

**44th Annual Meeting of the
Mississippi Chapter
of the American Fisheries Society**



February 7-9th 2018

Oxford, MS

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The organizers of the 2018 Mississippi Chapter of the American Fisheries Society Annual Meeting would like to *sincerely thank* the following groups for their support of the meeting.



President Elect Candidates

Nathan Aycock

Nathan Aycock is a fisheries biologist with the Mississippi Department of Wildlife, Fisheries, and Parks, where he leads the Delta fisheries management project. He's been at this position since 2009 and works primarily on sport fish management in oxbow lakes in the Mississippi Delta. Nathan received his BS in fisheries management from Auburn University and a MS in Wildlife and Fisheries Science from Mississippi State University. In his current position with MDWFP he has worked extensively to evaluate the impacts of invasive species on native fish communities and has also helped lead an eight year project investigating pallid sturgeon abundance in the Mississippi River. Nathan currently is the chairman of the Lower Basin Pallid Sturgeon working group and a member of the USFWS Pallid Sturgeon Recovery Team. He received MDWFP's Fisheries Biologist of the Year award in 2012 and was also recognized by the Mississippi Wildlife Federation as the Fisheries Conservationist of the Year in 2016. Nathan is passionate about environmental stewardship and likes teaching kids to love and respect nature. He currently lives near Rosedale, MS, with his wife and their two daughters Bethany and Olivia.

Ryan Jones

Ryan Jones is a Conservation Resources Management Biologist for the Mississippi Department of Wildlife, Fisheries, and Parks (MDWFP) Bureau of Fisheries. Ryan was born in Jackson, MS where he grew up running the banks of the Pearl River and every creek he could find. Aquatic biology became an obsession in high school when he began to discover the diverse community of organisms under the surface in the Ross Barnett Reservoir. He received a Bachelor's in Fisheries and Aquaculture Science and a Master's in Biology from Mississippi State University. He began his career with the National Marine Fisheries Service as an observer for the Red Snapper By-catch Reduction Device program. On the Gulf of Mexico he collected fisheries data onboard NOAA research vessels as well as commercial reef fish and shrimp boats. Ryan began his freshwater career in 2007 as an associate biologist for MDWFP. He is currently the project leader of the Central and Southwest Regions of the Fisheries Bureau where he is tasked with monitoring and regulating fisheries on public waters, private land technical guidance, public outreach, and aquatic vegetation management. He is a member of the MS Chapter of the American Fisheries Society and the MS Wildlife Federation. In 2016 Ryan was recognized as MDWFP Fisheries Biologist of the Year. He was also acknowledged for efforts to reduce littering at the Ross Barnett Reservoir Spillway where he received Volunteer of the Year award from Keep the Rez Beautiful, a subsidiary of Keep America Beautiful. Ryan is a passionate conservationist who is proud to serve and protect the natural resources in Mississippi.

Program at a Glance

All events will take place in the Avenue Ballroom.

Wednesday February 7th	
1:00-6:00 PM	Check-in and Registration
1:15-5:00 PM	Presentations
7:00-11:00 PM	Welcome Social
Thursday February 8th	
7:45-10:00 AM	Check in and Registration
8:00-10:00 AM	Presentations
10:00-10:15 AM	Break
10:15-12:00 PM	Presentations
12:00-1:30 PM	Lunch
1:30-3:30 PM	Presentations
3:30-3:45 PM	Break
3:45-5:30 PM	Presentations
5:30-6:30 PM	Poster Session
6:30-11:00 PM	Banquet
Friday February 9th	
8:00-10:00 AM	Special Session: Museum Collections
10:00 AM	Break
10:15-12:15 PM	Chapter Business Meeting
12:15 PM	Adjourn

Keynote Speaker

Henry L. “Hank” Bart Jr.



Henry L. “Hank” Bart Jr. is Professor of Ecology and Evolutionary Biology at Tulane University, and Director of the Tulane University Biodiversity Research Institute (TUBRI). A native of New Orleans, he earned Bachelor of Science and Master of Science degrees in Biological Sciences from the University of New Orleans, and a Ph.D. in Zoology from the University of Oklahoma. Prior to joining the faculty of Tulane University, he held faculty positions at the University of Illinois and Auburn University. He curates the Royal D. Suttkus Fish Collection at TUBRI, the largest research collection of post-larval fishes in the world. He specializes in ecology and taxonomy of freshwater fishes. He teaches Ichthyology, Stream Ecology, Natural Resource Conservation and Biodiversity Informatics to Tulane undergraduates and graduate students.

Keynote Address

The Importance of Sustaining Regional Biodiversity Collections: the case of the Neil H. Douglas Collection of Fishes

Henry L. “Hank” Bart Jr.

When news first reached the biodiversity collections community (via a Facebook post) that the University of Louisiana Monroe (ULM) could no longer keep its research collections of plants, fishes and amphibians and reptiles, the reaction was a mix of shock, grief and anger. But we should have seen this coming; the writing was on the wall. This presentation addresses the special importance of regional biodiversity collections to the institutions that house them, the problem orphaned collections create for the broader biodiversity collections community, the actions this community must take to hopefully prevent, but certainly to better prepare for, more instances of abandoned collections in the future, and, most importantly, steps institutions should take to sustain their collections. First and foremost, institutions must maintain faculty lines for collection curators. These individuals advocate on behalf of the collections both inside and outside of the institution, and they generate support for the collections. Second, the value of collections as indispensable research and education resources must constantly be promoted to the institutions housing them, in terms that justify institutional commitments of resources to the collection. Third, collections must find effective ways of disseminating the findings and impact of research use of their specimens to the broadest audiences. All these points will be addressed in light of ULM’s recent decision to abandon its biodiversity collections, with specific references to the fate of the Neil H. Douglas Collection of Fishes.

Special Session and Associated Abstracts

The Importance of Scientific Collections

Friday February 9th at 8:00 a.m.

Long-term support and maintenance of research collections are among the most critical issues facing systematic biology (Poss and Collette 1995). Budget cuts at universities have resulted in the loss of trained staff for curatorial work and collections have been moved, split, or lost due to lack of dedicated space. The recent divestment of scientific collections at the University of Louisiana at Monroe (ULM), which was the sixth largest regional center for total holdings by specimen (Poss and Collette 1995), indicates the severity of this trend. ULM's collections included fish from across the southeast United States including Mississippi. The value of scientific collections to fisheries professionals cannot be overstated: holdings of type specimens used in taxonomic descriptions, diet studies from preserved specimens, vouchers from regional field collections of species described in "Fishes of" books, education in fish taxonomy, and tissue for studies on genetics, age, and growth. A special session (2 hours) during the meeting will include invited presentations by collection managers highlighting the status of collections relevant to the state of Mississippi and a discussion of the preservation of existing and future collections with recommendations. A draft letter to the parent society in support of research collections will be prepared from discussions during the special session.

Coordinated by
Engineering Research and Development Center
and
Mississippi Valley Division



Poss, S. G. and B. B. Collette. 1995. Second survey of fish collections in the United States and Canada. *Copeia* Vol. 1995, No. 1, pp. 48-70.

Matthew D. Wagner, matthew.wagner@mmns.state.ms.us, (610) 763-9074

Utility of scientific collections from a state agency perspective

Matthew D. Wagner

Mississippi Museum of Natural Science, Jackson, MS 39202

The Mississippi Museum of Natural Science is a specimen repository with the largest representation of aquatic fauna from the state of Mississippi. The fish collection is currently at one third holding capacity with 67,847 lots comprised of 1,054,502 individual fish specimens. These fish specimens make up 33% of the 204,000 known fish distribution records from Mississippi. Additionally, the museum holds 13,868 lots of mussels (83,047 specimens) and 7,724 lots of crayfish (97,899 specimens), which make up a majority of the holdings of both groups for Mississippi. The data associated with these specimens create the baseline knowledge needed for conservation management of native species. This data is continually uploaded into the state natural heritage database and used in environmental reviews completed by both state and federal agencies. Most importantly, these collections include data on the chronological distribution of species, which is used in assessing both the state and federal species status and planning new surveys.

Jake Schaefer, jake.schaefer@usm.edu (601-266-4928)

Ichthyological collections at the University of Southern Mississippi

Jake Schaefer

Department of Biological Sciences, University of Southern Mississippi, 118 College Dr. #5018, Hattiesburg, MS 39401

The University of Southern Mississippi (USM) supports two ichthyological collections, one on the Hattiesburg campus that is primarily freshwater, and a smaller collection at the Gulf Coast Research Laboratory (GCRL) that is primarily marine. The GCRL collection was founded by Charles Dawson in 1958, and later curated by Stuart Poss and Sara LeCroy as GCRL was incorporated into USM in 1987. The collection in Hattiesburg was founded by Steve Ross in 1985. Today, the collections have nearly 90,000 lots and have grown substantially over the last 13 years. Since 2004, the Hattiesburg collection has increased in size from 28,000 to 54,000 lots while being relocated twice and narrowly avoiding an attempt by university administrators at “temporarily” putting the collection in storage. The collection is now housed in a newly constructed (2013) dedicated collections building at the Lake Thoreau Environmental Center located 5 km from the main campus. The collections have served as valuable repositories for efforts such as SEMAP, Alabama-Mississippi Rapid Assessment Team, ongoing annual surveys of Mississippi National Forests, Deepwater Horizon impacts, and a variety of other research and teaching efforts. Most infrastructure improvements for the collections has come from two NSF Collections in Support of Biological Research grants in 1988 and 2007. A summary of the history, significance, and future of the collections will be given.

Presentation Schedule

Students competing for the best student presentation are designated with an asterisk (*).

All moderators for this conference are students. Moderating gives students greater familiarity with conference structure, an informal opportunity to speak in the scientific setting, and promotes familiarity with colleagues and potential employers.

Wednesday February 7th		
Time	Title	Presenter
1:15 PM	WELCOME	Jill Hendon
Moderator	Hunter Hatcher of Mississippi State University	
1:30 PM	Overview of Mississippi's State Fishing Lakes Program	Josh Howell
1:45 PM	Effects of routine catfish stocking on angler effort at an urban Community Fishing Assistance Program Pond	Donta Reed
2:00 PM	Effects of Asian Carp on sport fish in Mississippi River oxbow lakes	Nathan Aycock
2:15 PM	Using fish as crayfish samplers in reservoirs and large rivers: preliminary results	Susie Adams
2:30 PM	Evaluation of a portable electrosedation system (PES) for anaesthetizing channel catfish to produce channel x blue hybrid catfish embryos in hatcheries	Nagaraj G Chatakondi
2:45 PM	A comparative analysis of light: dark preference in young-of-year Bighead and Silver carps	Michael Holliman
3:00 PM	A Bayesian belief network to prioritize conservation need among diverse aquatic taxa in speciose and understudied regions	David Schumann
3:15 PM	BREAK	
Moderator	Corbin Bennetts of The University of Southern Mississippi	
3:30 PM	Do young and old female Red Snapper contribute equally to reproduction?	Andrea Leontiou
3:45 PM	Comparative life histories of <i>Adonia</i> clade snubnose darters (Percidae: Etheostomatinae)	Ken Sterling
4:00 PM	Examination of Spotted Seatrout (<i>Cynoscion nebulosus</i>) feeding ecology in coastal Mississippi	Matthew Donaldson
4:15 PM	Growth of captive juvenile (YOY) Atlantic Tarpon (<i>Megalops atlanticus</i>) collected from coastal Mississippi tidal sloughs	Jim Franks
4:30 PM	A cry for help in a silent world: pigmentation as a response to hypoxia in paddlefish	Nicky Faucheux
4:45 PM	Size and age distribution of Gulf Menhaden (<i>Brevoortia patronus</i>) across the northern Gulf of Mexico	Kasea Price
7:00 PM	SOCIAL	

