in Greensboro, AL. My area of interest included fish disease diagnostics and prevention and aquaculture production. Prior to joining AU in March of 2019, I was the Director of the University of Arkansas at Pine Bluff's USDA/ Animal and Plant Health Inspection approved laboratory for 11 years. These labs inspect fish for listed diseases prior to export. I was also the Extension lead for Aquaculture and Fisheries at the University of Arkansas at Pine Bluff for 5 years. I received my MS and PhD degrees in Zoology with an emphasis in Aquaculture and Fisheries from Southern Illinois University in Carbondale. Before joining academia, I manage two production facilities and have 8 years of on-farm experience.
Luke Roy, royluke@auburn.edu, 334-624-4016

Luke Roy, royluke@auburn.edu, 334-624-4016

Evaluation of stocking density and dietary fish meal inclusion for intensive tank production of Pacific white shrimp (*Litopenaeus vannamei*) cultured in low salinity waters of west Alabama

Luke A. Roy[1], David Teichert-Coddington[2], Benjamin H. Beck[3], Sunni Dahl[1], Jesse James[1], Jingping Guo[1], D. Allen Davis[1]

[1]School of Fisheries, Aquaculture & Aquatic Sciences, Auburn University, AL 36849
[2]Greene Prairie Aquafarm, Boligee, AL 35443
[3]United States Department of Agriculture – Agricultural Research Service, Aquatic Animal Health Laboratory, Auburn, AL 36832

Shrimp farmers in Alabama that raise the Pacific white shrimp (*Litopenaeus vannamei*) are seeking to increase efficiency and intensify production. Semi-intensive earthen ponds are the traditional production system used by Alabama shrimp farmers, however, there is interest in evaluating intensive pond-based production systems such as split ponds. These alternative systems are more intensive and require higher stocking densities to offset capital investments costs required for initial construction and maintenance. Two trials were carried out using on-levee flow-through systems (twelve 800 L tanks per system) at an Alabama shrimp farm to evaluate stocking densities of 25, 75, 150, 225 shrimp/m^2 (Trial 1) and higher levels of fish meal (5, 10, 20%) at a high density of 225 shrimp/ m^2 (Trial 2). Results from Trial 1 revealed that as stocking density was increased shrimp final weight decreased while shrimp biomass and feed conversion ratio increased ($P < 0.05$). Survival of shrimp at the two highest densities (150, 225 shrimp/m^2) was lower than the two lowest densities (25, 75 shrimp/m^2). There were no differences ($P > 0.05$) in shrimp performance offered diets with varying levels of fish meal in Trial 2, however, overall survival in Trial 2 which was carried out at a high density (225 shrimp/m^2) ranged between 47.9-65.5%. In summary, poor survival of shrimp at higher density in this unique low salinity environment may not merit intensification of production using alternative intensive pond-based production systems such as split ponds.

Bio: I am originally from Michigan but grew up in Uruguay, South America. I am currently an Associate Extension & Research Professor in the School of Fisheries, Aquaculture, & Aquatic Sciences at Auburn University.

Colin Dinken, Colin.Dinken@Kleinschmidtgroup.com, 205-588-4613

Changes in physiology and stress responses of Largemouth Bass *Micropterus salmoides* naturalized with live forage diets

Colin P. Dinken[1], Kevin R. Keretz[2], Harold L. Schramm Jr.[3], Lora Petrie-Hanson[4], M. Wes Schilling[5], and Peter J. Allen[2]

[1]Kleinschmidt Associates, 5346 Stadium Trace Parkway, Hoover, AL 35244
[2]Department of Wildlife, Fisheries, and Aquaculture, Mississippi State University, Post Office Box 9690, Mississippi State, Mississippi 39762, USA
[3]U.S. Geological Survey, Mississippi Cooperative Fish and Wildlife Research Unit, Post Office Box 9691, Mississippi State, Mississippi 39762, USA (retired)
[4]Department of Basic Sciences, Mississippi State University, Post Office Box 6100, Mississippi State, Mississippi 39762, USA
[5]Department of Food Science, Nutrition, and Health Promotion, Mississippi State University, Post Office Box 9805, Mississippi State, Mississippi 39762, USA

