2023 Annual Meeting of the Mississippi Chapter of the American Fisheries Society

Natchez, MS

15–17 February 2023

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The organizers from the Mississippi Chapter would like to thank and recognize the following groups for financial support of the meeting.

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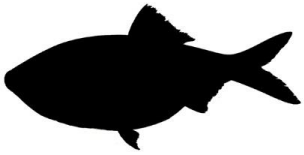


We also thank the Mississippi Department of Wildlife, Fisheries, & Parks for the in-kind donation of printing these programs.

Program-at-a-Glance

All activities will be held at the Natchez Grand Hotel

in the Conference Rooms and Grand Ballroom

Date & Time	Event	Location
Wednesday, February 15		
3:30 – 5:00 pm	**Registration**	**Outside Conference Room**
6:00 – 8:00 pm	**Welcome Social**	**Grand Ballroom**
Thursday, February 16		
	Breakfast	**On your own**
7:30–9:00 am	**Registration**	**Outside Conference Room**
8:30–10:15 am	**Presentations**	**Conference Room**
10:15–10:30 pm	**Break**	**Outside Conference Room**
10:30–12:00 pm	**Presentations**	**Conference Room**
12:00–1:45 pm	**Lunch**	**On your own**
1:45–2:45 pm	**Presentations**	**Conference Room**
2:45–3:00 pm	**Break**	**Outside Conference Room**
3:00–4:00 pm	**Presentations**	**Conference Room**
4:00–4:15 pm	**Break**	**Outside Conference Room**
4:15–5:00 pm	**Keynote Speaker**	**Conference Room**
5:00–6:00 pm	**Poster Session**	**Grand Ballroom**
6:00–8:30 pm	**Banquet**	**Grand Ballroom**
6:00–8:30 pm	**Student Raffle**	**Grand Ballroom**
Friday, February 17		
	Breakfast	**On your own**
8:30–9:15 am	**Presentations**	**Conference Room**
9:15–9:30 am	**Break**	**Outside Conference Room**
9:30–10:00 am	**Chapter Business Meeting**	**Conference Room**
10:00 am	**Adjourn**	

Keynote Speaker

Tom Holman

What a Long Fish Trip it's Been

Tom Holman grew up fishing in Indiana, Canada, and Virginia. He received a BS in Biological Sciences from George Mason University and an MS in Fisheries Management from Auburn University. He joined the Mississippi Department of Wildlife Conservation in 1988.

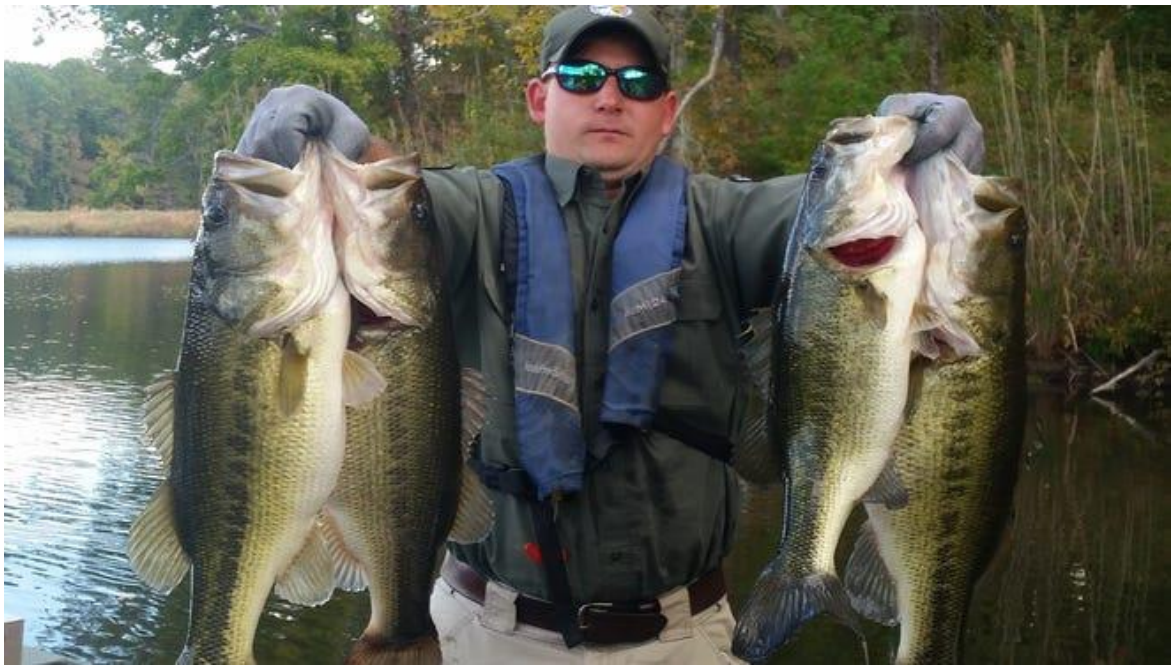
His early research work ranged from fish passage in reservoirs to fish assemblages and angler characteristics in rivers. In 1991, he became the Central District biologist managing sport fisheries in the district's two large reservoirs, 10 MDWFP-owned lakes and numerous miles of streams and rivers. He became an AFS Certified Fisheries Professional in 1996. He focused on improving sport fish populations in Ross Barnett Reservoir and Okatibbee Lake with projects investigating survival, growth, and movement of Florida Largemouth Bass, Crappie, and hybrid Striped Bass. In 2003, he moved into the administrative arena, coordinating activities of MDWFP's four hatcheries, the boating access program, and the aquatic education program (focusing on youth fishing events). Following Hurricane Katrina's major fish kill in the Pascagoula River, Tom coordinated a multi-year restocking program involving a mark/recapture project with advanced fingerling largemouth bass. In 2007, Tom became the Fisheries Bureau Sport Fish Restoration Program Coordinator overseeing grant application, compliance, and reporting processes for multiple bureau grants and university research grants. He has authored or co-authored articles in both agency publications and scientific journals.

Tom is active at the society level and has been a member of the Mississippi Chapter and parent society for 34 years. He has been a member or served on several committees and sections. Tom is also a member of the AFWA Fish Health and Education, Outreach, and Diversity committees. He has also served on several SEAFWA and SDAFS Fisheries Program planning committees and chaired these committees in 1994 and 2011 (SEAFWA) and 2012 (SDAFS).

Tom was named Fisheries Biologist of the Year by the Southeastern Association of Fish and Wildlife Agencies in 2018. He is currently the Deputy Fisheries Bureau Director with MDWFP.

President-elect Candidates

Ryan Jones



Ryan Jones is a Coordinator 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 the MDWFP Fisheries Bureau. He served as the Central Region project leader for nine years where he was tasked with monitoring and regulating public fisheries, private land technical guidance, public outreach, and aquatic vegetation management. He was recently promoted to coordinate and supervise the Fisheries technical staff statewide. In 2016 and 2018, Ryan was recognized as MDWFP Fisheries Biologist of the Year. He was 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. For efforts made in the eradication of giant salvinia on Ross Barnett Reservoir, he was awarded the Distinguished Service Award by the Mississippi Chapter of American Fisheries Society and Resolution of Commendation from Pearl River Valley Water Supply District. Ryan is a passionate conservationist who is proud to serve and protect the natural resources in Mississippi.

Jeremy Higgs

Jeremy Higgs is the Assistant Director for the Center for Fisheries Research and Development at The University of Southern Mississippi. He received his B.S. in Marine Biology with a minor in Environmental Studies from Southwestern College and a M.S. in Coastal Sciences from The University of Southern Mississippi. Currently, his work focuses on the life history, distribution, and movement of highly migratory species in the Gulf of Mexico. Jeremy is also the lab instructor for the Elasmobranch Biology field course for USM's Summer Field Program and provides mentorship for undergraduate and graduate students. Jeremy has been an active AFS member (National, Southern Division, and Mississippi Chapter) since 2011 and has been recognized as an AFS Certified Fisheries Professional since 2020. He has previously served AFS through two terms as Secretary Treasurer of the Mississippi Chapter (2016-2018 and 2018-2020); the Deputy Committee Chair, Committee Chair, and Past Committee Chair for the International Fisheries Section Fellow Award (2015-2018); and as the President of the USM Student Subunit (2013-2014). Jeremy looks forward to continuing to serve AFS as he continues his career.

