2018 Annual Meeting of the Alabama Chapter, American Fisheries Society

Little River Canyon Center and National Preserve

Fort Payne, AL
February 22-23, 2018

Current Officers

President:	Mark Meade
President-elect:	Dave Armstrong
Past President:	Steve Rider
Secretary:	Elise Irwin
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Program Schedule

All meeting activities to be held in Little River Canyon Center's Theatre Room

Thursday, February 22

12:30 – 5:00 PM	Meeting Registration
1:00 – 1:30 PM	Opening Remarks
1:30 – 3:00 PM	Student Presentations – Session A
3:00 – 3:15 PM	Break
3:15 – 5:00 PM	Student Presentations – Session B
5:00 – 5:15 PM	Poster Set-up
5:15 – 6:15 PM	Poster Presentations & Social
6:30 – 9:00 PM	Banquet, Guest Speaker & Student Awards

Friday, February 23

8:00 – 9:00 AM	Meeting Registration
8:00 – 8:45 AM	Chapter Business Meeting, News
8:45 – 9:00 AM	Opening Remarks
9:00 – 10:00 AM	Presentations – Session C
10:00 – 10:15 AM	Break
10:15 – 11:45 AM	Presentations – Session D
11:45 AM	Announcements, Discussions & Adjourn Meeting

Banquet Guest Speaker: W. Peter Conroy, Director, JSU EPIC*.*

W. Peter Conroy- Jacksonville State University Director, Environmental Policy & Information Center

A native of Pennsylvania, Pete moved to Asheville, North Carolina with his family in 1970. He received his Bachelor's degree in biology from Furman University in South Carolina and his Master's Degree in zoology from the University of Georgia. Trained as a biologist, Pete moved to Alabama in 1985 to work as the curator of the Anniston Museum of Natural History.

Since 1997, Pete has served as the Director of Jacksonville State University's Environmental Policy and Information Center (EPIC). His career includes appointments from Alabama Governors Bob Riley (R), Don Siegelman (D), Fob James (R), Jim Folsom (D) and Guy Hunt (R). Retained by President George Bush, Pete received White House appointments by President Bill Clinton in 1999 to serve as Alternate U.S. Federal Commissioner of the Tri-State (ACT/ACF) Water Compacts. In 2015, Pete received the River Hero Award in recognition for his decades of work highlighted by his White House role. Pete was also selected by the Office of the Secretary of the Army to serve on an Operational Assessment Team to review safety measures relating to the destruction of chemical materials in Alabama.

Pete Conroy may be best known for his interest in public lands, leading to the following designations.

- Little River Canyon National Preserve - Bush, 1992
- Dugger Mountain Wilderness - Clinton, 2000
- Mountain Longleaf National Wildlife Refuge - Bush, 2005
- Freedom Riders National Monument - Obama, 2017

Pete has lead and currently leads a number of projects related to conservation and economic development. Examples include the establishment and operation of the Little River Canyon Center, the Talladega Mountain Center, Longleaf Studios and entertainment complex, the re-use of the former Fort McClellan, the Chief Ladiga Rail-Trail, and several Alabama-based initiatives promoting smart growth, environmental education, arts, conservation, tourism, water policy and sustainable hospitality.

Presentation Schedule

Thursday, February 22 SESSION A (STUDENTS)

Moderator: Sarah Walsh, Auburn University

1:30 pm. Crayfish Connections: Linking Ecology and Hydrogeology in Alabama's Black Belt Prairie Using Burrowing Crayfish Site Preference. Rebecca Ann Bearden and Alex Huryn

1:45 pm Economic Value of Recreational Fishing on Walter F. George Reservoir (aka Lake Eufaula), Alabama and Georgia. Jeremy Plauger et al.

2:00 pm Movement behavior and habitat use of Shoal bass in two Chattahoochee River tributaries. Amy Cottrell and Steve Sammons

2:15 pm Shoreline rotenone application to control largemouth bass (*Micropterus salmoides*) recruitment in small impoundments. Tyler Coleman and Matt Catalano

2:30 pm A hydroacoustic survey of reservoirs in Alabama with Blueback Herring (*Alosa aestivalis*) and assessing the caloric density between Blueback Herring and Threadfin Shad (Dorosoma petenense). Ryan Bart et al.

2:45 pm Monitoring the Dispersal, Behavior, and Fate of Stocked Rainbow Trout *Oncorhynchus mykiss* in an Alabama Tailwater. Sarah Walsh and Steve Sammons

3:00 – 3:15 pm BREAK

SESSION B (STUDENTS)

Moderator: Sarah Johnson, Auburn University

3:15 pm Evaluating the Effects of an Invasive Zooplanktivore, Blueback Herring, in Lewis Smith Lake, AL. Patrick Anderson et al.

3:30 pm Assessment of Blue Shiner, *Cyprinella caerulea*, and Holiday Darter, *Etheostoma brevirostrum,* Population Distribution in Alabama via Environmental DNA (eDNA) Analysis. Jessica Metcalfe et al.

3:45 pm Co-occurrence and habitat associations of two estuarine sportfish, Red Drum and Spotted Seatrout, in coastal Alabama. Mariah C. Livernois and Sean Powers.

Thursday, February 22 continued

4:00 pm Parasite Community Dynamics within Invasive Giant Apple Snails (*Pomacea maculata)* in Three Mile Creek, Mobile, Alabama. Annie Slayton et al.

4:15 pm Macroinvertebrate community structure in regulated and unregulated reaches of the Tallapoosa River**.** Kristie Ouellette et al.

4:30 pm Tournament catch-and-release mortality and dispersal of Red Drum and Spotted Sea Trout. T. Reid Nelson et al.

4:45 pm Population Demography of *Leptoxis ampla* (Coenogastropoda: Pleuroceridae), a threatened species in the Cahaba River Basin. Daniel Wicker and Lori Tolley-Jordan.

5:00 – 5:15 pm POSTER SETUP

5:15 – 6:15 pm **POSTER SESSION**

Pyrosequencing Survey of Bacterial Associates within the Gastrointestinal tract of the Coosa Darter *(Etheostoma coosae).* Benjie Blair et al.

Development of SNP panels as a new tool to assess the genetic diversity, population structure, and parentage analysis of the eastern oyster (*Crassostrea virginica*). Wilawan Thongda et al.

