2023 Annual Meeting

Alabama Chapter of the American

Fisheries Society

Gulf State Park

Gulf Shores, Alabama

January 24-25, 2023

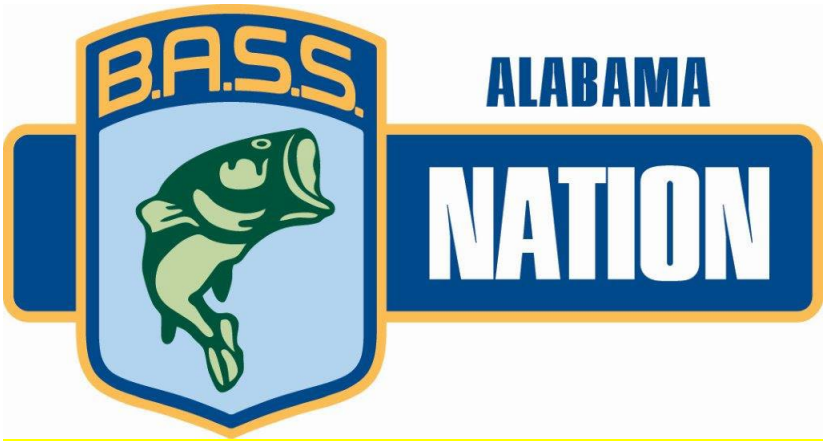
Current Officers

President:	Cal Johnson
President-elect:	Jason Throneberry
Past President:	Keith Henderson
Secretary:	Dennis DeVries
Treasurer:	Colin Dinken
AU Subunit President:	Paul Ramsey

Corporate Sponsors

Gold Level

Silver Level



Alabama Power

Bronze Level

PUBLICATIONS
PRESS, Inc.

Thank you to all of the ALAFS sponsors & donors!

Program Schedule

* All Oral Presentations and the Business Meeting will be Held in Gulfview Ballroom 2

* Poster Presentations, Social, and Banquet will be Held in Gulfview Ballroom 1

Tuesday, January 24:

10:30 AM – 4:00 PM	Meeting Registration & Load Talks
10:30 AM – 5:00 PM	Poster Setup
12:00 PM – 12:15 PM	Opening Remarks
12:15 PM – 2:30 PM	Student Presentations – Session A
2:30 PM – 2:45 PM	Break
2:45 PM – 5:00 PM	Student Presentations – Session B
5:00 PM – 5:30 PM	Break
5:30 PM – 6:30 PM	Poster Presentations & Social
6:30 PM – 8:30 PM	Social, Banquet & Awards

Wednesday. January 25

8:00 AM – 9:00 AM	Breakfast/Meeting Registration
9:00 AM – 10:00 AM	Business Meeting
10:00 AM – 10:15 AM	Break
10:15 AM – 12:30 PM	Presentations – Session C
12:30 PM	Adjourn

Alabama Chapter of the American Fisheries Society Annual Meeting – January 2023

Welcome and Opening Remarks

Cal Johnson – President

SDAFS Update

Jason Olive - President, Southern Division of AFS

Jason Olive is the Chief of Fisheries Management for the Arkansas Game and Fish Commission. He is currently serving as 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 6 years. Jason has served as an officer at the sub-unit, chapter, division, and section levels of AFS, and currently chairs the AFWA Subcommittee on Water.

Presentation Schedule

Tuesday, January 24

SESSION A (STUDENTS)

Moderator: Daniel West, Geological Survey of Alabama

12:15 pm Simulating Tradeoffs Between Fishing Quality and Economic Performance with Increasing Tournament Effort in an Alabama Black Bass Fishery. Natalie Coash and Matthew Catalano.

12:30 pm Using Fisheries Techniques to Estimate Age and Growth of Hybrid Catfish (*Ictalurus punctatus* ♀ x *Ictalurus furcatus* ♂) from Commercial Catfish Farms. Julia Palmer et al.

12:45 pm Interspecies Variability of Native Fish Nursery Habitats in the Lower Red Red River Basin. Paul Ramsey et al.

1:00 pm Analogous Relationships Between Landscape Constraints and a *Faxonius* Assemblage in the Ozark Highlands. Jordan Ramsey et al.

1:15 pm Estimating Components of Mortality for Two Black Bass (*Micropterus spp.*) Species at a Large Alabama Reservoir with High Catch-and-Release Angling Effort. Max Rubino.

1:30 pm Effects of Salinity on Growth, Survival, and Serum Osmolality of Red Snapper (*Lutjanus campechanus*) and Yellowtail Snapper (*Ocyurus chrysurus*). Stephanie Velasques et al.

1:45 pm The Effects of Stocking Density on the Growth of Jvenile Pacific White Shrimp (*Litopenaeus vannamei*) in Recirculating Biofloc System. Shrijan Bajracharya et al.

2:00 pm Mortality and Movement of Greater Amberjack in the Gulf of Mexico and Atlantic Ocean off the Southeastern U.S. Samantha Young.

2:15 pm Attitudes, Perceptions, and Beliefs of Reef Fish Fishers in the Gulf of Mexico. Sarah Gibbs et al.

2:30 – 2:45 pm **Break**

SESSION B (STUDENTS)

Moderator: Dr. Katelyn Lawson, Auburn University

2:45 pm Effects of Size-Selective Catch-and-Release Angling on Population Size Structure of Two Black Bass (*Micropterus spp.*) Species in an Alabama Reservoir. TJ Pullen and Matthew Catalano.

3:00 pm Effects of Temperature and Salinity on Blood Chemistry and Survival of Atlantic Tarpon (*Megalops atlanticus*). Manuel E. Coffill-Rivera et al.

3:15 pm Seasonal Movements of Paddlefish in William "Bill" Dannelly Reservoir, including the Lower Cahaba River, Alabama. Chris Smith et al.

3:30 pm Investigating the Persistence of Virulent *Aeromonas hydrophilia* Isolate ML-09-119 within Commercial Catfish Pond Bottoms at Different Temperatures. James T. Tuttle et al.

3:45 pm Using the Electron Transport System as an Indicator of Organismal Thermal Tolerance and Respiration Rate. Ehlana Stell et al.

4:00 pm Tracking Southern Flounder Spawning Migration from Mobile Bay, Alabama via Ultrasonic Telemetry – Timing, Rates, Routes, and Homing. Dylan M. Keine and Sean P. Powers.

4:15 pm Condition and Passage Rate of Paddlefish and Damaged Rostra in the Alabama River. Nathaniel Steffensmeier et al.

4:30 pm Evaluation of Different Stocking Densities for Nursery Culture of the Pacific White Shrimp (*Litopenaeus vannamei*) in a Biotic System. Aya S. Hussain et al.

4:45 pm Relationship Between Aerobic Scope and Upper Thermal Limits of Pacific White Shrimp (*Litopenaeus vannamei*) in Low-Salinity Culture Systems. Aya S. Hussain et al.

5:00 pm **Break and Adjourn**

Poster Presentations

5:30 – 6:30 pm **Gulfview Ballroom 1**

50+ Years of Fish Survey Data – An Update on the GSA Fish Database. Nathaniel D. Stum and Chris B. Haynes.

Oyster Population Health Across Dynamic Environmental Gradients in Mobile Bay, Alabama. Jacqueline L. Wilson et al.

First Detection of White Spot Syndrome Virus in Alabama Crayfish: A Case Study on a Research Station in Auburn, Alabama. Nicole Tripp et al.

Methods for Spherical Baited Remote Underwater Video (SBRUV) surveys in offshore Alabama. Adam Wolff Jung et al.

Tag Alabama: What have We Learned from the Angler-Based Recreational Tagging Program? Jeffrey Plumlee et al.

Wednesday, January 25

8:00 am Breakfast & Meeting Registration

SESSION C (Professionals)

Moderator: Dr. Dennis Devries, Auburn University

9:00 am Business Meeting – **Gulfview Ballroom 2**

10:15 am Performing CPR on Alabama's Rivers: Conservation, Protection and Restoration at Watershed Scale. Alana Reynolds.

10:30 am Epidemiology and Economic Impact of Disease-Related Losses on Commercial Catfish Farms: A Seven-Year Case Study from Alabama, USA. Hisham A. Abdelrahman et al.

10:45 am Progress in Gene Editing and Transgenics in Channel Catfish. Rex Dunham et al.

11:00 am Progress in Xenogenesis in Channel Catfish. Rex Dunham et al.

11:15 am Rapid Expansion and Subsequent Decline of Red Lionfish in the Alabama Artificial Reef Zone. Crystal L. Hightower et al.

11:30 am Juvenile Red Snapper Distribution and the Effects of Artificial Reefs. Trey P. Spearman and Sean P. Powers.

11:45 am Linking Physiology and Upper Thermal Limits in Crayfish. Kaelyn Fogleman et al.

12:00 pm ARSNiC: A New Approach for Prioritizing Aquatic Organism Passage and Infrastructure in Alabama. Daniel West

12:15 pm A History of Crayfish Research in Alabama with Comments on the Currently Understood Fauna. Stuart McGregor et al.

12:30 pm **Network & Adjourn**

Abstracts

Oral Presentations (Student Sessions)

Natalie Coash (Student), nsc0024@auburn.edu, 616-375-1224

Simulating Tradeoffs Between Fishing Quality and Economic Performance with Increasing Tournament Effort in an Alabama Black Bass Fishery

Natalie Coash and Matthew Catalano

Auburn University School of Fisheries, Aquaculture, and Aquatic Sciences, Auburn, AL 36830

Abstract:
Largemouth Bass *Micropterus salmoides* and Alabama Bass *Micropterus henshalli* are native centrarchid species that are the focal point of modern recreational fisheries in Alabama. Across the state and much of the south, black bass populations are subject to high amounts of angler effort partly attributable to the popularity of fishing tournaments. As tournaments gain popularity, agencies lack important information regarding the population level effects of size-selective catch-and-release angling. Systems with high catch-and-release rates, and low post-release survival can result in catch-and-release mortality rates that exceed harvest mortality, possibly resulting in negative effects on fishing quality. Tournaments may have a negative impact on fishing quality due to higher post-release mortality in comparison to non-tournament catch and release angling. However, tournaments also provide economic benefits through increased expenditures in local communities. The objectives of this study are to evaluate trade-offs between economic benefits and fishing quality across a gradient of increasing black bass tournament fishing effort at Neely Henry Lake, a 4,500-hectare reservoir within the Coosa River Basin in northeast Alabama. We utilize a dynamic age structured model including a submodel for fishing-related economic expenditures. The model allows for differential effort, post-release mortality, and effort-related expenditures between tournament and non-tournament anglers. The model will be informed by published creel and economic surveys and a current intensive reward/telemetry tagging study being conducted on Neely Henry. Agencies can utilize this information to construct management regulations that maximize the benefits of the tournament fishing industry as well as support a high quality fishery with desirable catch rates and size structure.

