



NAVIGATING WAVES OF CHANGE

Alabama-Mississippi
Bays and Bayous
Symposium

Book of Abstracts

Nov. 28-29, 2018



Arthur R. Outlaw Convention Center



Mobile, AL

Abstracts

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Africatown Connections Blueway: Healing Begins by Reclaiming Our Heritage & Happiness *(Oral)*

Liz Smith-Incer - National Park Service Rivers, Trails & Conservation Assistance Program

Broadening the Audience for Conservation Using Art Programs *(Oral)*

Ayesha Gray - Grand Bay National Estuarine Research Reserve

Connecting Water Quality Parameters and EJSCREEN Values in Mobile County, AL *(Oral)*

Ellie Mallon and Diego Calderon-Arrieta - Mobile Baykeeper

Do We Know What We Don't Know About Living Shorelines? Perspectives from End-Users *(Oral)*

Eric Sparks - MS-AL Sea Grant Consortium; Mississippi State University

Dreams Do Come True... Partnering with State Agencies to Provide Environmental Education to Schools *(Oral)*

Ashley Campbell - City of Daphne

Embrace the Gulf – A Yearlong Campaign for the Gulf of Mexico *(Oral)*

Lee Yokel - Dauphin Island Sea Lab; Gulf of Mexico Alliance

Faunal Assemblages Associated with Living Shorelines and Implications for High-Wave Energy Ecosystems *(Oral)*

Daniel Firth - Mississippi State University

Leveraging Partnerships for Effective Educator Workshops *(Oral)*

Tina Miller-Way - Dauphin Island Sea Lab

Promoting Nature Based Tourism in Coastal Mississippi *(Oral)*

Melissa Pringle - Allen Engineering and Science, Inc.

Resilience to Future Flooding in the Gulf of Mexico *(Oral)*

Mikaela Heming - Northern Gulf of Mexico Sentinel Site Cooperative

Seagrass Monitoring in the Pensacola Bay System: A Partnership Between Citizens and the University of West Florida *(Oral)*

Jane M Caffrey - University of West Florida Center for Environmental Diagnostics and Bioremediation

Strategic Watershed Awareness and Monitoring Program (SWAMP): Empowering Citizen Scientists *(Oral)*

Ilka Porter - Mobile Baykeeper

Swift Tract: Slow Down the Waves and Speed up the Oysters *(Oral)*

Jacob Blandford - The Nature Conservancy

The National Water Extension Program: Water Information for Everyone *(Oral)*

Karen Bareford - MS-AL Sea Grant Consortium; University of Alabama

The National Water Model: Transforming Water Modeling *(Oral)*

Karen Bareford - MS-AL Sea Grant Consortium; University of Alabama

The NOAA Water Initiative: A New Era of Water Information *(Oral)*

Brenna Sweetman - The Baldwin Group, Inc.; NOAA Office of Coastal Management

To Plant or Not to Plant Along Breakwater-Protected Shorelines in a High Energy Environment *(Oral)*

Sara Martin - Mississippi State University

10 Things that Need to be Considered in Ecological Planning and Design

(Oral)

Abstract Description : The objective of this presentation is to outline 10 things that need to be considered in ecological planning and design. Ecological design is defined by Sim Van der Ryn and Stuart Cowan as "any form of design that minimizes environmentally destructive impacts by integrating itself with living processes." Furthermore, ecological design is an integrative, ecologically responsible design discipline. The forces of current global conditions hovering over the human race today - population densification and growth, unbridled urbanization, changing climatic conditions, food production, and biodiversity loss to name a few, alter ecosystems and cause environmental damage from the local to the global. To address these conditions, many landscape architects are shifting to a more systems-based and ecologically-driven approach to the design of landscapes. For those less familiar with the principles of ecological planning and design, the following 10 considerations will be further defined and discussed: 1) Ecological Context 2) Scale Linking 3) Systems Hierarchy and Flow 4) Green Infrastructure 5) Ecosystem Services 6) Natural Disasters 7) Designing for Change 8) Transdisciplinary 9) Design with Nature 10) Speculation Ecological planning and design will continue to play a critical role in the shaping of our future habitats. The aforementioned points are 10 that are considered fundamental, complex, and interesting.

Christopher Grant ^{1*}

Watermark Design Group

Resilience

A 21 Year Evolution of Environmental Advocacy in Coastal Alabama

(Oral)

Abstract Description : Mobile Baykeeper began in 1997 with volunteers from Mobile Bay's western shore working to protect their home, their families and their incomes. The founders set the stage to expand the work and the leadership to cover both sides of the Bay and the statewide issues that affect the watershed and our coastal communities. Mobile Baykeeper has built a reputation for being the environmental watchdog, a collaborator for solutions and the informed voice of reason working for clean water, clean air and healthy communities. By creating capable and stable staff, involved board, and broad community support, Mobile Baykeeper is working for responsible growth, driving smart investments in infrastructure and educating and engaging the community to help drive the messages home. Growing responsibly means we research new projects and expansions; support and participate in all planning efforts; and work to ensure the projects chosen work toward the triple bottom line - strong economy, healthy environment, thriving community. Combining knowledge of the laws and regulations established to protect our waterways with on the ground research, Mobile Baykeeper provides evidence based information to protect swimmable, fishable, drinkable water. While Mobile Baykeeper takes great pride in knowing the laws, rules, issues, etc., we strongly believe an educated community is the best tool to ensure long-term sustainability of our natural resources. The Strategic Watershed Awareness and Monitoring Program (SWAMP) and projects like Litter Free Mardi Gras are designed to teach the importance of watersheds and instills a lifelong commitment to conservation and environmental protection.