Experimentation and stocking of Largemouth Bass *Micropterus salmoides* often requires large numbers of advanced-sized fish. Although intensive culture can produce large numbers of fish, formulated diets containing high levels (> 20%) of dietary carbohydrates may lead to high liver and muscle lipids and high liver glycogen levels. This condition, often referred to as fatty or pale liver syndrome, may negatively affect the ability of fish to respond to stressors, which may reduce survival. Survival and liver health, regarding glycogen accumulation, have been found to improve in Largemouth Bass after switching to diets containing lower levels of dietary carbohydrates and higher levels of protein, which may be best accomplished with live forage. However, the effects of switching Largemouth Bass to a natural diet of live forage (i.e., naturalization) and the length of time needed for naturalization to improve liver health and stress responses are not known. Therefore, an experiment was conducted to determine the amount of time Largemouth Bass raised to advanced size on formulated diets need to be naturalized to (1) change and stabilize liver health metrics, blood metrics, and muscle metrics, and (2) for physiological metrics to be similar to those found in wild Largemouth Bass. Physiological variables of livers (i.e., color, hepatosomatic index, moisture, lipids, glycogen, and hepatic steatosis), blood (i.e., plasma cortisol, glucose, lactate, and pH), and muscle (i.e., lipids), were measured in fish maintained on a formulated diet and over a 12 week naturalization period to live forage. Following rearing on a high carbohydrate and lipid diet (i.e., 20% carbohydrates; 16% lipids), 4-6 weeks of naturalization improves liver health, and many parameters become similar to those found in populations of wild fish at this time.

Bio: Colin Dinken earned his bachelor’s degree at Auburn University and his master’s degree at Mississippi State University in fisheries science. He is currently an associate scientist at Kleinschmidt Associates, where he performs fisheries and other studies regarding the licensing and relicensing of hydroelectric projects.

Dave Armstrong, dave.armstrong@dcnr.alabama.gov, 251-626-5153.

Evaluating gear type and environmental conditions to improve catch success of Alligator Gar broodfish in the Mobile-Tensaw Delta

Dave Armstrong and Tommy Purcell

Alabama Department of Conservation and Natural Resources
Division of Wildlife and Freshwater Fisheries, Fisheries Section, 30571 Five Rivers Blvd., Spanish Fort, AL 36527.

In Alabama, Alligator Gar populations have experienced a decline in abundance and due to their limited distribution, are classified as a non-game species of moderate conservation concern. Conservation management plans have included creel limits and a stocking enhancement program to augment a diminished population within the lower Alabama River. Our objective was to evaluate gill net efficacy on catch and the environmental parameters associated with improving broodfish capture rates for hatchery propagation. Broodfish collections were initiated and completed over 75 spring sample dates during March 2005 through April 2015. Catch was highest in April, though not statistically significant. Collectors utilized multifilament gill nets comprised of three mesh sizes 101.6, 127.0, and 152.4 mm combined with net lengths of 22.9, 30.5 and 61 m. Gill nets (n = 569) expended 2,175 h of soak time, resulting in the capture of 101 individuals (range = 1,020 to 2,210 mm TL). Catch was highest for the smallest mesh size though net panel length did not influence catch rates. Median fish lengths increased with larger mesh sizes. Catch declined more than threefold for net soak efforts $\geq$ 2 h and the proportion of successful gill nets declined more than 40% compared to nets fished < 1 h. Examination of environmental conditions during and prior to setting of gill nets demonstrated that fish capture success was in part influenced by various aspects of tidal current and water temperature. Evaluation of broodfish sampling methods revealed the need for improvements to collection procedures. Agencies involved in hatchery propagation programs should continually evaluate field sampling methods, use of collection gear and environmental conditions to increase catch rates and improve staff efficacy.