Oral Presentation
Bio: Originated from Grand Rapids, MI. Graduated in 2021 from the University of Wisconsin – Stevens Point. Currently trying to master R software under Dr. Matt Catalano at Auburn University.

Julia L. Palmer (Student), jzp0147@auburn.edu, 334-624-4016

USING FISHERIES TECHNIQUES TO ESTIMATE AGE AND GROWTH OF HYBRID CATFISH (*Ictalurus punctatus* ♀ x *Ictalurus furcatus* ♂) FROM COMMERCIAL CATFISH FARMS

Julia L. Palmer*, Jesse B. James, Peter C. Sakaris, Anita M. Kelly, Hisham A. Abdelrahman, Rusty A. Wright, Benjamin H. Beck, Luke A. Roy

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

Abstract:
In west Alabama, catfish producers routinely face the challenge of fish that exceed market size (aka “big fish”) in their commercial ponds. These fish are evading harvest and can increase in size significantly before the next harvest occurs. This is problematic for the producers because processing plants prefer catfish in the 1-4 lbs. range, and farmers are paid a premium price for this size. Harvesting inefficiencies and ponds with uneven bottoms that allow catfish to escape seines are significant drivers of the big fish problem. Due to their larger size and growth potential, hybrid catfish (*Ictalurus punctatus* ♀ *x Ictalurus furcatus* ♂) tend to be a more significant big fish issue than channel catfish.

The objective of our study is to quantify the age structure and growth of hybrid catfish that evade capture and remain in ponds following commercial harvest. Twelve recently harvested ponds will be sampled to collect up to 100 fish per pond using an electrofishing boat with dip nets. Following collection, fish will be numbered, and the total length (mm), weight (kg), and sex of fish will be recorded. We will extract otoliths from the brain cavity and use the cut method to estimate fish age. Once we can accurately observe the core, we will use a high-quality image analysis software program connected to a microscope to count the annuli surrounding the core. This counting will be conducted by two readers independently and compared. If there is any dispute regarding age estimation, a third reader will be brought in to resolve the disagreement. Data collected on fish age, growth, and longevity of hybrid catfish found in ponds following harvest will help producers and researchers better understand the big fish problem. Additionally, looking at factors like seining frequency and pond characteristics will contribute to solutions for this issue.

Oral Presentation

Bio: I am originally from western New York but graduated in 2020 (B.S. in Environmental Science) from Georgia Gwinnett College. My thesis work is under Dr. Luke Roy, estimating the age and growth of missed hybrid catfish in aquaculture ponds.

Paul Ramsey (Student), pqr0001@auburn.edu, 407-718-9573

Interspecies variability of native fish nursery habitats in the lower Red River basin

Paul Q. Ramsey[1], Shannon K. Brewer[2], & Dennis DeVries[3]

[1]Alabama Cooperative Fish and Wildlife Research Unit, Auburn University, Auburn, AL

[2]U.S. Geological Survey, Alabama Cooperative Fish and Wildlife Research Unit, Auburn University, Auburn, AL

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

Abstract:
Freshwater fishes represent one of the most threatened taxa in North America, and nursery habitats are important for successful recruitment. Historically, nursery habitat in large rivers has been defined simply as shallow, calm waters; however, nursery habitats are likely to vary based on other coarse-scale habitat factors. The objective of our study was to describe nursery habitat of large river fishes that are understudied. We focused on seven species of *Lepomis* (e.g., Bluegill *Lepomis macrochirus*, Orangespotted Sunfish *Lepomis humilis*, Warmouth *Lepomis gulosus*, Longear Sunfish *Lepomis megalotis*, Redear Sunfish *Lepomis microlophus*, Green Sunfish *Lepomis cyanellus* and Bantam Sunfish *Lepomis symmetricus*) because of their value as both sportfish and forage species. An occupancy model framework was used to determine the influence of field and geospatial covariates on the detection and occupancy of juvenile *Lepomis* fishes. We found species detection was positively related to water temperature and negatively related to dissolved oxygen. Nursery habitat occupancy within *Lepomis* was related to a variety of factors. Juvenile Bluegill tended to occur in reaches that were relatively straight, whereas juvenile Green Sunfish were more likely to occur in more complex, sinuous reaches. Warmouth juveniles were more likely to occur in river reaches that were wide and shallow. Bantam and Longear sunfishes were both more likely to occur in reaches comprising shallower water. Lastly, Orangspotted Sunfish tended to occur in reaches with lower discharge restricting them spatially within the catchment. Our results suggest an important context dependency of nursery habitats even within fishes that are taxonomically similar.

Oral presentation

Bio: I grew up in Orlando, FL. I graduated from Florida State University in 2014 (B.S. Biology). My thesis work assesses nursery habitat and hatch dates of large river fishes of the lower Red River basin under Dr. Shannon Brewer.

Jordan Ramey (Student), jtr0056@auburn.edu, 256-419-7055

Analogous relationships between landscape constraints and a *Faxonius* assemblage in the Ozark Highlands.

Jordan Ramey[1], Shannon Brewer[2], Robert Mollenhauer[3]

1 Alabama Cooperative Fish and Wildlife Research Unit, Auburn University, Auburn, AL

2 U.S. Geological Survey, Alabama Cooperative Fish and Wildlife Research Unit, Auburn University, Auburn, AL

3 Texas Parks and Wildlife Department, Heart of the Hills Fisheries Science Center, Mountain Home, TX

Abstract:
Although the importance of crayfishes to ecosystem dynamics and energy transfer is well recognized, we lack information on distributions and associated habitat use for many species. Within our study area, three crayfishes are considered of conservation concern (*F. nana, F. macrus, F. meeki brevis*), whereas two native species are considered strong competitors that often invade new habitats (*F. neglectus neglectus* and *F. virilis*). We used field-collected covariates and geospatial data in a multispecies occupancy model framework to determine the multiscale factors related to both crayfish detection and occupancy. For all species, detection probability was relatively high and negatively related to water clarity. As expected, there were some shared relationships among species and some important differences. All species shared a negative relationship with landscape disturbance at the catchment scale and a positive relationship with cobble substrate at the reach scale. *F. nana, F. macrus,* and *F. meeki brevis* shared relationships with most habitat factors; however, *F. macrus* was less likely to occur in reaches with deep pools. Both *F. neglectus* and *F. virilis* were more likely to occur in reaches with a large proportion of pool habitats reflective of reach-scale disturbance. Otherwise, *F. neglectus* and *F. virilis* had opposite relationships with other reach and landscape factors. Our results suggest mechanisms associated with disturbance across the landscape negatively affects even strong competitors that appear to share few habitat relationships. Moreover, species that are considered strong competitors appear to benefit from disturbances that increase the proportion of pool habitat at the reach scale.

Oral presentation

Bio: I received a B.S. Natural Resources Management with a minor in Biology from the University of Tennessee at Martin in 2020. I am currently pursuing a M.S. at Auburn University under Dr. Shannon Brewer and my thesis focuses on general ecology and life-history of crayfishes in the Ozark Highlands region of Oklahoma.

Max Rubino (Student), mjr0084@auburn.edu, 406-781-6334

Estimating components of mortality for two Black Bass (*Micropterus spp.*) species at a large Alabama Reservoir with high catch-and-release angling effort.

Max Rubino

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

Abstract:
Post-release mortality associated with catch-and release angling has the potential to negatively impact fishing quality in recreational fisheries. However, the population level impact of catch and release angling is not yet well understood and depends on the magnitude of capture and post-release mortality rates. Post-release mortality rates associated with fishing tournaments are higher than non-tournament releases and could contribute substantially to total fishing mortality for some species. To better quantify the population-level impacts of catch-and-release angling, we conducted a combined high value reward and radio telemetry study to estimate natural, harvest, tournament hooking, and non-tournament hooking mortality rates of two black bass species at Neely Henry Reservoir in Alabama. We tagged 454 Largemouth *(Micropterus salmoides*) and 348 Alabama Bass (*Micropterus henshalli*) with high value external dart tags. In addition, 50 fish of each species were implanted with a radio transmitter that indicated mortality when tags remained motionless for 24 hours. All fish were collected using standard electrofishing procedures in late January and early February of 2022. Manual radio tracking was conducted monthly to monitor the mortality status of all telemetered fish. Preliminary results indicate that the annual capture rate for both species exceeds 0.5. Additionally, estimates of post-release tournament mortality (0.43), and annual natural mortality (0.61) are at the high end of literature values. There is an indication of possible angler selectivity towards Alabama Bass in some angling sectors. Results from this study will inform better recreational fishing management on high effort bass reservoirs in the southeastern US and beyond.

Oral Presentation

Bio: I graduated from Montana State University with a B.S. in Fish and Wildlife ecology in 2021. I am currently researching mortality components in a high effort catch-and-release fishery under Dr. Matthew Catalano.

Stephanie Velasquez (Student), sfv0003@auburn.edu, 334-740-5384

Effects of salinity on growth, survival, and serum osmolality of red snapper *Lutjanus campechanus* and yellowtail snapper *Ocyurus chrysurus*

Stephanie Velasquez[1], Harsha S.C. Galkanda-Arachchige[1], Robert P. Davis[1], Sidra Nazeer[1], John Stieglitz[1], Leonardo Ibarra-Castro[1], and Allen Davis[1]

[1]School of Fisheries, Aquaculture, and Aquatic Sciences
Auburn University, AL 36849
[2] Department of Marine Biology and Ecology, Rosenstiel School of Marine, Atmospheric, and Earth Science, 4600 Rickenbacker Causeway, Miami, FL 33149-1031
[3] Whitney Laboratory for Marine Bioscience, University of Florida, FL, USA.