Laura Jackson ¹

Mobile Baykeeper

Casi Callaway ^{2*}

Mobile Baykeeper

Outreach and Education

A GIS Approach to Determining the Impact of Large-scale Breakwaters on Fringing Marsh Vegetation *(Oral)*

Abstract Description : Shoreline erosion is a major concern of coastal land managers. The related loss of associated ecosystem services, such as improved water quality and provision of habitat, are also concerning. To reduce erosion, land managers often install nearshore breakwaters to attenuate wave energy. Practices, like these, have accelerated along the Northern Gulf of Mexico coast due to funding associated with the Deepwater Horizon Oil Spill. However, evaluations of the effectiveness of breakwaters at preserving or enhancing natural shorelines are limited. To evaluate the effectiveness of large-scale breakwaters at enhancing shoreline vegetation in high wave energy environments, a shoreline monitoring program began landward of five-year-old breakwaters (OBW), recently constructed breakwaters (RBW), and reference no breakwater sites (NBW) along Bon Secour Bay, AL in 2017. Monitoring covers 4.8 km of consecutive shoreline. The OBW, RBW, and NBW complexes cover 0.6 km, 3 km, and 1.2 km, respectively. In all sites, the perimeter of natural *S. alterniflora* patches were field mapped in winter 2017, summer 2017, winter 2018, and summer 2018 using a Real Time Kinetic (RTK) Global Positioning System (GPS) to compare fringing marsh area across complexes. Preliminary results indicate no significant effect of breakwaters on vegetative cover. If these trends continue throughout the duration of the monitoring, they will show that similarly designed breakwaters could have minimal impact on preserving and enhancing shoreline vegetation in high wave energy environments.

Gillian Palino ^{1*}

Mississippi State University

Andrew Lucore ²

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Nigel Temple ³

Mississippi State University

Sara Martin ⁴

Mississippi State University

Daniel Firth ⁵

Mississippi State University

Eric Sparks ⁶

MS-AL Sea Grant Consortium; Mississippi State University

Outreach and Education

A Hierarchical Bayesian Surplus Production Model for Blue Crabs (*Callinectes sapidus*) in the Northern Gulf of Mexico *(Oral)*

Abstract Description : Assessment of stocks such as Blue Crab (*Callinectes sapidus*) in the northern Gulf of Mexico (nGOM) are challenging, partly, because age-structured approaches cannot be used. To overcome model limitations and data availability challenges, we constructed a surplus production model for the gulf-wide stock, evaluated in a Hierarchical Bayesian (HB) framework. 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 (IOA). The HB approach allows the inclusion of prior information and the designation of regional hyperparameters to facilitate estimation of parameters and explicitly model uncertainty. We used commercial harvests and fishery-independent survey data from all five Gulf states. Region-specific hyperparameters for catchability and observational error were estimated from global priors. We conducted alternative model runs to evaluate the sensitivity of parameter estimates to the inclusion of different IOA. Biomass trajectories for base and alternate models were compared for the stock from 1984 to 2016. We found the model was insensitive to removal of IOA and all models showed patterns of declining biomass over the time period examined. The utility of this modeling approach is that it can be used for the determination of stock and fishery status of the Blue Crab stock at regional and Gulf-wide scales and be used to understand those states and regions that exhibit relatively greater uncertainty in relative abundance from process and observation error.

Megumi Oshima ¹ *

University of Southern Mississippi

Robert Leaf ²

University of Southern Mississippi

Wei Wu ³

University of Southern Mississippi

Living Resources

A History of Causes, Patterns, and Case Studies of Manatee Mortality in the Northern Gulf of Mexico (*Poster*)

Abstract Description : Mortality of the West Indian manatee (*Trichechus manatus*) has increased in the northern Gulf of Mexico (nGOM) in recent years, corresponding with an overall increase in reported live manatee sightings in the region. To better understand manatee mortality in the nGOM, we used data jointly collected by the Dauphin Island Sea Lab's Manatee Sighting Network and the Alabama Marine Mammal Stranding Network for manatee strandings in Alabama and Mississippi. Since 1912, 18 manatee carcasses have been reported in Alabama and 10 in Mississippi, with nearly 70% of carcasses reported during the last decade. Carcasses included 15 males, 5 females, and 8 cases where sex could not be determined. Based on photo-identification, straight length, and sclerochronological aging data, carcasses ranged from 0 (stillborn calf) to ~40 years of age. Half of reported mortalities were attributed to cold stress associated with seasonally occurring water temperatures below 20°C. Other documented causes of death in the nGOM included the first confirmed mortality attributed to harmful algal bloom (red tide) exposure in Mississippi in 2015 and two cases of watercraft-related mortality in 2013 in Mississippi and 2015 in Alabama. These recent mortalities highlight the diverse and possibly increasing anthropogenic and naturally occurring threats to manatees in the nGOM region. As manatee occurrence increases in the nGOM and other areas outside of Florida, mortality data can provide important ecological and life history data to inform conservation and management practices and support recovery efforts for this protected species throughout its range.

Elizabeth Hieb ¹ *

Dauphin Island Sea Lab

Kayla DaCosta ²

Dauphin Island Sea Lab; University of South Alabama

Ruth Carmichael ³

Dauphin Island Sea Lab; University of South Alabama

Living Resources

A Holistic Assessment of Resilience to Climate Change Hazards Along the Mississippi and Alabama Gulf Coast, USA (*Oral*)

Abstract Description : How communities prepare for, respond to, and recover from the impacts of climate-related hazards is conceptualized in terms of their resilience. Communities that can increase their resilience are in a better position to absorb adverse impacts from climate-related hazards and recover from them when they occur. As a result, there is strong interest in the ability to measure resilience as a key step towards disaster risk reduction. Metrics aimed at measuring resilience suffer from a number of key limitations, however. For instance, hazard and community context are often ignored, attempts to validate resilience metrics are largely non-existent, and most indicator-based methods represent a broad-brushed approach that might neglect the true underlying drivers of resilience within communities. This presentation describes the background and preliminary stages of an MS-AL Sea Grant project that will entail the development an integrated measurement framework to better understand drivers of community resilience using “top-down” quantitative and “bottom-up”, stakeholder-led approaches. The methodology includes: a) predictions of the magnitude of climate-related hazards on communities using newly available resources; b) an accounting of business exposure along the MS-AL coast; and c) the identification of context-specific characteristics that drive resilience. With improved resilience metrics, our vision is to provide governments, risk managers, community and business leaders, and researchers new opportunities to create local initiatives and equitable public policy programs to increase the capacity of communities to mitigate, respond, and recover effectively and efficiently from damaging climate-related events.