Presentation Schedule – Thursday, February 16

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

Time	Presentation Title	First author
8:45 am	Analysis of temperature and acceleration data from tagged Gulf Sturgeon (*Acipenser oxyrinchus desotoi*) within the Pascagoula River and in the Mississippi Sound, Mississippi	Elizabeth Greenheck*
9:00 am	Hematology of Redear Sunfish (*Lepomis microlophus*)	Madison Eisenhuth*
9:15 am	Estimation of Mortality Rates for the Gulf Menhaden Stock	Catherine Wilhelm*
9:30 am	Developing Spawning and Rearing Techniques to Improve Production of Crappie (*Pomoxis* spp.)	Matthew Nichols*
9:45 am	Movement dynamics of juvenile Gulf Sturgeon within the Pascagoula River	Sarah Stovall*
10:00 am	Passage of Silver Carp *Hypophthalmichthys molitrix* through water-control structures in a floodplain network	Josh Stafford*
10:15 am	Break	
10:30 am	Sheepshead, *Archosargus probatocephalus*, estuarine emigration patterns from two sub-systems within the Mississippi Sound	Caleb Wilson*
10:45 am	Evaluating habitat use by nekton in widgeon grass (*Ruppia maritima*), shoal grass (*Halodule wrightii*), and unvegetated bottom habitats in the Grand Bay National Estuarine Research Reserve	Jessica Woodall*
11:00 am	Short-term (96-h LC50) ammonia tolerance of fingerling blue (*Ictalurus furcatus*), channel (*I. punctatus*), and hybrid (*I. furcatus* × *I. punctatus*) catfish	Hayin Tamut*
11:15 am	Seasonal changes in space use for three trophically-distinct fish species in a coastal bay system	Austin Draper*
11:30 am	Source contributions to nekton in an oligohaline ecosystem	Keith Chenier
11:45 am	An Overview of the MDMR Estuarine Seine Project	Chris Graham
12:00 pm	Lunch – on your own	
1:45 pm	Mississippi Pearls: An overview of current freshwater mussel research in Mississippi	Robert Ellwanger
2:00 pm	Paddlefish movement and determination of potential prey items in the Bouie River gravel pits above and below the Glendale weir	Kasea Price
2:15 pm	Evolution of crappie fishing and fisheries management in Mississippi, 1950s – 2020s, with emphasis on the USACE flood control reservoirs	Keith Meals
2:30 pm	Using historic and contemporary fish assemblages to assess oxbow lakes in the Mississippi River Alluvial Valley	David Ruppel
2:45 pm	Break	

Presentation Schedule – Thursday, February 16

Time	Presentation Title	First author
3:00 pm	Long-term links between channel morphology and fish assemblages in modified Yazoo Basin streams	Nicky Faucheux
3:15 pm	Using detection and occupancy modeling to assess the status of Bluenose Shiner (*Pteronotropis welaka*) in Mississippi	Calvin Rezac
3:30 pm	Extending Our Reach: A multi-state collaborative approach to reef fisheries Extension	Marcus Drymon
3:45 pm	Is there evidence of negative impacts to the Spotted Seatrout stock by the Gulf Menhaden fishery in the northern Gulf of Mexico?	Robert Leaf

Presentation Schedule – Friday, February 17

Time	Presentation Title	First author
8:30 am	Effects of catch-and-release fishing on Atlantic tarpon (*Megalops atlanticus*) in Puerto Rico	Wes Neal
8:45 am	Distribution, abundance and condition of juvenile sharks in the Mississippi Sound	Angie Hoover
9:00 am	A Simulated Bite Experiment Elucidates Cookiecutter Shark-Bite Dynamics	Mark Grace

Poster Presentations

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

Poster Number	Title	First author
1	The Waters of Freshwater Mussels: A closer look at the effects of agriculture spillover on the survival of freshwater mussels in the southeast	Brittany Barner*
2	Exploring seed dispersal by fish as a recovery mechanism for endangered plants in river floodplains	Breelyn Bigbee*
3	A systematic review on hydrological connectivity relevant to oxbow lakes: Research concepts, progress, approaches, scales, and future directions	Hafez Ahmad*
4	Invasive bigheaded carp distribution patterns in lakes of the Lower Mississippi Alluvial Valley	Michaela Palmieri*
5	Vulnerability of reservoir fish habitats to climate change	Darren Shoemaker*
6	Development and evaluation of a derelict crab trap reward program for Mississippi commercial shrimpers	Keith Chenier*
7	Microbiomics of Gulf Coast Fishes	Matthew Scott*
8	Diversity and habitat selection among larval fish in seasonally flooded forests along the Pascagoula River	Grant Peterson*
9	An Update to the Fishes of Mississippi Checklist	Matthew Wagner
10	Age and Growth of Red Drum, *Sciaenops ocellatus*, in the north central Gulf of Mexico	Faith Robinson
11	Seasonal variation of demersal fish communities in the northern Gulf of Mexico from historic bottom trawl survey	Rachel Longmire
12	Salinity driven differences in species diversity in Biloxi Bay Estuary: a preliminary investigation	Nicholas Stewart

ABSTRACTS

ORAL PRESENTATIONS

Student Presentation

Analysis of temperature and acceleration data from tagged Gulf Sturgeon (*Acipenser oxyrinchus desotoi*) within the Pascagoula River and in the Mississippi Sound, Mississippi

Elizabeth M. Greenheck[1], Michael J. Andres[1], Mark S. Peterson[1], William T. Slack[2], and Paul O. Grammer[3]

[1]Division of Coastal Sciences, The University of Southern Mississippi;
[2]The United States Army Engineer Research and Development Center;
[3]Center for Fisheries Research and Development, The University of Southern Mississippi

Gulf Sturgeon (GS; *Acipenser oxyrinchus desotoi*) are a federally threatened, anadromous species that occupy seven coastal rivers in the northern Gulf of Mexico and make long migrations between riverine and marine habitats. Tracking of GS movements using acoustic telemetry has occurred since the late 1990s but has increased in use for long term monitoring projects since 2015. More recent advancements in acoustic transmitter technology have allowed researchers to acquire internal temperature data (°C) along with discrete movement information (internal acceleration; m/s^2) for tagged individuals using accelerometer tags. In this study, nine subadult (908–1226 mm fork length; FL) and 15 adult (1278–1650 mm FL) GS were tagged with InnovaseaTM accelerometer tags between October 2021–2022. Tagged GS were monitored in seven general areas throughout the Pascagoula River and the Mississippi Sound by an autonomous array of VR2W and VR2Tx InnovaseaTM acoustic receivers from November 2021–January 2023. Water temperature data were acquired during this same time period within the seven monitoring areas from VR2Tx receivers, Hobo temperature data loggers, and USGS stations. Internal body temperatures of tagged GS were within ±6.8 °C of water temperatures and varied per individual but not by monitoring area or time-of-day. Acceleration of GS ranged from 0.02–4.9 m/s^2 but occurred most often between 0.21–0.79 m/s^2 (5 and 95 percentile) and did not vary by area or time-of-day. Acceleration values > 2m/s^2 (which may indicate movement or jumping behavior of GS) also did not vary by area or time-of-day, but did not occur within the Pascagoula River estuary or within the Chickasawhay River (a principal tributary to the Pascagoula River with presumed GS spawning habitat). Overall, these accelerometer data from GS give us insight into physiological relationships between GS and their environment and may help distinguish differences in behavior or habitat use.

ORAL PRESENTATIONS

Student Presentation

Hematology of Redear Sunfish (*Lepomis microlophus*)

Madison Eisenhuth and Peter J. Allen

Mississippi State University, Starkville, MS

Redear Sunfish (*Lepomis microlophus*) is a freshwater species belonging to the Centrarchidae family that is widespread in natural waterways, recreational ponds, and aquaculture ponds of North America. Despite its importance, little research has been conducted on this species, including basic research to develop a better understanding of normal blood conditions to create a profile for healthy fish. Therefore, blood was collected from 11 adult Redear Sunfish and measured for: pH, hematocrit, hemoglobin, and red blood cell concentration (manual and automated methods). Using these measurements, mean corpuscular volume, mean corpuscular hemoglobin, and mean corpuscular hemoglobin concentration were calculated. Values were compared to other species in the Centrarchidae family. Values differed from some species; mean ± standard error hematocrit was 37.7±0.03% and corpuscular hemoglobin concentration was 29.03±1.39 g/dL. In contrast, bluegill (*Lepomis microchimus*) have reported hematocrit of 28% and mean corpuscular hemoglobin concentration of 20.7 g/dL. This information will be beneficial for providing a baseline of knowledge about healthy Redear Sunfish useful for field work and cultivation in an aquaculture setting, where this species is also often used to control mollusks and reduce disease transmission.