Thursday, February 8th

Time	Title	Presenter
7:50 AM	ANNOUNCEMENTS	Jill Hendon
Moderator	Ashley Shannon of Mississippi State University	
8:00 AM	Sub-pixel coastal wetland classification in the lower Pascagoula River: a comparison of three methods	Jason Tilley*
8:15 AM	Ecohydrology of the Lower Mississippi River floodplain	Catherine Murphy
8:30 AM	Supplemental cover as recruitment habitat in reservoir mudflats	Hunter Hatcher*
8:45 AM	The utility of using freshwater mussels for biomonitoring in Mississippi streams	Todd Slack
9:00 AM	Persistence of flooded agricultural plants as potential fish habitat	Giancarlo Coppola*
9:15 AM	Benthic macroinvertebrate communities along a gradient of hydrological connectivity within the Lower Mississippi River and its floodplain	Audrey Harrison*
9:30 AM	Five decades (1960s - 2000s) of Lower Mississippi River side channel morphological change	Amanda Oliver
9:45 AM	Freshwater mussels (Unionidae) of Bayou Bartholomew, Louisiana and Arkansas, with comments on historical changes at a single mussel bed from 1991 to present	Steven George
10:00 AM	BREAK	
Moderator	Meg Oshima of The University of Southern Mississippi	
10:15 AM	Comparison of age-frequency distributions for Ocean Quahogs, <i>Arctica islandica</i> , in the Western Atlantic Ocean	Sara Pace
10:30 AM	Blue Catfish, <i>Ictalurus furcatus</i> , electrofishing and telemetry on Lake Dardanelle, Arkansas: what habitats do they use and is use proportionate with low-frequency electrofishing efficiency?	Zach Moran*
10:45 AM	Movement patterns of Bull Sharks, <i>Carcharhinus leucas</i> , in St. Louis Bay, MS	Christopher Lapniewski
11:00 AM	Movement patterns of Red Drum, <i>Sciaenops ocellatus</i> , in St. Louis Bay, MS	Paul Grammer
11:15 AM	Residents, migrants, or both? Evaluating population dynamics and movement of paddlefish <i>Polyodon spathula</i> in a regulated system	Chelsea Gilliland*
11:30 AM	Distribution of angel sharks (Squatinae) in United States waters of the western North Atlantic Ocean	Trey Driggers
11:45 AM	Seasonal occurrence, distribution and movement of Whale Sharks (<i>Rhincodon typus</i>) tagged in the northern Gulf of Mexico	Eric Hoffmayer
12:00 PM	LUNCH	

Moderator	Zach Moran of Mississippi State University	
1:30 PM	Occupancy modeling to assess atypical <i>Aeromonas hydrophila</i> (aAh) prevalence in farm-raised catfish	Bradley Richardson*
1:45 PM	Physicochemical, biological and morphometric factors of lakes influencing crappie growth	Bryant Haley*
2:00 PM	Recreational Red Snapper reporting: an update on the Tails n' Scales mandatory reporting system	Trevor Moncrief
2:15 PM	Results from a multi-year charter vessel reef fish observer program	Wade Hardy
2:30 PM	Reducing shark bycatch in recreational and commercial fisheries	Glenn Parsons
2:45 PM	Cooperative efforts in reducing bycatch in Mississippi's Blue Crab fishery	Rick Burris
3:00 PM	Debunking angler lore: can the Farmer's Almanac really forecast catch rates?	Ashley Shannon*
3:15 PM	The Role of Private Waters in Recruiting New Anglers	Leslie Burger
3:30 PM	BREAK	
Moderator	Nate Jermain of The University of Southern Mississippi	
3:45 PM	Red Drum (<i>Sciaenops ocellatus</i>) reproductive biology in the north-central Gulf of Mexico	Corbin Bennetts*
4:00 PM	Effects of gonadotrophin-releasing hormone analog (GnRH _a) injection time on White Crappie (<i>Pomoxis annularis</i>) latency period	Christian Shirley*
4:15 PM	Age and growth of Red Drum, <i>Sciaenops ocellatus</i> , in the north-central Gulf of Mexico	Beckah Campbell*
4:30 PM	Age and growth of Atlantic Chub Mackerel (<i>Scomber colias</i>) in the Northwest Atlantic	Taylor Daley*
4:45 PM	A Hierarchical Bayesian surplus production model for Blue Crab (<i>Callinectes sapidus</i>) in the northern Gulf of Mexico	Meg Oshima*
5:00 PM	Swimming performance of adult Silver Carp (<i>Hypophthalmichthys molitrix</i>)	Jan Hoover
5:15 PM	Analyzing leap characteristics and burst speeds of Silver Carp (<i>Hypophthalmichthys molitrix</i>) using in situ video analysis	Ehlana Stell*
5:30 PM	POSTER SESSION	
6:30 PM	BANQUET	

Friday February 9th		
8:00 AM	SPECIAL SESSION WELCOME: Importance of Collections	
8:15 AM	Utility of scientific collections from a state agency perspective	Matthew Wagner
8:45 AM	Ichthyological collections at The University of Southern Mississippi	Jake Schaefer
9:15 AM	Open Discussion with Expert Panel	
10:00 AM	BREAK	
10:15 AM	MISSISSIPPI CHAPTER BUSINESS MEETING	
12:15 PM	Adjourn	

Poster Presentations

Students poster abstracts are designated with an asterisk (*).

Poster #	Title	Presenter
1	Comparison of stream crayfish sampling methods	Zanethia Barnett
2	Use of a modified fyke net to study Southern Flounder, <i>Paralichthys lethostigma</i> , in Mississippi coastal waters: a preliminary assessment	William Dempster
3	GCRL Tripletail Tagging Project – A Twenty-one Year Assessment	Dyan Gibson
4	Assessing Growth and Establishment of Agricultural Plantings on Reservoir Mudflats	Hunter Hatcher*
5	Age of tournament caught Swordfish, <i>Xiphias gladius</i> , in the northern Gulf of Mexico: a preliminary study	Jeremy Higgs
6	Comparison of two gear types frequently used in Mississippi's recreational Blue Crab Fishery	Jack Husley
7	A review of fishery-independent monitoring data for blue crab megalopae in Mississippi	Harriet Perry
8	Seasonal variation of dry energy density of Gulf Menhaden and blue crab from the Gulf of Mexico	Anna Swigris*
9	Gear effectiveness and size selectivity for five species of Madtoms (<i>Noturus spp.</i>)	Matthew Wagner

Presentation Abstracts

Abstracts are in alphabetical order by presenting author's last name.
Presenting author is underlined.

Susan B. Adams, sadams01@fs.fed.us, (662) 234-2744 ext. 267

Using fish as crayfish samplers in reservoirs and large rivers: preliminary results

Susan B. Adams¹ and Zanethia C. Barnett^{1,2}

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²University of Mississippi, Department of Biology, 214 Shoemaker Hall, University, MS 38677

Crayfishes in large water bodies of the southeastern US are woefully undersampled, largely due to a lack of efficient sampling methods. In addition to the paucity of basic ecological information created by this situation, managers may be unable to recognize and respond to crayfish invasions in large water bodies without better distributional information and sampling methods. We are experimenting with using fish as samplers of crayfishes in reservoirs and large rivers. We have obtained fish guts from three routine, standardized fish sampling efforts and one non-routine effort. Fish samples came from: MS Department of Wildlife, Fisheries, and Parks electrofishing in the Pascagoula River (and Marsh) and in Columbus Lake, MS; Tennessee Valley Authority electrofishing and gill netting in three reservoirs in the Bear Creek drainage, AL; and US Forest Service rotenone application to the partially-drained Choctaw Reservoir, MS. Fish guts were dissected and stomach and intestinal contents were stored separately in 70-95% ethanol. Contents were sorted, and crustacean fragments were stored in ethanol and later identified (to species when possible) under a dissecting scope. We will present results on proportions of each fish species containing crayfishes in each sampling area and possibly preliminary data on crayfish species present. We will also discuss the sampling effort required relative to other sampling options.

Nathan Aycock, nathana@mdwfp.state.ms.us, (256) 653-8073

Effects of Asian Carp on sport fish in Mississippi River oxbow lakes

Nathan Aycock, Darrin Hardesty, Donta Reed, and Chad Washington

Mississippi Department of Wildlife, Fisheries, and Parks, Jackson, Mississippi, 39211

As the invasive silver carp and bighead carp continue to quickly expand their range throughout the United States, it's important for managers to understand how they impact native fish species, especially recreationally important sport fish species. In 2016 and 2017 MDWFP conducted rotenone sampling on three oxbow lakes of the Mississippi River to determine the current fish community composition. In two of these lakes (Lake Whittington and Tunica Lake) Asian carp were abundant, while in the third (Eagle Lake) they were not collected. This data was then compared to results from rotenone sampling conducted on the lake in the 1980s and 1990s prior to Asian carp colonization. At Lake Whittington and Tunica lake silver carp were the most abundant species by weight and comprised 31% and 42% of the total catch, respectively. Centrarchid biomass had declined over 75% at these lakes compared to historic data, and Clupeid biomass was down over 90%. These trends were not evident at Eagle Lake, lending further support to the idea that Asian carp are behind the declines. This research further quantifies the damage Asian carp can cause to native fish species and to the recreational fishery at the water bodies they colonize.

Corbin Bennetts, corbin.bennetts@usm.edu, (228) 818-8816, Student Paper

Red Drum (*Sciaenops ocellatus*) reproductive biology in the north-central Gulf of Mexico

Corbin Bennetts¹, Robert Leaf¹, and Nancy Brown-Peterson²

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²Center for Fisheries Research and Development, Gulf Coast Research Laboratory, The University of Southern Mississippi, Ocean Springs, MS 39564

Understanding the reproductive dynamics of a fish stock is essential for conservation and management. The Gulf of Mexico Red Drum (*Sciaenops ocellatus*) stock is a data limited species and is assessed using proxy methods that necessitate accurate information of life history dynamics including their age-specific reproductive patterns. In this study, we describe the spawning season and length- and age-specific maturity dynamics of Red Drum. Red Drum were collected in the north-central Gulf of Mexico from September 2016 through October 2017 ($n = 743$) using fishery-independent and -dependent methods. Morphometric data and gonads were collected from each fish and age was determined from a subsample ($n = 572$) by extracting the otolith and quantifying the number of annuli present using established methods. Integer age estimates were adjusted by accounting for the time between catch date and the assumed hatch date of October 1st. Maturity status was determined using histological examination of reproductive tissue and used in combination with length and age data to determine the sex-specific mean length and age at 50% maturity with a logistic model. Spawning season was determined using reproductive phase distributions by month, as determined with histology, and verified with gonosomatic indices. Results indicate a spawning season of late July through mid-September. The mean length and age at 50% maturity was 512 mm TL and 1.2 y for males and 563 mm TL and 2.1 y for females. Red Drum stock assessments are sensitive to variation in reproductive inputs, thus the findings will be useful to increase precision of future assessment efforts.

Leslie M. Burger, leslie.burger@msstate.edu, (662) 325-6686

The role of private waters in recruiting new anglers

Burger, L.M.¹, R.D. Lusk², and J.W. Neal¹

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²Pond Boss Magazine, Post Office Box 12, Sadler, Texas 76264

Angling participation in recent decades has generally stagnated or declined in many areas of the United States, threatening the political and financial support for fisheries conservation. Angler recruitment programs aim to counteract these trends, but most are public programs targeting public waterbodies. There are about 4.5 million small bodies of water in the United States, the vast majority of which are privately owned. Many contain quality fishing opportunities and support considerable limited-access angling opportunities. These systems may play a major yet hidden role in recruitment of new anglers. Unfortunately, data on anglers and angling activity on private waters are largely non-existent, so it is unclear what impact these systems have on the recruitment of new anglers. We explored the idea that private waters are providing youth angling opportunities, increasing fishing participation, and contributing to the recruitment of new anglers. An online survey of pond owners and managers was conducted using directed questions regarding youth angling access to private waters and the pond owner's role in recruitment of youth anglers. Survey results indicate these committed pond owners and managers are actively engaged in angling recruitment and retention by providing extensive youth fishing opportunities to friends and family beyond that generally available in traditional recruiting events on public waters. Agencies tasked with addressing angler recruitment and retention rates should consider implementing programs that support youth fishing outreach on privately owned ponds and lakes as another tool to combat declining participation rates.