Conservation management of Alligator Gar, *Atractosteus spatula*, in Alabama: an evaluation of brood fish collections in the Mobile-Tensaw delta, 2008-2015. David Armstrong and Tommy Purcell.

Using Time Lapse Cameras and a Roving Creel Survey to Evaluate a Tailrace Trout Fishery. Christopher McKee and Jay Haffner.

Friday, February 23 **SESSION C**

Moderator: Lindsay White, Auburn University

9:00 am An update on the currently understood distribution and status of the crayfish fauna of Alabama. Stuart W. McGregor et al.

9:15 am Small Impoundment Management: Using Littoral Zone Habitat to Alter Traditional Fisheries Management Rates. Michael P. Holley and Matt Marshall

9:30 am Species-diagnostic SNP markers for the black basses (*Micropterus spp*.): A new tool for black bass conservation. Eric Peatman et al.

9:45 am Distribution and age composition of Red Snapper *Lutjanus campechanus* across the inner continental shelf of the northern Gulf of Mexico. Crystal L. Hightower et al.

10:00 – 10:15 am BREAK

SESSION D

Moderator: Reid Nelson, Univ. South Alabama, Dauphin Island Sea Lab

10:15 am Faunal Habitat Linkages for Alabama Barrier Island Restoration Assessment on Dauphin Island, Alabama. Elise Irwin and Clint Lloyd.

10:30 am Commercial Harvest of Paddlefish from a Provisional Fishery in the Alabama River. Steven J. Rider et al.

10:45 am Efficacy of stocking advanced-size, delta-strain Largemouth Bass in the Mobile-Tensaw delta, Alabama. Dave Armstrong et al.

11:00 am Alabama's Public Fishing Lakes Program: Past, Present, and Future Perspectives. Matthew Marshall and Jonathan Brown

11:15 am Metabolic physiology of the Chattahoochee crayfish, *Cambarus howardi*, acclimated to different environmental temperatures. Mark Meade

11:30 am A new Pygmy Sunfish species from South Alabama and West Florida Michael Sandel et al.

11:45 am ANNOUNCEMENTS, DISCUSSIONS & ADJOURN

ABSTRACTS

ORAL PRESENTATIONS (STUDENT SESSIONS)

Rebecca Ann Bearden (Student), rabearden@crimson.ua.edu, 205-614-1887

Crayfish Connections: Linking Ecology and Hydrogeology in Alabama's Black Belt Prairie Using Burrowing Crayfish Site Preference

Rebecca Ann Bearden and Alex Huryn, University of Alabama, Department of Biological Sciences, Tuscaloosa, AL 35487

A unique group of invertebrates with adaptations for burrowing into benthic and terrestrial habitats, crayfish provide a vital link to the health of aquatic and terrestrial environments. Because of sampling difficulty and small sample size, one faction of the crayfish community that remains underrepresented is primary burrowing crayfish, which spend most of their lives in subterranean burrows far from surface water. I am using field surveys to determine what combination of environmental variables influence burrowing crayfish site selection most significantly in a Black Belt Prairie stream: soil characteristics, ground cover, floodplain connectivity, or groundwater characteristics. I am also assessing peak crayfish activity periods by using motion triggered photography to determine what may serve as an environmental cue to cause crayfish to exit their burrows most frequently: air temperature, rainfall amount, or photoperiod. Following the identification of preferred burrowing sites and peak activity periods, I will develop an occupancy model for burrowing crayfish in the Black Belt Prairie region of Alabama. This research marks the first burrowing crayfish ecology study in the Black Belt Prairie region of Alabama and is part of a recent crayfish research direction that examines the life-history components and ecological patterns of burrowing crayfishes. The expected results include the following: 1) increased knowledge regarding the effects of habitat characteristics on the distribution of burrowing crayfish in the Black Belt Prairie; 2) increased knowledge regarding the seasonal movement patterns of burrowing crayfish that will result in more efficient collection efforts for these crayfish; 3) information needed to address potential habitat threats through a watershed management plan focused on species conservation.

Jeremy Plauger (Student), jdp0039@auburn.edu , 301-401-4444

Economic Value of Recreational Fishing on Walter F. George Reservoir (aka Lake Eufaula), Alabama and Georgia

Jeremy D Plauger[1], Terry R Hanson[1] and Steven M Sammons[1]

203 Swingle Hall, Auburn University, AL 36849

Completed in 1963, Walter F. George Reservoir (aka Lake Eufaula) is located approximately 137 km between Columbus and Fort Gaines, Georgia. The reservoir supports many sport fisheries and has a national reputation for its Largemouth Bass fishery. Although a very popular reservoir, the annual economic impact from anglers is virtually unknown. An economic creel survey took place January 1 through December 31, 2017 in the area between Walter F. George Dam to the Georgia State Road 39 Bridge, approximately 14375 ha. The reservoir was divided into four sections with 3-5 subsections within each unit. A stratified, non-uniform probability sampling design was used for this survey to select time of day and section of reservoir to sample. A roving creel survey, instantaneous counts, aerial counts of boats, and follow-up telephone surveys were all conducted to meet the goals of this project. Sampling periods consisted of five consecutive days and two periods were conducted each month. Each 5-day period consisted of two weekend days and three weekdays, with three aerial boat counts of the entire reservoir conducted during the period. Anglers contacted on the water were asked standard creel survey questions regarding their experience and catch that day, along with second questions about their expenditures. Other detailed questions were asked based on individual expenses during follow up interviews. These expenditures will be divided into the larger towns and counties where their money was spent (Eufaula and Abbeville, Alabama; Georgetown and Ft. Gaines, Georgia) and other regions from out of town anglers. Data from phone surveys will be combined with those from the roving creel survey, instantaneous counts, and aerial surveys, to estimate the complete economic impacts of angling on Lake Eufaula to surrounding communities and both states.

Amy Cottrell (Student), amc0125@auburn.edu; (920)-819-6421

Movement behavior and habitat use of Shoal bass in two Chattahoochee River tributaries

Amy Cottrell and Steve Sammons

203 Swingle Hall, Auburn University, AL 36849

This study uses radio telemetry and side-scan sonar to look at differences in movement patterns and habitat use of Shoal bass in two Chattahoochee River tributaries, Flat Shoals and Mulberry Creek. These two tributaries hold two of the few remaining viable populations of Shoal bass in their native range. Though both located in the fall line region, the two study tributaries are geomorphically distinct. 20 individuals were tagged in each creek, and 20 additional males were tagged in Flat Shoals to analyze male nesting behavior. Fish were tracked each week for 18 consecutive months, with the study overlapping two spawning seasons. We are using side-scan sonar to look at habitat associations and how use/availability changes when compared across seasons and between creeks.