ORAL PRESENTATIONS

Student Presentation

Estimation of Mortality Rates for the Gulf Menhaden Stock

Catherine Wilhelm[1], Amy Schueller[2], Emily Liljestrand[3], Kim De Mutsert[1], and Robert Leaf[1]

[1]University of Southern Mississippi;
[2]NOAA Fisheries,
[3]Michigan State University

Gulf Menhaden, *Brevoortia patronus*, is the target species of the second largest fishery in the United States. Gulf Menhaden fishery and stock is described using an age-structured stock assessment that has been ongoing since the 1960s. The model is parametrized, in part, using age-specific mortality rates. New advancements in technology have made it possible for modernizing the calculations of many of these parameters in the assessment. In an effort to improve estimates of Gulf Menhaden mortality rates we conducted a study to develop mark-recovery models in AD Model Builder to evaluate recently digitized records of a large-scale tag and recapture study. Recovery data were comprised of adult (n = 90,210) and juvenile (n = 142,013) individuals that were captured, tagged with unique ferro-magnetic tags, and then recovered from the fishery from 1970 to 1988. The models account for the difference in juvenile and adult tagging mortality as well as tag recovery probability. Juvenile dynamics were modeled such that 'transition' into the adult tagged population took place after tagging, with the assumption that all recovered fish were adults. Fishing effort was derived from fishery landings per month throughout the tagging study. Estimating mortality rates based on mark recovery data using contemporary methods will provide validation of current parameters, indicate the annual variation in mortality, and allow an understanding of the range of observed mortality.

ORAL PRESENTATIONS

Student Presentation

Developing Spawning and Rearing Techniques to Improve Production of Crappie (*Pomoxis* spp.)

Matthew Nichols[1], Sandra Correa[1], Charles Mischke[1], Tom Holman[2], and Peter Allen[1]

[1]Mississippi State University;
[2]Mississippi Department of Wildlife Fisheries and Parks

Sunfishes (Centrarchidae) represent one of the most prolific groups of fishes in North America and may be found in almost all freshwater habitats. They are important members of fish communities and food chains, and species such as black crappie (*Pomoxis nigromaculatus*) and white crappie (*P. annularis*) are important recreational sport fishes with substantial economic value. Despite being widely cultured, techniques for crappie aquaculture remain largely extensive. More intensive methods, such as the use of induced spawning, can provide greater consistency and quantity of crappie to meet stocking and population management goals. Needed is an understanding of how prolonged holding pre-spawn in cool temperatures in recirculating aquaculture systems (RAS) affects the success of white crappie spawning, to allow for flexibility in spawning protocols by hatchery managers. It is also necessary to have a greater understanding of the feeding habits of larval and juvenile crappie to guide pond fertilization and management practices to increase the success of crappie growth and survival in aquaculture and recreational settings. Therefore, this study aims to examine the spawning effectiveness of reproductively mature white crappie that have been caught in the spring and kept in recirculating aquaculture systems for 2, 4, and 6 weeks before spawning at a cool temperature (15 °C). Feeding habits and prey preferences, and growth and survival of larval to juvenile crappie will also be examined under several pond fertilization approaches. This knowledge will be important for guiding hatchery techniques to improve production of crappie and to better manage stocking and population enhancement programs in small impoundments and lakes.

ORAL PRESENTATIONS

Student Presentation

Movement dynamics of juvenile Gulf Sturgeon within the Pascagoula River

Sarah G. Stovall, Michael J. Andres, Mark S. Peterson, and Kasea L. Price

Division of Coastal Sciences, The University of Southern Mississippi

Gulf Sturgeon, *Acipenser oxyrinchus desotoi*, are an anadromous species federally listed under the Endangered Species Act. Movement/mortality patterns are likely affected by anthropogenic activity such as channelization and trawling within the Pascagoula River (PR). The lower PR divides into two distributaries south of river kilometer 23 with the more natural side to the west and the Pascagoula Ship Channel at the terminus of the east distributary; the latter is deeper and maintained via dredging. Our objectives were to determine if juvenile Gulf Sturgeon movement within the lower PR occurred primarily within the western distributary as the maintained ship channel in the east allows higher salinity further upriver. We internally tagged 72 juvenile GS from the PR with acoustic transmitters and tracked fish using receivers placed throughout the lower river. Detections for 2020–2022 were summarized monthly to deduce area/corridor use and transitions between distributaries. Juvenile movement primarily occurred within the western distributary as 80.0%, 90.2%, and 85.2% of the total detections in 2020, 2021, and 2022, respectively, were in this distributary. During fall outmigration, frequency of detections within the eastern distributary decreased as corridors within Bayou Chemise (natural) and Marsh Lake (dredged) were used to travel west. Across all three years, Bayou Chemise had a greater detection frequency than Marsh Lake. Juvenile Gulf Sturgeon tended to avoid the dredged Pascagoula Ship Channel and the Marsh Lake corridor, possibly due to alteration coupled with high salinity stress in that area. Southern movement from upriver fresher areas to more saline areas during the fall supports the general trend of juvenile Gulf Sturgeon remaining in freshwater holding areas until migrating to saltier water in the fall for feeding. Our study provides more insight into Gulf Sturgeon movement within the PR estuary and help inform managers on timing and duration of dredging activities.

ORAL PRESENTATIONS

Student Presentation

Passage of Silver Carp *Hypophthalmichthys molitrix* through water-control structures in a floodplain network

Joshua D. Stafford[1], Corey G. Dunn[2], Michael E. Colvin[1], and Leandro E. Miranda[2], and Dennis Riecke

[1]Department of Wildlife, Fisheries, and Aquaculture, Mississippi State University;
[2]U.S. Geological Survey, Mississippi Cooperative Fish and Wildlife Research Unit;
[3]Mississippi Department of Wildlife, Fisheries, and Parks, Fisheries Bureau

Silver Carp (*Hypophthalmichthys molitrix*) are invasive fish that have spread throughout the Mississippi River basin and jeopardize native species and recreational fisheries. The Lower Mississippi Alluvial Valley has extensive levee systems with numerous water-control structures for managing floodwaters. These water-control structures could potentially be operated to limit the expansion of invasive fishes, including Silver Carp. Our goal is to examine environmental variables coinciding with Silver Carp movements through water-control structures. We established an acoustic array spanning Yazoo River, Steele Bayou, Muddy Bayou, and Eagle Lake in western Mississippi. Steele Bayou Water Control Structure separates Yazoo River from Steele Bayou and is not managed to limit movements of Silver Carp. In contrast, water releases from Muddy Bayou Water Control Structure are managed to exceed the theoretical burst swimming speed of Silver Carp to limit movements of Silver Carp from Steele and Muddy bayous into Eagle Lake. Beginning in spring 2022, we began tracking 95 acoustically tagged Silver Carp with our stationary acoustic array and bi-monthly active tracking. We predict Silver Carp movements will be positively correlated with fish length, spring spawning season, being male, rising water temperatures, and changes in water stage height. Accordingly, we deployed water-level and temperature loggers throughout our study region. So far, five Silver Carp passed through Steele Bayou Water Control Structure (four downstream, one upstream) while no Silver Carp have moved through Muddy Bayou Water Control Structure. Movements through Steele Bayou Water Control structure occurred between spring and early summer when water levels were dropping. We will use statistical models to determine which variables correlate with Silver Carp movements. Ultimately, findings of our study could help managers tailor operations of similar infrastructure to impede expansion of Silver Carp.

ORAL PRESENTATIONS

Student Presentation

Sheepshead, *Archosargus probatocephalus*, estuarine emigration patterns from two sub-systems within the Mississippi Sound

Caleb Wilson, Michael J. Andres, Mark S. Peterson, and Austin Draper

Division of Coastal Sciences, The University of Southern Mississippi

Constructed oyster reefs seek to restore habitat, improve environmental conditions, and provide increased harvest. For fish in particular, there is an expected benefit to reef-associated species and reef transients, including changes in their movements toward these habitats. However, without data on their movement patterns, before the oyster reefs are constructed, the use of these constructed oyster reefs cannot be accurately assessed due to a lack of baseline data. Baseline movement data of fish should be assessed to determine the relative use of the oyster reef construction as compared with background movements in a dynamic estuary. Sheepshead, *Archosargus probatocephalus*, is one such species expected to benefit from reef construction, is a popular sportfish, and has relatively understudied movement patterns. The main objectives of this study were to describe 1) the movements of Sheepshead emigrating from the St. Louis Bay and Pascagoula River estuaries, 2) their directionality, and 3) their extent of use within the Mississippi Sound. We acoustically tagged 19 Sheepshead with an average total length of (41.7 ± 3.99 cm). Our data showed that Sheepshead tends to stay within the sub-systems close to the tagging location with a few leaving between March – June. Nearly all the fish that emigrated from their sub-system were larger than the average length (46.2 ± 5.41 cm), with the fish smaller than average staying close to tagging sites with little to no emigration out of their respective estuary. Detections of these fish leaving appear random as all moved to the east, west, or south with no set path or destination. Based on our data, only a select few mature fish will likely move to newly constructed reef habitats unless they initially settle into those habitats.