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Cooperative efforts in reducing bycatch in Mississippi's Blue Crab Fishery

Burris, R.E.

Mississippi Department of Marine Resources, Office of Marine Fisheries 1141 Bayview Ave.
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Bycatch is a concern in all commercial and recreational fisheries across the Gulf of Mexico. Fisheries managers have been successful in mitigating the effects of certain gear types and minimizing bycatch using a variety of different methods, but mainly through implementing regulations. While the crab trap fishery in Mississippi is highly selective and efficient in targeting Blue Crabs (*Callinectes sapidus*), the incidental catch of species such as Hardhead Catfish (*Ariopsis felis*), Spadefish (*Chaetodipterus faber*), Striped Hermit Crabs (*Clibanarius vittatus*), as well as sublegal hard crabs and overriggerous female crabs is still common in the fishery. Though the mortality rate in actively run traps is low (0.6%), mortality rates in derelict crab traps have been documented up to 100% over time. The Mississippi Department of Marine Resources Office of Marine Fisheries (MDMR) has been proactive in reducing bycatch in the crab fishery through a variety of alternative, cooperative approaches such as increasing public awareness, encouraging the use of Terrapin Excluder Devices (TEDs), requiring and providing Bycatch Reduction Devices (BRDs), and through the removal of derelict crab traps in Mississippi's marine waters. The Mississippi Derelict Crab Trap Removal Program, largely through the help of Mississippi's commercial crab fishermen, has removed and recycled over 21,600 derelict traps from Mississippi waters since the inception of the program in 1999. The MDMR is also exploring and applying innovative technology to locate and remove submerged derelict traps that may otherwise go unnoticed.

Beckah Campbell, beckah.campbell@usm.edu , (228) 265-4535, Student Paper

Age and growth of Red Drum, *Sciaenops ocellatus*, in the north-central Gulf of Mexico

Beckah Campbell, Corbin Bennetts, and Robert Leaf

The University of Southern Mississippi, Gulf Coast Research Laboratory, Ocean Springs, MS 39564

Individual growth parameter estimates, derived from length-at-age models, are essential to the assessment and management of fish stocks and decision support for sustainable use policies. Red Drum are a popular recreational target in the Gulf of Mexico, are commercially harvested in Mississippi, and have a long history of stock exploitation. The most recent federal age-structured Red Drum assessment (2000) indicated that the Gulf of Mexico stock was both “overfished” and “data limited”. The objective of this research was to describe the sex-specific age and growth characteristics of Red Drum in the north-central Gulf of Mexico. Otolith-derived age estimates, length, and sex data were collected from Red Drum ($n = 310$) harvested in the northern Gulf of Mexico from September 2016 to October 2017. These data were used to model the sex-specific length-at-age relationship for Red Drum in the northern Gulf of Mexico using a two and three-parameter von Bertalanffy growth function. This work provides an improved description of the length-at-age relationship of Red Drum, particularly by modeling the sex-specific relationship and thereby reducing the unexplained variance in the current growth models. This work will inform management and benefit future assessments by providing information on sex-specific growth dynamics of Red Drum in the north Gulf of Mexico.

Nagaraj Chatakondi, nagaraj.chatakondi@ars.usda.gov, (662) 686-3566

Evaluation of a portable electrosedation system (PES) for anaesthetizing channel catfish to produce channel x blue hybrid catfish embryos in hatcheries

Nagaraj G Chatakondi

USDA ARS Warmwater Aquaculture Research Unit, P. O. Box 38, 141 Experiment Station Road, Stoneville, MS 38776

Anesthetics or sedatives are commonly used in fisheries and aquaculture research and production procedures to ease handling and reduce fish stress to conduct morphological and physiological evaluations on live fish. The anesthetics block or reduce the activation of the hypothalamus-pituitary-interrenal (HPI) axis associated with handling stressors. Failure to suppress stress induction activation of the HPI axis results in release of cortisol, which affect other physiological processes. Tricaine methanesulfonate is the only FDA approved chemical sedative used in aquaculture and fisheries management to ease handling related stress in the United States. However, an alternate sedation method that is cost-effective, quick, and facilitate post-spawning survival of broodfish is needed.

The present study was conducted to determine the efficacy of a portable electrosedation (PES) as an alternative sedation method with potential cortisol blocking properties. Electrodesation immobilize fish by electrically inducing interference with neurotransmission. This method does not involve any with-drawl periods, disposal requirements, and potentially easy to use. The efficacy of electrodesation has not been quantitatively compared with the standard chemical sedative in Channel Catfish.

The results of this study suggest that the physiological disturbance of channel catfish during routine handling procedures could be reduced through PES sedation. Channel catfish subjected to PES at 100 volts, 30 Hz for 4 seconds reached stage IV of sedation and the fish were sedated for an average of 2 minutes. The mean plasma cortisol response at recovery was 32 ng/mL, lower than other sedation methods. Relative fecundity, percent fertilization and hatching success of PES sedated fish were similar to MS222 sedated fish under hatchery conditions. PES equipment neither expire nor degrade, and require handling or disposal protocols. PES is a physical anesthetic that has a potential to replace the existing chemical anesthetic to improve the efficiency of catfish hatchery production.

Giancarlo Coppola, gc844@msstate.edu, (845) 546-5032, Student Paper

Persistence of flooded agricultural plants as potential fish habitat

Giancarlo Coppola¹, Hunter R. Hatcher¹, Michael E. Colvin¹, Marcus A. Lashley¹, and Leandro E. Miranda²

¹Department of Wildlife, Fisheries, and Aquaculture, Mississippi State University, Mississippi State, Mississippi 39762, USA

²U.S. Geological Survey, Mississippi Cooperative Fish and Wildlife Research Unit, Mississippi State University, Mississippi 39762, USA

We submerged potted-plants of cool-season crops in an outdoor mesocosm to assess their persistence and applicability as potential reservoir mudflat plantings for fish habitat enhancement during flooding stages. Experimental pots (15 cm diameter) were planted in October 2016, with balansa clover (*Trifolium michelianum*), ryegrass (*Lolium multiflorum*), and triticale (*Triticale hexploide*) and maintained at Mississippi State University. Adult plants were submerged in a flow through aquaculture tank (2.44 m diameter, 1.37 m height) in May 2017, for three months. Maximum height measurements and stem counts were extracted from underwater photographs taken every week throughout the experiment. Time-to-event analyses and fitted regression models were used to estimate temporal persistence of structural metrics for the study species and compared using Cox proportional hazards. Timing of maximum catch per unit effort of structure dwelling age-0 centrarchids sampled May through September 2017 in the mudflats of Enid Lake, MS, were used to define the preferred time intervals of submerged crop persistence. Body dimensions of a subsample of age-0 centrarchids were used to predict the height that degrading experimental plants will cease to serve as potential habitat for juvenile centrarchids. Results suggest that plantings of ryegrass and triticale can retain enough vertical structure for a long enough period if inundated during spring flooding to provide structure for refuge seeking juvenile centrarchids. Results provide reservoir and fisheries managers insight towards selecting a plant species for reservoir mudflat enhancement that can provide effective fish habitat.

Taylor T. Daley, taylor.daley@eagle.usm.edu, (703) 862-7834, Student Paper

Age and growth of Atlantic Chub Mackerel (*Scomber colias*) in the Northwest Atlantic

Taylor T. Daley, and Robert T. Leaf

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Recent efforts to manage Atlantic Chub Mackerel (*Scomber colias*) in the Northwest Atlantic have necessitated description of the stock's life-history characteristics, specifically the length-at-age relationship. Atlantic Chub Mackerel ($n = 316$) were collected in the Northwest Atlantic using fishery-independent and fishery-dependent sampling from July 2016 to October 2017. Total lengths (TL) ranged from 17.7 to 39.7 cm. All ages (assuming a hatch date of January 1st and adjusted by date of capture) ranged from 0.58 to 7.58 years. In order to anchor the growth curve, juvenile fish ($n = 60$, TL = 2.1 to 7.7 cm) were collected in January from SEAMAP plankton surveys and were assigned an age of zero. Four non-linear candidate growth models were fit to length measurements and otolith-derived age estimates and the best candidate model was selected using DIC. Models were fit within a Bayesian framework using a combination of informed and uninformed priors. The three-parameter von Bertalanffy growth function was selected as the best candidate model, as it provided the lowest DIC score. The resulting median parameter estimates were 33.58 (95% credible interval 33.19 to 33.98) TL cm, 1.45 (1.33 to 1.59) y^{-1} , and -0.07 (-0.09 to -0.06) y for L_{∞} , k , and t_0 respectively. These results will directly inform management of *S. colias* in the Northwest Atlantic.

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Examination of Spotted Seatrout (*Cynoscion nebulosus*) feeding ecology in coastal Mississippi

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The Spotted Seatrout (*Cynoscion nebulosus*) supports valuable commercial and recreational fisheries in coastal Mississippi. The species establishes local resident populations that spend their entire lifecycle within the estuary in which they were spawned. Fishing and natural mortality are important factors that drive population dynamics of both Spotted Seatrout and its prey. However, this species is currently managed using a single species stock assessment that does not incorporate predator-prey interactions. With increasing support of ecosystem-based models that evaluate tradeoffs of energy flow and biomass, characterizing the predator-prey interactions among harvest species becomes increasingly important. The last Spotted Seatrout diet study in Mississippi was completed over 30 years ago. Thus, an updated assessment of Spotted Seatrout foraging ecology would directly benefit future state management efforts of this species. Here, we present results from an ongoing study that describes the feeding ecology of Spotted Seatrout in coastal Mississippi. Diets are described using the indices of weight, occurrence, and mean proportion by weight. Minimal differences in prey species composition were observed between years; seasonal changes in diet, however, were observed during both years of the study. Additionally, the relationship between stomach fullness and corresponding reproductive stage is presented to help characterize Spotted Seatrout feeding strategies relative to reproduction. Expanding our sampling effort in upcoming years will fill important knowledge gaps concerning the feeding ecology of Mississippi's Spotted Seatrout population.

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Distribution of angel sharks (Squatinae) in United States waters of the western North Atlantic Ocean.

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Distributions of fishes inhabiting deepwater ecosystems remain largely speculative due to limited sampling efforts in these environments. As a result, spatial ranges of many deepwater fishes are assumed to be continuous across broad expanses despite occurrence records showing spatial fragmentation. Angel sharks (Squatinae) in United States (US) waters of the western North Atlantic Ocean (WNA) are considered by most to consist of a single species, *Squatina dumeril*, ranging from Massachusetts to Texas. However, records of angel sharks south of North Carolina are exceedingly rare and the presence of multiple species in the northern Gulf of Mexico (GOM) has been suggested. We examined angel shark distribution in US waters of the WNA utilizing fisheries-independent data in an effort to 1) determine if their range is continuous throughout the region and 2) identify if spatial discontinuities in distribution patterns exist that could be consistent with the idea of multiple species within the region. Data were obtained from 104,957 fisheries-independent trawls conducted from Nova Scotia to the Florida Keys and throughout the northern GOM. Off the east coast of the US, no angel sharks were collected from Georgia to the Florida Keys. In the northern GOM, the distribution of angel sharks was continuous throughout outer continental shelf waters with the exception of an area off Louisiana. The disjunct distribution of squatinae off the east coast of the US and in the northern GOM suggests the possibility of genetic isolation between angel sharks in the two regions. Future studies will be needed to understand the importance of this finding from both taxonomic and population dynamics perspectives.