Tyler Steven Coleman (Student), tsc0018@auburn.edu, 716-777-0957

Shoreline rotenone application to control largemouth bass (*Micropterus salmoides*) recruitment in small impoundments.

Tyler Steven Coleman[1] and Matt Catalano[1]

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

Reducing largemouth bass (*Micropterus salmoides*) population density is an important challenge in small impoundment (<40 ha; ie., recreational fishing ponds and small lakes) management and is necessary to maintain desirable growth rates, body condition, and size structure. Common gears (hook-and-line, electrofishing) used for the mechanical removal of largemouth bass are inefficient at capturing age-0 and age-1 fish, which exert substantial predation pressure on bluegill. An alternative approach is the direct control of largemouth bass recruitment via reduction of age-0 density. Application of the piscicide rotenone along the shoreline is one such approach that has been attempted but has not been thoroughly evaluated. We evaluated the influence of shoreline rotenone treatment on age-0 and age-1 largemouth bass densities in small impoundments and assessed the effect of impoundment size on the efficiency of the approach. Twelve small impoundments were observed for this study and only half were treated with rotenone while leaving the others as untreated controls. The treatment was applied twice during the summer of 2017 and changes in age-0 density were assessed via shoreline seine hauls just before and after each treatment. Preliminary data indicate that rotenone treatment reduced age-0 catch rates by 71-100 % across impoundments, but the effect of the treatment on age-1 density will remain unclear until follow-up electrofishing age composition samples are collected in spring of 2018. If shoreline rotenone proves effective in reducing largemouth bass recruitment and population densities while increasing growth, then this approach will be a valuable tool for small impoundment management.

Ryan Bart (Student), rjb0043@auburn.edu, 218-296-2239

A hydroacoustic survey of reservoirs in Alabama with Blueback Herring (*Alosa aestivalis*) and assessing the caloric density between Blueback Herring and Threadfin Shad (*Dorosoma petenense*)

Ryan Bart[1], Patrick Anderson[1], Dennis DeVries[1], and Rusty Wright[1]

[1]Auburn University, 203 Swingle Hall, Auburn, AL 36849

In 2010, Blueback Herring *Alosa aestivalis* was found in Lewis Smith Lake, Alabama. Since this initial discovery, Blueback Herring have been found in several other waters in Alabama including Lake Martin, Yates Lake, and the Lewis Smith Lake dam tailrace. The introduction and population increase of Blueback Herring creates a potential for competition with native fish like Threadfin Shad *Dorosoma petenense* that could cause declines in both planktivores and the piscivores that feed on them. To quantify the abundance and habitat use of pelagic fishes, hydroacoustic surveys were conducted during July 2016, February 2017, and September 2017 in Lewis Smith Lake, Lake Martin, Bankhead Lake, and Yates Lake. Dissolved oxygen and temperature profiles were recorded down to 40 meters (or the lake bottom) in each lake to determine the available pelagic fish habitat. Summer dissolved oxygen was highest in the epilimnion, depleted at the thermocline, and increased again in the hypolimnion. The layer of cool oxygenated water beneath the thermocline was found to provide suitable habitat for large piscivores, and hydroacoustics results suggest that this habitat is used. To assess the comparative forage value of Blueback Herring and Threadfin Shad, their energy densities were quantified using bomb calorimetry from Lewis Smith Lake collections from April 2016 through December 2017. Threadfin Shad had an average caloric density of 1001 cal/g while Blueback Herring had a caloric density of 1218 cal/g, a 21% difference that was significant ($P<0.05$). By quantifying the abundance of pelagic fish and determining their caloric values, we will be able to determine the overall energetic impact of the Blueback Herring on native fishes in Alabama reservoirs.

Sarah Walsh (Student), szw0099@auburn.edu , (208) 936-5027

Monitoring the Dispersal, Behavior, and Fate of Stocked Rainbow Trout *Oncorhynchus mykiss* in an Alabama Tailwater

Sarah Walsh and Steve Sammons

Auburn University, School of Fisheries, Aquaculture, and Aquatic Sciences, 203 Swingle Hall, Auburn, AL 38849

Hypolimnetic discharge from reservoirs in the southern United States provide cold enough water temperatures (< 20° C) to support successful Rainbow Trout fisheries in regions where they otherwise could not exist. These tailwater trout fisheries remain widely popular for recreational anglers and are of major socioeconomic significance. The objective of our research is to describe post-stocking dispersal, behavior, and fate of Rainbow Trout cohorts stocked in the Sipsey Fork tailwater below Lewis Smith Dam in Northern Alabama. In a recent creel survey, only 4 to 23% of the trout stocked each month were harvested indicating that the ultimate fate of the majority of stocked Rainbow Trout is unknown. In spring, summer, and fall 2017, we tagged and manually tracked cohorts of Rainbow Trout to document movement patterns and determine approximate longevity in the fishery. Tagged trout were tracked twice a week for the first four weeks post-stocking, once a week during the next four weeks, and then biweekly for the next two months. We calculated Rainbow Trout dispersal, range, and fate using ArcView. Knowledge regarding the dispersal and fate of stocked Rainbow Trout in this system will allow more efficient management of the fishery, leading to increased recruitment, retention and satisfaction of anglers that utilize this resource.