Chris Burton ¹*

Auburn University Department of Geosciences

Chandana Mitra ²

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Ming-kuo Lee ³

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Luke Marzen ⁴

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Resilience

A Novel Entry Pathway for Domoic Acid into the Marine Food Web

(Oral)

Abstract Description : Domoic acid (DA) is a known neurotoxin produced by diatoms from the genus *Pseudo-nitzschia*. DA is responsible for amnesic shellfish poisoning and its transfer through the food web may pose a threat to human health. Copepods (e.g. *Acartia tonsa*), shellfish, and fish can act as vectors for DA; however, whether copepods accumulate DA via pathways other than direct ingestion of diatoms is unknown (e.g. particulate DA, pDA, vs. dissolved DA, dDA). An LC-MS/MS method was developed and optimized for the determination of pDA and dDA. Five experiments using field-collected seawater were conducted to assess relative grazing of *Pseudo-nitzschia* (vs. other diatom groups) and DA assimilation by *A. tonsa*. dDA and pDA concentrations throughout the experiments ranged from below the detection limit for both, up to 1.09 and 1.61 ng ml⁻¹, respectively. In one experiment, where animals were suspended in particle-free seawater, triplicated measurements found accumulated DA in copepod tissue; these data suggest ~34% of the assimilated DA entered via a dDA pathway. This experiment also had the highest *Pseudo-nitzschia* abundance (~400,000 cells L⁻¹) and cellular toxicity (6 pg DA cell⁻¹). These results demonstrate the potential for DA to enter the marine food web through a previously overlooked pathway and suggest dDA exposure may be more relevant to organisms which do not directly consume *Pseudo-nitzschia* or their primary herbivores. Such observations could explain why DA is so pervasive within the regional marine food web during *Pseudo-nitzschia* blooms despite their ephemerality.

Israel Marquez ¹ *

University of South Alabama; Dauphin Island Sea Lab

Ann Abraham ²

U.S. FDA, Division of Seafood Science and Technology; Gulf Coast Seafood Lab

Jeffrey Krause ³

Dauphin Island Sea Lab

Water Quality

A Paleoclimate Perspective on Water Policy in the Southeast (*Oral*)

Abstract Description : The historic socioeconomic damage caused by hydroclimate extremes such as drought and flooding is well documented in the Southeastern U. S. and recent events such as flooding in the Carolinas highlight the significant and ongoing hazard posed by hydroclimate variability to the natural and built environment. Determining the long-term natural variability of streamflow as well as the frequency and magnitude of extreme hydrologic events is important not only in terms of thoughtfully managing the water resources, but also in terms of providing context for understanding hazards to life, property and infrastructure, and ecological impacts. Paleo proxies of hydroclimate are limited in the Southeast; however, the available paleo records clearly indicate that instrumental observations of hydroclimate (e.g., streamflow) do not adequately represent the range of natural variability and therefore any water resource policy that does not take the paleo record into account will not stand the test of time. Water resource managers in the Southeast should heed the lessons of the Western states and not only promote the development of paleo records in the region but also use these valuable archives to inform and guide water policy.

Matthew Therrell ¹ *

University of Alabama

Glenn Tootle ²

University of Alabama

Emily Elliott ³

University of Alabama

Bennett Bearden ⁴

Geological Survey of Alabama

Resilience

A Vision for Sustainable Restoration of Salt Marsh in an Age of Rising Seas *(Oral)*

Abstract Description : Ecosystem services of salt marsh are well documented; they are dynamic, unique ecosystems, but not all salt marsh is created equal due in part to anthropogenic influences. At present this resource faces two significant challenges: wave erosion and sea level rise. Given uncertainties in published sea-level rise estimates and projections, the most optimistic projections leave us asking the question, "Will what I'm conserving or restoring be here in several decades?" For restoration practitioners, where we place our efforts for conserving, protecting and restoring salt marsh is a central question and should have a central foundation, a comprehensive salt marsh functional assessment. The backbone of this assessment is the use of a tidal fringe wetland hydrogeomorphic method (HGM). The HGM serves to quantify existing marsh function but it can also serve to estimate future restored marsh function (i.e., highest potential function) and as such can be a valuable tool in prioritizing the location of salt marsh restorations (i.e., best sites to restore for highest function) and conservation actions (e.g., oyster reef breakwaters to protect existing marsh systems). The HGM method for the Mississippi and Alabama Gulf Coast was successfully employed in the Savannah River Estuary in Georgia to site and restore over 2.4 acres of salt marsh since 2012. Despite the continued effects of wave erosion and sea level rise on our coastal systems, the HGM method for salt marsh continues to hold promise as a guide for salt marsh restoration and conservation efforts along the northern Gulf Coast estuaries.

David Vance ¹ *

Geosyntec Consultants, Inc.

Resilience

Adapting Stormwater Management for Coastal Floods *(Oral)*

Abstract Description : Severe weather and water events are increasing globally, with coastal areas identified as particularly vulnerable to weather- and water-related risks such as frequent storm events, high tide flooding, storm surge and sea level rise. Flooding can have devastating impacts on coastal stormwater management systems, and a malfunctioning stormwater system can exacerbate flooding impacts. As part of the NOAA Water Initiative, the NOAA Office for Coastal Management (OCM) is working to address this gap within coastal communities through the development of a decision support tool that will help integrate coastal total water level information into stormwater management practices. This tool, designed to be an interactive, web-based resource, will assist stormwater managers, planners, engineers and floodplain managers in examining coastal flooding impacts on stormwater systems. Information from this tool will describe impacts and implications of coastal inundation on stormwater management, help determine when and where practitioners should expect to see impacts on stormwater systems and evaluate options for future planning purposes. This presentation will provide a brief overview of OCM's new decision support tool to support the NOAA Water Initiative, "Adapting Stormwater Management for Coastal Floods."