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A cry for help in a silent world: pigmentation as a response to hypoxia in paddlefish

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During previous field studies, we have observed dark blotches on the white ventral surface of Paddlefish, *Polyodon spathula*, mid-length between the pectoral and pelvic girdles. These blotches seemed to be more common in fish caught in water bodies with low dissolved oxygen. To explore this phenomenon, we sampled and photographed 130 Paddlefish from five sites in the southern USA representing a range of habitats and oxygen levels. Three sites were normoxic backwater channels or oxbow lakes in the lower Mississippi and Yazoo basins. One site was a fishkill in a lock and dam on the Pearl River, while the last site was the Bonnet Carre spillway after it was opened in 2011. Pigmentation was qualitatively assessed in the field using a six point indicator and quantitatively described in the laboratory using image analysis. We found that Paddlefish collected from normoxic waters had significantly less ventral pigment than those collected from oxygen-deficient waters. We also found the rapid qualitative scores assigned in the field were highly correlated with time-intensive quantitative scores determined in the laboratory. We suggest that the correlation between pigmentation and dissolved oxygen is associated with the hormonal response of Paddlefish to chronic stressors, such as deteriorating water quality, and that this may be cost-effectively evaluated in the field using a simple qualitative scoring system.

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Growth of captive juvenile (YOY) Atlantic Tarpon (*Megalops atlanticus*) collected from coastal Mississippi tidal sloughs

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Juvenile Tarpon (*Megalops atlanticus*) (n = 39) collected from two coastal Mississippi tidal sloughs (tidal creeks) located in Jackson County (Ocean Springs and Gautier) during September and October 2007 were maintained live in an indoor, recirculating aquaculture system for 224 days to observe growth and response to captivity. Water temperature, salinity and dissolved oxygen ranged 25.4–28.5 °C, 19.0-28.0 ppt. and 7.0-8.3 mg/L, respectively, and pH was maintained at 8.0. Lighting was provided via day/night photoperiod cycle in accordance with natural seasons, and the fish were fed commercial pellets once/day to satiation. The juveniles were separated into two size groups (small, 84-125mm fork length (FL), 6.3-22.4g total weight (TW), n=18; large, 138-200mm FL, 22.6-84.6g TW, n=21) and placed into individual culture tanks by size group. Length and weight of the fish were recorded at three other time intervals (Day 61, Day 141, and Day 224) during the study. The mean daily growth rate for each size +group and both groups combined was: small (0.321mm/day FL, 0.308g/day TW), large (0.301 mm/day FL, 0.624g/day TW), and combined (0.328 mm/day FL, 0.440g/day TW), representing an overall growth of 33% in length and 76.7% in weight. The length-weight relationship at the end of the study was expressed as $TW=0.00004*FL^{2.8073}$, $r^2 = 0.9412$. This is the first known captive growth study conducted on young-of-the year (YOY) Atlantic Tarpon collected from the northern Gulf of Mexico. Hardiness in captivity, lack of cannibalism, acceptance of commercially available feed, and relative ease of maintenance indicate potential for larger-scale captive rearing. Further research is needed to better understand requirements for growth and development of captive young Tarpon under culture conditions.

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Freshwater mussels (Unionidae) of Bayou Bartholomew, Louisiana and Arkansas, with comments on historical changes at a single mussel bed from 1991 to present

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Bayou Bartholomew is a large tributary of the Ouachita River that drains much of southeastern Arkansas and northeastern Louisiana. During November 2017, a freshwater mussel survey was conducted in Arkansas and Louisiana portions of Bayou Bartholomew. A total of 1,168 individuals (670 live and 498 dead) representing 27 species were collected from 10 sites. Of the 27 species collected, one was federally listed threatened and four were state listed threatened or of special concern in Louisiana. Numerically dominant live mussels were: threeridge (*Amblema plicata*) 15%, bankclimber (*Plectomerus dombeyanus*) 13% and Wabash pigtoe (*Fusconaia flava*) 11.5%. Less abundant live mussels included: pimpleback (*Cyclonaias pustulosa*) 8%, mapleleaf (*Quadrula quadrula*) 7%, yellow sandshell (*Lampsilis teres*) 6%, bleufer (*Potamilus purpuratus*) 6%, washboard (*Megaloniaias nervosa*) 5%, pistolgrip (*Tritogonia verrucosa*) 5%, rock pocketbook (*Arcidens confragosus*) 3%, threehorn wartyback (*Obliquaria reflexa*) 3%, fragile shell (*Leptodea fragilis*) 2%, giant floater (*Pyganodon grandis*) 2%, wartyback (*Cyclonaias nodulata*) 2%, monkeyface (*Theliderma metanevra*) 2% and deertoe (*Truncilla truncata*) 2%. Rare mussel species represented by < 1.3% were: rabbitsfoot (*Theliderma cylindrica*), butterfly (*Ellipsaria lineolata*), spike (*Elliptio dilatata*), pyramid pigtoe (*Pleurobema rubrum*) Louisiana fat mucket (*Lampsilis hydiana*), plains pocketbook (*Lampsilis cardium*), ebonyshell (*Fusconaia ebena*), Texas lilliput (*Toxolasma texasensis*), tapered pondhorn (*Uniomerus declivus*), little spectaclecase (*Villosa lienosa*), and Ouachita kidneyshell (*Ptychobranthus occidentalis*). The majority of the recent dead mussels were collected from two sites in the lower reach from raccoon shell middens. Dominant recent dead mussels were rabbitsfoot (*T. cylindrica*) 52%, monkeyface (*T. metanevra*) 15% and plains pocketbook (*L. cardium*) 5%. When comparing our recent survey to previous historical studies, changes at one site were apparent. In 1993, more mussel species were collected including the federally listed pink mucket (*Lampsilis abrupta*). Rabbitsfoot (*T. cylindrica*) was considered rare historically, but in our survey, it was the most abundant recent dead mussel (N=258).

Chelsea R. Gilliland, crg352@msstate.edu, (724) 977-0854, Student Paper

Residents, migrants, or both? Evaluating population dynamics and movement of paddlefish *Polyodon spathula* in a regulated system

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Paddlefish commonly move to varying locations in river systems associated with discharge, water temperature, substrate, and photoperiod. Additionally, Paddlefish may also display seasonal site fidelity and natal philopatry. An abundant Paddlefish population exists in a 0.8 ha pool below a water control structure that impounds and regulates Oktoc Creek. Telemetry study of tagged fish revealed many Paddlefish occupying the pool year round. Managers want to release water to improve connectivity of this population to the Noxubee River. However, it is uncertain whether the population is completely migratory and trapped in the pool during low flows, a resident population exhibiting high fidelity, or a combination of resident and migratory fish. Understanding this uncertainty is important because the likelihood of actions to achieve management objectives depends on the population type. We used capture-recapture to evaluate Paddlefish population abundance, dynamics, and movement. One hundred eight fish were tagged, fifty one with acoustic tags to evaluate movement. Estimated abundance exceeded 110 fish, survival estimates were high, and movement rates low. The number of acoustically tagged Paddlefish in the pool fluctuates daily suggesting fish are moving down Oktoc Creek potentially seeking sufficient water levels to enter the larger Noxubee River downstream. Nine Paddlefish moved downstream and one returned, however four were detected above the Demopolis Lake Dam, Alabama, along the Tennessee-Tombigbee Waterway. Results support the hypotheses that the Paddlefish population occupying the pool is a mixture of residents and migrants. Experimental flow releases will be used to further discriminate among the three hypotheses.

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Movement Patterns of Red Drum, *Sciaenops ocellatus*, in St. Louis Bay, MS

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Spatial and temporal movement data are currently being obtained from a distinct size-class (600 - 800 mm total length (TL)) of acoustically tagged Red Drum in St. Louis Bay, MS using passive acoustic telemetry. The acoustic hydrophone receiver array consists of 44 VEMCO VR2W receivers strategically deployed within the bay, the bay mouth, and directly outside the bay mouth in the MS Sound (hereafter referred to as Bay, Mouth, and Sound zones). Onset HOBO loggers recording bottom water temperature are also deployed on a subset of acoustic receiver moorings. Throughout 2017, Red Drum (n=18) were captured, surgically implanted with VEMCO V13 acoustic transmitters, externally tagged, and released upon recovery. Total length of acoustically tagged Red Drum ranged from 601-750 mm TL (mean = 666 mm) and weight ranged from 3.1-4.5 kg (mean = 3.2 kg). Acoustic relocation data from 14 of the 18 Red Drum yielded 61,895 detections from January through November 2017. Of the 61,895 detections 80% (n = 49,499) were recorded within the Bay zone, 17% (n = 10,661) in the Mouth zone, and 3% (n = 1,735) in the Sound zone. Numbers of mean detections per month differ by zone and month, and patterns in the data appear to be driven largely by seasonal changes in water temperature. The relatively high number of mean monthly detections within the Bay zone indicate it is the area most consistently used by Red Drum in the current study. Differences in the mean monthly detections of Red Drum in the Mouth and Sound zones indicate on average there are relatively higher numbers of detections in spring and fall months, when bottom water temperature is quickly changing. Overall, acoustic relocation data appear to show spatially and temporally explicit patterns of differential use among the three zones within the St. Louis Bay system.

Bryant Haley, bmh244@msstate.edu, (901) 326-1829, Student Paper

Physicochemical, biological and morphometric factors of lakes influencing crappie growth

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Crappie fishing has long been a boon to the state of Mississippi – bringing in nearly \$100 million annually in recent years. Although the large flood control reservoirs (Arkabutla, Sardis, Enid and Grenada) are the top destinations, many anglers prefer smaller water bodies that are closer to home. Mississippi is home to many small impoundments which currently provide or have the potential to provide quality crappie fishing opportunities. The aim of this study was to determine the key characteristics that promote quality crappie populations in smaller water bodies. From 2015 to 2017 we sampled 17 small impoundments throughout the state of Mississippi. Impoundments ranged in size from 28 to 357 hectares. Criteria for selection included the presence of a crappie population and feasibility of our chosen sampling methods (e.g., lakes with excessive surface vegetation or excessively steep shorelines were excluded. Sampling consisted of spring electrofishing to assess general community structure, fall trap netting to determine crappie population characteristics, and summer physicochemical sampling to classify habitat characteristics. These data were incorporated into multiple regression models using key crappie population metrics (e.g., size at age, relative weight, and catch per effort) as dependent variables to determine which reservoir characteristics exert the greatest influence on crappie populations. Results and management recommendations will be discussed.

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Results from a multi-year charter vessel reef fish observer program

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Current data collection practices for recreational fisheries, especially Red Snapper, yield data that are imprecise and therefore make it difficult for fisheries managers to implement effective management strategies. As such, implementation of an expanded state-based creel survey, with funding through the National Fish and Wildlife Foundation (NFWF), allowed the Mississippi Department of Marine Resources (MDMR) to place observers on charter for-hire trips targeting reef fish to assess landings, discards, and associated reporting biases. By expanding fishery-dependent data collection efforts, MDMR can more precisely estimate effort, landings, and discards. A total of 10 vessels have participated in the program; six of those vessels were federal for-hire vessels and four were Mississippi charter license holders. Vessel trips were chosen randomly each month; observers were placed on trips spanning the state and federal Red Snapper seasons for a total of 18 trips in 2016 and 19 trips in 2017. Although the majority of reef fish observed were Red Snapper, seven other species were caught or released. At sea sampling included recording the number of discards, fish length, level of barotrauma, and condition of each fish upon release. Additional bio-sampling data were collected at the dock which included the length, weight, sex, and otoliths from each fish landed. A total of 630 fish were caught in 2017 compared to 407 fish caught in 2016. All fishing effort was concentrated on MDMR created fish havens (artificial reefs) with 98% of the overall catch being Red Snapper. With fishing depths less than 100 feet on the artificial reefs, the number of fish with visual signs of barotrauma were minimal. All of these data collected have helped determine accurate discard rates, release mortality estimates, and how they apply to the recreational reef fish fishery in Mississippi.