Bio: Dave and Tommy are fisheries biologists within the ADCNR Fisheries Section in District V, southwest Alabama.

Tim McLean, tmclean@southernco.com, 205-664-6189

Alabama Power Company – Challenges for the Aquatic Plant Management Program

Tim McLean

Alabama Power Environmental Affairs Department, Calera, AL 35040

A brief overview of Alabama Power's Aquatic Plant Management Program. Will also discuss our current state of exotic species on our reservoir systems, primarily Eurasian Watermilfoil and Hydrilla.

Bio: Born in Louisiana, but grew up in Conyers GA. Graduated in 2005 from Auburn University with a degree in Fisheries Science. Sixteen years of experience in fisheries and aquatic plant management.

Kyle Moon, kyle@alabamaaquarium.com, 205-663-6888

High Risk = High Reward: Dredging Long Life Lake at the Birmingham Botanical Gardens

Kyle Moon

Alabama Aquarium & Pond Services, Birmingham, AL.

In 2019, we used a mini dredge to remove sediment from the 50-year-old Long Life Lake in the Japanese Garden of the Birmingham Botanical Gardens. This presentation will document the real-life struggles, costs, manpower, process and rewards of enhancing and remediating this reservoir in the wealthiest city in the state of Alabama.

Bio: Small business owner and fisheries biologist for Alabama Aquarium & Pond Services out of Birmingham, AL.

Crystal LouAllen Hightower, CHightower@disl.org, 251-861-2141 x2097

Tag Alabama: Early Success in an Angler Based Saltwater Recreational Tagging Program

Crystal L. Hightower[1], Sean P. Powers[1], Merritt E. McCall[1], and T. Reid Nelson[2]

[1] University of South Alabama, Department of Marine Sciences, Mobile, Alabama 36688
[2] University of California, Santa Cruz & NOAA Fisheries, Santa Cruz, California 95060

Tag Alabama is a partnership between CCA Alabama, the University of South Alabama Department of Marine Sciences, and the Dauphin Island Sea Lab. Tag Alabama gives CCA Members the opportunity to participate in user-based data and research on Speckled Trout and Red Drum in coastal Alabama. Each angler, after attending a training workshop, receives a tagging kit. They also receive instructions on tagging and tag data entry in a web logging system. The program began in 2018 and, in two years, has reached early success with 325 participating anglers. The program has also resulted in over 2,500 fishes tagged. Initially we have learned more about broadscale spatial and temporal movement patterns for both species. Eventually we hope to contribute to life history parameters including fishery dependent size distributions and mortality estimates. There is also interest in expanding the program to include more species and increased involvement of participants by adding tournament style tagging events. This program promotes angler engagement in the catch and release of fishes in our area while improving on our current knowledge and status of these fisheries in coastal Alabama.

Bio: Crystal attended undergrad at the University of North Alabama, Florence, AL (B.S. Marine Biology) and graduate school at the University of South Alabama (M.S. Marine Sciences) under advisement by Dr. Sean Powers. She is currently Senior Research Lab Manager for the Fisheries Ecology Lab, Dauphin Island, AL.

Katelyn M. Lawson, klawson@auburn.edu, 334-844-5017

Semiautomated Process for Enumeration of Fishes from Recreational-Grade Side-Scan Sonar Imagery

Katelyn M. Lawson[1,2], Josey L. Ridgway[1], Andy T. Mueller[1], Jacob D.A. Faulkner[1], and Robin D. Calfee[1]

[1]U.S. Geological Survey, Columbia Environmental Research Center, 4200 New Haven Road, Columbia, Missouri 65201
[2]Department of Biological Sciences, Auburn University, 101 Rouse Life Sciences, Auburn, Alabama 36849