Patrick Anderson (Student), pra0005@auburn.edu, 334-844-2345

Evaluating the Effects of an Invasive Zooplanktivore, Blueback Herring, in Lewis Smith Lake, AL

Patrick Anderson, Ryan Bart, Dennis DeVries, Rusty Wright

203 Swingle Hall Auburn, AL 36830

Blueback Herring *Alosa aestivalis* was introduced to Lewis Smith Lake, Alabama in 2010, and within four years it had spread throughout the lake. This presentation will report primarily on collections made in 2016-2017 with comparisons to results from a past study conducted from 2013-2014. To quantify impacts of this Blueback Herring introduction, we collected juvenile and adult fish via electrofishing at 7 different sites monthly from 2016-2017. Larval fish and zooplankton were also collected at each site on each sampling date. To determine the most effective larval fish sampling gear, we conducted paired sampling with a bow-mounted push net and a towed net during months with peak larval fish densities. We found that the towed net had a significantly higher catch rate of larval fish ($p = < 0.5$, difference between gears = 0.08 $\#/m^3$). Prey items of larval, juvenile, and adult, Largemouth Bass, Alabama Bass, Striped Bass, Threadfin Shad, and Blueback Herring were identified to the lowest practical taxonomic level, counted, and measured. We found that zooplankton density has remained relatively stable between 2013 and 2017 at 6 of 7 sites. Over the 2-year study, Juvenile and adult Blueback Herring on average consumed larger prey than the mean size found either in juvenile/ adult Threadfin Shad diets or in the lake. The overlapping diets of juvenile and adult Blueback Herring versus Threadfin Shad was generally high. Catch rates of Blueback Herring have increased at a greater rate than those of Threadfin Shad between 2016-2017 versus 2013-2014 at nearly every site by season combination, suggesting that Blueback Herring continues to increase throughout the system. Although our results do not identify decreased zooplankton density or size, given the preference of Blueback Herring for large zooplankton, effects on overall zooplankton density may require additional time to manifest in this mesotrophic system.

Jessica Metcalfe (Student), jmetcalfe@stu.jsu.edu, 256-238-3117

Assessment of Blue Shiner, *Cyprinella caerulea*, and Holiday Darter, *Etheostoma brevirostrum,* Population Distribution in Alabama via Environmental DNA (eDNA) Analysis

Jessica Metcalfe, Chris Murdock, Mark Meade, and Brianna Salverda

Department of Biology, Jacksonville State University, Jacksonville, AL 36265

Blue shiners, *Cyprinella caerulea*, were once found within the Cahaba and Coosa River systems in Alabama. The holiday darter, *Etheostoma brevirostrum*, has historical presence in the upper Coosa River system in Alabama. Recent surveys suggest that *C. caerulea* are now expatriated from the Cahaba River with diminished range in the Coosa River. *E. brevirostrum* has exhibited similar population reduction. Both species require population distribution data to address possible impacts and to inform management decisions. *E. brevirostrum* is also currently on petition for federal classification and protection. In the reported studies, separate environmental DNA (eDNA) sampling methodologies were developed to assess *C. caerulea* and *E. brevirostrum* populations within Alabama. For the blue shiner, a real-time PCR assay was developed for the amplification of a mitochondrial gene, NADH dehydrogenase subunit 2 (ND2) gene. For the holiday darter, a similar assay was developed for the amplification of a mitochondrial gene, cytochrome b (cytb) gene. In each assay, the primers and dual-labeled oligonucleotide probes were designed to anneal to a section of the respective genes that allowed for species-specific amplification while excluding related taxa known to cohabitate the survey sites. Water samples were collected from sites in the Coosa and Cahaba River systems within Alabama. All samples were filtered on site, utilizing manual vacuum pumps in conjunction with 0.45 micron filters and disposable funnels. Environmental DNA (eDNA) samples were subsequently isolated from these filters and tested for the presence of either *C. caerulea* or *E. brevirostrum* DNA using their respective PCR assays.

Mariah Livernois (Student), mlivernois@disl.org, 251-861-2141 ext. 2384

Co-occurrence and habitat associations of two estuarine sportfish, Red Drum and Spotted Seatrout, in coastal Alabama

Mariah C. Livernois[1,2] and Sean P. Powers[1,2]

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[2] Dauphin Island Sea Lab, Dauphin Island, AL 36528

Estuaries generally support an array of abiotic conditions, and a diversity of associated organisms with specific tolerances. Within these heterogeneous landscapes, biogenic habitats including seagrasses and saltmarsh edges emerge, each providing unique ecosystem functions. Structured habitats are especially critical in their role as refuge and foraging grounds for multiple species of predatory fishes and their prey. Investigating the environmental factors that shape species co-occurrence can enhance our understanding of ecological interactions between them. The present study aims to examine the spatial distributions and habitat affinities of two estuarine-dependent fishes with similar life histories, Red Drum (*Sciaenops ocellatus*) and Spotted Seatrout (*Cynoscion nebulosus*), at their subadult to adult life stages in Mobile Bay, AL. Two long-term gillnet sampling surveys are being analyzed independently to determine when and where these species co-occur. Preliminary results suggest frequent spatial overlap, but negatively correlated CPUEs, indicating some degree of spatial partitioning. Additionally, catch events have been combined and analyzed with spatial data for submerged aquatic vegetation (SAV) and saltmarsh shoreline. Across both gillnet surveys, the probability of catching a Red Drum increased as the nearby extent of SAV increased, suggesting a strong positive association. Spotted Seatrout exhibited no significant relationships with SAV. The probability of catching either species increased with increasing nearby saltmarsh edge extent, but only for one of the two surveys with greater coverage of the estuary. Analyses are ongoing, but our results elucidate the conditions under which these exploited species are most likely to interact. This can aid in developing holistic management strategies that incorporate their habitat preferences and ecological dynamics.

Annie Slayton (Student). aslayton@stu.jsu.edu

Parasite Community Dynamics within Invasive Giant Apple Snails (*Pomacea maculata)* in Three Mile Creek, Mobile, Alabama.

Annie Slayton[1], Lori Tolley-Jordan[1], and Jessica Wooten[2]

[1] Department of Biology, Jacksonville State University, Jacksonville, AL.
[2] Department of Biology, Piedmont College, Demorest, GA.

Pomacea spp. (Gastropoda: Ampullaridae) are snails of South American origin that have successfully invaded tropical/sub-tropical freshwater ecosystems throughout the world due to their popularity in the aquarium trade and life history characteristics that allow them to quickly establish stable populations. There are currently four *Pomacea* species that have invaded waters in the southern US, primarily in the southeast. Of these, the giant apple snail, *P. maculata*, is the only species that has successfully invaded Alabama waters in Three Mile Creek, Mobile, AL. Although helminth parasites that can impair wildlife or human health have been reported in *P. maculata's* native range (Trematodes) and in the snail's invasive range (Nematode: *Angiostrogylus cantonensis*-rat lung worm), no parasites have been reported from snails in Mobile. Thus, the objective of this study was to determine if apple snails in Mobile harbor parasites. Snails were collected bi-monthly from March through October 2017. Of the 151 snails collected, 46 percent were infected with Nematodes, Trematodes, or both worms simultaneously. In general, male *P. maculata* had a higher frequency of nematode infections as compared to females that had more trematodes. Parasite identification was accomplished using the molecular markers, 18s rDNA and ITS2. Preliminary results suggest that these snails are infected with *A. cantonensis* and identification of the trematodes is still ongoing. Results from this study emphasize the critical need for improved monitoring of invasive apple snails to detect, and possibly prevent, the spread of pathogens.