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Benthic macroinvertebrate communities along a gradient of hydrological connectivity within the Lower Mississippi River and its floodplain

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Although the Lower Mississippi River is a highly engineered system, many natural habitats remain intact, including large swaths of forested floodplain containing a variety of water body types. These range from highly connected secondary or side channels, to rarely connected lakes, most of which are naturally occurring remnants of a historically protean river system. Resident organisms are adapted to these water bodies, as well as their seasonal inundation patterns driven by their connectivity to the main stem river channel. It is unknown how and to what extent connectivity shapes these river-floodplain communities. To gain understanding into the relationship between connectivity and community structure, twelve water bodies spanning a gradient of hydrological connectivity were sampled for benthic macroinvertebrates in the fall, winter, spring, summer over a two year period. Distinct communities with variable taxonomic makeup and richness were found across connectivity types and connection frequencies, indicating a relationship between stability and community permanence. Water bodies with extended periods of connection or disconnection were found to host a wider variety of benthic macroinvertebrate taxa, while water bodies with intermediate connectivity hosted a more limited suite of benthic macroinvertebrate taxa. Results from this study indicate the need for conservation of habitats varying in connection frequency, in order to increase and maintain the highest levels of macroinvertebrate diversity.

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Supplemental cover as recruitment habitat in reservoir mudflats

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Supplemental cover addition is commonly used to meet fishery management objectives, however little is known about its effects on fish assemblages in large reservoirs. We evaluated fishes at sites with supplemental cover (i.e., brush piles) and control sites without brush piles to estimate the effect of cover on fish assemblages. Sampling with rotenone was conducted at 120 shallow (<1.5 m) sites, 60 with cover and 60 without cover, at Enid Lake, Mississippi, during May-September 2017. All fish collected were identified to species, measured, and batch weights were recorded for young of year fish by species. We compared brush pile and control sites for differences in biomass and abundance using permutational analysis of variance, and differences in average total length of young-of-year fish using linear modeling. These comparisons allowed for evaluation of differences between local fish assemblages and young-of-year fish size in sites with and without brush. We also examined the connections between abundance and biomass of young of year fish in brush piles based on the depth and volume of the brush pile using linear modeling. This analysis facilitates the understanding of the impact of size and depth on young of year fish use of brush piles in shallow areas throughout the summer months. We found that fish biomass and abundance both differed significantly between brush pile and control sites with young-of-year fish being larger on average in brush pile sites. Additionally, we found that both volume and depth impact young of year fish abundance in brush piles while volume and time impact young of year fish biomass in brush piles. Findings can be used to support use of brush piles in management and inform the placement and size of brush piles in shallow areas to better meet management objectives related to recruitment of young of year fish.

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Seasonal occurrence, distribution and movement of Whale Sharks (*Rhincodon typus*) tagged in the northern Gulf of Mexico

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Whale sharks (*Rhincodon typus*) are typically solitary animals; however, in the northern Gulf of Mexico they form large aggregations at shelf-edge banks during summer. While there is an understanding of their seasonal distribution in the region, knowledge of movements once they leave aggregation sites is limited. Here we report the movements of 44 satellite tagged whale sharks within the Gulf of Mexico from 2008-2014. Most sharks were tagged at an aggregation site off the coast of Louisiana. State-space modeling was applied to movement data to generate most probable tracks and used to analyze seasonal trends in distribution. Sharks ranged from 4.5-12.0 m total length ($n = 44$; mean 7.9 ± 0.3 m SE) with a male to female ratio of 5:1. Mean number of days-at-liberty was 97 days (± 15 SE) and all but four individuals remained within the Gulf of Mexico. Shark movements occurred throughout Gulf of Mexico with a net southward movement during cooler months. Additionally, several sharks moved into the Caribbean Sea, demonstrating connectivity among documented aggregation sites in the western North Atlantic Ocean. These broad movements necessitate multi-national, cooperative efforts to improve management of whale sharks in the western North Atlantic Ocean.

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A comparative analysis of light: dark preference in young-of-year Bighead and Silver carps

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We evaluated light/dark preference in young-of-year *bighead* carp *Hypophthalmichthys nobilis* and silver carp *H. molitrix*, highly invasive fishes in North America. We hypothesized scototatic patterns of exploration for each species and that this pattern of exploration would be modified by group size. There were eight groups in this experiment, with group defined by species and number of fish; the experimental groups had one, two, four, or eight subjects in the light/dark apparatus simultaneously with the species evaluated separately. Preliminary analysis indicates significant differences in light: dark preference between the species, as indicated by total time in each environment ($p < 0.0001$) and permanence time ($p = 0.0074$), and in locomotor behavior, as indicated by latency for first choice of compartment ($p = 0.0009$). Silver carp usage (exploration) of the light compartment was significantly greater for fish tested singly as compared to those tested in groups ($p = 0.0034$), but there was no significant difference in usage of the light environment among groups of bighead carp ($p > 0.05$). The light/dark preference task provides an index of activity/exploration, may generate unconditioned anxiety-like responses in teleosts, and allows comparison of “boldness-shyness” and emotional reactivity traits across species. Greater use of the dark environment in our tests may indicate greater neophobic/predator avoidance behavior in silver carp, whereas increased use of the light environment by bighead carp may indicate boldness, compared to silver carp, and a greater tendency for exploration of new environments (i.e., dispersal).

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Swimming performance of adult Silver Carp (*Hypophthalmichthys molitrix*)

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Hydraulic barriers are being designed for containment of Silver Carp populations in the Upper Mississippi and Ohio Rivers and are being considered for local backwaters in the Lower Mississippi Basin. For containment to be effective, flow fields must exceed swimming capabilities of fish, but speeds and endurance of adult Silver Carp are not well-documented due to their large size and active nature, and to their fragility when transported. Using a 2935 L mobile swim tunnel, we measured swimming endurance of 122 field-collected fish on-site at Forest Home Chute, a backwater of the Mississippi River near Vicksburg, MS. Fish 53-98 cm TL, Age 3+, were tested at water velocities of 76-244 cm/s seasonally. Females outnumbered males 2.1:1. Prolonged and burst swim speeds ranged from 0.9 to 2.8 body lengths/s. Endurance (time to fatigue) decreased gradually with increased swim speed, was typically higher during spring and lower during autumn, but was highest in summer at low swim speeds and lowest in summer at high swim speeds. Seasonal variation in endurance was not clearly associated with water temperature (which was the same in spring and winter) or with reproductive condition (since > 90% of females were gravid during spring, autumn, and winter), but may be influenced by cyclical patterns in physiology and behavior. Our data demonstrate that for hydraulic barriers to effectively contain carp, flows must exceed best swimming performance of fish, which cannot be established without testing fish at multiple times throughout the year.

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Overview of Mississippi's State Fishing Lakes Program

Josh Howell

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The Mississippi Department of Wildlife, Fisheries, and Parks (MDWFP) operates 20 state fishing lakes throughout the state with over 4,000 acres of water. The MDWFP Fisheries Bureau is responsible for managing both the fisheries and facilities to provide safe and enjoyable recreational opportunities to a variety of user groups. State Fishing Lakes provide camping, skiing, pavilion rentals, day use areas, and quality fishing for the public.

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Movement patterns of Bull Sharks, *Carcharhinus leucas*, in St. Louis Bay, MS

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Data are limited regarding movement patterns of juvenile Bull Shark, *Carcharhinus leucas*, in and around St. Louis Bay, Mississippi. A passive acoustic hydrophone receiver array consisting of 44 VEMCO VR2W receivers was strategically deployed throughout St. Louis Bay and its associated drainages to examine the spatial and temporal movements of juvenile Bull Shark in and around the bay. At the mouth of the bay system and directly south of the bay mouth, in the MS Sound, receivers were configured to monitor both immigration to and emigration from the bay. Onset HOBO data loggers were deployed on a subset of receiver moorings to record bottom water temperature. From June through September 2017, juvenile Bull Shark ($n = 10$) were captured, surgically implanted with Vemco V16 acoustic transmitters, and released upon recovery. Total length (TL) of acoustically tagged juvenile Bull Shark ranged from 760 – 1,153 mm (mean = 948 mm) and weight ranged from 3.5 - 9.5 kg (mean = 6.05 kg). In total, 15,887 detections were recorded between June and November 2017; however, the majority of detections occurred between September and November because only two individuals were tagged prior to September. Of the 15,887 total detections, 4.9% ($n = 783$) were recorded within the bay, 27.6% ($n = 4,391$) in the mouth, and 67.4% ($n = 10,713$) in the sound, directly south of the bay mouth. Preliminary examination of acoustic relocation data suggests the mouth of the bay and MS Sound areas within the array were used more frequently than the bay. Interestingly, an increased number of detections were recorded in the bay in the days following the landfall of Hurricane Nate in early October, indicating juvenile Bull Shark movement may be influenced by major storm events.

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Do young and old female Red Snapper contribute equally to reproduction?

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Many studies have shown that younger female fish have a lower reproductive contribution to stocks than older females. This study used four criteria to determine if there is a difference in reproductive contributions of female Red Snapper (*Lutjanus campechanus*) off the coast of Mississippi in 2016 by age. We define young females as < 3 years (220-487 mm FL), while old fish are \geq 3 years (300- 686 mm FL); female 50% sexual maturity is 258-274 mm FL. The spawning season is shorter in younger female Red Snapper based on GSI data. Histological analysis showed a significant difference in the distribution of the reproductive phases in April and July, and clear but non-significant differences during other months. A higher percentage of immature and early developing phases is seen in younger females, whereas older females have a higher percentage of actively spawning fish throughout the reproductive season. However, there was no significant difference in monthly distribution of oocyte stages between younger and older fish, but, excluding September, younger fish had a noticeably lower percentage of oocyte maturation than older fish. There was no significant difference in relative batch fecundity between young and old females. Additionally, there was no significant difference in spawning interval between ages, although younger fish spawned every 2.05 days, while older fish spawned every 1.75 days. Finally, while not significantly different, a lower percentage of younger females (20%) were daily spawners than older females (31.6%).

This study indicates that younger female Red Snapper have a slightly shorter spawning season than older fish, but once they do start to spawn, there is no significant difference in fecundity and spawning interval. Thus, younger fish likely contribute less to reproductive output on a population level during the year, but individually their contributions appear equal to those of older fish.

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Recreational Red Snapper reporting: an update on the Tails n' Scales mandatory reporting system

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Red Snapper are one of the most targeted fish in the Gulf of Mexico (GOM) with over 5 million pounds of fish harvested by the recreational sector each year. It is also one of the most controversially managed fishes, as both recreational and commercial fisherman target this species for its excellent table fare and catchability. Due to the magnitude of fishing pressure, accurate and timely estimation of Red Snapper harvest is of the utmost importance so that fishermen will not exceed the allocated quota each year. Estimating the fish harvested by private recreational and for-hire fishermen in the GOM is complex, as nearly a million anglers participate in a short, derby-style fishing season each year. With this in mind, Mississippi's Commission on Marine Resources adopted a modification to Mississippi regulations in 2015, requiring mandatory reporting of all recreational Red Snapper landings in the state. That same year, Mississippi Department of Marine Resources (MDMR) partnered with a software developer to create a mobile and web-based application for users to report recreational Red Snapper landings. The goal of the program was to develop a simple and concise reporting system that is easily accessed and intuitive to the user. Data collected are analyzed and used to estimate catch, effort, compliance rates, and biomass harvested in real time for the recreational fishery. The program is currently in its third year, and is being peer-reviewed for certification through NOAA. Tails n' Scales represents a successful implementation of a Red Snapper reporting system and has increased accuracy for Red Snapper harvest estimates in the recreational sector. In the future, MDMR hopes to expand the program to incorporate data on other reef and inshore species.

Zach Moran, zm332@msstate.edu, (540) 660-1005, Student Paper

Blue Catfish, *Ictalurus furcatus*, electrofishing and telemetry on Lake Dardanelle, Arkansas: what habitats do they use and is use proportionate with low-frequency electrofishing efficiency?