ORAL PRESENTATIONS

Student Presentation

Evaluating habitat use by nekton in widgeon grass (*Ruppia maritima*), shoal grass (*Halodule wrightii*), and unvegetated bottom habitats in the Grand Bay National Estuarine Research Reserve

Jessica Woodall[1], Kimberly Cressman[2,3,4], M. Zachary Darnell[1], Patrick Biber[1], and Kelly M. Darnell[1]

[1]The University of Southern Mississippi;
[2]Grand Bay National Estuarine Research Reserve;
[3]Mississippi State University;
[4]Catbird Stats LLC

Seagrass beds support high biodiversity and animal abundance, serve as feeding grounds for a variety of nearshore animals, offer shelter from predation, and act as a nursery habitat for juveniles. The species composition of seagrass beds can impact habitat use by animals. Two common species of seagrass in the Gulf of Mexico are *Ruppia maritima* (widgeon grass) and *Halodule wrightii* (shoal grass). The shallow coastal waters of the Grand Bay National Estuarine Research Reserve (GNDNERR) support both of these species, but the habitat use of each by nekton is poorly understood, which limits management. Nekton communities were sampled in May, July, September, and November 2022 in GNDNERR within *R. maritima* and *H. wrightii*-dominated seagrass beds and unvegetated habitat. All nekton were collected, identified to species, weighed, and measured to quantify density, species richness, and species diversity within each habitat. Seagrass cores were also collected to quantify above and below-ground biomass, leaf area index, and epiphyte load. Juveniles of several commercially fished nekton species including blue crabs (*Callinectes sapidus*), white shrimp (*Litopenaeus setiferus*), and brown shrimp (*Farfantepenaeus aztecus*) were collected, with higher density and greater species diversity in seagrass compared to unvegetated bottom. These results reinforce the importance of seagrass within GNDNERR as essential nursery habitat and can be used to inform management and long-term planning.

ORAL PRESENTATIONS

Student Presentation

Short-term (96-h LC50) ammonia tolerance of fingerling blue (*Ictalurus furcatus*), channel (*I. punctatus*), and hybrid (*I. furcatus* × *I. punctatus*) catfish

Hayin Tamut and Peter J. Allen

Mississippi State University

To maintain sustainable commercial catfish production, water quality is critical in culture systems. Fish are particularly sensitive to ammonia concentrations, with excess ammonia leading to adverse physiological consequences such as reduced growth and increased mortality. In water, ammonia occurs in two forms as ionized ammonia, NH4+, and un-ionized ammonia, NH3. The toxicity of ammonia is influenced by its metabolism, excretion and detoxification. Ammonia is toxic in both forms, but is generally more toxic in the un-ionized form. As pH and temperature increase, the relative proportion of unionized ammonia increases. The unionized form can readily cross from water into fish if concentrations are higher than internal concentrations. Ammonia has a number of direct effects on the gills, circulatory system, and immune system and causes oxidative damage. However, little is known about the comparative differences in ammonia tolerance among commercial catfish species. Therefore, the LC50 of ammonia was examined in blue (*Ictalurus furcatus*), channel (*I. punctatus*), and hybrid (*I. furcatus* × *I. punctatus*) catfish over 96 hours. Other water quality variables (i.e., pH, dissolved oxygen and temperature) were maintained similarly among treatments. Preliminary results indicate all catfish species examined were relatively tolerant to ammonia compared to many other temperature freshwater species and channel catfish may have greater ammonia tolerance than blue or hybrid catfish. Results will be discussed in the context of aquaculture and fisheries management of catfish species.

ORAL PRESENTATIONS

Student Presentation

Seasonal changes in space use for three trophically-distinct fish species in a coastal bay system

Austin Draper[1], Paul O. Grammer, Mark S. Peterson[1], and Michael J. Andres[1]

[1]Division of Coastal Sciences, The University of Southern Mississippi
[2]Center for Fisheries Research and Development, The University of Southern Mississippi

The Mississippi Sound is a highly productive estuarine system featuring multiple, smaller bays and subsystems. Seasonal patterns of fishes moving through these areas has yet to formally be described. For this region there is a need of baseline movement data as these areas are experiencing increased pressure from human development, recreational fishing, coastal erosion, and oyster reef loss. The objective of this study was to describe seasonal movements of three different fish species that feed at different trophic levels. Bull Shark (BS), Red Drum (RD), and Gulf Sturgeon (GS) were implanted with acoustic transmitters and tracked using fixed-receiver acoustic telemetry within and around St. Louis Bay, MS from 2017-2020. In total, 20 BS and 36 RD were tagged with average length of 76.2 cm fork length (FL) and 62.6 cm total length (TL), respectively. In total, 75 GS were detected with sizes ranging from ~40-190 cm FL. We modeled space use using dynamic Brownian bridge movement models and found that co-occurrence changed seasonally and varied by year. Overall, BS and GS had the most spatial overlap across months, whereas RD-GS and RD-BS spatial overlap only occurred during shorter periods. All species had unique patterns of presence and absence from the St. Louis Bay area, but when present, overlap was common for all species despite feeding at different trophic levels. The mouth of St. Louis Bay had particularly high usage for all species. This may be occurring due to it being the only corridor into and out of the bay and therefore this is a high value habitat for species whose spatial usage patterns involve both bay and sound movement patterns.

ORAL PRESENTATIONS

Source contributions to nekton in an oligohaline ecosystem

Keith Chenier[1], Kelly Darnell, Marcus Drymon[1], and Eric Sparks[1,3]

[1]Mississippi State University;
[2]The University of Southern Mississippi;
[3]Mississippi-Alabama Sea Grant

Fringing salt marshes and submerged aquatic vegetation are critical components of estuarine ecosystems that provide numerous benefits to nekton. Given the habitats' proximity to one another and tidal amplitude, nekton may have the opportunity to use both habitats in a single day. Numerous studies have been conducted in meso- or polyhaline environments where true seagrasses are the dominant type of aquatic vegetation and the faunal community is marine. The findings of these studies vary, but several have indicated that salt marshes and seagrasses may serve as redundant habitats. However, the roles of aquatic vegetation and fringing marshes at providing habitat benefits (e.g., nutrition) are poorly understood in oligohaline environments, particularly in the northern Gulf of Mexico. To my knowledge, no studies have evaluated the roles of aquatic vegetation (i.e., *Vallisneria americana*) and fringing marsh (i.e., *Juncus roemerianus*) in fueling food webs in an oligohaline system. Therefore, for this project I propose to quantify the roles of each at providing dietary needs for nekton using the Back Bay of Biloxi, MS as a study system. The objectives of the study are to: 1) determine the dominant basal carbon source of nekton and 2) determine the seasonal variation of source contributions to nekton. Results of this study will improve understanding of the food web in oligohaline environments and could directly inform future restoration efforts as well as fishery management strategies in similar ecosystems. Results to date are variable, however consumers appear to be obtaining nutrition from both marsh grasses and aquatic vegetation. There is also a close correlation between 2 basal carbon sources of interest, *J. roemerianus* and *V. americana*.

ORAL PRESENTATIONS

An Overview of the MDMR Estuarine Seine Project

Chris Graham, Jonathan Barr, and Trevor Moncrief

Mississippi Department of Marine Resources

The state of Mississippi is home to numerous targeted estuarine species that provide commercial and recreational opportunities for a large proportion of the coastal community. Some of these species include Spotted Seatrout (*Cynoscion nebulosus*), Red Drum (*Sciaenops ocellatus*), and Southern Flounder (*Paralichthys lethostigma*). In an effort to increase knowledge on the recruitment and spatial distribution of juveniles of these species, the Mississippi Department of Marine Resources (MDMR) initiated an estuarine seine program, through funding provided by Gulf States Marine Fisheries Commission (GSMFC), that expands across the three coastal counties. Current sampling locations include two sites in each county (Hancock, Harrison, Jackson) with four additional sites being added to Harrison County as a compensatory switch from Brown Shrimp Post Larval (BPL) monitoring. These basins consist of estuarine marshlands primarily containing muddy or loamy sediment. Each site was sampled once per month throughout all months of the year. Staff utilized 50-foot bag seine with 1/8-inch mesh which were pulled 9.1-m (30') using tether lines as guides. Samples were divided by species, enumerated, measured (standard length, mm) and weighed with cumulative and individual weights (grams). This presentation will cover summary findings for this project through December 2022 and examine the basin-level differences of catches.

ORAL PRESENTATIONS

Mississippi Pearls: An overview of current freshwater mussel research in Mississippi

Robbie Ellwanger and Calvin Rezac

Mississippi Department of Wildlife, Fisheries, and Parks: Mississippi Museum of Natural Science

The State of Mississippi currently holds 85 species of unionid mussel, including 16 species listed by the United States Fish and Wildlife Service as either threatened or endangered. Currently, 9 other species found in Mississippi waters are being considered for listing by the USFWS, with up-to-date data needed for each species. Information is also needed for all species of conservation concern within the state to complete the 2025 State Wildlife Action Plan. The sporadic sampling of the mussel fauna of Mississippi through time has left large gaps in the current knowledge of the statuses of some of the state's most imperiled species. Recently, biologists for the Mississippi Department of Wildlife, Fisheries, and Parks in conjunction with the USFWS have created a full distribution database for all vouchered mussel specimens known from the state of Mississippi. Biologists at MDWFP have also begun conducting system-wide mussel surveys across the state, focused on determining species occurrence, species richness, and CPUE. Herein, we discuss the importance of freshwater mussel conservation in Mississippi and current MDWFP projects focusing on freshwater mussels in the state.