Kristie Ouellette (Student). kmo0025@auburn.edu 334-844-9318

Macroinvertebrate community structure in regulated and unregulated reaches of the Tallapoosa River

Kristie Ouellette[1], Clint Lloyd[1], and Elise Irwin[2]

[1]Alabama Cooperative Fish and Wildlife Research Unit
[2]U.S. Geological Survey

Dams and other barriers to the natural flow regimes are well known to cause changes in hydrologic conditions of downstream river reaches. Hydropeaking is a method commonly utilized by hydroelectric dams to generate electricity during peak demand. However, these sudden releases, often from hypolimnetic zones of the reservoir, can cause dual waves of sheer stress and thermal stress that can alter faunal communities immediately downstream of the reservoir. Furthermore, active control of flow conditions reduces flow extremes but increases the frequency of pulse disturbances, reducing potential community variability downstream of the reservoir. R.L. Harris Dam is a hydropeaking facility located in the upper-central Tallapoosa River Basin that has been subject to an adaptive flow management project (R.L. Harris Adaptive Management Program, or AMP) since 2005. Our objective is to provide reliable estimations of the impacts of changes in flow and temperature on downstream macroinvertebrate communities. The goal is to identify macroinvertebrate taxa or functional trait groups which can be utilized to predict responses of flow management from Harris Dam. Macroinvertebrates were collected in spring and fall seasons since the inception of the AMP. Fall samples from the 2005 (normal), 2008 (drought), 2009 (wet), 2012 (drought), and 2014 (normal) years were analyzed to determine the macroinvertebrate community response to extremes in natural hydrologic variation in regulated and unregulated reaches in the river basin. Macroinvertebrate community composition in the river displays clear differences between regulation type throughout all water years, with less variation in community composition in the regulated versus the unregulated reaches. Furthermore, regulated and unregulated communities appear to be most similar during years with more extreme hydrologic conditions, especially flood conditions. These data will be used to inform best practices for management of the flows from Harris Dam.

T. Reid Nelson (Student) tnelson@disl.org, 251-861-2141 x2384

Tournament catch-and-release mortality and dispersal of Red Drum and Spotted Sea Trout

T. Reid Nelson[1,2], Crystal Hightower[1,2], Sean Powers[1,2]

[1] Dauphin Island Sea Lab 101 Bienville Blvd. Dauphin Island, AL 36528
[2] University of South Alabama, Department of Marine Science, Mobile, AL 38660

Catch-and-release fishing tournaments have been popular in freshwater and are becoming prevalent in coastal tournaments where sportfish, such as Red Drum and Spotted Sea Trout, are targeted. In theory, this type of tournament should decrease mortality on the target species and have less impact on a fishery than a tournament that relies solely on harvested weigh-ins. However, concerns associated with live weigh-in fishing tournaments remain, namely post-release mortality, displacement of fish from home range and habitat, and stockpiling fish at the weigh-in location. To investigate these impacts 49 Red Drum and 28 Spotted Sea Trout were implanted with acoustic tags during the live weigh-in category of the 2016 and 2017 Alabama Deep Sea Fishing Rodeo (ADSFR). Fishes were monitored with acoustic receivers throughout coastal Alabama and detection data for at least one week was needed to determine survival. For 2016 and 2017 combined, mean survival of Red Drum was 0.94 ± 0.03 with 45 fish alive, 2 dead, and 2 unknowns. Spotted Sea Trout survival was 0.77 ± 0.08 in 2017 with 19 fish alive, 4 dead, and 5 unknowns. After release, both Red Drum and Spotted Sea Trout dispersed from the rodeo site quickly. The mean number of days for fishes to first leave the ADSFR release site was 2.6 ± 0.70, with total number of days detected at the site of 16.55 ± 3.57. Also, the mean last day detected at the release site was 35.73 ± 5.47. Fishes were detected throughout coastal Alabama with a mean detection distance of 7595 ± 1847.04 meters (m), the furthest distance detected for Red Drum was 62560 m and 49000 m for Spotted Sea Trout. Based on these results, live weigh-ins at coastal fishing tournaments should be successful with low mortality of released fishes and high dispersal away from release site.

Daniel Wicker (Student) dwicker@stu.jsu.edu

Population Demography of *Leptoxis ampla* (Coenogastropoda: Pleuroceridae), a threatened species in the Cahaba River Basin

Daniel Wicker and Lori Tolley-Jordan

Department of Biology, Jacksonville State University, Jacksonville, AL

The Cahaba River has the highest level of extant pleurocerid diversity in the Mobile River Basin. With 74% of the entire North American freshwater gastropod fauna considered imperiled, the importance of conservation research on these taxa cannot be understated. *Leptoxis ampla*, commonly known as the Round Rocksnail, is an endemic pleurocerid that is listed as federally threatened and patchily distributed in the Cahaba River Basin. Little is known about these populations of *L. ampla*, and knowledge of effective population abundance, size structure, and production is critical to understanding the viability of individual populations. We targeted four populations of *L. ampla* from known localities in the Cahaba River and its tributaries and sampled for species abundance and developed secondary reproduction models for each population using AFDM to develop length-mass regressions models. Results indicate populations in tributaries are more stable, reproducing more frequently and maintaining greater population abundance year-round. Cahaba River populations suffer from habitat degradation, suggesting conservation efforts prioritize main stem populations.