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Fisheries scientists have recently focused on creating standardized low-frequency electrofishing procedures for sampling Blue Catfish *Ictalurus furcatus*. Current low-frequency sampling procedures recommend a simple random or stratified random sampling methods that incorporate reservoir section. However, they do not account for the habitats Blue Catfish use. This presents an opportunity to improve upon contemporary standardized sampling protocols. We compared telemetry data from 43 Blue Catfish (560-1040mm TL), to electrofishing data collected via a systematic random sampling design to determine how capture rates were related to habitats occupied by the acoustically-tagged fish. We divided Lake Dardanelle, Arkansas (17,806 hectares) longitudinally into a lacustrine, transition, and riverine zones, and collected 8,029 Blue Catfish in 458 samples taken from channel edge, main channel, adjacent flat, and wing dyke habitats. The majority of Blue Catfish were captured on channel edge habitats (N= 3,731), while main channels (N=2,231), and wing dykes (N=1,642) were also significant producers of fish. In proportion to available habitats, Blue Catfish were located on deep (> 8 m) channel edges on outside bends in the lacustrine and transition zones, and current seams near wing dyke scour holes in the riverine zone. We speculate that Blue Catfish congregate in habitats that offer relief from high current while also providing an abundance of food items. We recommend that managers consider deep channel edge habitats in lacustrine and transition type zones, and channel edges on outside bends and wing dikes in riverine type zones when creating a standardized protocol for their management area.

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Ecohydrology of the Lower Mississippi River floodplain

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The land between the levees along the Lower Mississippi River (LMR) comprises greater than 2 million acres of floodplain characterized by bottomland hardwoods, natural and manmade lakes, pools, sloughs, side channels and tributary mouths. These floodplain waters are spatially and temporally dynamic and, as a result, harbor diverse and abundant biota. We endeavored to evaluate the quantity and quality of aquatic habitats in the LMR floodplain by relating biotic responses within water bodies to the manner and timing of connection with the river. Fishes and macroinvertebrates were collected during the fall, winter, spring and summer at four discrete habitat types representing a decreasing legacy of connectivity: eupotamal (e.g., secondary channel), parapotamal (e.g., oxbow lake with tie channel), plesiopotamal (e.g., seasonally-flooded abandoned channel), and paleopotamal (e.g., perched isolated pool). These types of water bodies are hypothesized to support distinctive biotic communities as a result of successional processes. We compared the fish and benthic macroinvertebrate assemblages among habitats and seasons and related these biotic patterns to measured environmental gradients. In addition, we developed field methods for modeling the onset, duration, magnitude and frequency of connection with the main channel. Floodplain waterbodies with intermediate connectivity to the main channel were rare and fish and macroinvertebrate assemblages exhibited different patterns along the study gradient. Model outputs will be used to identify potential management strategies useful in the enhancement and restoration of floodplain ecosystems.

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Five decades (1960s - 2000s) of Lower Mississippi River side channel morphological change

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Levees have isolated the Lower Mississippi River (LMR) from 80% of the historic floodplain. This disconnection increases the importance of the remaining connected off channel waterbodies, including side channels. Side channels provide a variety of habitats with diverse connectivity that are isolated from navigation impacts. These habitats are utilized for feeding, resting, and spawning of numerous species including the endangered pallid sturgeon. However, river engineering has impacted side channels and there is widespread belief that the number, area, and volume of LMR side channels is decreasing. To study the condition of LMR side channels, we compiled five decades of bathymetric data. We then located side channels and digitized their outlines using the definition adapted from Cobb and Clark 1980: side channels occur where three bathymetric transects indicate divided flow due to a bar/island with a crest > 1.5m above the Low Water Reference Plane. Aerial imagery taken at river stages > 3m was used to confirm presence/absence of unsurveyed channels. Using the outline, bathymetry, and a Triangular Irregular Network model; area, volume, maximum relative depth (Rdepth) and mean Rdepth were calculated. Over five decades, 191 side channels were identified and 94 had data for all five decades. In these 94, area, volume and Rdepth fluctuated between decades with larger, deeper channels in the middle decades and shallower, smaller channels in the 1960s and 2000s. These results suggest that surveyable side channels remain dynamic and require continued monitoring to ensure the decrease in area, volume and depth observed in the 2000s does not persist.

Megumi Oshima, Megumi.oshima@usm.edu, (843) 902-9841, Student Paper

A Hierarchical Bayesian surplus production model for Blue Crab (*Callinectes sapidus*) in the northern Gulf of Mexico

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Assessment of stocks such as Blue Crab (*Callinectes sapidus*) in the northern Gulf of Mexico (nGOM) are challenging, in part, because age structured approaches cannot be used. To overcome this and data availability challenges, we constructed a surplus production model for the gulf-wide stock (Texas, Louisiana, Mississippi, Alabama, and the Gulf Coast of Florida) that was evaluated in a Hierarchical Bayesian (HB) framework. The HB approach provides a comprehensive way to incorporate abundance dynamics from data-rich regions to inform the dynamics of regions that are data poor or have poor data. Using the HB framework allows the inclusion of prior information and hyperparameters to facilitate estimation of parameters and explicitly model uncertainty. The objectives of this study were to develop a HB surplus production model for assessing the nGOM Blue Crab stock and evaluate the sensitivity of the model to the inclusion of fishery independent indices of abundance. Commercial landings and fishery-independent survey data from Texas, Louisiana, Mississippi, Alabama, and west Florida were used. Region-specific hyperparameters - population growth rate, carrying capacity, and catchability - were estimated from global priors. Median values were used to determine fishery reference points, maximum sustainable yield (MSY), and the associated biomass (B_{MSY}) and fishing mortality rate (F_{MSY}). Alternative model runs were conducted to evaluate the sensitivity of parameter estimates to the inclusion of different indices of abundance. Overall, this model can be used to assess the Blue Crab population at regional and Gulf-wide scales, as well as future management decisions by identifying data that contribute to reference point uncertainty.

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Comparison of age-frequency distributions for ocean quahogs, *Arctica islandica*, in the Western Atlantic Ocean

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Ocean quahogs (*Arctica islandica*) are the longest-lived, non-colonial animal known today, with maximum life span estimates exceeding 500 years. A commercially important bivalve, ocean quahogs inhabit the continental shelf of the North Atlantic basin. Geographic differences in the age structure of four populations of ocean quahogs *Arctica islandica* throughout the range of the stock within the US exclusive economic zone were examined. The ages of animals fully recruited to the commercial fishery (≥ 80 mm shell length) were estimated using annual growth lines in the hinge plate. Population age frequencies from each of the four sites were used to develop an age-length key for each site enabling reconstruction of population age frequencies. Within-site variability was high for both age-at-length and length-at-age; a single age-length key could not be applied and would not result in accurate age estimates for populations throughout the northwestern Atlantic. For most sites, the oldest living animals recruited 200–250 years BP, coincident with the ending of the Little Ice Age. All four sites experienced an increase in recruitment beginning between approximately 1855 and 1905, depending upon site. The southern populations had the oldest animals, consistent with a presumed warming from the south. Few quahogs were present in prior years. Thereafter, at each site, the populations reached carrying capacity through more or less continuous recruitment. The lag in population expansion following recruitment of the oldest living animals is consistent with the extended time to maturity in the species and suggests that the oldest animals record initial colonization near the end of the Little Ice Age.

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Reducing shark bycatch in recreational and commercial fisheries

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A new leader designed to reduce shark bycatch during commercial and recreational fishing was tested during this project. The “entangling-leader” was designed to promote shark (and other similarly-toothed fishes) “bite-offs” and thus prevent, altogether, the necessity of landing these fishes. For commercial applications, the leader was designed primarily around the 16/0 weak hook that commercial tuna fishers are required to use. Various sized hooks were used for application in the recreational fishery. A leader-clip produced using a 3-D printer was designed for attachment to the hook shank, and held 4 to 5 loops of leader in advance of its’ attachment to the hook eyelet. The loops of leader were found to consistently entangle in the teeth of sharks after taking the baited hooks, which resulted in the line being cut and sharks released. However, when fishes without cutting teeth, such as drum, snapper and tuna, took the bait, the loops of leader simply spooled out of the leader clip resulting in the fishes capture. Shark catch per unit effort using control leaders was 6.7 to 22.8 sharks/100 hooks/hr whereas entangling leader CPUE was 3.2 to 3.3. To further promote bite-offs, ultra-high molecular weight polyethylene line (Spectra) of various tensile strengths and under various loads were tested and its response to a simulated shark tooth was examined. At high loadings, spectra failed at 500,000 times the rates of monofilament fishing line. Although further testing is required to evaluate the leader for its ability to capture target species (particularly tuna and swordfish) the results presented here suggest that use of the entangling leader could potentially reduce shark bycatch during commercial tuna/swordfish longlining by 86%.

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Size and age distribution of Gulf Menhaden (*Brevoortia patronus*) across the northern Gulf of Mexico

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The Gulf Menhaden (*Brevoortia patronus*) fishery is the second largest, by weight, in the United States. Recent assessment efforts have highlighted the need to better understand the spatial and temporal influences on population dynamics. In this work we highlight our efforts to use the Gulf of Mexico states' monthly fishery independent data collection efforts to understand temporal and spatial dynamics of the fishery. The objectives for this study were to describe sampling efforts, evaluate spatial and temporal distribution of population demographics, investigate precision of standardized ageing techniques, and provide recommendations for future assessment of Menhaden populations. We obtained individuals from full gillnet sets (all panels) from randomly selected sites at locations in Texas, Louisiana, Mississippi, and Alabama. From each individual length and weight were determined. Fish age was determined blindly using whole, polished otoliths and scale samples. Length and age distributions varied spatially and temporally across the Northern Gulf. Based on pairwise age estimates, otolith derived age estimates show greater precision than estimates derived from scales. The results from this project will help us to better understand the spatial and temporal variability in length composition for the stock in the Northern Gulf of Mexico. Methods to improve ageing precision can be made with our recommendation to use polished whole otoliths for ageing estimation of Gulf Menhaden. Gulf state resource management agencies can use the information developed in this project to refine fishery independent sampling efforts.

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Effects of routine catfish stocking on angler effort at an urban Community Fishing Assistance Program Pond

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MDWFP is actively looking for new and innovative ways to get more people to fish. The Community Fishing Assistance Program (CFAP), which manages small ponds in urban areas of Mississippi, is one method MDWFP is using to reach new anglers. MDWFP recently concluded a two year research project in Clarksdale, Mississippi, to see how stocking catfish in a CFAP pond affected fishing effort. We set up game cameras on the lake to record the number of people fishing each day. During the first year no fish were stocked and an average hour of fishing effort per acre was recorded. During the second year adult channel catfish were stocked bimonthly. Our data shows that after stocking fish, the lake had a 41% increase in fishing effort. This shows that routine stocking of catchable sized catfish in a CFAP pond may be a way to encourage fishing, especially among targeted demographics such as young, urban residents.

Bradley M. Richardson, bmr380@msstate.edu, (618) 697-3178, Student Paper

Occupancy modeling to assess atypical *Aeromonas hydrophila* (aAh) prevalence in farm-raised catfish

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The sensitivity of nearly all tests for pathogens are less than 100%, leading to the potential for false negatives. False negatives occur when the pathogen is present but is not detected. This occurrence can negatively bias results, showing a lower prevalence of the pathogen than is actually present in the population. Our study aimed to investigate the prevalence of an atypical strain of the bacterium *Aeromonas hydrophila* in farm-raised channel catfish *Ictalurus punctatus*, using occupancy modeling. Atypical *Aeromonas hydrophila* (aAh) is a bacterial disease that has plagued the southeastern US since the late 2000s. An outbreak has the potential to kill 10,000+ kg of market-sized catfish in only a few days. Thus, a better understanding of this pathogen is paramount to the United States aquaculture industry. Presence of aAh in catfish gill and anal swabs was analyzed using quantitative polymerase chain reaction (qPCR) in triplicates. Initial qPCR results suggested the pathogen was present in approximately 2% of the population during latent (no active outbreak) periods. For occupancy analysis, each aliquot (3 per swab type) was treated as one sampling event, thus resulting in 6 sampling events per fish. Detections varied among fish, confirming imperfect detection in the qPCR assay. qPCR sensitivity was estimated to be approximately 89% for the *A. hydrophila* strain. Accounting for test sensitivity, occupancy models suggested a prevalence higher than that of preliminary qPCR results. The results of this study highlight the importance of accounting for imperfect detection in pathogen presence tests and warrants further implementation of occupancy in the epidemiology of other pathogens.