ORAL PRESENTATIONS

Paddlefish movement and determination of potential prey items in the Bouie River gravel pits above and below the Glendale weir

Kasea L. Price, Eric R. Haffey, and Michael J. Andres

Division of Coastal Sciences, The University of Southern Mississippi

The American Paddlefish, *Polyodon spathula*, is a highly mobile ram suspension filter feeder. Their native range covers the Mississippi River basin south to the Gulf Coast (TPWD). Their status in the Pascagoula River watershed is poorly known. They are listed as vulnerable on The IUCN Red List of Threatened Species and listed in Mississippi as a species of special concern. Population decline is due to historical overharvest, habitat loss, and interrupted migration pathways (e.g., damns, sills, weirs). Objectives for this research are to determine patterns of Paddlefish movement in the lower Bouie River (a highly altered system comprised of a series of four lakes separated by a weir from historical gravel mining), determine if they move around a weir, and determine relative differences in potential prey items. We tracked movement of 13 Paddlefish using an acoustic telemetry array in the mouth of the Bouie River and throughout the Leaf River beginning in May 2022. Drift nets were set above and below the weir in April, May, and June of 2021 and 2022 to determine potential prey items. Paddlefish tagged below the weir stayed within this system, no fish were observed above the weir or moving into the Leaf River. Next, we looked at occurrence of potential prey items, focusing on the lower pits to see if prey abundance might be significant. We found a strong occurrence of Ephemeroptera, Cladocera, and Plecoptera, all potential prey items. Cladocera was the dominant available food source in April while Ephemeroptera was dominant in May and June. We suspect this altered stretch of the Bouie River offers Paddlefish plenty of foraging opportunity directly adjacent to potential spawning habitat, resulting in this highly mobile species displaying “lazy” behavior.

ORAL PRESENTATIONS

Evolution of crappie fishing and fisheries management in Mississippi, 1950s – 2020s, with emphasis on the USACE flood control reservoirs

Keith Meals and Arthur Dunn

Mississippi Department of Wildlife, Fisheries, and Parks

The four northern Mississippi US Army Corps of Engineers (USACE) flood control reservoirs (FCRs) are widely recognized as some of the best crappie fisheries in the state and nation. Since their completion in the 1950s, crappie fishing and management have evolved due to a suite of co-occurring and interrelated factors, including USACE rule curve changes, reservoir aging, extreme water level conditions, innovations in fishing and communication technologies, fisheries research and sampling, tournaments, fishing guides, economic conditions and impacts, and angler desires and expectations. A timeline of changes in statewide and lake specific regulations and some of the factors that influenced those changes will be presented, as well as potential future challenges and trends.

ORAL PRESENTATIONS

Using historic and contemporary fish assemblages to assess oxbow lakes in the Mississippi River Alluvial Valley

David S. Ruppel, N.M. Faucheux, S.G. George, K.J. Killgore, and W.T. Slack

U.S. Army Core of Engineers, U.S. Army Engineer Research and Development Center, Waterways Experiment Station

Oxbow lakes within the Mississippi River batture are dynamic in nature. Fluctuating river levels impact the level of connectivity which can range between completely disconnected from the mainstem to fully inundated lakes with flowing currents. Fish communities that are associated with oxbow lakes can be impacted by the level of connectivity throughout the year. Using historical and contemporary data can provide insight into how disturbances shape the current community. The objectives of this study were twofold: 1) assess fish communities among five oxbow lakes to determine if species composition differs; 2) assess historic data in two oxbow lakes to see how fish communities have shifted through time. The Fish and Invertebrate Ecology Team sampled five oxbow lakes within the batture during the fall and winter of 2022. Each lake was split into three sections, upper, middle, and lower, and each section was electro-fished for a total of 20 minutes. We assessed differences between lakes using number of families, core species, one-time species, and diversity indices including evenness, Shannon, and Richness. Additionally, we assessed how fish communities changed in two lakes over a 20-year period. Communities were similar for most lakes sampled but varied with depth and other environmental variables. Additionally, we assessed how fish communities changed in two lakes over a 20-year period to determine if they maintained a loose equilibrium or if they show stark differences due to the invasion of silver carp. Results from this study demonstrate how fish communities respond to sedimentation of oxbow lakes and other disturbances in the lower Mississippi River.

ORAL PRESENTATIONS

Long-term links between channel morphology and fish assemblages in modified Yazoo Basin streams

Nicky M. Faucheux[1] and Leandro E. Miranda[2,3]

[1]U.S. Army Core of Engineers, U.S. Army Engineer Research and Development Center, Waterways Experiment Station;
[2]Mississippi Cooperative Fish and Wildlife Research Unit, Mississippi State University;
[3]U.S. Geological Survey, Mississippi Cooperative Fish and Wildlife Research Unit

In addition to having high diversity of stream fishes, the hill streams of Yazoo Basin have a long history of land use modification and subsequent erosion control issues. To address widespread instream erosion, over 160 low-drop grade control structures (GCS) were installed in the late 1980s and early 1990s as part of the federally funded Demonstration Erosion Control project. We assessed the effects of these GCS on channel morphology and fish assemblages approximately 30 years post-installation. To assess GCS effects on channel morphology, stream cross-sections were used to calculate Bank Height Ratio, Width/Depth Ratio, and Entrenchment Ratio, while point estimates made along the transects were used to calculate the average sediment size distribution. Analyses revealed that the GCS were successful in checking channel incision moving headward in the streams: sites upstream of the GCS were less incised and had greater accumulations of fine substrates compared to downstream sites and sites on streams lacking erosion control structures. The GCS could potentially affect fish assemblages through two different mechanisms: 1- habitat modification or 2- selective filtering of the assemblages by acting as barriers to upstream migration. Analysis of beta diversity revealed that diversity was driven by species replacement rather than nestedness, which indicates that differences in the assemblages were due to differences in habitat rather than barriers to fish passage. Analysis of catch per effort data confirmed differences in assemblage structure that echoed the instream habitat differences revealed in stream morphology analysis.

ORAL PRESENTATIONS

Using detection and occupancy modeling to assess the status of Bluenose Shiner (*Pteronotropis welaka*) in Mississippi

Calvin R. Rezac[1], Abigail J. Shake[1], Chris P. Flaherty[1], Robert J. Ellwanger[1], and David A. Schumann[2]

[1]Mississippi Department of Wildlife, Fisheries, and Parks, Research Department of Mississippi Museum of Natural Science;
[2]University of Wisconsin – La Crosse

The Bluenose Shiner, *Pteronotropis welaka*, is a small-bodied fish with a wide, disjunct distribution throughout the southeastern US. Recent status assessments in neighboring states have declared the species vulnerable to extirpation because of habitat loss and fragmentation. However, the Bluenose Shiner is also regarded as being difficult to collect due to the habitat the species is often found in (i.e., sluggish, deep pools with aquatic vegetation). Given the species' specialized habitat requirements, we ask are Bluenose Shiners rare or do previous efforts reflect sampling methods with a low probability of detection? In Mississippi, the species occurs within three major drainages (Pearl, Pascagoula, and Jourdan) but, to our knowledge, no statewide status assessment has ever been attempted. We present the findings of our study in which we used an occupancy-modeling approach that incorporates estimations of detection probability to assess the status of Bluenose Shiner within all three major drainages of occurrence. We also aim to guide future survey efforts by identifying site and landscape level features that are important for species occurrence. In 2022, we detected Bluenose Shiner using a 10 ft. seine at 26 of 89 sites (29%) with a catch-per-unit-effort of 34.4 (fish/hour). Bluenose Shiners were uncommonly collected (9% of hauls) and detection was low (0.27), but in ideal habitat was locally abundant. The modeling approach we used increased our confidence in our survey results and provided information on where and how much to sample for during future surveys. Although Bluenose Shiner are still found in all three drainages in Mississippi, the historical range of the species appears to have retracted. In our study the species was limited to small headwater streams. Continued habitat loss is of concern for the species and future surveys should focus on novel headwater streams to identify new populations.