Brenna Sweetman ¹ *

The Baldwin Group, Inc.; NOAA Office of Coastal Management

Outreach and Education

ADEM Water Quality Monitoring Programs: Current Status *(Oral)*

Abstract Description : In 1974 the Alabama Water Improvement Commission, ADEM's predecessor, created the initial surface water quality monitoring program with a network of 51 ambient trend monitoring stations statewide. In 1997, ADEM developed the initial water quality monitoring strategy to focus the Department's surface water quality monitoring mission. The strategy was updated in 2005, with the 2003 EPA Elements of a State Water Monitoring and Assessment Program as the basic framework. The 2005 Strategy outlined quality assurance plans, data management, data analysis, reporting, program review, and overall resource needs. The ADEM 2005 Monitoring Strategy was a coordinated monitoring approach designed to characterize water quality, to identify impacts from a variety of sources, and to provide a systematic and integrated framework for gathering necessary information to support the ADEM decision-making processes. The overall strategy was implemented on a 5-year rotation by river basin and incorporated a combination of targeted, probabilistic, and long-term monitoring stations to meet state monitoring goals and objectives. Progress made during the last 10 years and changes to program priorities within ADEM and EPA allow ADEM to now conduct monitoring statewide each year, while continuing to meet the ADEM monitoring goals over a five-year period. This change enabled ADEM to provide frequent, intensive monitoring within each basin group to more accurately measure trends in water quality before and after implementation of restoration efforts, respond to data needs more quickly, and to minimize the impact of weather-related events on data collected within any one basin.

Fred Leslie ¹*

Alabama Department of Environmental Management

Water Quality

Advanced Hydrologic and Hydraulic Modeling Technologies (*Oral*)

Abstract Description : State of the art hydrologic and hydraulic modeling technologies are being used in the preliminary planning and design of stream projects and stormwater management projects in Baldwin and Mobile Counties. The hydrologic model being used is the Army Corps of Engineers (ACOE) Gridded Surface Subsurface Hydrologic Analysis (GSSHA) System. This is a physics based 2-D overland flow model. GSSHA models have been used for providing discharges at multiple locations throughout the watershed for stream restoration projects, and for determining potential stormwater improvement impacts from proposed projects. Additionally, it is being used for specialty information such as the determination of timing in the West Fowl watershed to calculate how long it takes for runoff to get from the headwaters to specific outlet locations. For long term uses, it will be available for use in management of stormwater in the basin as a whole which will sustain the projects that have been worked on. The two-dimensional hydraulic model being used is the Federal Highway Administration's (FHWA) Finite Element Surface Water Modeling (FESWMS) system. This is a two-dimensional finite element hydraulic model capable of identifying high velocity and shear stress zones spatially within the stream restoration project. This type of modeling provides a reduction in risk since the proposed design surface can be modeled to determine where potential erosion would occur for a given discharge event. This presentation will show examples of how these models have been and are currently being used on various projects.

John Curry ¹*

Hydro, LLC

Water Quality

Africatown Connections Blueway: Healing Begins by Reclaiming Our Heritage & Happiness *(Oral)*

Abstract Description : The Mobile County Training School Alumni Association, made up of many descendants of the original founders of Africatown, is connecting people of all ages to the outdoors, by providing hands-on experiential education opportunities on the water and provides leadership for the Africatown Connections Blueway Planning Team. By establishing the Africatown Connections Blueway, the Planning Team seeks to re-connect their neighbors to the surrounding waterways from which they have been separated. Of primary importance is to preserve and make available the international historical significance of Africatown to communities across Alabama, the United States and the entire world in hopes of contributing to the healing process from the sadness that stems from long lost ties to Africa. Africatown, located in Mobile, Alabama, represents what is left of the area settled by Tarkbar captives brought to the United States by slave ship (The Clotilda) in 1860 (50 years following illegalization of slave trade in America). Africatown is unique in that it represents a group of Africans who were forcefully removed from their homeland, sold into slavery, and then formed their own, largely self-governing community, all the while maintaining a strong sense of African cultural heritage. The Africatown Connections Blueway Planning Team, which includes community members as well as active advisors representing academia, local government, The National Park Service, The Smithsonian, The Slave Wrecks Project, Public Lab would like to serve as a guide for others interested in fostering a dialogue about preserving a special natural space and its rich history.

Liz Smith-Incer ¹ *

National Park Service Rivers, Trails & Conservation Assistance Program

Joe Womack ²

C.H.E.S.S.

Anderson Flen ³

Mobile County Training School Alumni Association

Outreach and Education

Aging Infrastructure and How to Keep Water Working *(Oral)*

Abstract Description : Mobile Area Water & Sewer system provides water and wastewater services to approximately 275,000 people in Mobile County and water service to Spanish Fort in Baldwin County. In order to provide these critical services a large number of assets are required, including water treatment plants, pump stations, distribution system piping, sewer treatment plants, lift stations, and collection system piping. Many of these assets are out of sight and out of mind and a growing percentage are reaching the end of their useful life. In some cases repairs have been made to the assets for years and the only answer now is replacement. Wastewater assets that are reaching the end of their useful life have a greater potential to fail and the resulting sanitary sewer overflows can negatively impact water quality in our community. This presentation will provide information on the aging infrastructure issue and will give examples of how Mobile Area Water & Sewer System is addressing the sanitary sewer overflows on both a long and short term basis. In addition, it will address the challenges of funding the upgrade to the aging infrastructure while keeping in mind the affordability concerns of the ratepayers. There will also be discussion on how to balance between replacing aging sewer infrastructure with replacing those assets that provide drinking water and fire protection as well as addressing the needs for growth in order to sustain our community. We will outline our plan to Keep Water Working.

Charles Hyland ¹*

Mobile Area Water & Sewer System

Water Quality

Alabama Coastal Bird Stewardship Program (ALCBSP) (*Oral*)

Abstract Description : The Alabama Coastal Stewardship Program (ALCBSP) works to annually protect and conserve Alabama's coastal bird populations through comprehensive survey and monitoring. Together with staff and volunteers, the program complements the work of a Gulf-wide stewardship initiative to monitor and protect sensitive beach nesting species. In August 2017, Birmingham Audubon opened a coastal science office based in downtown Mobile. To date, staff have implemented both coastal stewardship and Audubon Coastal Bird Survey (ACBS) programs, collecting critical population and breeding data necessary for future conservation planning, including habitat restoration and management. During the 2018 breeding season, a total of 27 stewardship sites were identified across Mobile and Baldwin counties. Intensive data were collected on all coastal bird species, with focus on Alabama's 11 coastal species of conservation concern: Least Tern, Black Skimmer, Snowy Plover, Wilson's Plover, American Oystercatcher, Brown Pelican, Reddish Egret, Short-billed Dowitcher, Sanderling, Red Knot, and Piping Plover. This study presents preliminary data collected during the program's first year and demonstrates the value of coastal stewardship for nesting and migratory shorebirds, seabirds, and waterbirds across the Gulf of Mexico.