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A Bayesian belief network to prioritize conservation need among diverse aquatic taxa in speciose and understudied regions

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The equitable allocation of limited conservation resources requires the prioritization of regions, species, or individual populations for management action. Although legislation provides a preliminary focus for priority setting by listing threatened and endangered species, these efforts extend to relatively few species and exclude many understudied taxa of potential conservation significance. Numerous conservation-prioritization frameworks exist to balance species' relative extinction risk with ecological and economic values (e.g. taxonomic distinctiveness, recreational value) and assist those responsible for maintaining biodiversity with conservation decisions. These prioritization schemes include qualitative descriptions, point scoring procedures, and rule sets, but rely on similar biological criteria to assign conservation priority to species perceived to be most vulnerable and irreplaceable. Criteria for the leading paradigm for assessing extinction risk and conservation status (International Union for Conservation of Nature Red List) were originally designed for higher vertebrates and difficult to apply to fishes and many fishes are understudied and lack necessary data (~46% of Chondrichthyes are "data deficient"). Consequently, current conservation status has only been evaluated for a small number (~20%) of fishes, despite their relatively high extinction risk. In addition, these and related methods (e.g. Species Status Assessments, US Fish and Wildlife Service) are exceptionally labor intensive and only feasible for a few target species and can be severely constrained by uncertainty. We developed a repeatable, transparent, and amenable method to identify fishes in need of conservation attention that is consistent with the concepts of redundancy, resiliency, and representation and applicable at any geographic scale. Our Bayes Net model utilizes widely available biological criteria (i.e. life history, ecological traits, museum databases) and well-known threats to set conservation priorities for fishes regardless of species knowledge. This model is broadly applicable to aquatic taxa worldwide and will be particularly useful when applied to highly diverse regions with many poorly known species.

Ashley N. Shannon, ans596@msstate.edu, Student Paper

Debunking angler lore: Can the Farmer's Almanac really forecast catch rates?

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Environmental and social factors impact angler catch-rates, thus several resources are available that claim to forecast angler success. The Farmer's Almanac "fishing calendar" predicts daily fishing condition and while the exact formula is unknown, the forecasts are widely accepted in popular culture. We attempted to corroborate historic fishing conditions using creel data collected from Enid Lake, northcentral Mississippi. We calculated catch per unit effort (CPUE) for boat anglers over three years (2006, 2010, 2014) and compared them to corresponding predicted fishing conditions (poor, fair, good, best) using linear regression. The influence of year and fishing condition was evaluated by parameterizing models that included and excluded their effect on catch rates. Model performance was assessed in comparison to the intercept-only, model using likelihood-ratio tests. Mean CPUE did not vary among years (range: 1.5 ± 0.09 [2014] – 2.0 ± 0.16 [2006]) nor between forecasted fishing conditions (Poor: 1.8 ± 0.13 , Fair: 1.9 ± 0.13 , Good: 1.5 ± 0.12 , Best: 1.9 ± 0.14). Negligible separation between models that included the influence of year (likelihood-ratio test [LRT] = 0, df = 2, p = 1), forecasted fishing condition (LRT = 4.7, df = 3, p = 0.19), and year + fishing interaction (LRT = 4.8, df = 5, p = 0.44) when compared to the null model suggests that these factors had little effect on catch rates. Large news corporations (WTVA, Tupelo MS) and numerous web based resources provide fishing forecasts that are largely unsubstantiated. Each provide caveats, such as local conditions and weather, that influence fishing conditions, but other abiotic factors, including water temperature, light intensity, and barometric pressure, may better predict fishing success. Until we better understand mechanisms behind fishing success, the Farmer's Almanac "fishing calendar" should not be the sole resource used by anglers.

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Effects of gonadotrophin-releasing hormone analog (GnRH_a) injection time on White Crappie (*Pomoxis annularis*) latency period

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Relatively little is known of the effects of time of day of hormone injection on latency period in most fishes. Interest in improved culture techniques for White Crappie (*Pomoxis annularis*), a popular recreational gamefish, has led to advances in tank holding and induced spawning methods. However, an understanding of latency period is needed for synchronizing and optimizing White Crappie hatchery production. Therefore, the effects of hormone injection timing on latency period and egg viability were examined. Crappie were injected with gonadotropin-releasing hormone analog (GnRH_a) at 1600 (evening treatment) and 0800 (morning treatment), monitored for latency period duration, and spawning success was determined by percent of females ovulated, ovulated egg volume, and egg fertilization percent. In the evening treatment group, 75% of the females ovulated, with eggs ovulated (mean \pm SE) 47.11 ± 1.95 hours post initial injection, and mean egg fertilization of 63%; while in the morning injection treatment, 91% of females ovulated with eggs ovulated (mean \pm SE) 44.80 ± 1.53 hours post initial injection, and mean fertilization of 56%. No significant difference in mean latency period or spawning success was observed between treatments. Therefore, diel timing of hormone injection did not affect latency period or spawning success in female White Crappie, allowing for flexibility in hatchery production.

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The utility of using freshwater mussels for biomonitoring in Mississippi streams

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The development of biomonitoring procedures for evaluating biological integrity of aquatic communities began in the 1960's and was prompted, in part, by the need to couple biological responses with physical and chemical changes in water resources. Arguably, the most notable is Karr (1981) and the development of the Index of Biotic Integrity (IBI) for fishes although the approach has been expanded to include other focal groups. Freshwater mussels are excellent indicators of water quality and habitat stability in addition to providing important ecosystem services, consequently these attributes render mussel communities very suitable as biomonitoring tools and restoration targets. However, their utility for biomonitoring within Mississippi streams has not been fully addressed. A comparison of ranked number of total species by drainage for both fishes and mussels illustrates a non-congruent pattern suggesting the utility for using attributes of mussel diversity in some drainages may be more informative than similar fish-based approaches. Metrics for consideration include measures of diversity, total abundance, tolerance level (e.g., temperature, dissolved oxygen, flow), evidence of recruitment, number of T&E taxa, relative proportion of live and fresh dead individuals, and guild or tribe composition (e.g., brood period, primary host group, host infection mode, behavior). Developing a mussel-based method for biomonitoring Mississippi streams, particularly the Yazoo drainage which is the second most speciose drainage (46 species), could be extremely useful in view of current issues regarding aquifer depletion and establishing environmental flows within this region.

Ehlana Stell, egstell@gmail.com, (662) 416-2930, Student Paper

Analyzing leap characteristics and burst speeds of Silver Carp (*Hypophthalmichthys molitrix*) using *in situ* video analysis

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Silver Carp have rapidly expanded their range exploiting vulnerable habitats, disrupting fisheries, and inflicting unknown ecological damage. These fish have continued to spread into the Middle Mississippi River and the Tennessee River Valley and great effort is being expended to prevent Silver Carp from entering the Great Lakes and expanding further into the Ohio, Illinois, Missouri, and Tennessee Rivers. Using boat-mounted cameras, we recorded *in situ* video of Silver Carp leaps to measure the horizontal distance, height, and angle of escape from three geographically distinct latitudes. Furthermore, burst speed, morphometric data and environmental data were measured at each site. Carp reached mean leap heights of 124 cm with a maximum of 276.08 cm in Ramsey Creek, Missouri. Maximum distance reached was 482.34 cm with a mean distance of 207.02 cm. Speeds varied across the three locations with significantly higher speeds in Missouri (628.4 +/- 99.9 cm/s (n=9)) compared to Mississippi (471.2 +/- 77.2 cm/s (n=14)) and Illinois (551.7 +/- 95.7 cm/s (n=16)). Total lengths of Silver Carp increased with decreasing latitude as expected; 73.09 +/- 11.05 cm (n=113) from Mississippi, 60.86 +/- 4.1 cm (n=30) from Missouri, and 54.79 +/- 9.3 cm (n=161) from Illinois. Fish from Mississippi were of slightly larger average condition. Our results documented the true burst speed of Silver Carp across a range of sizes and areas and revealed that the leaping abilities of Silver Carp are greater than previously estimated.

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Comparative life histories of *Adonia* clade snubnose darters (Percidae: Etheostominae)

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A growing proportion of the fish fauna of the southeastern United States is imperiled. However, one major obstacle to conservation management action is a lack of basic life history information for target species. Also awareness is growing that our ability to implement conservation measures is likely higher now than it will be in the future. Comparative life history analysis among closely related species is one method to help managers get the data they need to identify and take advantage of conservation opportunities in a timely manner. The group of snubnose darters composing the clade *Adonia* shows a high degree of imperilment. Of about 27 species, forms, and ESUs of *Adonia*, 18 (67%) are considered imperiled, and as additional cryptic diversity is described that proportion is likely to grow. In Mississippi, ≥ 4 forms of *Adonia* are present, of which ≥ 2 are imperiled. A systematic review of the literature indicates that for some aspects of life history (e.g., reproductive mode, habitat associations) abundant published information is available for many species of *Adonia*. However, some important aspects, such as patterns of dispersal and larval and juvenile habitat use, are almost entirely neglected. Even so, there is general consistency across *Adonia* for all aspects of life history for which solid data is available. A few aspects of *Adonia* life history present interesting, but challenging, life history puzzles such as determining the mechanisms driving female biased sex ratios or the effects of climate extremes on fitness in fractional spawning fishes. Further investigation using phylogenetic based analyses are needed to clarify which life history aspects are consistent and which are too variable to allow managers to apply the information to species of concern.

Jason Tilley, jason.tilley@usm.edu, (228) 233-7821, Student Paper

Sub-pixel coastal wetland classification in the lower Pascagoula River: a comparison of three methods

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Traditional field surveys of land use/land cover are expensive and time consuming. Satellite remote sensing provides a practical alternative that is less obtrusive and provides more frequent and broader spatial coverage with finer resolutions than field surveys. Although land use/land cover has been estimated in Mississippi, no investigations have employed contemporary machine learning methods using multi-scale satellite remote sensing to estimate sub-pixel (finer than 30 m pixel) coverage of coastal wetlands. The objectives of the current study were to compare different classification algorithms for coastal wetlands at the pixel and sub-pixel scale and generate a time-series of marsh coverage around the lower Pascagoula River. Models were developed using both unsupervised and supervised learning methods. QuickBird II satellite imagery was used as training data. Using this, we compared the pixel and subpixel performance of three popular supervised learning methods (regression trees [as random forest], neural networks, and support vector machines) at estimating fractional wetland cover from publicly-available Landsat imagery. For our data, the random forest performed best at the sub-pixel scale, and the support vector machine performed best at the pixel scale. Time-series among the three methods had similar temporal patterns in fractional wetland coverage. Future research would benefit from additional training data to improve time-series of fractional wetland coverage in the lower Pascagoula River marsh system.

Poster Abstracts

Abstracts are in alphabetical order by presenting author's last name.
Presenting author is underlined.

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Comparison of stream crayfish sampling methods

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Effective sampling methods are needed to accurately assess crayfish population distributions and assemblage structures. Unlike other stream organisms, quantitative sampling methods are not well established for crayfish. We compared crayfish collections from three sampling methods (electroshocking, kick seining, and nest trapping), analyzed the impacts of environmental factors on the effectiveness of these methods, and determined the effort needed by each method to accurately assess species richness and distribution within each stream and drainage. We sampled crayfish and measured physiochemical variables at 6–10 sites in each of five streams during spring and fall 2015–2017. Species richness and evenness were higher when kick seining. Substrate size was negatively associated with crayfish diversity with all sampling methods. Percentages of dissolved oxygen, vegetation and woody debris were correlated with crayfish diversity from kick seining, whereas percent canopy cover and conductivity were correlated with impacted crayfish diversity from electroshocking. Kick seining was the best method to assess species richness and distribution, requiring the fewest number of sites for 90–100% accuracy. To more effectively incorporate crayfish into ecosystem management decisions, quantitative methods must be established and their biases and efficiencies evaluated.