ORAL PRESENTATIONS

Extending Our Reach: A multi-state collaborative approach to reef fisheries Extension

Marcus Drymon

Mississippi State University, Mississippi-Alabama Sea Grant

Southeastern United States reef fisheries are some of the most commercially valuable and recreationally popular in the country. Across these fisheries, a speciose assemblage is targeted by a diverse and geographically variable group of stakeholders who collectively possess a wealth of local ecological knowledge gained from years on the water. Broadly speaking, the goal of the proposed regional collaborative is to build upon the conventional unidirectional flow of information (i.e., from research to management to stakeholder) by working directly with stakeholders on a consistent basis to identify pressing research needs and communicate those needs to the scientific and management community (i.e., from stakeholder to research and management). To accomplish this, we have assembled a team comprised of Sea Grant fisheries Extension professionals from across the Southeastern US (Texas, Louisiana, Mississippi, Alabama, Florida, Georgia, South Carolina and North Carolina). We have complemented these Sea Grant professionals with a social-ecological fisheries scientist, management representatives from the Gulf of Mexico and South Atlantic Fishery Management Councils and an Advisory Panel of commercial and recreational sector stakeholders and state fisheries management representatives. Collectively, this collaborative will work to gather (Objective 1), refine (Objective 2) and communicate (Objective 3) Southeastern US reef fish knowledge to appropriate stakeholders.

ORAL PRESENTATIONS

Is there evidence of negative impacts to the Spotted Seatrout stock by the Gulf Menhaden fishery in the northern Gulf of Mexico?

Robert Leaf

Division of Coastal Sciences, The University of Southern Mississippi

Large-scale monitoring efforts for Gulf Menhaden and Spotted Seatrout are undertaken by both federal and state entities in the northern Gulf of Mexico and these efforts support quantitative statistical assessments for both stocks. Statistical stock assessment modeling supports decision-making for fishing activities. An open question of interest to state and federal managers of is to understand how monitoring data and modeled population dynamics can be used to inform the interactions of different stocks in the ecosystem. The abundance and biomass of a stock at any time are simultaneously influenced by a variety of interacting environmental and biological factors that influence mortality, movement, growth, and reproduction. Here we investigate whether patterns in Spotted Seatrout abundance, landings, recruitment, and condition are influenced by the biological and population characteristics of Gulf Menhaden. In this work, I evaluate available information to understand if there is support for the hypothesis that the Spotted Seatrout stock is deleteriously impacted by the Gulf Menhaden reduction fishery operations. There are a variety of competing hypotheses regarding why the Spotted Seatrout stocks in Louisiana and Mississippi are depressed. These include but are not limited to 1.) changes to the prey base in terms of its condition, oil content, abundance, and age structure of Gulf Menhaden, 2.) recreational fishing pressure on the stock, and 3.) changes to the Spotted Seatrout stock due to impacts on water and habitat quality. This work serves as an exploratory analysis to evaluate patterns in both stocks using the best available modeled and observed data.

ORAL PRESENTATIONS

Effects of catch-and-release fishing on Atlantic tarpon (*Megalops atlanticus*) in Puerto Rico

Wes Neal, Laura Horowitz, Sandra Correa, and Peter Allen

Mississippi State University

Atlantic tarpon (*Megalops atlanticus*) is a popular inshore sportfish species in Puerto Rico, and pursuit of this species by local tourists and island visitors contributes to the economy. This species is managed as a no-take fishery, which aims to preserve populations by catching and releasing fish that would otherwise be subjected to harvest and removal from the population. This approach assumes minimal mortality or reduced fitness of released fish, yet the process of angling can produce many sub-lethal side effects or direct mortality. In this study, charter angling for tarpon in the San Juan Lagoon system in Puerto Rico was examined to determine post-release mortality and contributing factors. Angled fish were tagged with external acoustic telemetry tags and relocated periodically to determine fate after release. Post-release mortality was estimated to be at least 4.5% (confirmed mortality) and at most 20.5% (confirmed and classified mortalities). Tag loss, which could have artificially elevated mortality estimates, was reported for some recaptures. Important contributing factors to post-release mortality include hook design, gear action, landing procedures, and air exposure. Recommendations to minimize fish harm during angling include use of heavier action gear to reduce fight time, a circle hook requirement for live bait to reduce deep hooking, maintaining fish in the water during landing and photography, and limiting air exposure to 2 minutes or less if fish are removed from the water.

ORAL PRESENTATIONS

Distribution, abundance and condition of juvenile sharks in the Mississippi Sound

Angie Hoover, Anna Millender, Jeremy M. Higgs, and Jill M. Hendon

Center for Fisheries Research and Development, The University of Southern Mississippi

The Mississippi Sound is a productive, estuarine environment, contained between the Mississippi and Alabama coastlines, and a series of natural barrier islands. It is a known nursery for numerous species of sharks common to the Gulf of Mexico; however, use is variable by species. Understanding species specific partitioning of these juveniles can provide spatial or temporal guides for aiding in the management of these species. NOAA's Gulf of Mexico Shark Pupping and Nursery (GulfSPAN) survey is a cooperative, fishery independent effort used to identify and describe coastal nursery habitat for sharks. The University of Southern Mississippi's Center for Fisheries Research and Development has participated in this survey in the Mississippi Sound annually since 2003. Sampling occurred monthly from April to October and consisted of a 186m gillnet of multiple mesh panels that fished for one hour. Shark catch was identified to species, measured, weighed, and a sex determined. Data from 2015 to 2022 were used in this analysis to compare abundance and distribution of five commonly encountered federally regulated species (*Carcharhinus limbatus, Carcharhinus brevipinna, Carcharhinus leucas, Carcharhinus isodon* and *Rhizoprionodon terraenovae*). Relative condition of each species was calculated and compared annually. These data provide information about the specific use of the Mississippi Sound by these species as well as stock performance in terms of juvenile condition.

ORAL PRESENTATIONS

A Simulated Bite Experiment Elucidates Cookiecutter Shark-Bite Dynamics

Mark A. Grace[1], Daniel Huber[2], Kevin Travis[2], Michael H. Doosey[3], Jonathan Ford[4], Summer Decker[4], and Justin Mann[5]

[1]NOAA/NMFS/SEFSC Mississippi Laboratories PEM Division;
[2]University of Tampa;
[3]University of New Orleans;
[4]University of South Florida Morsani College of Medicine;
[5]Tulane University

Cookiecutter shark-bite dynamics are notably intriguing, especially when considering natural feeding behavior has not been observed. To elucidate cookiecutter shark-bite dynamics, bites were experimentally simulated for the two cookiecutter shark species; the Cookiecutter Shark (*Isistius brasiliensis*) and the Largetooth Cookiecutter Shark (*Isistius plutodus*), using three-dimensional printed models of jaws with teeth. Bite simulations were conducted at standardized jaw bite-gape angles and ballistic gelatin was used to approximate prey flesh. Morphometric aspect ratio analysis of simulated bite wound geometrics was used for attributing bites to species, and for evaluating factors that potentially affect cookiecutter shark total length estimates when based on natural bite geometrics. In addition, the mechanics of producing simulated experimental bites provide new insights related to the necessity for cookiecutter sharks to rotate their body to create nearly symmetrical oval bite wound.

POSTER PRESENTATIONS

Student Poster

The Waters of Freshwater Mussels: A closer look at the effects of agriculture spillover on the survival of freshwater mussels in the southeast

Brittany Barner

Mississippi State University, College of Forestry Resources

Freshwater mussels are a keystone species that are slowly vanishing from the landscape of our ecosystem. This poorly understood disappearance requires our immediate intervention through study, understanding, and adjusting factors within our control to assist in the survival of this unique and imperiled class of natural water purifiers. The objective of this study is to 1) identify common agricultural run-off that may find its way into bodies of water inhabited by freshwater mussels 2) isolate a factor found to have a negative impact on the survival of freshwater mussels 3) create a baseline of tolerance (if there is one) for further study. The long-term goal is to create a reference range to assist in understanding the balance of freshwater mussels' survival and aid in learning how agricultural run-off may be adjusted to benefit both nature's water filter and the human requirement to feed the future.

POSTER PRESENTATIONS

Student Poster

Exploring seed dispersal by fish as a recovery mechanism for endangered plants in river floodplains

Breelyn Bigbee, Sandra Correa, Peter Allen, Esteban Galeano, and Fernando Yamamoto

Mississippi State University

Seed dispersal by fish is an ancient ecological interaction that likely predated dispersal by other vertebrates in wetlands. Fruit-eating fish could play a crucial role in recovering endangered floodplain plant species. In the Lower Mississippi Alluvial Valley, pondberry is a federally endangered shrub primarily affected by hydrological modifications that led to fragmentation and seed dispersal limitation. Pondberry, like other floodplain plants, produces relatively small fruits with small seeds. To explore the potential of small fish as seed dispersers of Pondberry and other floodplain plants, we will set a controlled feeding experiment to assess 1) the frequency of seed consumption by fish, 2) mechanical damage to seeds during consumption, and 3) seed viability after passage by fish guts. We will run feeding trials in a fish room using two water circulation systems with 12 tanks each. Fish will be placed individually per tank and fed fruits of common floodplain plants with small seeds (e.g., beautyberry and elderberry) to satiation. Trials will be conducted with single fruit species on fish fasting during the previous 24 hrs. We will feed fruits in the morning and provide a second meal of a commercial ration to ensure proper nutrition. We will siphon feces and collect seeds every 4 hrs for 24 hrs. We will inspect seeds for evidence of damage during consumption and test seed viability using tetrazolium. We will compare the viability of control seeds subjected to waterlogging but not consumed by fish versus those retrieved from fish feces.