Katie Barnes ¹ *

Birmingham Audubon

Oil Spill

Alabama's Audubon Coastal Bird Survey (*Poster*)

Abstract Description : The Audubon Coastal Bird Survey (ACBS) program was implemented by the National Audubon Society in 2011 in response to the 2010 Deepwater Horizon oil spill. This ongoing community science driven project follows a standardized protocol that is mirrored across the gulf coast. The program provides critical baseline data that allows scientists to monitor regional population trends of coastal bird species across the Gulf of Mexico. Prior to the implementation of the Alabama Coastal Bird Stewardship Program (ALCBSP) through Birmingham Audubon, minimum and inconsistent survey efforts were being conducted in Alabama. As part of the ALCBSP initiative, staff have implemented standardized ACBS efforts during the fall, winter, and spring seasons. Alabama supports various species of conservation concern that require areas for foraging, nesting, and resting. Thus, monitoring such populations is crucial for the conservation and management planning of these coastal bird populations. These preliminary findings compare survey effort and coverage from historical surveys conducted between 2011-2016 to the current 2017-2018 ACBS data implemented by ALCBSP. Additionally, a preliminary summary of the current ACBS findings are represented, which includes detection frequencies of the state priority species by season. These surveys will continue to fill the current data gap of coastal bird populations in Alabama.

Emma Rhodes ¹*

Birmingham Audubon

Katie Barnes ²

Birmingham Audubon

Oil Spill

An Assessment of Southern Flounder in Alabama Coastal Waters (*Oral*)

Abstract Description : Southern Flounder (*Paralichthys lethostigma*) is a popular recreational and commercial finfish throughout the Gulf of Mexico. Recent landings by both commercial and recreational fishers indicate lower abundance of Southern Flounder in coastal Alabama. To evaluate these patterns and assess the current status of the stock, we synthesized fisheries-dependent and independent data and applied those data in an age-structured modeling environment. From these data sources two indices of abundances (fisheries independent and recreational CPUE), two catch at age matrixes (commercial and recreational) and growth parameters were calculated and entered into the National Marine Fisheries Service's (NMFS) ASAP model (version 3.0 April 2018 release) for the period from 2001-2017, which were the maximum number of years that met the minimum data requirements of the model. The ASAP model is a statistical catch-at-age model that allows internal estimation of a Beverton-Holt stock recruitment relationship. The assessment model indicated a stock that is experiencing a decline in overall population abundance due to low recruitment. Currently (2017) the stock biomass is above B_{msy} indicating that the stock is not overfished. However, F_{current} (the current Fishing mortality rate) is above the F_{SPR30%} (0.66 vs 0.50) indicating that the stock is currently experiencing overfishing (the rate of exploitation is too high and will lead to an overfished condition in the future). Although the stock has experienced similar lows in landings in the past (late 1980's), the results of this analysis indicate that management intervention is necessary to rebuild a sustainable stock.

Sean Powers ^{1*}

University of South Alabama; Dauphin Island Sea Lab

Mark Albins ²

University of South Alabama; Dauphin Island Sea Lab

John Mareska ³

Alabama Department of Conservation and Natural Resources

Living Resources

An Assessment of the Potential Effects Microplastics Have on the Commensal Flora of the Gut and How this Contributes to Colon Cancer

(Poster)

Abstract Description : Throughout the past couple of years, there has been a shift in the importance of marine environment awareness. An issue that is becoming a topic of major importance is microplastics. Due to the high disposal rates in conjunction with low recovery of waste materials, 8 million metric tons of plastic was being dumped into the ocean per year and it is inevitable that it has increased since then. Numerous scientific papers have been used to bring awareness to the undesirable effects these plastics have on aquatic life; however, diminutive evidence is known on the adverse effects these plastics have on humans after consumption. It is known that an imbalance in the commensal flora of the gut can lead to colon cancer, but to what extent that microplastics plays apart in this is unknown. In this study, common microplastics were assessed against frequent bacterium found in the gut respectively.

DeVant'e Dawson ¹ *

Tuskegee University

Richard Whittington ²

Tuskegee University

Water Quality

An Examination of How Urban and Rural Areas Identify Risk Perception Through Media Messages of Impending Severe Weather

(Poster)

Abstract Description : This study sought to measure risk perception and behavioral intention in rural and urban communities in Mississippi and Alabama when severe weather strikes. The aim was to examine individual responses to impending disasters based on media messages to determine behavioral intention. One segment of the FEMA National Preparedness Goal includes an examination of public information and warning of imminent danger—this was the focus of the project. We developed an experiment testing how visual cues and media messages surrounding impending disasters (e.g., tornadoes and/or hurricanes) influence an individual's risk perception and, thus, decision-making in the situation. In particular, the specific research questions addressed in this proposal include: What visual elements on the news screens/medium are most effective in increasing an individual's likelihood to take shelter from immediate or predicted danger? How does community size and makeup contribute to the effectiveness of the message? Respondents were selected from six counties along the Mississippi and Alabama coastline. The respondents were randomly placed into one of three conditions, each of which described a hypothetical "Hurricane Farrah," which was 24-to-48 hours from landfall nearby. Each condition contained a different graphic; 1) a hurricane cone of uncertainty, 2) live video of a hurricane or 3) a text-only statement from the National Weather Service. In all conditions, the NWS statement was read while the graphic was on the air. Data were collected on 466 respondents and analysis is ongoing to determine the effectiveness of the three conditions on behaviors related to disaster preparedness.