The use of hydroacoustic techniques is increasing as scientists search for less invasive ways to monitor fish populations, and using recreational side-scan sonar (SSS) imagery for monitoring has become more common in aquatic resource management over the last 15 years due in part to its low cost and user-friendly interface. The time-consuming nature of manually counting fish targets has limited the use of the data that is collected by these systems in research or management contexts. To reduce the time and effort that is required to enumerate acoustic targets that are presumed to be fish, we developed a semiautomated process that rapidly quantifies targets from recreational SSS imagery by using an open-source image processing software. Perceived fish targets were enumerated using a set of macroinstructions that performed similarly to manual enumeration by three experienced assessors. This method reduced variation that arises from individual assessors and eliminated the prohibitive time constraints that are associated with manual processing. Herein, we describe how our semiautomated process could be used in fisheries management contexts after further research and development of sampling methods. Future research will focus on field validation, quantifying relative abundance, testing across a broader range of environmental conditions, and exploring other applications for fisheries management.

Bio: I graduated with my PhD in Fisheries and Aquatic Sciences from the University of Florida in 2018. I currently work for the Alabama Natural Heritage Program but was previously employed as a Research Fish Biologist with the U.S. Geological Survey in Columbia, MO.

Kayla Fast, kfast@uwa.edu, 205-652-3851

eDNA Surveillance and Genomic Characterization of the Threatened Trispot Darter (*Etheostoma trisella*)

Kayla Fast[1], Parker Nenstiel[2], Anakela Popp[3], Pat O'Neil[2], Stuart McGregor[2],Brett Albanese[3], Bernard Kuhajda[4], Brook Fluker[5], Michael Sandel[1]

[1]The University of West Alabama, Livingston, AL, 35470
[2]Geological Survey of Alabama, Tuscaloosa, AL, 35486-6999
[3]Georgia Department of Natural Resources, Wildlife Resources Division, Social Circle, GA, 30025
[4]Tennessee Aquarium Conservation Institute, Chattanooga, TN, 37405
[5]Arkansas State University, Jonesboro, Arkansas, 72401

The Trispot Darter (*Etheostoma trisella*) is a small freshwater fish found in the Coosa River watershed in the southeastern United States. Recently, the trispot darter was listed as a threatened species under the Endangered Species Act (ESA). To describe population genomic diversity in this newly reclassified species, we have inferred evolutionary relationships and gene flow among extant populations using restriction site associated DNA sequencing from Diversity Arrays Technology (DArTSeq). Population genomic analyses for this species include populations from Alabama, Tennessee, and Georgia. In addition to assessing population genomic variation, we are monitoring the distribution of the trispot darter at historical and novel sites. We have implemented an alternative to traditional sampling methods in the form of environmental DNA (eDNA). This type of genetic material is DNA extracted from environmental samples (i.e., water) instead of an individual, biological specimen. We extracted eDNA from filtered water samples and detected the presence of trispot darters using loop-mediated isothermal amplification (LAMP). LAMP detects small quantities of DNA rapidly by amplifying multimeric DNA at a single temperature. Approximately 9,732 single nucleotide polymorphisms (SNPs) were recovered after DArTSeq data were filtered. These SNP data support three genetic populations: one including fish from Ballplay Creek, a second of Little Canoe Creek populations, and a third which includes the Mill Creek, Coosawattee, and Coahulla Creek populations. The data also provide evidence that is concerning for the persistence of these populations. We have confirmed the presence of the trispot darter at some localities where it has historically been found, but were unable to detect their presence at Ballplay Creek. Trispot darter DNA was also detected at additional, possibly novel sites. An understanding of the trispot darter's current distribution, particularly potential extirpation from historic sites, will provide a platform for conservation efforts and investigation of evolutionary histories.

Bio: I am from Mississippi and completed both a B.S. and M.S. in biological sciences at Mississippi State University. I now work with Dr. Michael Sandel as a Research Associate.