Abstract:
Marine finfish culture has received considerable interest by aquaculturists worldwide due to their potential for restocking as sports fish as well as commercial food fish. The aquaculture of snapper species such as the yellowtail, *Ocyurus chrysurus* and the red snapper, *Lutjanus campechanus* poses promising species for the aquaculture industry due to their high market value and the potential to support an economically important commercial and recreational fishing industry. The possible culture of high-value snapper species in lower salinity conditions apart from oceanic (~34 g/L) may pose a more economic technology for snapper.
Two trials were conducted to determine the salinity tolerance of red snapper based on serum osmolality, growth performance, and survival, including a six-week growth trial and a short-term salinity trial of red snapper across a wide range of salinities (2-32 g/L). The isosmotic point was estimated as 372.01 mmol/kg, which corresponds to 11.4 g/L salinity, and no significant differences were noted for survival and FCR of fish reared in 8 and 32 g/L salinity. However, significantly low growth was noted in fish reared in 8 g/L salinity compared to fish reared in 32 g/L salinity could be due to the increased osmoregulatory energy expenditure in this salinity.
Two additional trials were conducted to determine the salinity tolerance of yellowtail snapper in varying salinity conditions of 3-32 g/L, followed by a six-week growth trial in 6-32 g/L salinity. The isosmotic point was estimated as 415.75 mmol/kg, which corresponds to 32 g/L. Survival was significantly different for fish reared in 6 g/L, which may be due to increased osmoregulatory energy expenditure. Interestingly, significant differences ($p < 0.05$) were observed for biomass, with highest weights in 12 g/L and 16 g/L. Such findings serve as initial data in the possible potential of red and yellowtail snapper culture in lower salinity conditions.

Oral presentation
Bio: I am from Manila, Philippines. Graduated in 2015 (M.Sc. Biology) from Ateneo de Manila University. My dissertation work is on utilizing different diet formulation in marine species, effect of salinity on growth and serum osmolality of yellowtail snapper, *Ocyurus chrysurus,* and determination of methionine requirement in Pacific white shrimp, *Litopenaus vannamei* under Dr. Allen Davis.

Shrijan Bajracharya (Student), szb0213@auburn.edu, 502-395-8817

The effects of stocking density on the growth of juvenile Pacific white shrimp (*Litopenaeus vannamei*) in a recirculating biofloc system

Shrijan Bajracharya[1], D. Allen Davis[1], and Luke Roy[2]

[1]Auburn University, School of Fisheries, Aquaculture, and Aquatic Sciences, Auburn, AL 36830
[2]Auburn University, Alabama Fish Farming Center, Greensboro, AL 36744

Abstract:
One of the most crucial aspects of shrimp cultivation is stocking density. Shrimp production can be increased by increasing stocking density; however, this requires more feed input, which could impair water quality. High stocking density can affect shrimp growth, and survival, and contribute to the stress response brought on by overcrowding. The objective of this study was to observe the response of *L. vannamei* when cultured at different stocking densities in a biofloc system. The experiment was conducted in an indoor biofloc recirculating aquaculture system consisting of 24, 150L culture tanks. The shrimp were stocked at 67, 133, 200, 267, 333, 400, 467, and 533 shrimp/m^3 and raised for 30 days. All the treatments were provided with a commercial shrimp diet (Zeigler Shrimp Grower SI-35, CP 35%) four times per day via hand feeding. At the end of this study, significant differences in growth and FCR between treatments were observed. Survival was above 90% in all the treatments. The highest mean weight (6.03 g) and weight gain percentage (545.97%) were recorded in shrimp cultured at 67 shrimp/m^3. A declining trend was observed in the final mean weight and weight gain (%) with an increase in stocking density. FCR and biomass both increased with increasing density. From the shrimp grower's point of view, one would want to achieve higher biomass (more shrimp) by raising shrimp at higher stocking densities, but the risk of crowding, high FCR, and potentially poor water quality associated with higher stocking densities can compromise shrimp growth (resulting in smaller shrimp). Therefore, it is critical to determine optimal stocking densities in biofloc systems to promote better shrimp growth.

Oral presentation

Bio: I grew up in Bhairahawa, Nepal. Graduated in 2020 (M.S. Aquaculture) from Kentucky State U. My dissertation is on Pacific white shrimp in biofloc system under Dr. Davis and Dr. Roy.

Samantha Young (Student), ssy0008@auburn.edu, 570-463-5314

Mortality and Movement of Greater Amberjack in the Gulf of Mexico and Atlantic Ocean off the Southeastern US

Samantha Young and Matthew Catalano[1]

203 Swingle Hall, Auburn University, AL 36849

Abstract:
Greater Amberjack (*Seriola dumerili*) are a popular species for sport and commercial fisheries across the southeastern United States. There are two Greater Amberjack stocks off the southeastern US: the South Atlantic and Gulf of Mexico (GOM) stocks. Currently, the South Atlantic stock is stable, yet the GOM stock is both overfished and undergoing overfishing. Obtaining independent estimates of exploitation for these stocks would aid management by supplementing existing stock assessments. We are conducting a large-scale multi-investigator tagging study to estimate regional fishing mortality, length-based vulnerability, and movements of the Greater Amberjack. In summer 2022, we began tagging 1200 Greater Amberjack with conventional reward tags. Up to 400 of these fish were also implanted with an internal acoustic transmitter. The study area was divided into three regions: the Western GOM (Texas and Louisiana), the Eastern GOM (Mississippi, Alabama, and Florida), and the South Atlantic (Florida to North Carolina). Fish lengths were also stratified into three length intervals to estimate vulnerability to capture, harvest, and discard, and half of the fish were double tagged to estimate tag shedding rates. We will collect tag returns from both recreational and commercial fisheries with a $250 reward incentive for reporting external tags. Detections of fish tagged with acoustic transmitters will be obtained from new and existing receiver arrays to inform mortality estimates and detect fish movements. Our results will provide critical estimates that fisheries management agencies can use to make informed regulatory decisions for future fishing seasons to help maintain a sustainable fishery.

Oral Presentation

Bio:I am originally from a small town in Pennsylvania and earned my Bachelor degree in marine science from the University of South Carolina in 2020. I am attending Auburn University in pursuit of my Masters degree in fisheries focusing on a large-scale tagging study on Greater Amberjack.

Sarah Gibbs (Student), sgibbs@disl.org, 518-256-5002

Attitudes, Perceptions, and Beliefs of Reef Fish Fishers in the Gulf of Mexico

Sarah Gibbs[1], Marcus Drymon[2,3], Amanda Jargowsky[2,3], and Steven Scyphers[1]

[1]School of Marine and Environmental Sciences, University of South Alabama and the Dauphin Island Sea Lab, Dauphin Island, AL, 36528

[2]Mississippi State University, Coastal Research and Extension Center, 1815 Popps Ferry Road, Biloxi, MS, 39532

[3]Mississippi-Alabama Sea Grant Consortium, 703 East Beach Drive, Ocean Springs, MS, 39564

Abstract:

Reef fish fisheries in the Gulf of Mexico are some of the most economically and recreationally valuable in the country. Both the assemblage of species and the stakeholders that utilize these resources are highly diverse, which creates a complex social-ecological system that can be complicated to manage. It is therefore important to characterize the opinions and local knowledge of fishers and integrate them into fisheries management. Using an online survey, we assessed recreational reef fish fisher attitudes and beliefs, perceptions of reef fish populations and management, and overall satisfaction with reef fish fisheries. A total of 902 respondents from across the Gulf of Mexico completed the survey. Results showed generally high levels of satisfaction with reef fish fisheries. Differences in responses by state were found, indicating that fishers' attitudes, perceptions, and beliefs may be influenced by geographic location and the reef fish species that fishers perceive as most important to their fishing. Overall, results from this survey can be used to better understand characteristics of recreational reef fish fishers and lead to more effective fisheries management in the Gulf. This study is the first of four annual surveys to examine how responses change over time.

Oral Presentation

Bio: I am a 2nd year PhD student at the University of South Alabama/Dauphin Island Sea Lab. I am originally from Troy, NY. I graduated in 2021 with a B.S. in Environmental Science from Northeastern University in Boston, MA. My dissertation research is on the adaptive capacity of fishers under Dr. Steven Scyphers and Dr. Jonathan Grabowski.

TJ Pullen (Student), tjp0051@auburn.edu, 940-222-1976

Effects of size-selective catch-and-release angling on population size structure of two black bass (Micropterus spp.) species in an Alabama Reservoir

TJ Pullen and Matthew Catalano

203 Swingle Hall
Auburn, AL 36849

Abstract:
The potential for size-selective catch-and-release angling to affect the size distributions of black bass (Micropterus spp.) populations is not well understood. Angling is highly size selective, and some types of angling, such as competitive fishing events, may be particularly size selective by incentivizing the capture of large fish. We are conducting research on Largemouth and Alabama Bass at Neely Henry reservoir in Alabama to assess the potential for size selective angling to affect population size structure. This system is characterized by high fishing effort, a high proportion of fish captured in tournaments, and a high rate of catch-and-release fishing. Size selectivity of tournament and non-tournament angling was estimated from a high reward tagging study and by sampling size distributions of both species from the creel. Creel samples will be used to construct size distributions for fish that were: harvested, weighed-in at a tournament, culled in a tournament, released immediately. Variation in growth trajectories among individual fish was estimated by ageing samples of fish from the creel and from standardized electrofishing surveys. An age- and size-structured equilibrium model will be used to predict size distributions under a range of fishery scenarios that will be selected to represent the fishery at Neely Henry Reservoir and the southeastern U.S. more broadly.

Oral Presentation

Bio: I am from Ponder, TX. I earned a bachelor's degree in Fisheries & Aquatic Ecology from Oklahoma State University in 2021. I am currently working on assessing the effects of size-selective angling on black bass on Neely Henry Reservoir.