POSTER PRESENTATIONS

Benjie Blair, bblair@jsu.edu, 256-782-5643

Pyrosequencing Survey of Bacterial Associates within the Gastrointestinal tract of the Coosa Darter *(Etheostoma coosae).*

Benjie Blair[1], R. C. Watson[1] , M. Meade[1] , M. Fields[2], C. Steed[1], R. Watkins[1], C. Murdock[1]

Jacksonville State University, Jacksonville, Alabama[1]
Montana State University, Bozeman, Montana[2]

Many studies have demonstrated that microbes in the gastrointestinal (GI) tract are of high importance for the health of the host. However, few studies have focused on the Coosa Darter (*Etheostoma coosae***)**. In this study, Roche 454 pyrosequencing was applied to a pooled set of different 16S rRNA gene amplicons obtained from GI content of *E. coosae* to build an initial snapshot of microbiota diversity. This fish is found in a unique Northeast Alabama watershed and is related to a number of endangered species. Compared to culture-dependent investigation, this study reveals an impressive diversity of the microbial flora. The results presented here indicate that the major groups present were members of the phyla Proteobacteria, Firmicutes, and Verrucomicrobia. Conversely, the phyla Fusobacteria and Nitrospira were less common in these samples. The most prevalent genus represented was Tetragenococcus, a known fermenter, had 174 sequences of 1467 total for the sample. Many of these bacteria might be of high physiological relevance for *E. coosae* based on diet and may serve as a template for comparisons to related fish species. It may also serve as a baseline to compare to fish isolated from contaminated streams, which may affect the health and microflora composition in these environments.

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Development of SNP panels as a new tool to assess the genetic diversity, population structure, and parentage analysis of the eastern oyster (*Crassostrea virginica*)

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Culture of the eastern oyster (*Crassostrea virginica*) is rapidly expanding. Combined with their continuing role as an environmental sentinel species and ecological model, this trend necessitates improved molecular tools for breeding and selection, as well as population assessment and genetic conservation. Here, we describe the development and validation of two panels of 58 single nucleotide polymorphism markers (SNPs) for the species. Population analyses revealed three distinct populations, based on FST values and STRUCTURE, among wild oysters sampled from Delaware Bay (1), northwest Florida (2), Alabama (2), Louisiana (2), and the Texas Gulf Coast (3), consistent with previous microsatellite and mtDNA analyses. In addition, utilizing the developed panels for parentage assignment in cultured oysters (Rutgers, New Jersey) resulted in a highly accurate identification of parent pairs (99.37%). The SNP markers could, furthermore, clearly discriminate between hatchery stocks and wild-sourced individuals. The developed SNP panels may serve as an important tool for more rapid and affordable genetic analyses in eastern oyster.

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Conservation management of Alligator Gar, *Atractosteus spatula*, in Alabama: an evaluation of brood fish collections in the Mobile-Tensaw delta, 2008-2015

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Exploitation of Alligator Gar, *Atractosteus spatula* (AGR), combined with agency concerns about their population status led to the Alabama's Department of Conservation and Natural Resources promulgation of the first protective regulation (2 fish/angler/day) for this species in 1992. Population assessments and limited distribution of AGR (8225 ha in Mobile-Tensaw Delta, lower Alabama and Tombigbee Rivers), further led to designation as a species of moderate conservation concern in 2004. Results of a meeting with gar anglers, along with concerns over commercial pressure were re-evaluated, and subsequently, fishing regulations were amended in 2005 (1 fish/angler/day). Biologists determined that team-coordinated field collections of brood fish for hatchery culture could be used as a tool to expand and enhance the AGR population within the middle Alabama River (Claiborne Reservoir). Results of brood fish collections reveal that, 75 sample dates during February to April (50.7% successful dates) over 8 years resulted in the capture of individuals (N=101) ranging in length from 102 to 221 cm. Collectors deployed a total of 578 (12.5% successful net-sets) multi-filament gill nets, expending 2167 hours of effort. By late 2010, hatchery staff determined that AGR ranging from 121.9 to 127 cm were not consistently mature and nearly 24% of captured fish were considered too small. The majority (91.7%) of small AGR were captured specifically in 102 mm mesh nets. Collections after 2011 limited the use of 102 mm mesh nets and only individuals $\geq$ 137.2 cm were transported to hatcheries for spawning.

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Using Time Lapse Cameras and a Roving Creel Survey to Evaluate a Tailrace Trout Fishery

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Many tailrace fisheries provide anglers with unique angling opportunities. Anglers often travel longer distances and purchase specialized equipment to access these fisheries. This translates into fishing tourism dollars and revenue for local and state economies. The Smith Lake Tailrace near Jasper, AL is Alabama's only year round trout fishery. The goals of this project were to determine angler use of the trout fishery, the percentage of stocked trout that are harvested, direct expenditures related to the fishery, and to identify any needed management actions to improve the fishery. An angler survey was conducted from June 2014 through May of 2016 on the upper 2.5 miles of stream. Concurrently, time lapse cameras were placed at parking areas to estimate effort. Angler use was high at 7,400 hours of effort per mile of stream which resulted in $181,300 of annual expenditures. However, anglers harvested only 16% of trout stocked throughout the course of the study. Anglers traveled from 3 states and 31 Alabama Counties to fish for trout in the tailrace.

ORAL PRESENTATIONS (PROFESSIONAL SESSION)

Stuart W. McGregor; smcgregor@gsa.state.al.us; (205) 247-3629

An update on the currently understood distribution and status of the crayfish fauna of Alabama

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

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In 2008 Schuster and Taylor compiled 4,649 museum records of crayfishes collected in Alabama from 8 museum collections into a database documenting 85 species. Subsequent distribution maps created from that database identified under sampled areas of the state, and over seven field seasons and with contributions from outside sources we steadily closed coverage gaps and grew the database to almost 9,000 records. During that period several undescribed species were discovered and formally described, several species known from surrounding states were collected in Alabama for the first time, and some species whose taxonomic status and relationships to other species were in doubt but whose respective statuses were resolved, led to the current total of 97 species from the state, with 94 native and 3 introduced. Twelve of these species are Conservation Priority 1 and 30 are Conservation Priority 2 species in Alabama. None are currently federally listed but one may be a strong candidate for listing. Another five are considered hypothetical residents due to their presence in adjoining states with appropriate habitat and no discernible barrier.