Dylan Shaw, dcshaw@southernco.com, 205-573-8972

Cooperative Survey of Tributaries in Bankhead National Forest for Federally Endangered Rush Darter (*Etheostoma phytophilum*)

Dylan Shaw[1], Jeff Baker[1], Steve Krotzer[1], Allison Cochran[2], and John Moran[2]

[1] Alabama Power Company- 744 County Road 87, Calera, Alabama 35040
[2] U.S. Forest Service- 1070 Highway 33, Double Springs, AL 35553

Alabama Power Company and U.S. Forest Service biologists surveyed five small tributaries of Clear Creek in the Bankhead National Forest in search of *Etheostoma phytophilum* (rush darter). The rush darter has a limited distribution and is known only from a few locations in three river drainages in Alabama. Although it was previously documented in the Clear Creek drainage, it had not been collected on Forest Service property. These surveys resulted in an upstream extension of the known range of the rush darter in Mill Creek onto the Bankhead National Forest. In addition, new localities were discovered in a tributary to Mill Creek and in Tig Branch, both tributaries of Clear Creek. These populations represent a significant increase in the known occurrences of the species and the first time the fish was documented in the Bankhead National Forest. Future surveys will revisit areas with suitable habitat where attempts at capture were unsuccessful and explore additional Clear Creek tributaries in an effort to further extend the known range.

Bio: I grew up along the Tennessee River in Florence, AL. I attended the University of North Alabama and graduated with a B.S. in Biology in 2016. Shortly thereafter, I moved to Auburn, AL and began work for an environmental testing company. In January of 2019 I accepted a job as a contractor for Alabama Power and in November of 2019 I was hired on as a full-time biologist. Our work primarily consists of threatened and endangered (T&E) species management on Alabama Power lands, T&E surveys and wetland delineations along transmission line ROWs, and participation in cooperative conservation projects that promote stewardship throughout the state.