Manuel E. Coffill-Rivera (Student), manuelcoffill@gmail.com, 407-432-0666

Effects of temperature and salinity on blood chemistry and survival of juvenile Atlantic tarpon *Megalops atlanticus*

Manuel E. Coffill-Rivera1, Yvanna Paez Mendez1, Logan Little1, Patrick M. Graham2, James S. Franks2, J. Wesley Neal1, and Peter J. Allen1

1Department of Wildlife, Fisheries and Aquaculture, Mississippi State University, Post Office Box 9690, Mississippi State, Mississippi 39762, USA
2Center for Fisheries Research and Development, The University of Southern Mississippi, Gulf Coast Research Laboratory, 703 East Beach Dr., Ocean Springs, Mississippi 39564, USA

Abstract:
Atlantic tarpon *Megalops atlanticus* are highly migratory sportfish that support recreational fisheries throughout their range. In U.S. waters, juveniles can be found in marshes along the Gulf of Mexico and Atlantic seaboard, with temperature limiting their latitudinal distribution. Juveniles may overwinter in these areas during the first several years of their life. Low temperatures are known to cause mortality in adults, but the challenges of temperature are less understood in juveniles. Furthermore, salinity, which can change dramatically in these habitats, may have a synergistic effect with temperature. To examine the effect of temperature and salinity on juvenile tarpon, wild fish were collected from the Mississippi coast and acclimated to different environmental conditions. The hematology of juvenile tarpon was examined in two different salinity (<5 and >25ppt) and temperature (15 and 25°C) treatments, mimicking conditions found in estuaries, followed by a lower thermal tolerance test. Fish were acclimated to these treatments for two weeks after which blood samples were collected and analyzed from 14 fish per treatment. Blood plasma osmolality offered valuable insight into physiological challenges with low temperature and variable salinity. Increased plasma osmolality was observed at both low and high salinity treatments acclimated to 15°C (334 ± 1 and 356 ± 3 mmol/kg, respectively) compared to 25°C treatments (328 ± 3 and 343 ± 3 mmol/kg, respectively). For the lower thermal tolerance test, all fish were acclimated to 15°C for 2 weeks, then transferred to separate tanks where temperature was gradually decreased at 0.85 ± 0.06 °C/hr until fish lost equilibrium. Fish at low salinity lost equilibrium more rapidly (<5ppt, 12.65 ± 0.46°C) than fish at high salinity (>25ppt, 11.26 ± 0.14°C). Results indicate that young tarpon are susceptible to low temperature, exacerbated by low salinity, findings useful in assessment of juvenile tarpon overwintering habitat.

Oral presentation

Bio: I was born in Puerto Rico and moved to Florida when I was a teenager. I received my M.S. degree from Mississippi State University in 2022, and I’m currently pursuing a Ph.D. degree at the University of South Alabama and the Dauphin Island Sea Lab.

Chris Smith (Student), czs0059Aauburn.ecu, 334-844-4058

Seasonal movements of Paddlefish in William “Bill” Dannelly Reservoir, including in the lower Cahaba River, Alabama.

Chris Smith, Dennis R. DeVries, and Russell A. Wright

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

Abstract:
Previous studies have shown seasonal variation in Paddlefish *Polyodon spathula* habitat selection, association with structure, and summer backwater habitat use (where zooplankton is thought to be abundant, important for all Paddlefish life stages). Our study area, Dannelly Reservoir, Alabama, extends from R.F. Henry Lock and Dam (L&D) to Millers Ferry L&D and we subdivided it into three sections based on channelization and available backwater habitat. Moving downstream from R.F. Henry, the river becomes less channelized with larger and more abundant backwaters. The Cahaba River flows into the Alabama River in what we defined as the middle reservoir section. Assuming that the small tributaries are not adequate to support spawning, Paddlefish in Dannelly Reservoir have two potential routes for their spawning migration: continue upstream on the Alabama River to the R.F. Henry tailrace, or move upstream into the Cahaba River. In 2021 we deployed passive acoustic receivers throughout Dannelly Reservoir, including 10 randomly-selected backwater sites and the lower Cahaba River. Between November 2021-March 2022 we tagged, released, and tracked 23 Paddlefish using both these receivers and manual tracking. We also collected seasonal zooplankton samples at 6 reservoir and 10 backwater sites. Tagged fish were detected most often in the middle river section (12 of the 23 never or briefly left this section) which is also where zooplankton abundances were highest. Two fish entered the Cahaba River during March 2022, one of which was a gravid female; both exited in April 2022. Only 1 fish migrated to the R.F. Henry tailrace (in late March 2022). Ten fish entered the randomly selected backwater sites, 4 of which spent the entire summer in backwaters. Future work will include fish tagging/tracking, zooplankton sampling, incorporating manual tracking data and temperature/pressure data collected for each fish, to help in identifying habitats these fish are using seasonally.

Oral Presentation

Bio: I am originally from Dallas, Texas, but lived in Macon Georgia for many years where I worked for an insurance company. I left that job to come to Auburn University where I received an undergraduate degree in Fisheries Biology, and where I am currently pursuing my master’s degree with Dr. DeVries and Dr. Wright.

James T. Tuttle (Student), jtt0039@auburn.edu, 215-983-1508

Investigating the persistence of virulent *Aeromonas hydrophila* isolate ML-09-119 within commercial catfish pond bottoms at different temperatures

James T. Tuttle[1], Timothy J. Bruce[2], Hisham A. Abdelrahman[1], Luke A. Roy[1], Ian A.E. Butts[2], Benjamin J. Beck[3], and Anita M. Kelly[1]

[1]Alabama Fish Farming Center, Greensboro, AL 36744; [2]School of Fisheries, Aquaculture and Aquatic Sciences, Auburn University, Auburn, AL, 36849; [3]US Department of Agriculture, Agricultural Research Service, Aquatic Animal Health Research Unit, Auburn, AL, 36832

Abstract:
Virulent *Aeromonas hydrophila* (*vAh*) has caused severe, chronic, and recurring mass mortality events in catfish since 2009. The ability of *vAh* to persist in the bottoms of production ponds has yet to be researched. To investigate *vAh* persistence, a full persistence trial (*FPT*) was designed by first collecting sediments from four catfish ponds, and autoclaving each sample thrice for 60 min. Isolate ML-09-119 was grown in tryptic soy broth (*TSB*) for 24 h at 28 ^{o}C, *vAh* culture was centrifuged at 4,000 rpm for 10 min, and then *TSB* supernatant was discarded. Cells were resuspended in 1.0X PBS, resulting in an inoculum concentration of $8.67\pm0.65\times10^{7}$ CFU/mL. Inside triplicate decontaminated glass aquaria separated into four chambers, 120 g of sterilized sediment, 12 mL of inoculum, and 500 mL of sterile dechlorinated water were mixed thoroughly for 60 min. The volume inside each chamber was increased to 8 L, aquaria were situated in a temperature-controlled room (28 and 21 ^{o}C for the *FPT* and pilot trial, respectively), and chambers were aerated for 12 h daily. At 24, 48, 96, 144, and 192 h post-inoculation, then at 7-day intervals, 1 g of sediment was removed to enumerate *vAh CFU* in the sediment. Next, 1 g of sediment from each chamber was centrifuged and resuspended with 0.1X PBS. Serial dilutions were plated onto ampicillin dextrin agar and incubated at 28 ^{o}C. Pilot and *FPT* results indicated *vAh* colonies remained viable over 113-day and 28-day periods, respectively. Organic matter, alkalinity, extractable micronutrient concentrations, cation exchange capacity, and pH of all sediments were measured. Correlation coefficients between *vAh CFU*/g and measured chemical variables were not significant. While this study did validate the ability of *vAh* to persist in submerged bottom sediments, further research to determine which environmental factors and how temperatures influence *vAh* persistence is paramount.

Oral Presentation

Bio: I am originally from Philadelphia Pennsylvania, and I graduated from the University of Rhode Island in 2018 (BSc in Marine Biology). My MS thesis is investigating the presence and persistence of pathogenic bacteria within the bottoms of commercial catfish ponds in west Alabama.

Ehlana Stell (Student), egs0046@auburn.edu, 662-416-2930

Using the electron transport system as an indicator of organismal thermal tolerance and respiration rate.

Ehlana Stell, Shannon Brewer, Dennis DeVries, Russell Wright
[1]SFAAS, Auburn University
[2]U.S. Geological Survey, Alabama Cooperative Fish and Wildlife Research Unit, Auburn University

Abstract:
Freshwater systems are undergoing rapid thermal shifts in many areas of North America and as such, it is becoming more important to understand species specific responses to changing thermal regimes. Traditional techniques for determining the thermal tolerance of species are often lethal and time consuming. Using the enzyme activity of the electron transport system within mitochondria has been suggested as an alternative and may provide a non-lethal, quick, and efficient alternative to traditional techniques. Here we use Largemouth Bass, a species with well documented thermal tolerance and respiration rates, to test the efficacy of using ETS to determine thermal tolerance and respiration rate in response to variable acclimation temperatures in a freshwater fish. Three tissue types (skeletal muscle, heart, and liver) were dissected from bass acclimated to 20, 25, and 30°C and used in ETS enzyme assays ranging from 7.5-40°C. While there were significant differences among the tissue types and acclimation temperatures, the maximal enzyme activity occurred from 25.23-31.91°C while traditionally derived CTmax resulted in loss of equilibrium at 39-42°C which is significantly higher than the upper optimum range determined via the enzyme assays. The R:ETS ratio was calculated using skeletal muscle tissue samples from fish acclimated from 10-32.5°C and tested in an intermittent respirometer. This ratio increased with temperature with the largest changes occurring at the upper optimum thermal range determined by enzyme assays. These results suggest ETS analysis may have important bioenergetics modeling effects as it can determine biologically relevant thermal tolerances and potentially be used to predict whole organismal respiration rates.

Oral Presentation

Bio: Ehlana is from Booneville, Mississippi and graduated with her Bachelor of Science and Master of Science from the University of Mississippi before beginning her Doctoral research at Auburn University in 2018. She work under advisors Dennis DeVries and Russell Wright.