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Small Impoundment Management: Using Littoral Zone Habitat to Alter Traditional Fisheries Management Rates

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The management of small impoundments and public fishing lakes by the Alabama Division of Wildlife and Freshwater Fisheries (ADWFF) has historically followed a regimented approach that applies static rates for fish harvest, stocking, fertilization, and other management techniques. Since the 1950's, ADWFF Public Fishing Lakes (PFLs) fisheries management has relied on rates that followed those suggested by Homer Swingle, from his early work at Auburn University. These rates relied on surface acreage as the determining characteristic that influenced all aspects of fisheries management. Recently, ADWFF has explored alternative rates to managing small impoundments, based on limnological and morphological characteristics of PFLs. Specifically, management rates for largemouth bass were altered based on summertime "Littoral Habitat". The exploration of alternative management schemes came after age and growth data suggested that bass crowded PFLs were actually experiencing growth overfishing of largemouth bass. We report on recent management of PFLs, where summertime "Littoral Habitat", instead of surface acreage was used to lower stocking rates to improve growth, condition and size structure of largemouth bass. Also, restrictive bass harvest was implemented to reduce overfishing of LMB during the first year the PFLs were open to the public after renovation. For comparison, mean and modal total length, length frequencies, and relative stock density of largemouth bass populations one year, and two years after renovating PFLs renovation were compared between status quo and "Littoral Habitat" management schemes. Our data indicates that fisheries management of small impoundments based on "Littoral Habitat" may be better suited to improve growth and condition of largemouth bass, and improve the size structure of largemouth bass one year after renovation.

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Species-diagnostic SNP markers for the black basses (Micropterus spp.): A new tool for black bass conservation

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Black basses (*Micropterus* spp.) are among the most important recreational sportfish in the United States. Depending on the species, they are of additional interest for aquaculture, conservation, and/or ecological monitoring. *Micropterus* species can readily hybridize, particularly as stocking events bring species lacking reproductive isolating mechanisms into contact with one another. Several black bass species across the Southeastern United States are highly vulnerable to swamping events via hybridization with introduced sister species. Rapid identification of pure and hybridized individuals is critical in state agency hatcheries tasked with restorative stocking and in monitoring the health of riverine populations. To facilitate these assessments, we developed panels of fixed/diagnostic SNP markers for black bass. Following genotyping-by-sequencing, we validated and extended a panel of 64 markers capable of differentiating 13 species and 2 undescribed types of black bass. We have tested these markers on >1300 samples to-date. Case studies illustrating the informativeness of the markers, taken from analyses of natural populations of bass in Alabama, Georgia, and Texas will be presented.

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

Distribution and age composition of Red Snapper *Lutjanus campechanus* across the inner continental shelf of the northern Gulf of Mexico

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Red Snapper is an economically and ecologically important species in the northern Gulf of Mexico where it often dominates the reef fish community in shallow to mid water depths along the continental shelf. The affinity of Red Snapper for artificial and natural reefs is well established; however, this affinity appears to vary with age. We used a multi-gear survey that targeted all age classes of Red Snapper to determine the distribution by age class on artificial reefs, natural reefs, and unconsolidated mud/sand bottom across the shallow water portion of the continental shelf (< 100 m) of the northcentral Gulf of Mexico. Bottom trawls, vertical longline, remotely operated vehicles equipped with video recorders (ROV), and bottom longlines were conducted in 2km x 2km randomly selected grids that were previously surveyed with side-scan sonar to give a synoptic understanding of habitat use by age class for the species. 0 to1 yr old Red Snapper were found primarily in shallow water (~20-40 m depth) on unconsolidated muddy bottom in the northwestern portion of the survey area. Vertical longline collected age 2-8 year old Red Snapper near artificial and natural reef structure. Mean age of Red Snapper did not differ between natural and artificial reefs. Older Red Snapper (5-42 yrs) were collected away from reef structures on unconsolidated bottoms. Older Red Snapper were found throughout all depth zones. Our results demonstrate ontogenetic changes in habitat use for Red Snapper but do not show a strong trend of older age Red Snapper increasing with increasing depth.

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Faunal Habitat Linkages for Alabama Barrier Island Restoration Assessment on Dauphin Island, Alabama

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Dauphin Island is a strategically significant barrier island along the northern Gulf of Mexico, serving as the only barrier island providing protection to much of the state of Alabama's coastal natural resources. The island has sustained impacts from both storms and the recent Deepwater Horizon oil spill, warranting evaluation of restoration options. This work will identify the most beneficial and effective restoration activities for Dauphin Island that, if implemented, would ensure long-term sustainability and resiliency of the state of Alabama's only barrier island, its habitats, the living coastal and marine resources it supports, as well as estuarine conditions in Mississippi Sound and the extensive coastal wetlands to the north. We have identified multiple objectives associated with long-term sustainability and resiliency of Dauphin Island. To evaluate the influence of restoration alternatives on conservation values we are developing a decision tool for the decision maker (Alabama Department of Conservation and Natural Resources) that will constitute a transparent assessment of the tradeoffs among the restoration strategies. A fundamental objective of this project is to maximize coastal marine resources, particularly for the fauna that inhabit the island and the specific habitat types that these species utilize. Team members worked together to elicit faunal expertise and developed a list of species that utilize Dauphin Island. This list was used to estimate and rank general linkages of species to habitats. The rankings were then used in nonmetric multi-dimensional scaling (NMDS) ordination to identify similarities among faunal species based on estimated habitat usage. These habitat groupings will be used alongside geospatial models currently being developed to help quantify changes in habitat as a result of a suite of restoration alternatives. Through conceptual and predictive ecological modeling, reducing uncertainty can ultimately illuminate how these restoration alternatives contribute to the long-term sustainability of Dauphin Island as a barrier island.

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Commercial Harvest of Paddlefish from a Provisional Fishery in the Alabama River

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In the early 1980's, increased commercial fishing pressure occurred on paddlefish (*Polyodon spathula*) populations in Alabama. This increased fishing effort resulted in a decline of paddlefish abundance and size in Alabama. As a result, the Alabama Division of Wildlife and Freshwater Fisheries (ALDWFF) placed a moratorium on the harvest of paddlefish in Alabama waters in 1988. Due to the increase in market prices and world-wide demand for caviar (circa 2002), the ALDWFF received numerous inquiries into the status of paddlefish in Alabama and the potential to open the fishery. After determining the paddlefish population was viable for harvest, a five-year "provisional" fishery was opened in 2013. Over the provisional period, 4,814 gravid females were harvested, and 19,948 lbs. of eggs were processed. Using a "provisional" fishery designation, the Alabama Division of Wildlife and Freshwater Fisheries has been able to appropriately adjust regulations for future seasons in the Alabama River.