Cory Armstrong ¹*

University of Alabama

Resilience

An Interactive Gulf-based Water Quality Visualization Tool for the Gulf of Mexico *(Oral)*

Abstract Description : An interactive Gulf-based water quality visualization tool has been developed that displays multiple water quality datasets for the Gulf of Mexico over several time steps with a major focus on the Mississippi Sound. This visualization tool makes it easy for stakeholders to access water quality data via a web application located at: www.water.msstate.edu. The automated tool downloads satellite data immediately after they become available for the northern Gulf Mexico region, processes them, and then stores them on a server so that they can be assessed in near real-time. It currently downloads and processes level-2 Aqua MODIS data from NASA and displays chlorophyll-a (chl- a) on a map-based visualization. The tool visualizes 20-years of chl-a with the ability to query and visualize chl-a maps with a time slider, a layer synchronizer, and a layer swipe tool. It can also display the chl-a value at any location or generate a time series plot and display the temporal range of chl-a at any location. Planned developments will display the spatial extent of harmful algal blooms, suspended sediment concentration, colored dissolved organic matter, and ocean acidification parameters that will be derived from satellite sensors and unmanned aerial systems. Later, the visualization tool will be transformed into a decision support system. The development of this decision support system will provide scientists and natural resource managers with robust science-based resources to monitor the health and resilience of our coastal waters.

Wondimagegn Beshah ¹*

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Padmanava Dash ²

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Geosystems Research Institute; Northern Gulf Institute; Mississippi State University

Water Quality

Apparent Oxygen Utilization of Bear Point Bayou (*Poster*)

Abstract Description : Dissolved oxygen (DO), a major indicator of water quality, is also a critical component for the survival and success of aquatic organisms. However, when a hypoxic event occurs ($\text{DO} < 2 \text{ mg/L}$) and continues for extended amount of time; changes in behavior, physiological stress, and death to organisms is often the result. Ultimately these events significantly disrupt an ecosystem's balance and function. Two sites of Bear Point Bayou on the Gulf Park campus of the University of Southern Mississippi have been monitored for DO, pH, turbidity, nitrate and phosphate on a monthly basis. Results indicate low dissolved oxygen concentrations or hypoxia events in February and April 2017. Additionally, oxygen utilization values calculated on a monthly basis indicate that February and April exhibited the highest values which is consistent with a depletion of O_2 in the water column. Comparisons between the calculated piston velocities of oxygen suggest that these hypoxic events are being biologically driven rather than physically. Continued monitoring of these sites will yield data for future comparisons between nitrate and phosphate concentrations and will be valuable indicators of the biological processes dominating this unique aquatic system.

Anna Millender ^{1*}

University of Southern Mississippi

Water Quality

Application of Geotextile Tubes in Coastal Environments (*Oral*)

Abstract Description : This presentation is to demonstrate the effective use of geotextile tubes for coastal stability, erosion control, habitat enhancement, and barrier restoration. The presenter will discuss projects that include, but not limited to, Galveston Bay, where over 5 miles of coastal shoreline, beach and bay side, have been protected for near 20 years while enduring several named storms, and Raccoon Island (Barrier Island in South Louisiana). Discussion will also include the constructability and limitations for geotextile tubes and benefits. These benefits range from beneficial use of dredge material, working in poor soils, reduced sediment loads in the work area, wildlife habitat, longevity, use of native material, reduced mobilization for construction, and reduced footprint for modern containment and shoreline protection. The presenter, Dean Wickoren, has been working with tubes since the 1980s and has developed means and methods to ensure project success. This knowledge of success will be evident throughout the discussion. While ensuring success, the presenter will go in depth on the failures and downfalls of how to not install or where not to incorporate the geotextile tube. Doing tubes for over 25 years, Dean has seen success and learned from failure. To conclude, use of geotextile tubes in coastal systems throughout the gulf coast and around the world are on the rise and will be a key component to the future of marsh and barrier island creation and restoration.

Cody Colvin ¹*

Industrial Fabrics

Dean Wickoren ²

Industrial Fabrics

Resilience

Assessing Ecosystem Services Supply for Restoration Scenarios (*Oral*)

Abstract Description : One challenge for restoration efforts is to communicate the value of restoration to the public. An ecosystem services approach helps translate environmental changes into human benefits and helps the public understand the value of restoration efforts to their overall wellbeing. Here we demonstrate a publicly available ecosystem services assessment tool developed by the US EPA Office of Research and Development in open source QGIS. Restoration alternatives along the Gulf of Mexico Coastline are compared to baseline conditions for ecosystem functions such as excess nitrogen removal, storm water retention, carbon burial, and atmospheric pollution removal. These processes benefit humans by maintaining downstream water quality, mitigating floods, helping to mitigate emissions effects, and by reducing respiratory health care costs. The tool translates benefits into monetary units using common valuation techniques such as marginal replacement, social, and health care costs. Users can define new scenarios by substituting land use/cover types and/or changing transportation networks, which influence access to services. Users can visually explore an area of interest via an interactive map and to generate reports for the specific location of interest summarizing the extent of ecological features and the monetary value of the four beneficial ecosystem functions noted above. Advanced users can define land use and transportation network change scenarios and compare ecosystem service values and transportation times side by side in a report. Our tool complements other rapid assessment approaches that provide non-monetary benefit indicator metrics based on human demand and access, to compare benefits of restoring different sites.

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Habitats

Assessing Marine Debris Accumulation on an Urban Creek (*Poster*)

Abstract Description : Mobile Baykeeper implemented a trash monitoring plan to assess the levels and types of debris accumulation at One Mile Creek and the impact on water quality, public health and safety, and native habitats. Since the full extent of debris accumulation along the shore and below the water is currently unknown, the first phase of monitoring focused on establishing a baseline in order for improvements to be measured over time. The second phase consisted of monthly qualitative and quantitative assessments. Mobile Baykeeper utilized the Urban Rapid Trash Assessment (URTA) protocol to evaluate the effectiveness of efforts from a NOAA Marine Debris Removal grant. The URTA protocol calls for defining a representative 100 ft. reach of the stream to assess six parameters, each receiving a score between 0 and 20 for a total possible score of 120. These parameters included: level of trash, actual number of trash items collected, persistent and buoyant trash, biohazards and sharp items, illegal dumping, and accumulation of trash. Utilizing the combination of this technical, numerical monitoring assessment with relevant qualitative data, a change in URTA values by 46 points have been seen after one year of data collection, cleanups and campaign implementation. Plastic and styrofoam products makeup 91% of the composition of trash items along One Mile Creek. Mobile Baykeeper will continue to monitor campaign efforts and compare URTA to other trash assessment protocols like the EPA's Escaped Trash Assessment Protocol (ETAP) to generate feedback and promote a standardized protocol to effectively measure trash in urban watersheds.