Dylan Kiene (Student), dkiene@disl.org, 251-861-2141 x2384

Tracking Southern Flounder Spawning Migration from Mobile Bay, Alabama via Ultrasonic Telemetry - Timing, Rates, Routes, and Homing

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

[1] University of South Alabama, School of Marine and Environmental Sciences, Mobile, Alabama

Abstract:
Southern Flounder (*Paralichthys lethostigma*) is a species of great importance both commercially and recreationally throughout the northern Gulf of Mexico. However, certain aspects of their reproductive life history, particularly their migratory spawning behavior, are not well understood. The objective of this study is to quantify Southern Flounder spawning egress from Mobile Bay and understand variability of timing and magnitude of egress across years. From August 2019 to December 2021 175 Southern Flounder ranging in size from 355mm to 635mm were surgically implanted with Vemco acoustic transmitters and externally tagged with Floy T-bar tags (2019 = 55; 2020 = 45; 2021 = 75). An additional 213 flounder were tagged solely with external mark-recapture T-bar tags (2109 = 8; 2020 = 25; 2021 = 180). The spatial distribution of acoustic tags as well as the size distribution of tagged flounder varied yearly while effort remained the same across all years with 20 hook & line charter fishing days being the most effective way to capture and tag flounder. Reported recapture rates by year 2019 (6%), 2020 (14%), 2021 (6%) indicate high system fidelity outside of seasonal movements presumably associated with spawning. Magnitude of egress from Mobile Bay varied by year (2019 = 30%; 2020 = 22%; 2021 = 20%) while timing of egress remained relatively consistent across years (October = 9%; November = 70%; December = 9%; January = 12%). Migratory routes were examined and found to be heavily weighted in preference of egress through the mouth of Mobile Bay rather than through the Mississippi Sound (MB = 90%; MS =10%). No significant difference in size of migratory vs non-migratory flounder was observed in any year. Work is ongoing to understand inshore overwintering of mature female flounder, establish recapture reporting rates and parse out environmental drivers of flounder seasonal migration.

Oral Presentation

Bio: Dylan Kiene is a Ph.D. student at the University of South Alabama under the advisement of Dr. Sean Powers.

Nathaniel Steffensmeier (Student), nms0046@auburn.edu,

Condition and Passage Rate of Paddlefish with Damaged Rostra in the Alabama River

Nathaniel M. Steffensmeier[1], Russell A. Wright[1], Dennis R. DeVries[1], Steven J. Rider[2], Travis R. Powell[2], and Gregory T. Miles, Jr[2]

1 School of Fisheries, Aquaculture & Aquatic Sciences, Auburn University, AL 36849
2 Rivers & Streams Fisheries Program, Alabama Division of Wildlife and Freshwater Fisheries, Montgomery, AL 3611

Abstract:
The unique rostrum of Paddlefish (*Polyodon spathula*) aids in finding zooplankton prey as well as provides lift and stability in the water column. This structure can sometimes be damaged or may even be completely broken. Injury or complete loss of their rostrum may have non-lethal impacts on body condition and swimming ability, although little data exist concerning such effects. Here we quantify the extent and prevalence of rostrum damage across the Alabama River, as well as potential sublethal effects of such damage. Data from Paddlefish (n=351) collected in the Alabama River from 2017 to 2022 by both Auburn University and the Alabama Division of Wildlife and Freshwater Fisheries were combined to determine the proportion of fish with damaged rostra across the four river sections separated by three lock-and dam structures, the relative severity of that damage, the impact of damage on body condition (relative condition, Kn), and whether severity of rostrum damage was related to passage/non-passage over the crested spillway at Claiborne Lock and Dam (using a subset of Paddlefish tagged with combined acoustic and radio tags). We found that the highest percentage of Paddlefish with rostrum damage was in both Claiborne Lake (70.0 %) and the Lower Alabama River (66.9 %), with lower values in both William “Bill” Dannelly Reservoir (14.5 %) and Jones Bluff Reservoir (13.3%). Both male and female Paddlefish with rostrum damage had a significantly lower condition factor than those fish without damage. However, there was no significant difference in passage rate of Claiborne Lock and Dam between individuals with and without rostrum damage, and a calculated rostrum damage score did not differ significantly between fish that passed and did not pass. Additional study of the sublethal effects of rostrum damage to Paddlefish, including on movement patterns, is needed to more fully understand this phenomenon.

Oral presentation

Bio: I am from Columbus, OH and graduated from the Ohio State University in 2020 (B. S. in Forestry, Fisheries, and Wildlife). My thesis work focuses on the influence of rostrum damage to Paddlefish in the Alabama River under Dr. DeVries and Dr. Wright.

Aya S. Hussain (Student), *asm0073@auburn.edu*, 334-498-1105

Evaluation of different stocking densities for nursery culture of the Pacific white shrimp (Litopenaeus vannamei) in a biofloc system

Aya S. Hussain[1,2], Shrijan Bajracharya[1] and D. Allen Davis[1]

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

2 Zoology Department, Faculty of Science, Suez University, Egypt 43511

Abstract:
To optimize the use of energy and space, the density in shrimp nurseries should be maximized. Although, high density can impact growth performance of the shrimp, survival rate and water quality parameters. Systems should also have environmentally friendly management practices that provide greater biosecurity to the culture system such as biofloc-type systems. Therefore, the objective of this study was to evaluate the effects of different stocking densities on the growth and survival of the Pacific white shrimp post-larvae under intensive nursery conditions in a biofloc system. A four-week nursery trial was conducted at the E.W. Shell Fisheries Center at Auburn University, AL. The nursery system consisted of twenty-four 150L polyethylene tanks recirculating with a sump (~ 800L) and circulation pump run as a common biofloc-type system. Eight different stocking densities were assigned as experimental treatments (0.5, 1, 2, 3, 4, 6, 8, and 10 PL/L). A sub-sample of PLs from each treatment (ie. tank from each treatment) was weighed every five days during the experimental period to determine when and if the growth diverged over time for shrimp reared at the various densities (Figure 1). At day 5, 10, and 15 of the experiment, it was observed that the growth of the PLs didn't diverge between the different densities. At day 20 and 25, the growth of the PL diverged between the various densities. The results of the overall growth of the PLs throughout the trial were significantly different (P= <0.001) between the different densities. As it would be expected, the higher the stocking densities, the lower the growth of the PLs. In practical, a shrimp farmer would want to maximize the use of the nursery space to hold high stocking density, but at same time it's important to find the appropriate stocking density to not inhibit the shrimp growth.

Oral presentation

Bio: I grew up in Egypt. Received Masters in 2015 (Aquaculture) from Suez Canal University, Egypt. My dissertation work is on various biofloc systems and physiological stress of Pacific white shrimp projects under Dr. Allen Davis and Dr James Stoeckel.

Aya S. Hussain (Student), *asm0073@auburn.edu*, 334-498-1105

Relationship between aerobic scope and upper thermal limits of Pacific white shrimp (Litopenaeus vannamei) in low-salinity culture systems

Aya S. Hussain[1,2], Kaelyn J. Fogelman[1], Hisham A. Abdelrahman[1], Luke A. Roy[1], and James A. Stoeckel[1]

[1]School of Fisheries, Aquaculture and Aquatic Sciences, Auburn University, Auburn, AL, USA, 36849
[2]Zoology Department, Faculty of Science, Suez University, Suez, Egypt, 43511

Pacific white shrimp aquaculture in low-salinity water is a viable industry and production strategy in the southeastern US. A major challenge facing this industry is a phenomenon called late-term mortality which is thought to be driven by thermal stress at the end of the growing season when water temperatures can reach or exceed 36 °C in production ponds. To investigate the physiological mechanisms behind upper lethal limits in shrimp, we evaluated linkages between empirically measured thermal limits and absolute aerobic scope (AAS), or ability to provide energy above that needed for basic maintenance. In this study, we tested whether thermal tolerance decreases with increasing shrimp age/size and whether AAS is a useful concept for understanding the physiological basis of thermal tolerance in shrimp. We exposed two size classes (small: 2.07 ± 0.86 and large: 24.64 ± 2.55 g) of shrimp to increasing temperature at a rate of 1 °C/h from 28–42 °C. At each temperature, we used intermittent respirometry to estimate resting metabolic rate and we directly measured lethal thermal tolerance by evaluating critical thermal maximum (CT_{max}). Additionally, we used the electron transport system assay to estimate maximum metabolic rate at temperatures from 9–45 °C. Small shrimp had a higher CT_{max} than large shrimp, with upper lethal limits of 40.6 and 39.0 °C, respectively. For both size-classes, AAS reached its minimum (AAS_{min}) at temperatures near the onset of metabolic depression and within 2 °C of CT_{max}. Large shrimp exhibited a lower temperature at AAS_{min} than that of smaller shrimp. Reductions in AAS appear to be one of the underlying physiological drivers of thermal tolerance in L. vannamei and an indicator of increasing thermal stress. Changes in the temperature at which AAS reaches its minimum may be a useful predictor of shifts in thermal tolerance among shrimp size-classes.

Oral presentation

Bio: I grew up in Egypt. Recieved Masters in 2015 (Aquaculture) from Suez Canal University, Egypt. My dissertation work is on various biofloc systems and physiological stress of Pacific white shrimp projects under supervision of Dr. Allen Davis and Dr. James Stoeckel.

Poster Presentations

Nathaniel (Nate) Sturm, nsturm@gsa.state.al.us, 659-239-3934
Chris Haynes, chaynes@gsa.state.al.us, 659-239-3999

50+ Years of Fish Survey Data—An Update on the GSA Fish Database

Nathaniel D. Sturm[1] and Chris B. Haynes[1]

[1] Geological Survey of Alabama, Ecosystems Investigations Program, Tuscaloosa, AL 35401

Abstract:
This poster serves to update the community on the current status of the Geological Survey of Alabama's Dynamic IBI Survey System (Fish Database). The Geological Survey of Alabama has recorded fish survey data since 1969. As of 2022, all fish survey data has been added to a digital fish database, The Dynamic IBI Survey System, and iteratively QC'd. The database now contains 5,831 records. In wadable streams, this data was collected through Index of Biotic Integrity (IBI) Surveys consisting of 30 sample efforts divided among pools, riffles, and runs. For larger rivers/non-wadable streams, Boat Electrofishing Surveys were employed, targeting the left shoreline, right shoreline, and midchannel in 3 distinct 600 second passes. The poster provides examples of the types of information collected during surveys, some limitations of the current database, and a breakdown of the number of records available by Icthyoregion, county, HUC 8 watershed, and over time. This wealth of fish survey data is available for use upon request from members of the Geological Survey of Alabama's Ecosystems Investigations Program, led by Stuart W. McGregor.