POSTER PRESENTATIONS

Student Poster

A systematic review on hydrological connectivity relevant to oxbow lakes: Research concepts, progress, approaches, scales, and future directions

Hafez Ahmad, L. E. Miranda, Corey G. Dunn, and Mike Colvin

Department of Wildlife, Fisheries, and Aquaculture, College of Forest Resources, Mississippi State University
U.S. Geological Survey, Mississippi Cooperative, Fish and Wildlife Research Unit

The Lower Mississippi Alluvial Valley (LMAV) includes hundreds of oxbow lakes formed by various fluvial processes. These oxbow lakes periodically connect to the river during high water, but the mode of connection, as well as periodicity, duration, and timing of the hydrologic connectivity, vary. Hydrologic connectivity (HC) is the flow, pathways, and amount of water exchange that facilitate the movement of materials over water bodies. Hydrologic connectivity plays a significant role in regulating aquatic ecosystem services because it regulates the exchange of nutrients, sediments, chemicals, and biota. However, hydrologic connectivity has not been adequately defined or quantified. This study conducted a systematic literature review to identify possible definitions, factors influencing HC, approaches for quantifying HC, scales, and management strategies for controlling HC in oxbow lakes. The review showed that a shallow oxbow lake's fish assemblage fluctuates throughout the year depending on the lake's connectivity, while a deeper oxbow lake's assemblage remains mostly stable regardless of its distance from rivers and inconsistent connectivity. Human activities such as dam construction, levees, water management, and changes in natural factors have modified the degree and nature of HC in the LMAV. In a highly altered and invaded by exotic species floodplain, reduced hydrologic connectivity may be more desirable to limit exotic species. Various management strategies can be used to limit connectivity. This review assessed potential problems in defining and quantifying HC and future directions that can enhance understanding of HC and offer strategies for effective ecosystem management in the LMAV.

POSTER PRESENTATIONS

Student Poster

Invasive bigheaded carp distribution patterns in lakes of the Lower Mississippi Alluvial Valley

Michaela Palmieri[1], Leandro E. Miranda[2], Corey Dunn[2], Leslie Burger[3], and Dennis Riecke[4]

[1]Department of Wildlife, Fisheries and Aquaculture, Mississippi State University and Mississippi Cooperative Fish and Wildlife Research Unit;
[2]U.S. Geological Survey, Mississippi Cooperative Fish and Wildllife Research Unit, and Deptmane of Wildlife, Fisheries and Aquaculture, Mississippi State University;
[3]Department of Wildlife, Fisheries and Aquaculture, Mississippi State University;
[4]Mississippi Department of Wildlife, Fisheries and Parks

Large populations of Silver Carp (*Hypophthalmichthys molitrix*) and Bighead Carp (*H. nobilis*), collectively called bigheaded carps, can result in significant ecological, economic, and human safety impacts. In the Lower Mississippi Alluvial Valley (LMAV) bigheaded carps have been documented in major bodies of water including the Mississippi, Arkansas, Red, and Yazoo rivers. In the lakes of the LMAV knowledge of bigheaded carps distribution is lacking. The goal of this study is to increase understanding of bigheaded carp distributional patterns throughout lakes in the LMAV, a crucial step in effective invasive species management. Species Distribution Models (SDM) are used to estimate species distribution based on species occurrence and environmental predictor variables. Onsite surveys for bigheaded carps are impractical given the size of the LMAV. Local ecological knowledge (LEK) uses the knowledge of local professionals and local people about the presence and relative abundance of species. As an alternative to onsite surveys, we propose administering a questionnaire to fisheries biologists, conservation officers, other fisheries professionals, and the public to gain LEK about carp presence in the LMAV. The LMAV will be geographically stratified by fish management jurisdiction. Lakes in each jurisdiction will be ordered by extent of disconnection and selected through random systematic sampling. Environmental covariates will be obtained from existing datasets or through GIS. Maximum Entropy (Maxent) is considered a top performing presence-only species distribution modeling program. We will use Maxent to develop our SDM and to identify environmental covariates that are significant drivers of bigheaded carps distribution. We expect that inundation, connectivity, and water control structures may be significant influences of carp distribution. Understanding environmental variables that are associated with carp presence will allow us to manipulate those environmental conditions and prioritize management for vulnerable lakes to manage the spread of bigheaded carps.

POSTER PRESENTATIONS

Student Poster

Vulnerability of reservoir fish habitats to climate change

Darren J. Shoemaker[1,2], Leandro E. Miranda[1,2], Corey Dunn[1,2], Kevin M. Hunt[1], and Ryan P. Boyles[3]

[1]Department of Wildlife, Fisheries, and Aquaculture, Mississippi State University, Mississippi State, Mississippi 39762, USA (1-4)
[2]U.S. Geological Survey, Mississippi Cooperative Fish and Wildlife Research Unit, Mississippi State, Mississippi 39762, USA (1-3)
U.S. Geological Survey, Climate Adaptation Science Centers Department of Applied Ecology

Reservoir fish habitat decline due to aging is well documented, but climate change may accelerate this decline. However, models suggest climate will impact different geographic areas at varying intensities. Because of this unevenness, scientists and stakeholders need to identify which habitats are likely to experience detrimental effects. Reservoirs are uniquely valuable habitats because they serve a wide variety of ecological and societal functions, including water supply, fish conservation, and recreation. We are developing a vulnerability index for reservoirs across the United States to better prepare stakeholders for climate change during the 21st century. A database which includes relevant habitat characteristics such as reservoir size, depth, catchment, and land use for 3,825 reservoirs across the United States was obtained from the Reservoir Fish Habitat Partnership. Estimates for 19 historic (1970-2000) and future (2081-2100) bioclimatic indicators were obtained for each of the reservoirs from the climate database WorldClim at a 2.5 minute spatial resolution (~4.5 km at the equator). These indicators include various descriptors of temperature and precipitation commonly applied in climate change investigations and likely to directly influence fish habitats. We intend to use modeling to identify which reservoir habitat characteristics are influenced by the 19 bioindicators. We will then determine the differences between the historic and future climate conditions at each reservoir to estimate the intensity of the effects of climate change. From these, we can predict which reservoirs and which habitat characteristics are likely to be impacted by climate change. We will use the results of this study to create an index of vulnerability for the United States which shows where and how reservoir conditions are likely to be affected by climate. This will be a valuable tool for fish and reservoir managers to determine how to best allocate limited resources when making conservation decisions.

POSTER PRESENTATIONS

Student Poster

Development and evaluation of a derelict crab trap reward program for Mississippi commercial shrimpers

Keith Chenier[1], Alyssa Rodolfich[1], Ben Posadas[2], Caitlin Wessel[3], Ryan Bradley[4], and Eric Sparks[2]

[1]Mississippi State University;
[2]Mississippi State University & Mississippi-Alabama Sea Grant;
[3]NOAA Marine Debris;
[4]Mississippi Commercial Fisheries United

Commercial shrimpers frequently encounter various types of marine debris that cause damage to nets resulting in costly repairs and lost fishing time. One of the most common types of debris encountered is derelict crab traps. Currently, derelict traps consist of 79% of all marine debris encounters by Mississippi shrimpers. When these crab traps are caught, historically traps were returned to the water for a variety of reasons, creating a continuous, detrimental cycle among commercial fishing vessels and the coastal economy. To alleviate and quantify trap impacts on the commercial shrimping industry in Mississippi Sound, a team of researchers, extension professionals, and fishing organization leaders have developed a trap disposal and incentive program. Any shrimper registered in the program receives a reward of $5.00 for each derelict crab trap removed from the Mississippi Sound and brought to any of the designated harbors along the Mississippi Coast. The program began in 2019, and nearly 50 shrimpers have facilitated the removal and disposal of 3,204 derelict crab traps. Shrimpers also reported location and economic impact data that showed marine debris encounters costs the MS shrimping industry nearly $1,000,000 annually.