Laura Jackson ¹

Mobile Baykeeper

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Cade Kistler ³

Mobile Baykeeper

Casi Callaway ⁴

Mobile Baykeeper

Water Quality

Assessing the Current Status of Adult Red Drum (*Sciaenops ocellatus*) in the Northern Gulf of Mexico (*Oral*)

Abstract Description : Based on the duration of the federal harvest moratorium, Gulf of Mexico Red Drum remain a data-limited species since the late nineteen eighties. Despite their popularity as an inshore sportfish, little is known about their post-escapement distribution and abundance in offshore waters of the Gulf of Mexico. The latest gulf-wide stock assessment recommended increased sampling across the Gulf of Mexico for adult Red Drum for comparison to historical data. They also recommended purse seine as the least size-selective sampling gear for Red Drum in offshore waters. To compare current age composition and update biological information for adult Red Drum, we sampled schooling Red Drum throughout the Gulf Coast from western Louisiana to the eastern Alabama barrier islands via purse seine from 2014-2017. Red Drum ranged from 561-1018 mm total length and 2-26 years old. Size distribution showed Louisiana Red Drum were larger than those collected in Alabama (K-S; $p < 0.05$); although, there was no difference in age composition (K-S; $p = 0.968$). This may be a result of higher quality forage for Louisiana Red Drum. Coarse gut content analysis also showed feeding during spawning aggregations. Overall, purse seine sampling was successful; however, due to the lack of a traditional commercial fishery and the ephemeral nature of the schools, obtaining samples via this method proved to be logistically difficult. Trends in abundance over time may be monitored through ongoing fishery independent surveys, unless a program is developed specifically for fishery independent purse seine operations.

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Living Resources

Assessing the Status of Diamondback Terrapins (*Malaclemys terrapin*) in Northwest Florida (Oral)

Abstract Description : Diamondback terrapins (*Malaclemys terrapin*) are the only resident brackish water turtle in the United States. They range from Cape Cod MA south along the east and gulf coasts. Within this range, there have been numerous projects on their biology and as many on conservation efforts. Most states within their range currently list them as either threatened, endangered, or a species of concern. Within one area of this range there is very little known about the status of the animal, the Florida panhandle. Working with partners within the Diamondback Terrapin Working Group, the University of Alabama at Birmingham, Birmingham Audubon, the University of Florida, and the Florida Fish and Wildlife Conservation Commission, Florida Sea Grant Extension has trained numerous citizen scientists to assist with surveying the occurrence of these turtles in the panhandle. Since 2007, Sea Grant has worked with over 105 volunteers training them on how to identify terrapins and terrapin nesting beaches for the purpose of updating the range of the animal and assisting researchers by providing them known nesting locations. This project extends from the Alabama state line to Wakulla County. Within this range, terrapins have been verified in all eight counties. This presentation will provide an update on the current survey and trapping efforts, as well as locations of nesting beaches.

Rick O'Connor^{1*}

Florida Sea Grant

Living Resources

Benefit-Cost Analysis of Using Offshore vs. Nearshore Sand for Coastal Restoration *(Oral)*

Abstract Description : Demand for dedicated dredging in U. S. waters has more than doubled in the past decade, with particular growth in coastal Louisiana, where an estimated 90 million cubic yards of sediment will be needed for barrier shoreline and wetland restoration over the next 50 years. Sediment acquisition for these projects is typically restricted to two sources: nearshore materials of limited quantity and quality, and Outer Continental Shelf (OCS) inputs of potentially higher quantity, quality, and costs. To date, no integrated framework has emerged for estimating costs incurred, and ecosystem service benefits derived, from projects relying on these two source materials. The objective of this study is to conduct a benefit-cost analysis of using OCS vs. nearshore sand for coastal restoration. A conceptual model is developed that accounts for direct benefits (accruing at the project site, typically accounted for) and indirect benefits (accruing at adjacent downdrift sites, typically ignored), as well as subaerial (accruing above the surface of the water contributing to island acreage, typically accounted for) and subaqueous (accruing below the surface of the water, typically ignored). Benefits estimates are based on simulated changes in island-system footprint over time under alternative environmental (e.g., weather) conditions, and ecosystem-service values taken from the literature. Costs are based on coastal restoration project contract bids obtained from the State of Louisiana and the Bureau of Ocean Energy Management. The analysis accounts for alternative cost assumptions, sand grain size, weather scenarios (key factors in such projects), and ranges of ecosystem-service values.

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Resilience

Biogeochemical Evaluation of Dissolved Organic Matter and Trace Elements Over an Oyster Bed in the Western Mississippi Sound Using Multivariate Statistics (*Oral*)

Abstract Description : The main objective of this study was to assess the dissolved organic matter (DOM)-trace element association over an oyster bed in the Western Mississippi sound. Water samples from forty-six locations were collected during four field campaigns from March to July 2018. DOM chemistry of the region was characterized using Parallel factor (PARAFAC) analysis. Results revealed the presence of five DOM components (C1-C5). C1 and C3 were terrestrial humic-like components; while C2, C4 and C5 were bacterially and photochemically processed components. DOM optical indices of the samples revealed more allochthonous DOM and less autochthonous production of DOM over the oyster bed. Analytical results indicated a steady increase in the concentration of arsenic (As; 34.3 ± 8.64 to 140 ± 12.7 $\mu\text{g/L}$), uranium (U; 0.51 ± 0.14 to 1.64 ± 0.17 $\mu\text{g/L}$), iron (Fe; 1800 ± 284 to 4714 ± 480 $\mu\text{g/L}$) and zinc (Zn; 9.27 ± 10.7 to 17.1 ± 2.02 $\mu\text{g/L}$). The mean concentrations of manganese (Mn; 17.1 ± 15.7 $\mu\text{g/L}$), copper (Cu; 8.88 ± 3.02 $\mu\text{g/L}$), mercury (Hg; 0.35 ± 0.33 $\mu\text{g/L}$) remained same, while lead concentration (Pb; 0.76 ± 0.52 to 0.08 ± 0.08 $\mu\text{g/L}$) was found to decrease during the field campaigns. Principal component analysis (PCA) indicated a strong association of As, U, Fe with suspended particulate matter and bacterially reprocessed marine DOM components. Combination of PARAFAC, PCA and hydrological data indicated that local hydrodynamics influence the biogeochemical cycling and distribution of DOM and trace elements along the oyster beds in the Western Mississippi Sound.