Poster Preszentation

Nate Sturm - Bio: Originally from Lakewood, CO, I came to Alabama to acquire my B.S. in Environmental Science (2016) and M.S. in Aquatic Biology (2021) from The University of Alabama. I worked as an intern in the Ecosystems Investigations Program from 2014-2016 and returned as a Biologist II in 2022.

Chris Haynes - Bio: I began working as a Biologist II with the Geological Survey of Alabama in November 2021. Originally from Choccolocco, Alabama, I received my B.S. in Marine Science and Biology in 2013 from The University of Alabama. Since then, I have worked as a Fisheries Biologist II for the state of Florida and as an Environmental Scientist III for the state of Louisiana, where I focused on fish community sampling and gamefish management.

Jacqueline L. Wilson, jwilson@disl.org, 251-861-2141 x 2384

Oyster Population Health Across Dynamic Environmental Gradients in Mobile Bay, Alabama

Jacqueline L. Wilson[1], Jeffrey D. Plumlee[1], Sean P. Powers[1]

[1]University of South Alabama, School of Marine and Environmental Science, Mobile, Alabama 36688

Abstract:
Wild oyster harvest in the state of Alabama has precipitously declined over the past half-century. Alabama wild oyster harvest has gone from 1000 metric tons in the 1950's to less than 20 metric tons per year in 2014 – 2018. The majority of Alabama's wild oyster fishery is in the Mobile Bay area, a salt-wedge estuary with widely ranging physiochemical and environmental conditions. These dynamic conditions create an equally dynamic landscape for successful oyster populations to navigate; as such, it is important to understand how environmental variables correlate with oyster growth, mortality, and predation along a spatially diverse environmental gradient. We designed an experiment to examine the correlation between growth, predation, and mortality on oysters using *in situ* observations of oysters set in areas with historically productive oyster reefs. Stations were equipped with four moorings, containing two Vexar mesh pods of 20 seed size oysters (25-75 mm) mounted at fixed positions and set out for three, two to three-week trials per season. Moored oysters were exposed to two treatments: Treatment 1) open vs. closed, where oysters were adhered to zip ties with underwater two-part epoxy and mounted to the pod exterior in order to monitor predation, vs. inside the pod. Treatment 2) above vs. below, where oysters are subjected to differences in vertical relief. We correlated oyster growth and mortality with abiotic data sourced from Alabama's Real-Time Coastal Observation System (ARCOS) and *in situ* HOBO data loggers, recording water temperature (°C), salinity (PSU), and dissolved oxygen (mg/L). Preliminary data show no significant variation in growth and mortality between station(s) from year to year; however, initial observations show a correlation between oyster mortality and salinity. Future monitoring could provide a better understanding of the effects of environmental variables and the overall health of current and future Alabama oyster populations.

Poster Presentation

Bio: Jacqueline received her B.S. in Biology with a concentration in Marine Sciences from the University of South Alabama, Mobile, Alabama, in 2019. She is currently a Research Technologist for the Fisheries Ecology Lab, Dauphin Island, AL.

Nicole Tripp (Student), nzt0046@auburn.edu, 954-607-9852

First detection of white spot syndrome virus in Alabama crayfish: a case study on a research station in Auburn, Alabama

Nicole Tripp[1], Nicholas Barnes[1], Courtney Harrison[1], Abdulmalik Oladipupo[1], Timothy Bruce[1], and James Stoeckel[1]

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

Abstract:
White spot syndrome virus (WSSV) is a pathogen of concern for aquatic crustaceans. WSSV infection of crayfish in the United States has been reported in Louisiana crayfish farms since 2007 but has not been previously reported in Alabama. In the spring of 2022, *Procambarus clarkii* in laboratory raceways at the E.W. Shell Fisheries Center in Auburn, AL exhibited patterns of lethargy and mortality indicative of WSSV. Subsequent qPCR assays confirmed WSSV, the first report of this disease in Alabama. Crayfish surveys of ponds, streams, and experimental systems were conducted from spring through fall 2022 to determine spatial and temporal variability of WSSV. Results showed that WSSV was already widespread in wild *P. clarkii* populations as of May/June 2022, with peaks in Spring and Fall, but low to negative results in mid to late summer. Previous research has suggested an optimal temperature range of 19-30 ± 1℃ for WSSV, which may explain why WSSV prevalence in the wild was low in summer when temperatures regularly exceeded 30℃. However, high temperatures were insufficient to mitigate WSSV. Crayfish that were initially quarantined tested below detectable limits, but eventually tested positive even though they were held at 30℃. Despite carrying the virus, these crayfish exhibited no mortality even though the insertion of internal pit tags had stressed them as part of an ongoing study. Thus, the presence of WSSV does not necessarily cause virulence, even in presumably stressed animals. The widespread occurrence of WSSV in streams and ponds of the E.W. Shell Fisheries Research Center (1600 acres, two watersheds) suggests that WSSV is already endemic in parts of Alabama. Widespread surveys are needed to determine the geographic extent of the disease and prevalence in wild populations. Additional research is also necessary to discern factors that affect the degree of virulence in infected populations.

Poster Presentation

Bio: I grew up in Plantation, FL, and graduated in 2020 from the University of Florida with a B.S. in marine sciences. My thesis focuses on effective control methods for removing invasive red swamp crayfish under Dr. Jim Stoeckel.

Adam W. Jung (Student), ajung@disl.org, 240-506-8213

Methods for Spherical Baited Remote Underwater Video (SBRUV) surveys in offshore Alabama

Adam W. Jung, Sean P. Powers, Crystal L. Hightower, Mark A. Albins, Grant R Lockridge

University of South Alabama, Department of Marine Sciences, Mobile, Alabama 36688

Abstract:
Fishery-independent video surveys are widely used to gather data on relative abundance and species composition of reef- and bottom-associated fish. The use of video survey data in stock assessments is becoming more frequent and there is a growing need for standardized methods to collect these data for state and federal managers. Video surveys have advantages over traditional fisheries gear (e.g. trawls, longlines, gillnets) as they can be used over a wider range of depths and bottom types, are less selective of particular species and size-classes, are non-extractive and are archival. However, video surveys have inherent biases that need to be assessed to make them comparable to concurrent fishery data collection. Single fixed cameras are commonly used to collect video data, but their limited field of view makes them susceptible to double-counting (counting a single fish multiple times as it swims into and out of view). Spherical cameras allow analysts to track fish more effectively reducing the potential bias from double counting. To optimize deployments of a Spherical Baited Remote Underwater Video system (SBRUV) off the coast of Alabama we are refining deployment methods and adjusting the system settings, software, and overall design of our SBRUV. Our goal is to deploy both Remotely Operated Vehicles (ROVs) with single fixed cameras and SBRUVs together to compare measures of relative abundance (using max N counts) and community structure. This comparative analysis will allow identification and quantification of species-specific gear biases and guide data collection using SBRUVs in the future so they can be used alongside other fishery independent data to improve stock assessments and management decisions.

Poster Presentation

Bio: Adam Jung is a M.S. student in the University of South Alabama under the advisement of Dr. Sean Powers at the Fisheries Ecology Lab at Dauphin Island Sea Lab.

Jeffrey Plumlee, jplumlee@disl.org, 251-861-2141 x2190

Tag Alabama: What Have We Learned from the Angler-Based Recreational Tagging Program?

Jeffrey D. Plumlee[1], Crystal L. Hightower[1], Sean P. Powers[1], Mark A. Albins[1], Dylan Kiene[1], Matthew Catalano[2], T. Reid Nelson[3], Blakeley Ellis[4]

[1] University of South Alabama, School of Marine and Environmental Sciences, Mobile, Alabama 36688
[2]Auburn University, School of Fisheries, Aquaculture, and Aquatic Sciences, Auburn, Alabama, 36849
[3]George Mason University, Department of Environmental Science and Policy, Fairfax, Virginia 22030
[4]Coastal Conservation Association Alabama, Orange Beach, Alabama 36561

Abstract:
Tag Alabama is an angler-based tagging program sponsored by the Coastal Conservation Association (CCA) Alabama, the University of South Alabama School of Marine and Environmental Sciences, and the Dauphin Island Sea Lab. Since 2018, the program has engaged 414 anglers through the tagging program and an additional 561 anglers through tag recoveries. Year to year there has been increasing participation in the number of tagging anglers from 58 tagging anglers in 2018 to 169 tagging anglers in 2022. To date, the program has tagged 6,506 fish representing four species (Red Drum, Spotted Seatrout, Tripletail, and Atlantic Tarpon) the majority of which (95%) are Red Drum (44%) or Spotted Seatrout (51%) tagged in Mobile Bay, Alabama. Red Drum recapture rates (18%) and days at liberty (152 ± 182 days ± s.d.) were higher than Spotted Seatrout (9% recapture rate; 84 ± 94 days at liberty). Distance traveled from the initial capture location was similar between both species (Red Drum, 17 ± 28 km ± s.d.; Spotted Seatrout, 14 ± 17 km) with 52% of Red Drum and 45% of Spotted Seatrout recaptured within 5 km of their initial catch location. Broad-scale seasonal movement pattern differences are apparent between cooling (September – February) and warming (March – August) seasons for tagged Red Drum and Spotted Seatrout. Specifically, in warming seasons there is a clear southward latitudinal trend for Spotted Seatrout and an east-west longitudinal movement for Red Drum. Work is ongoing to establish recapture reporting rates, and eventually, fishing effort and annual mortality estimates for these two species. The success of the Tag Alabama program is possible only through the participation of voluntary anglers. As such, fostering and promoting program involvement is key to its production of valuable fishery-dependent data.

Oral Presentation

Bio: Jeff Plumlee is a postdoctoral fellow at the University of South Alabama under the direction of Dr. Sean Powers.