POSTER PRESENTATIONS

Student Poster

Microbiomics of Gulf Coast Fishes

Matthew Scott[1], Kayla Fast[2], Alex Rakestraw[2], Magdalene Dogbe[1], Heather Jordan[1], Sophie Picq[3], Joseph Receveur[3], Jean-François Guegan[4], Jennifer Pechal[3], Eric Benbow[3], Alexandra Bauer[3], Christine Chevillon[5], and Michael Sandel[1]

[1]Mississippi State University;
[2]The University of West Alabama;
[3]Michigan State University;
[4]Institut de recherche pour le développement;
[5]Centre national de la recherche scientifique

The southeastern United States is recognized as one of the most biodiverse ecosystems on Earth, particularly when considering macroorganisms like fish and amphibians. Relatively speaking, little attention has been paid to the microbiological diversity within this ecosystem, or to the interactions between macro and microbiological communities. Toward this end, we characterized the role that habitat and species specific parameters play on the dermal microbial communities of several wild populations of fishes in the northern Gulf of Mexico. We surveyed and cultured sportfishes, baitfishes, and macroinvertebrates from Louisiana, Mississippi, Alabama, and Florida. We used traditional 16s microbial metabarcoding to quantify and compare the dermal microbial communities across species, seasons, microhabitats and macrohabitats. Our study reveals taxon-specific effects on microbial connectivity across watersheds, and seasonal effects on the mucosal dermal microbiomes of multiple species. Results of this work provide novel insights into the role of local coastal fishes in shaping environmental microbial communities in the Gulf of Mexico.

POSTER PRESENTATIONS

Student Poster

Diversity and habitat selection among larval fish in seasonally flooded forests along the Pascagoula River

Grant Peterson, Autumn Carroll, and Sandra Correa

Mississippi State University

Seasonally flooded forests are an understudied ecosystem that provides services such as water purification, flood control, temperature regulation, and habitat for animals like fish and waterfowl. As deforestation and human-altered hydrology threaten river-floodplain forests, understanding the role these ecosystems play in the lives of aquatic organisms is critical. While research has shown that flooded forests represent key habitat for adult fish, little is known about fish in early life stages. Our goal was to determine the species composition of larval and juvenile fish communities in flooded forests along the Pascagoula River, the last major river in the USA with unaltered hydrology. We hypothesized that 1) species composition would be the same for young and adult stage fishes, 2) larval fish would be most abundant in spring and summer, and 3) flooded forests represent critical habitat for young fish. Each month between November 2021 and October 2022 (excluding June-August), we sampled fish in three flooded forest sites along the upper and lower reaches of the Pascagoula River using a set of three light traps and one mini-fyke net per site. Traps were soaked over two nights, and we retrieved fish and invertebrates each morning. We recorded depth and water quality measurements, such as chlorophyll-a (a proxy for phytoplankton production), pH, conductivity, ammonium, and temperature, using a HydroLab sonde. Ultimately, 2,326 fish were captured and preserved in 99% ethanol. In the lab, fish were photographed, measured, and sorted into 46 morphotypes. Muscle samples from 397 fish were taken and prepared for Sanger DNA sequencing, which will be used for taxonomic identification. Over the coming months, we will conduct multivariate (ordination) and matrix correlation (Mantel test) analyses to assess spatiotemporal trends in species distributions and to compare with existing data on adult fish collected in the same sites.

POSTER PRESENTATIONS

An Update to the Fishes of Mississippi Checklist

Robert J. Ellwanger[1], Calvin R. Rezac[1], John S. Peyton[1], Michael J. Andres[2], Jacob F. Schaefer[3], William T. Slack[4], and Matthew D. Wagner[5]

[1]Mississippi Museum of Natural Science, Mississippi Department of Wildlife, Fisheries, and Parks;
[2]Division of Coastal Sciences, The University of Southern Mississippi;
[3]The University of Southern Mississippi;
[4]U.S. Army Engineer Research and Development Center Environmental Laboratory EEA,
[5]U.S. Fish and Wildlife Service

The novel work by Fannye A. Cook (1959) established a list of 145 native freshwater species including two introduced species across 21 families and an additional 39 saltwater fishes which invade freshwater from 22 families. Forty-two years later, Ross et al. (2001) produced an update to the original publication on Mississippi fishes which listed 217 (14 introduced) inland species within 25 families based on just over 92,000 records. An updated checklist was needed as there have been recent technological advancements in the field of taxonomy and more than two decades worth of ichthyological studies on the occurrence of Mississippi fishes since Ross et al. (2001). Herein, we present an updated assessment of the ichthyofauna within the state of Mississippi, including both freshwater and select euryhaline species, based on the Fishes of Mississippi database of over 230,000 records.

POSTER PRESENTATIONS

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

Faith Robinson, Gary Gray, and Jeremy Higgs

Center for Fisheries Research and Development, The University of Southern Mississippi

The sustainability of commercial and recreational fisheries is dependent upon data-driven fishery management practices. To help inform resource managers, collecting life history parameters, especially age and growth estimates, of targeted species is essential. In the northern Gulf of Mexico, the Red Drum (*Sciaenops ocellatus*) is an important recreational and commercial species with all fishery-dependent take occurring within state-managed waters. However, this species migrates offshore at a larger size and age, which limits the availability of data for these size classes. One way to collect data for these larger fish is through fishery-independent surveys. Researchers at The University of Southern Mississippi's Center for Fisheries Research and Development have conducted bottom longline surveys since 2007 and gillnet surveys since 2004 that allow for the catch of Red Drum to conduct these life history studies. The current study examined archived Red Drum samples (i.e., otoliths) to determine age estimates, model growth, and calculate length-at-age models. For this project, we have extracted, cut, and aged 158 otoliths from Red Drum ranging in size from 267 - 1062 mm in total length. Observed ages ranged from 0-42 years with the oldest observation recorded from a female Red Drum (1062 mm total length). A multi-model approach was taken to examine growth and preliminary analysis indicates that the growth rate declines after the first five and six years, for males and females respectively. Results from the current study were also compared to previous studies within the region to determine if there has been a shift in observed age or growth parameters. The current study highlights the importance of fishery-independent sampling to provide resource managers with the data necessary to ensure the future sustainability of these important sportfish in the northern Gulf of Mexico.

POSTER PRESENTATIONS

Seasonal variation of demersal fish communities in the northern Gulf of Mexico from historic bottom trawl survey

Rachel Longmire, Olivia Lestrade, Angie Hoover, Lillian Collins, and Jill Hendon

Center for Fisheries Research and Development, The University of Southern Mississippi

Many commercially and recreationally important demersal fish and invertebrate species reside in the northern Gulf of Mexico. The Southeast Area Monitoring and Assessment Program (SEAMAP), a cooperative effort between federal, state, and academic entities, has been conducting fishery-independent surveys in the Gulf for decades with the goal of providing valuable long-term monitoring data to stock assessment and management efforts. One of the SEAMAP programs is a seasonal (summer, fall) Shrimp and Groundfish Bottom Trawl Survey, conducted annually along the continental shelf in the northern Gulf. The survey provides diversity, abundance, and distribution data on encountered demersal invertebrate and finfish groups. The University of Southern Mississippi's Center for Fisheries Research and Development (CFRD) is the State of Mississippi's SEAMAP partner and has participated in this survey since 1985. For this analysis, trawl stations (n=250) conducted between the years 2015 and 2021 within NOAA shrimp statistical zones 10 and 11 were used. This area is in a region known as the fertile fisheries crescent and is renowned for its abundant biota. The analysis conducted herein will compare the summer and fall catch to determine if there is seasonal signature in finfish diversity and abundance in these zones.

POSTER PRESENTATIONS

Salinity driven differences in species diversity in Biloxi Bay Estuary: a preliminary investigation

Nicholas Stewart, Jeremy Higgs, and Lillian Collins

Center for Fisheries Research and Development, The University of Southern Mississippi

Collection of data on early life history stages is useful in the assessment of recruitment success of commercial and recreationally important species. Seine sampling has historically been included in the Fisheries Assessment and Monitoring of Mississippi's Inter-jurisdictional Marine Resources project as a way to sample juvenile fish with collected data reported for use by marine resource managers. In early 2022 the seine sampling sites were revamped to include coastal habitats more likely to be utilized by species of commercial and recreational importance in Mississippi. Six new seine sampling sites were established in the Biloxi Bay estuary. These sites can be separated into areas of more freshwater influence with average salinity being < 7 ppt. (Popp's Ferry, Mullet Lake, and Fort Bayou) and areas that are influenced by saltwater input from Mississippi Sound with average salinity being > 11 ppt. (Grand Bayou, Marsh Point, and Bellefountaine). The catch from the new survey design from May 2022- December 2022 were summarized to look at species diversity across the sites as well as differentiate catch between localities. A total of 72 species were reported with the most common species being Bay Anchovy (*Anchoa mitchilli*), Inland Silverside (*Menidia beryllina*), and Gulf Menhaden (*Brevoortia patronus*). The most common invertebrates were Grass Shrimp (*Palaemonetes* sp.), White shrimp (*Penaeus setiferus*), and Brown shrimp (*Penaeus aztecus*). This provides insight of the species richness in the Biloxi Bay estuary with reasons to believe salinity may be an indicator for greater species diversity.

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