Chad Fitch, rcfitch@southernco.com, 205-438-3149

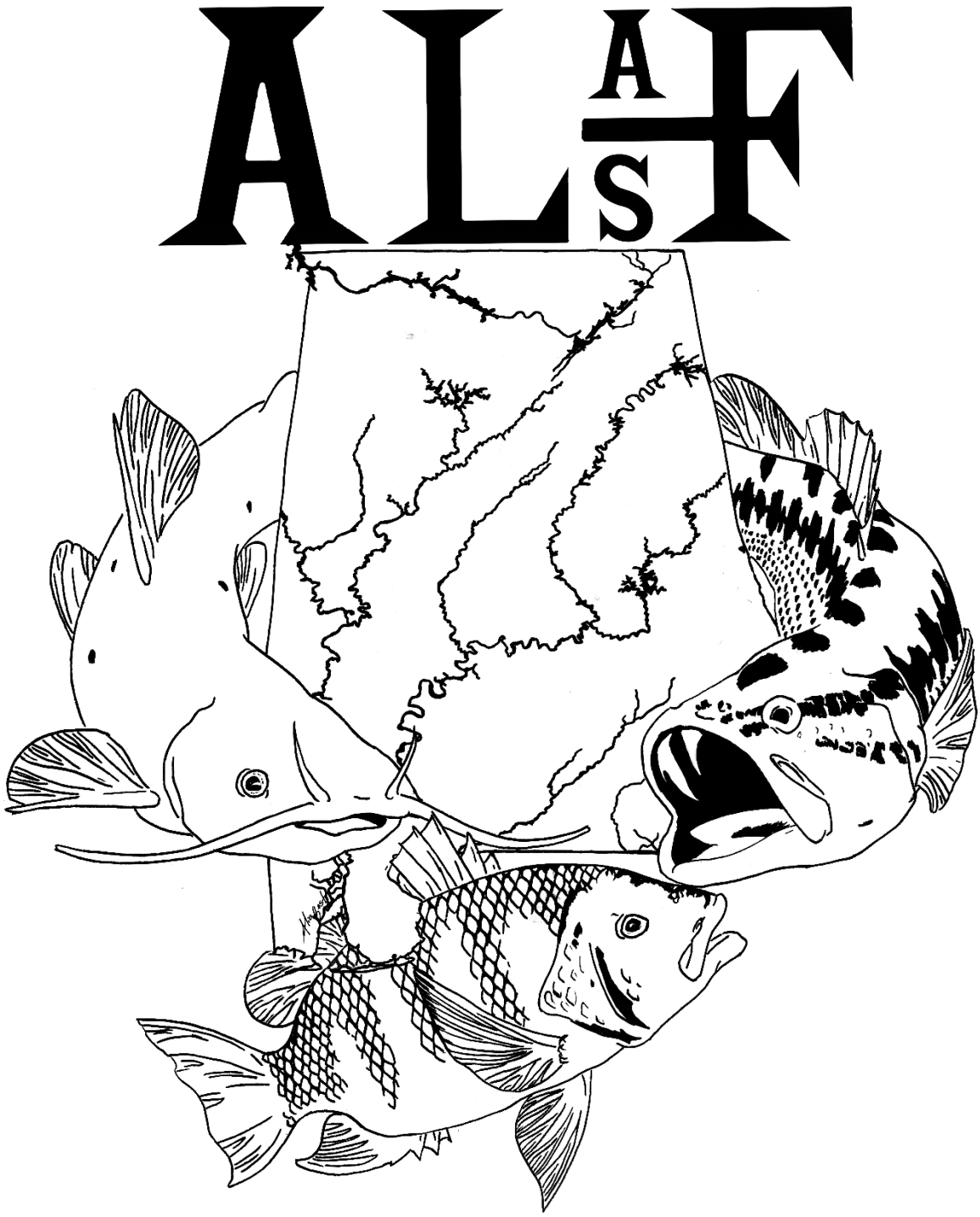
Fish Passage Enhancement for Trispot Darter (*Etheostoma trisella*)

Chad Fitch[1]

[1] Alabama Power Company, 744 County Road 87, Calera, AL 35040

Trispot darter (*Etheostoma trisella*) breeding habitat includes shallow marsh-like lowland areas adjacent to nonbreeding habitat, and Alabama Power Company (APC) partnered with U.S. Fish and Wildlife Service (USFWS) to enhance a major breeding site on APC property. Breeding for trispot darters occur late November through late April, and the breeding site (known as Site 13) of the federally threatened species is a tributary to Little Canoe Creek, located in St. Clair County, AL. A road crossing the tributary at Site 13 had two culverts to allow water flow and fish passage; however, the culverts were perched above the substrate. At times, heavy rainfall produced high velocities of water flowing through the perched culverts, causing a scoured pool downstream of the culverts. Over time, the downstream side of the culverts were several inches above the substrate which prevented fish passage until higher flows were present. USFWS were aware of the breeding site and contacted APC about enhancing fish passage for the trispot darter via contributions from APC and through the Partners for Fish and Wildlife Program Grant. After meeting with USFWS personnel and discussing pros and cons of enhancing fish passage and stream restoration, a decision was made to remove the two culverts and install a bridge. The culvert removal and bridge installation were conducted in 4 days in August 2019 while the creek was mostly dry. The creek is dry about two-thirds of year but consistently maintains a water channel during the winter months. Two post construction monitoring visits were conducted in November and December 2019 (before peak breeding season) to assess the project's impact and results will be discussed during the presentation.

Bio: APC Senior Environmental Specialist, Chad Fitch, has over 15 years of experience conducting wetland delineations, listed species surveys, and stream biomonitoring for state and federal compliance purposes. He is originally from Holly Springs, MS, but now lives in Birmingham, AL and graduated from the University of Southern Mississippi with a Master's Degree in Environmental Biology.


ALASF