Oral Presentations (Professional Session)

Alana Reynolds, alana.reynolds@tnc.org, 256-558-4462

Performing CPR on Alabama's Rivers: Conservation, Protection and Restoration at Watershed Scale

The Nature Conservancy in Alabama, 209 20th Street North, #70, Birmingham, AL 35203

Abstract:
Alabama ranks number one in aquatic biodiversity yet is also foremost in the number of imperiled species, rate of endemism, and species decline. To address the ever-growing threats faced by the stream systems of Alabama, it is necessary to use a watershed-scale conservation approach. Over the past 20 years The Nature Conservancy (TNC) in Alabama, along with its partners, has demonstrated how to develop and implement a successful watershed-scale protection and restoration methodology. This approach has been a case study in successful assessment, prioritization, and implementation of restoration activities within our five priority watersheds. We are currently working with partners to assess physical, chemical, and anthropogenic stressors of each river system, analyze data to highlight watershed health and stress points, and use this information to prioritize protection and restoration locations and activities. TNC leverages private and public funds targeted toward restoration, protection, and implementation projects. This collaborative approach continues to drive efforts of TNC and partners to maximize conservation benefits.
Over the past 5 years TNC has undertaken, completed, and remained engaged in several watershed and landscape scale conservation projects. TNC has secured a Regional Conservation Partnership Program grant through the Natural Resources Conservation Service to prioritize private agricultural lands for stream restoration in priority watersheds. In the urban corridor around Birmingham, TNC is actively engaging local communities regarding potential stormwater and sediment abatement projects to bolster environmental planning and restoration through Green Infrastructure and Low Impact Development. TNC of Alabama is also the non-federal sponsor for the Lower Alabama River Fish Passage Feasibility Study with the U.S. Army Corps of Engineers. This study will assess the feasibility of fish passage at Claiborne and Millers Ferry locks and dams on the lower Alabama River, which could ecologically reconnect the Cahaba River to the Gulf of Mexico.

Oral Presentation

Bio: Alana Reynolds is the Watershed Coordinator for the Freshwater Program at The Nature Conservancy in Alabama. She grew up in north Alabama and attended the University of Alabama where she received her B.S. in Environmental Science with a focus in freshwater studies. She has over ten years of experience in freshwater conservation and natural resources management where she has worked for state, federal, and private organizations.

Hisham A. Abdelrahman (Postdoctoral Fellow), hisham@auburn.edu, 334-703-0166

Epidemiology and Economic Impact of Disease-Related Losses on Commercial Catfish Farms: A Seven-Year Case Study from Alabama, USA.

Hisham A. Abdelrahman[1], William G. Hemstreet[1], Luke A. Roy[1], Terrill R. Hanson[2], Benjamin H. Beck[3], and Anita M. Kelly[1]

[1]Alabama Fish Farming Center, Greensboro, AL; [2]School of Fisheries, Aquaculture and Aquatic Sciences, Auburn University, Auburn, AL; [3]US Department of Agriculture, Agricultural Research Service, Aquatic Animal Health Research, Auburn, AL

Abstract:
The objectives of this study were to determine statewide production losses caused by diseases, identify the most incident catfish diseases affecting Alabama (AL) farm-raised catfish production in freshwater ponds and their annual pattern, and determine disease-related economic impacts. The Alabama Fish Farming Center (AFFC) conducted seven annual retrospective questionnaire surveys of AL catfish farmers since 2015 to assess the epidemiological situation of farm-raised catfish fish diseases and their economic impacts. Across the study (2015–2021), the annual number of survey respondents ranged from 64–74, with a total of 482 respondents. The yearly survey response rate ranged from 95.6–100% (mean: 98.2%). The annual survey coverage area ranged from 6,410–7,006 ha/year. About 97% of survey coverage area reported fish losses caused by a disease. Fish diseases resulted in the loss of 9 million fish/year (2.9 million kg/year; 436.7 kg/ha/year). Bacterial diseases resulted in >83% of catfish disease losses (>5 times losses to non-bacterial causes). The most incident statewide catfish disease was hypervirulent Aeromonas hydrophila (225 kg/ha/year), followed by columnaris (140 kg/ha/year), followed by Edwardsiella (52 kg/ha/year). The temporal epidemiological analysis results indicate that annual trends of proliferative gill disease and Bolbophorus disease were correlated with prolonged precipitation periods and total quantity of rainfall, respectively. Economic losses caused by fish losses to bacterial diseases, non-bacterial diseases, production losses due to reduced feeding during outbreaks, and expenditures associated with catfish diseases were responsible for 54.5%, 10.8%, 22.0%, and 12.7% of total direct economic impacts attributed to AL farm-raised catfish industry, respectively. Total disease-related financial losses in west AL were 11.1 million USD/year (1,651 USD/ha/year), representing about 9.5% of food-size catfish sales in AL. The present study provides the first comprehensive assessment of epidemiology and health economics of farm-raised catfish disease in the freshwater pond environment for a substantial duration.

Oral Presentation

Bio: I am originally from and grew up in Cairo, Egypt. I received a Ph.D. in Fisheries, Aquaculture, and Aquatic Sciences in 2016 from Auburn University, a Master of Probability and Statistics in 2015 from Auburn University, and a Master (2010) and a Bachelor (2006) in Veterinary Sciences from Cairo University, Egypt

Rex Dunham, dunhara@auburn.edu, 334-707-7491

Progress in Gene Editing and Transgenics in Channel Catfish

Rex Dunham, Baofeng Su, Jinhai Wang, Logan Bern, Mei Shang, Michael Coogan, De Xing, Zhenkui Qin, Rhoda Simora and Veronica Alston

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

Abstract:
Omega-3 fatty acid synthesis and antimicrobial protein genes were transferred into channel catfish, *Ictalurus punctatus*, and their effect on body composition and bacterial disease resistance evaluated. Gene knockout increased performance and controlled reproduction. Knockin of various omega-3 fatty acid genes at different genomic targets increased EPA and DHA -2.0 to 97.1% and 11.8 to 61.9%, respectively. Knockin of cecropin increased disease resistance. Knockin of alligator cathelicidin further increased bacterial disease resistance. Pleiotropic effects appear dependent upon insertion site. Cathelicidin KI at the *lh* locus reduced growth, but KI of cathelicidin in the non-coding region of chromosome 1 appeared to have a positive effect on growth.
Knockout of the myostatin (*mstn*) gene and *mc4r* genes increased growth at all life stages and in both pond and tank environments. Muscle fiber number was 30-40% higher in *mstn* mutants. *mc4r* mutants also had higher n-3 fatty acid levels and were sterile, as *mc4r* appears to have a critical role in regulating the HPG axis.
Absolute control of reproduction would almost eliminate environmental risk of domestic, interspecific hybrid, exotic and transgenic fish. Mutation of *mc4r*, *lh*, *fsh* and *gnrh* resulted in sterility in channel catfish, which was restored with hormone therapy.
Knockin of cecropin doubled survival when challenged with ESC. Knockin of cecropin coupled with knockout of myostatin tripled survival and increased growth 50%. Knockin of cathelicidin increased survival 2.5X and did not affect growth. Knockin of cathelicidin coupled with knockout of *lh* increased survival 3X and did not affect growth. Knockin of cathelicidin coupled with knockout of mc4r increased survival 2.5X and increased growth 50%. Double knockin of cathelicidin while knocking out both *lh* and *mc4r* increased survival 4X while increasing growth 20%. Simultaneous knockin of cathelicidin and cecropin while knocking out *mc4r* and myostatin increased survival 4X while increasing growth 50%.

Oral Presentation

Bio: I grew up in Peoria, Illinois. I have a BS in Ecology, Ethology and Evolution from the University of Illinois ’78; MS ’79 and PhD ’81 in Fisheries and Allied Aquacultures from the University of Illinois.

Rex Dunham, dunhara@auburn.edu, 334-707-7491

Progress in Xenogenesis in Channel Catfish.

Rex Dunham, Darshika Hettiarachchi, Veronica Alston Baofeng Su, Logan Bern, Mei Shang and Jacob Armanazi

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

Abstract:
Xenogenesis is a method of reproduction where successive generations differ from each other and no genetic material is transmitted from the parent to the offspring. It is similar to human surrogacy except the host carries gonads/gametes rather than a baby from the donor. A multitude of aquaculture and fisheries management applications exist. Oogonial stem cells (OSCs) and spermatogonial stem cells (SSCs) were interspecifically transplanted from a diploid donor catfish into a triploid host catfish. Xenogenic channel catfish and white catfish were created that produced gametes of channel catfish or blue catfish that could be used to make hybrids.
Injecting the stem cells into triploid hosts 4-6 days post hatch, dph, resulted in higher colonization and proliferation than other developmental time points. Based on PCR and PKH fluorescent imagining, 60-70% of host embryos injected with donor stem cells became xenogenic. Large numbers of xenogenic fry were produced with cryopreserved cells. Fluorescent imaging revealed that percentage of SSC cell area, SSC cluster area, OSC cell area, and OSC cluster area did not differ between the fresh and cryopreserved treatments at 45 and 90 DPH. There was a significant increase in cell area and cluster area from 45 to 90 DPH for all treatments indicating proliferation. Cryopreserved donor stem cells can recover in recipient gonads and perform as well as their freshly extracted counterparts.
Two channel catfish xenogenic males were mated 3 times over a two-year period. They produced one spawn per year but did not produce a second spawn in the same year. Five other males were paired twice in the same year with 4 producing one spawn and 1 (only 2 years old) fertilizing two egg masses. Fry/kg female BW produced was similar for xenogenic pairings and controls.
Xenogenic common carp were also produced that were able to produce blue catfish sperm.

Oral Presentation

Bio: I grew up in Peoria, Illinois. I have a BS in Ecology, Ethology and Evolution from the University of Illinois ’78; MS ’79 and PhD ’81 in Fisheries and Allied Aquacultures from the University of Illinois.

Crystal LouAllen Hightower, Chightower@disl.org, 251-861-2141 x2384

Rapid Expansion and Subsequent Decline of Red Lionfish in the Alabama Artificial Reef Zone

Sean P. Powers[1], Crystal L. Hightower[1], Monica J. Powers[1], Craig Newton[2] and Robert L. Shipp[1].