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Efficacy of stocking advanced-size, delta-strain Largemouth Bass in the Mobile-Tensaw Delta, Alabama

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The Mobile-Tensaw delta (MTD) is an 8231-ha oligohaline, tidal estuary that supports a popular Largemouth Bass, *Micropterus salmoides*, fishery. Due to the fast growing human population in southwest Alabama, the MTD is an increasingly popular public water for bass anglers. Local anglers are accustomed to delta-strain Largemouth Bass (DLMB) being abundant, but small in size, a combination not typically sought after by tournament anglers. The "small-and-abundant" delta bass syndrome is supported by other studies of coastal bass populations found in brackish, tidal environments and is not unique to the MTD. Further, angler concerns peaked when age-1 recruitment declined following substantial fish kills during post-Hurricane Ivan (2004) years. We proposed that improvements in the MTD population and fishery may be implemented by stocking advanced-size fingerlings produced from above-average size brood fish spawned at Marion State Fish Hatchery. Stocking larger, older fish reared on live food should provide a competitive advantage over native fish assuming: 1. Larger size at stocking and, 2. Higher growth potential in hatchery fish. Producing advanced-size fish is an expensive venture for any agency. Therefore, we tested this proposal using two area watersheds, Byrnes Lake (BYL, 11.7 ha) and Threemile Creek (TMC, 69.2 ha), typical of delta habitats. In BYL and TMC, 14,536 DLMB were tagged (CWT) and stocked during mid February-March of 2010-2012 (2009-2011 cohorts). Mean length (mm, TL) of sub-sampled hatchery fish ranged from 135-159 mm TL and were approximately 10 mo old at stocking. Six fixed sites per study area were electrofished and the proportion of recaptured, tagged DLMB (*N=304*) within cohorts ranged from 2.9 to 30.5% in TMC and 1.9 to 22.2% in BYL. Herein, we present results on DLMB stocking processes, relative contribution of stocked cohorts, as well as size and CPUE differences between stocked and wild cohorts.

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Alabama's Public Fishing Lakes Program: Past, Present, and Future Perspectives

Matthew Marshall and Jonathan Brown

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The Alabama Wildlife and Freshwater Fisheries Division (WFF) manages 23 Public Fishing Lakes (PFLs) in 20 counties throughout the State. PFLs range in size from 13 to 184 acres for a total of 1,912 surface acres and are managed to provide quality fishing on a sustained basis at an affordable price. Since the inception of the PFL Program in 1950, over 10 million anglers have visited the lakes harvesting over 12 million pounds of fish. Despite decades of success, the usage and relevancy of the PFL Program has declined. We have witnessed Alabama's population increase 7% from 2000-2010 while PFL usage decreased 31% during this period. Angler preferences and WFF budget constraints have changed requiring operational changes and alternative fisheries management schemes. We will discuss the PFL Program's history, status, and upcoming developments to sustain the PFL program for the future.

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Metabolic physiology of the Chattahoochee crayfish, *Cambarus howardi*, acclimated to different environmental temperatures

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The Chattahoochee crayfish is an uncommon species that occurs in Cobb, DeKalb, Douglas, Forsyth, Fulton, Hall and Lumpkin Counties in Georgia and the Halawakee Creek system in Alabama. The species can be found near urban centers where environmental conditions can be variable. Many crayfish species are tolerant to various environmental conditions, including hypoxic and anoxic conditions, however information on the Chattahoochee crayfish is not well documented. In this study, oxygen consumption rates of adult Chattahoochee crayfish (3.5-5.5g wet wt.) were measured using an aquatic respirometry system (Loligo® Systems, Viborg Denmark) following two weeks of acclimation to environmental temperatures of 20, 25, and 30 C. Mean oxygen consumption rates (MO_2) of intermolt animals during normoxia were 111±20, 221±42, and 260 (1 animal) mg O_2/kg*hr at the respective temperatures. At any temperature animals were observed to oxyregulate until oxygen tensions were reduced to 5kPa pO_2. Most animals did not survive acclimation to 30 C. Oxygen consumption rates were also observed in one crayfish during molting (25 C). Oxygen consumption rates increased to nearly 1500 mg O_2/kg*hr prior to and then decreased to zero during the molting process. Oxygen consumption rates increased to nearly 600 mg O_2/kg*hr following the molting process and then decreased to near normal values in approximately 24 hr. Overall, intermolt animals appear relatively tolerant to variable oxygen tensions, however, it is likely that low environmental pO_2 could adversely affect the survival of molting individuals.

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A new Pygmy Sunfish species from South Alabama and West Florida

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The Pygmy Sunfishes are a morphologically distinctive, but poorly understood genus of freshwater fishes endemic to the southeastern United States. The Everglades Pygmy Sunfish (Elassoma evergladei) was described in 1884, but intraspecific morphological and molecular variation remains undescribed. This geographic distribution of E. evergladei includes the Cape Fear River drainage of North Carolina, the Mobile River drainage of Alabama, and all intervening rivers south to the Florida Keys.This distribution covers diverse physiographic subprovinces, including numerous karst plains, Pleistocene alluvium, Carolina Bays, and the Mid-Florida Ridge. Previous research on co-distributed species has revealed strong population genetic structure associated with the same watershed divides and physiographic features. We characterized morphological and molecular variation among populations of the Everglades Pygmy Sunfish, including representatives from all major watersheds and physiographic provinces within the species range. Mitochondrial sequence data was used to construct a novel molecular phylogeny, which revealed two well-supported and geographically restricted clades (North Carolina and Alabama), which were basal to a broadly distributed and unresolved clade. Morphometric analyses revealed wide variation in body shape, but no significant differences among the three groups. Meristic analyses revealed a single character (head scale count) which distinguished populations from Alabama and extreme west Florida from all other populations. Morphological and molecular data provide evidence for a monophyletic and diagnosable clade within the range of E. evergladei, which satisfies criteria for the phylogenetic species concept 3 (PSC3). We propose a new species of Pygmy Sunfish, which is geographically restricted to the Mobile and Perdido River drainages of southern Alabama and western Florida.

From the Texas Chapter American Fisheries Society. Please plan to attend the Southern Division Meeting in Galveston, Texas on January 24-27, 2019.