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Use of a modified fyke net to study Southern Flounder *Paralichthys lethostigma* in Mississippi coastal waters: a preliminary assessment

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Information on the abundance, age distribution, reproduction, and movements of Southern Flounder *Paralichthys lethostigma* in Mississippi coastal waters is needed for proper management. However, no fishery-independent gear consistently catch enough specimens for routine monitoring or the establishment of a tagging program. The objective of this study was to test the efficiency of a fyke net for catching Southern Flounder while minimizing bycatch. A modified fyke net was deployed in Davis Bayou, Mississippi during fall of 2017. A lead was run perpendicularly from shore and directed fish into the “inner heart” of the net. At the end of the net was a modified crab pot with a narrowed and elongated funnel. The purpose of this modification was to allow flatfish to enter the trap while minimizing bycatch. The fyke net fished for a total of 47 days. Six flounder were caught and measured, four of which were tagged and released in good condition. The two remaining flounder were brought back to the laboratory to provide age and fecundity data. Bycatch was dominated by Blue Crab *Callinectes sapidus* (n=34), which represented 69.4% of the total catch, and was followed by Atlantic Croaker *Micropogonias undulatus* (n=3, 6.1%), Black Drum *Pogonios cromis* (n=2, 4.1%), Red Drum *Sciaenops ocellatus* (n=2, 4.1%), and Hardhead Catfish *Arius felis* (n=2, 4.1%). Considering the success of the design, the next phase of research will expand the number of fyke nets deployed in attempt to establish the first successful Southern Flounder tagging program in Mississippi coastal waters.

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GCRL Tripletail tagging project – a twenty-one year assessment

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Tripletail (*Lobotes surinamensis*) is a migratory species that is rapidly gaining in popularity with recreational fishers in US coastal waters. The Gulf Coast Research Laboratory (GCRL) Tripletail Tagging Project began in 1996 as part of the GCRL Cooperative Sport Fish Tag and Release Program. At that time, it was almost exclusively a volunteer undertaking of two charter boat captains along the Florida East Coast. Five years later, after being heavily promoted by GCRL through media channels and at various fishing tournaments and events, interest in volunteer tagging of Tripletail began to expand throughout the recreational fishing communities along the US East Coast, Northern Gulf of Mexico, and West Florida Coast. With the subsequent increase in the number of tagged Tripletail in these regions, some intriguing trends in migration and growth are emerging. Specifically, some tripletail seem to exhibit high site fidelity to areas where tagged, while others undergo long distance migrations. Despite the many outliers and negative growth data points from individual angler measurement error, trends seem to suggest a rapid juvenile growth rate. A remarkable uptick in tagging rates occurred in 2015-2016 along the Gulf Coast, coupled with anecdotal accounts that indicated bountiful tripletail in the Gulf of Mexico during this period. Recent efforts to recruit more volunteer anglers into the Tripletail Tagging Program included the strategic placement of tagging posters and aluminum signs at boat launches and bait shops, and incentivizing the reporting of tagged fish with complimentary Marty Wilson Tripletail art work magnets. Future promotions will include a dedicated tag reporting website with links provided within some of the more popular fishing apps. Thanks to the invaluable efforts of volunteer anglers, 4996 tag records, 554 recapture records, and 31 second recapture records have been reported from Texas to the Carolinas as of January 1, 2018.

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Assessing growth and establishment of agricultural plantings on reservoir mudflats

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Experimental agricultural plantings were sown on the mudflats of Enid Lake, Mississippi during the winter drawdown period in October 2016 and October 2017. Following planting all plots were monitored regularly until the following spring to evaluate effectiveness of establishment through ground cover, height, stem density, and biomass sampling. In total we planted 35 plots of 0.5 ha in 2016 and 40 plots of 0.125 ha in 2017. Plots were comprised of: Rye Grass (*Lolium*), Triticale (*x Triticosecale sp.*), Balansa Clover (*Trifolium michelianum*), Berseem Clover (*Trifolium alexandrinum*), several mixed plantings, and a disked control. Data were analyzed with an analysis of variance and differences among means evaluated with Tukey's honest significant difference (HSD) test. All experimental treatments were evaluated for significant difference from control plots to serve as a threshold for successful establishment. We found that plots seeded with grasses performed significantly better than control plots with respect to all metrics measured, while plots seeded with mixed planting performed better than control plots only with respect to height, and plots seeded with clover did not perform significantly better than control plots. Results serve as an evaluation of the efficacy of agricultural plant establishment on the mudflats of flood control reservoirs. In addition, conclusions can also be applied to the use of agricultural plantings as a management tool to create fish habitat.

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Age of tournament caught Swordfish, *Xiphias gladius*, in the northern Gulf of Mexico: a preliminary study

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Swordfish, *Xiphias gladius*, is a circumglobal species that is commonly sought after in the recreational and commercial fisheries. Due to their broad distribution, prior studies on age and growth have primarily been associated with the commercial longline fisheries in the South and North Atlantic Oceans, Mediterranean Sea and waters around Hawaii and Taiwan. In the current study, biological samples were collected from swordfish caught in the northern Gulf of Mexico by recreational anglers participating in the 2017 Mississippi Gulf Coast Billfish Classic. A total of 28 swordfish (22 female, 3 male, 3 unknown) were sampled during the two-day tournament. Observed maximum size for sampled swordfish was 213 cm, 195 cm, and 201 cm for female, male and unknown respectively. Anal spines were removed from each individual and the second spine was prepared for age analysis. Independent readers provided growth band counts; with no prior knowledge of specimen size, sex, or previous counts. To our knowledge, this preliminary work is the first to investigate age and growth of swordfish in the Gulf of Mexico.

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Comparison of two gear types frequently used in Mississippi's recreational Blue Crab fishery

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The recreational Blue Crab (*Callinectes sapidus*) fishery is very popular in Mississippi, with most of the effort being concentrated to the bays and bayous south of Interstate 10. While a wide variety of harvest methods and gear types are used, the most popular gear is the wire crab trap. There are two different sizes of crab traps that are more commonly deployed within the recreational trap fishery, the standard 24" X 24" X 18" trap and the 24" X 24" X 12", also referred to as the "half trap". The objectives of this study were to compare catch rates between the two different trap sizes and to determine if there were any seasonal, sex, and/or size selectivity based on trap size. From September 2016 to December 2017 three traps of each size were deployed near the mouth of Fort Bayou in the Back Bay of Biloxi on a monthly basis. Number of crabs, carapace width, molt stage, and sex were recorded for each trap. Catch-per-unit-effort (CPUE) was calculated as number of crabs per trap per day, standardized to a 24 hour soak time. Results show that the standard size trap had a higher catch rate with a CPUE of 2.21 compared to the half trap of 1.04. The p value of 0.000099 confirms the difference in catch rates between the two trap sizes was significant. Seasonal comparisons between the catch rates of the two traps sizes also show a contrast in the fall and the summer, however the winter and spring show no substantial difference. There also appears to be no variation in size or sex selectivity between the different traps.

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A review of fishery-independent monitoring data for blue crab megalopae in Mississippi

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Data from a fishery-independent study of blue crab (*Callinectes sapidus*) settlement are reviewed to examine the relationship between recruitment, measured as settlement, and climate-related hydrographic factors associated with circulation processes in the northern Gulf of Mexico. Megalopal settlement data are derived from a series of collections taken in the years 1991-2001, 2010, 2012, and 2014-2016 in the Biloxi and Belle Fontaine areas of Mississippi Sound. Published data attribute fluctuations in numbers of settling megalopae to variations in seasonal wind forcing or basin-scale events associated with Loop Current (LC) intrusions and spin-off of warm core eddies. Huge increases in settlement occurred in the fall of 2016 and continued into 2017. Average daily settlement in October of that year exceeded 1,500 megalopae per day with a yearly average of 652 per collector. Next highest yearly averages occurred in 1991 with 655 megalopae/collector in August and a yearly average of 295. In all other years, average annual catch was below 55 megalopae/collector.

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Seasonal variation of dry energy density of Gulf Menhaden and Blue Crab from the Gulf of Mexico

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Understanding variations in dry energy densities of common prey species can provide insight into the temporal dynamic of aquatic ecosystems. For example, in the Gulf of Mexico, forage fishes and crustaceans are key links for transferring energy to higher trophic level species, including recreationally and commercially important fishes. The objectives of this research were to: 1.) develop appropriate methodology for obtaining dry energy densities for two prey species, Gulf Menhaden, *Brevoortia patronus* and blue crab *Callinectes sapidus*, 2.) compare mean dry energy densities of Gulf Menhaden and blue crab, and 3.) evaluate seasonal variation of dry energy density for Gulf Menhaden. To determine dry energy density, we homogenized and freeze-dried whole Gulf Menhaden (n = 53) and blue crab (n = 8). We then used bomb calorimetry to determine caloric value (calorie g⁻¹ dry weight, CPGDW) of each sample. We found that blue crabs have significantly lower dry energy densities than Gulf Menhaden. We found Gulf Menhaden dry energy densities to be lower in the early spring, increase throughout the summer and peak in August (mean value 6,097.88 CPGDW). In addition, Gulf Menhaden exhibit positive relationships of dry energy density and fork length, wet weight, condition, and age. Understanding seasonal patterns and morphometric relationships of energy density may help inform predator-prey interactions, and we hypothesize that shifts in diet patterns of predators may be influenced by caloric value of prey. The information developed here is a first step to better evaluate ecosystem dynamics and can be used to inform future research on commercially and recreationally important species in the Gulf of Mexico.

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Gear effectiveness and size selectivity for five species of madtoms (*Noturus spp.*)

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Madtoms (*Noturus spp.*) are a group of 29 small nocturnal catfish species found in North America with many species of current conservation concern as they are facing range reductions. As state and federal agencies are continually accruing data to inform the United States Fish and Wildlife Service on the current status of species and develop management plans, it is imperative that the choice of gear(s) utilized to perform surveys take potential gear biases into consideration. Without understanding the potential gear biases on catch rates and length of individuals, different researchers using varying gears could come to wildly different conclusions about the status of a given species and potentially incorrectly inform management. Herein, we designed a gear comparison study test species-specific detection bias and species-specific size structure bias of three commonly used active gears (seines, backpack electrofishing units, and dipnets) and one passive gear (Gee-style minnow traps) for Brown Madtom (*Noturus phaeus*), Freckled Madtom (*Noturus nocturnus*), Piebald Madtom (*Noturus gladiator*), Least Madtom (*Noturus hildebrandi*), and Brindled Madtom (*Noturus miurus*) in Mississippi. From our data we conclude that backpack electrofishing is likely the most effective and representative gear for sampling Least Madtom, Brindled Madtom, Freckled Madtom, and Brown Madtom in Mississippi streams; although, seining is likely the most effective and representative gear for sampling Piebald Madtom. The data revealed that size structure was similar between backpack electrofishing and seining for Least Madtom. For Brindled Madtom, backpack electrofishing collected larger individuals than dipnets or seines, but dipnets and seines collected similar sized fish. The same pattern was observed for Brown Madtom, whereby backpack electrofishing captured larger individuals than dipnets or seines, while dipnets and seines collected similar sized fish. Overall, our data implies that biologists should understand the potential gear biases when sampling and interpreting collection data for different madtom species.



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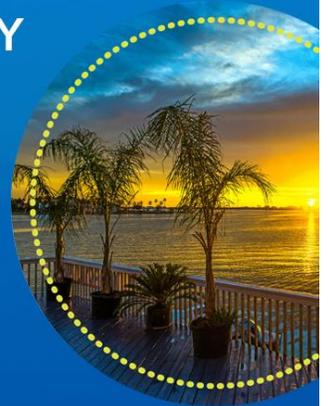
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