[1]School of Marine and Environmental Sciences, University of South Alabama, Mobile, AL 36688 & the Dauphin Island Sea Lab, 101 Bienville Blvd Dauphin Island, AL 36528
[2]Alabama Department of Conservation and Natural Resources, Marine Resources Division, Dauphin Island, Alabama 36528

Abstract:
Invasive species remain a threat to marine ecosystems and long-term monitoring of the fate of these invasions remains relatively rare. The initial observations of Red Lionfish off the Alabama coast were followed by a rapid and dramatic increase in the frequency of occurrence as well as the density of Red Lionfish. As part of an annual large-scale, randomized survey of the thousands of artificial reefs and natural hard bottom areas off the Alabama coast, we estimate the population of Lionfish over the last decade. Density was higher on artificial reefs than natural hard bottom features with peak densities in 2015 of 8 ± 1 Lionfish per artificial reef. By 2019 densities decreased to less than 2 ± .3 Lionfish per artificial reef. Densities on a similar area of natural hard bottom followed the same general temporal pattern through 2020. The decline was coincident with an increase in several smaller reef fish (juvenile red snapper, gray snapper, and vermillion snapper). No apparent cause of the decline in Red Lionfish was evident from video observations and limited inspection of diver collected specimens (e.g., fish disease) although our sampling and analysis was not designed to investigate this in any detail. Similar rapid expansion and declines have been reported for Red Lionfish in other regions (e.g. Caribbean and Florida) as well as more generally for invasive species in several habitats.

Oral Presentation

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). She is the Research Coordinator for the University of South Alabama School of Marine and Environmental Sciences and Lab Manager for Dr. Sean Powers' Fisheries Ecology Lab at the Dauphin Island Sea Lab, Dauphin Island, AL.

Trey P. Spearman, tspearman@disl.org, 251-414-8183

Juvenile Red Snapper Distribution and the Effects of Artificial Reefs

Trey P. Spearman[1], Sean P. Powers[1,2]

[1] Dauphin Island Sea Lab, Dauphin Island, AL 36528
[2] School of Marine & Env. Sciences, U. of South Alabama, AL 36688

Abstract:
In the effort to support better management strategies, the ecosystem-based fisheries management (EBFM) model is being used more to keep the targeted species within the context of the entire ecosystem. Examples of data that can support EBFM are various quantifiable habitat characteristics and habitat preference at different life-stages. Alabama has modified its coastal habitat extensively with the largest artificial reef program in the world, adding reefs for adult red snapper and other species in areas that was previously only unconsolidated sediment. While adult red snapper prefer these reefs, the juveniles prefer low-relief and open bottom, where they are separated from larger reef-based predators. Our study examines the distribution of juvenile red snapper off Alabama's coast, showing high densities focused south of the mouth of Mobile Bay and pushing into Mississippi waters. These distributions are correlated to higher mud content in the sediment, created by freshwater input bringing excess silt and clay. Artificial reef density is also highest in an overlapping area, and with new permitting zones approved will continue to expand across the juvenile habitat. This overlap of comparatively high densities of reef-based predators and juvenile red snappers has not shown to affect the juvenile's abundance significantly, and may even increase overall productivity in demersal species. Our prediction is that the continued deployment of reefs in the new permitting zones, though expected to support more large predators, will not hinder the juvenile red snapper production.

Oral Presentation

Bio: Trey is from Birmingham, AL with a B.S. in Marine Biology from Auburn University and an M.S. in Marine Science from the University of South Alabama. He works under Dr. Sean Powers at the Dauphin Island Sea Lab, and is currently running the Fisheries Ecology Lab's Benthic Habitat Assessment Program.

Kaelyn Fogelman; kjf0021@auburn.edu; 272-215-2540

Linking Physiology and Upper Thermal Limits in Crayfish

Kaelyn Fogelman[1]*, Kayla Boyd[1], Chester Figiel[2], James Stoeckel[1]

[1]School of Fisheries, Aquaculture, and Aquatic Sciences, Auburn University, Auburn, Alabama, USA
[2]United States Fish and Wildlife, Warm Springs, Georgia, USA

Abstract:
Conservation of threatened aquatic taxa is impeded by a lack of understanding of the relationships between physiology and thermal tolerance and the ability to obtain sufficient numbers of study animals that are protected or hard to obtain (i.e., primary burrowing crayfish). In this study, we measured physiological responses and tolerances of three common, secondary-burrowing crayfish (*Procambarus clarkii*, *C. latimanus*, and *C. striatus*), and one state-threatened primary burrower (*C. harti*), to acute thermal stress. Our objectives were to: 1) test for differences in upper thermal limits (UTL) between species; and 2) trace physiological responses to thermal stress across multiple levels of organization (cellular to organismal). Crayfish were acclimated to 25℃ and then exposed to increasing temperature (2℃/h) until they reached UTL (lack of response to probing). Thermal performance curves were developed for respiratory enzyme activity (ETS), organismal respiration rate (MO_2) and absolute aerobic scope (AAS: ETS minus MO_2). The mean UTL of *C. harti* was significantly lower than that of *C. latimanus*, but the difference was less than 0.5℃. All species reached UTL when ETS activity, MO_2 and AAS had declined to 71-80%, 83%-93%, and 70-77% of their maximum rates, respectively. This translated to species reaching UTL when temperature at maximum rate had been exceeded by 8-11℃, 3-7℃, and 9-11℃ for ETS activity, MO_2, and AAS respectively. Results provide sublethal and lethal acute temperature thresholds for focal taxa and suggest that acute thermal thresholds protective of common species will be equally protective of a rare primary burrower. Linkages between physiological responses and acute thermal stress will be valuable for future modelling of adverse outcome pathways (AOPs) for crayfish subjected to warming temperatures. Development of accurate AOP models may ultimately reduce the number of individuals and assays required for determining effects of acute thermal stress on species of interest.

Oral Presentation

Bio: Kaelyn Fogelman is a postdoc at Auburn University in the School of Fisheries, Aquaculture and Aquatic Sciences. Her research focuses on the ecology of aquatic mollusks and crustaceans, with an emphasis on food webs, thermal tolerance, and stress physiology. Much of her work involves conservation of imperiled fauna, invasive species control and how aquatic invertebrates will be impacted by our changing climate.

Daniel West, DWest@gsa.state.al.us, 205-247-3588

ARSNiC: A New Approach for Prioritizing Aquatic Organism Passage and Infrastructure in Alabama

Daniel West[1]

[1]Geological Survey of Alabama, Ecosystems Investigations Program, Tuscaloosa, AL 35486

Abstract:
Alabama is an aquatic biodiversity hotspot, but many species are at risk from habitat fragmentation. Assessments confirm the ecological importance of providing aquatic organism passage (AOP) through road-stream crossings for aquatic species during all stages of life are needed to ensure robust communities and healthy populations. Longitudinal connectivity of streams is necessary for species to access spawning grounds to allow for successful reproduction and adequate gene flow. A common cause for stream reaches to become isolated is perched culverts, which can restrict the movements of aquatic organisms during critical time periods. Perched culverts result from erosion on the downstream side of the crossing related to hydrologic changes in the stream altered by the crossing structure. Increased erosion degrades habitat downstream through, scouring, bank destabilization, and burying of primary habitat under excessive sediment. Other threats related to increased erosion by culverts are issues with transportation infrastructure. From structure failure to collapsing roadways, these events can leave communities completely isolated, disrupting daily lives, blocking main throughways for shipping and emergency services, and lead to increased costs for repair and/or replacement. In an effort to confront these issues, the Alabama Rivers and Streams Network including Connectivity (ARSNiC) team was created to identify, assess, evaluate, and prioritize longitudinal connectivity projects on a statewide scale. ARSNiC is a multi-agency partnership which performs assessments using multiple compounding methodologies from evaluating sediment risk input for roadways, to the structural influence on fluvial geomorphic responses, to the ecological and social benefits. Applying a step-up approach, the ARSNiC team is assisting in streamlining restoration efforts through identifying and prioritizing crossing structure replacements, along with improving transportation corridors. This new approach on longitudinal connectivity, provides potential opportunities for improving watershed connectivity and habitat availability for aquatic organisms, strengthening transportation infrastructure, and adds to social feasibility in a statewide diverse partnership.

Oral Presentation

Bio: Daniel is a fluvial geomorphologist employed as an Environmental Scientist in the Ecosystems Investigations Program at the Geological Survey of Alabama and the current leader for the Alabama Rivers and Streams Network including Connectivity team. With specialization in watershed dynamics and management, Daniel's interests lie in integrating habitat assessments into watershed science.

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

A History of Crayfish Research in Alabama With Comments on the Currently Understood Fauna

Stuart W. McGregor[1], Guenter A. Schuster[2], Christopher A. Taylor[3], and Rebecca A. Bearden[1]

[1]Geological Survey of Alabama, P.O. Box 869999, Tuscaloosa, Alabama 35486
[2]Eastern Kentucky University (retired), 224 Primrose Circle, Richmond, Kentucky 40475
[3]Illinois Natural History Survey, 1816 S Oak Street, Champaign, Illinois 61820

Abstract:
Alabama has rich aquatic faunas due to mild climate, diverse rivers and geology, varied habitats, abundant rainfall, and lack of glacier effects. The first known collection of Alabama crayfish curated into a scientific collection was made in 1853 near Mobile by Louis Aggasiz of Harvard University. In 1976 Ray Bouchard of the U.S. National Museum compiled the first state checklist including 58 species and noted 75 may ultimately be found. In a 1996 American Fisheries Society publication Chris Taylor and associates presented comprehensive state and province lists for North America including conservation statuses and included 83 species for Alabama. In 2004 Guenter Schuster and Chris Taylor presented a bibliography of primary and gray literature on crayfishes in Alabama for ADCNR, modified the list to 81 species, provided brief accounts, and suggested conservation statuses. In another AFS publication in 2007 Taylor and associates updated the previous list and reported 83 species. In 2008 Schuster and associates visited museum collections, created a searchable database, and updated the list to 85 species. Collections were made for two State Wildlife Grant reports by the Geological Survey of Alabama released in 2011 and 2018, wherein the database was updated, distribution maps created for each species, and conservation statuses revised. In 2015 ADCNR's Alabama's Wildlife Action Plan and in 2017 Alabama Wildlife, Vol. 5, included conservation statuses for crayfishes for the first time. In 2017 and 2018 articles in the Journal of Crustacean Biology and in a 2022 article in Subterranean Biology taxonomic changes were made that affected Alabama's species list. A comprehensive book on the Alabama crayfish fauna with photographic keys and plates, species accounts, distribution maps, etc., was published in 2022 and it reported 99 species. An additional species was added to the state's fauna post-production of the book, achieving the coveted century mark.

Oral Presentation

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.

Gulf State Park Map