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Water Quality

Bivalves at Work *(Oral)*

Abstract Description : Oyster reefs are a critically endangered habitat with approximately 85% of historic reefs lost worldwide. This critical loss of an ecologically vital and economically important resource has resulted in a boom of restoration projects. However, these restoration efforts are rarely monitored to determine if the expected ecosystem services are restored. Chief among these services is the ability of oysters to improve water quality, with many projects citing a 50 gallon/day clearance rate. To assess the accuracy of this assertion, the feeding behavior of oysters, and other associated bivalves, was documented in situ along the Florida east coast. Feeding behavior of the oysters remained consistent across the region though was generally lower than the touted 50 gallons/day clearing a maximum of 15 gallons/gram/day. These data indicate that average size of the oysters within a population is important to its filtration capacity, but clearance rates can be generalized across a wide range of water conditions.

Jessica Lunt ¹*

Dauphin Island Sea Lab

Living Resources

Black Mangrove Expansion into Southeast Texas Salt Marshes (*Oral*)

Abstract Description : Climate change is enabling the redistribution of foundation species, which may affect ecologically and economically important ecosystem functions and organisms that are associated with these environments. One evident example of this distribution shift occurs in the Gulf of Mexico where black mangroves are expanding into saltmarshes. While the climate mechanism facilitating black mangrove expansion is understood, less is known about the consequences for replacing salt marsh habitat with black mangroves. Salt marshes provide habitat to many important species, including blue crabs and brown shrimp. We conducted field sampling and manipulative experiments to help illuminate some of the unknown effects from this shift in vegetation species. First, we determined if there was a change in community structure as ecosystems shift from salt marsh to black mangrove forest by collecting nekton and benthic samples from each habitat. Secondly, using tethering experiments, we measured predation intensity in salt marshes and black mangroves. We found nekton abundances to be significantly higher in salt marsh than in the black mangrove ecosystems. Predation intensity was significantly higher in the black mangrove ecosystems and may account of community differences.

Meredith Diskin ¹ *

University of South Alabama; Dauphin Island Sea Lab

Living Resources

Broadening the Audience for Conservation Using Art Programs (*Oral*)

Abstract Description : Science and art are linked disciplines; both are endeavors of discovery and creativity. Both ask questions of the natural world, explore modes of perception and expression, and pay exquisite attention to detail. At the Grand Bay National Estuarine Research Reserve, we conduct programs that use art to engage community members in conservation of Gulf Coast natural resources. Our intent is to expand our audience to a new group in the community and create an immersive experience where participants gain new perspective and value of their local habitats and creatures, as well as gain new insight into natural resource management. By creating art programs that last from half day to three days, participants are given the opportunity to explore the Reserve, find and learn about various plants and animals, and time to create original works of art based on their experience. These programs reach new and non-traditional audiences, most participants have never visited the Reserve, and many leave the Reserve with a new understanding of their local habitats and a desire to spend more time outdoors. We discuss how these ecosystems function to protect the shoreline from storms, improve water quality and fisheries, in addition to the aesthetic values of our coastal habitats. Our intention is to inspire environmental stewardship and conservation actions by educating participants about the functions of these habitats and risks they face, ongoing work to restore and protect marshes, savannas, and coastlines, and to actively encourage community members to look for peace and beauty in nature.

Ayesha Gray ¹ *

Grand Bay National Estuarine Research Reserve

Outreach and Education

Building Bridges to Better Understand Fishing Communities Cooperative Research Project (*Oral*)

Abstract Description : The Mississippi Coalition for Vietnamese-American Fisher Folks & Families (MSCVAFF) & The University of Southern Mississippi-Gulf Coast Research Laboratory (GCRL) are collaborating on Building Bridges to Fishing Communities, a capacity-building project supported by the National Academy of Sciences. Fisher folks and research scientists are conducting research on the health of oyster reefs in the Mississippi Sound, which has declined after the Deepwater Horizon/BP oil spill and freshwater inflow from the Bonnet Carre Spillway opening. The goal of the project is to foster a cross-sector relationship and cultivate trust between fishing and research communities and cultivate greater engagement of fishers to share their Traditional Ecological Knowledge (TEK). The cooperative research includes quarterly sampling of oyster reefs located in the Western Mississippi Sound, with basic water quality measurements, processing activities in the citizen science lab at the USM-Marine Education Center, followed by laboratory analysis of oysters, sediment, and oyster shells for polycyclic aromatic hydrocarbons (PAHs). Quarterly trainings are conducted with both classroom and on-the-water trainings. Additionally, trained fishers collect relevant, monthly water quality data during routine fishing trips. Further, social science research is assessing relationship-building among fisher folks and researchers. Preliminary statistics will describe fisher folks' priorities and interests. This project is unique in establishing a multi-sector partnership that addresses a longstanding community need to evaluate the health of oyster reefs, a natural resource deemed vitally important to the sustainability of fishing communities, their livelihoods, and cultural heritage.

Thao Vu ¹ *

Mississippi Coalition for Vietnamese American Fisher Folks and Families

Jessie Kastler ²

University of Southern Mississippi

Oil Spill

Building Storm Resilient and Environmentally Sustainable in a Coastal Landscape *(Oral)*

Abstract Description : As human pressures of development, pollution, and growing populations continue to increase along the Mississippi Gulf Coast, so too will the stresses placed on our coastal resources. In addition to non-climate stressors, the growing concerns relating to changing climate conditions are also affecting how we approach the integration of the built environment with the natural environments. In order for coastal communities to effectively address these challenges as we seek to achieve sustainability through community resilience, we must first understand the nature of these natural and man-made challenges. The Marine Education Centers' (MEC) original facility was lost due to Hurricane Katrina. Although the replacement project took over a decade to design and construct, the time was used wisely to develop a holistic approach to project planning and implementation, which considered not only the goals and objectives of the MEC and its mission, but the environmental setting, building efficiencies, long-term sustainability and costs. The MEC project placed a priority on a land feature/site ecology based collaborative strategy, which lead to an approach that featured resilient design over standard building architecture, and structural design features to address resiliency. This presentation will cover the design, construction, and completion phases of the MEC complex to demonstrate how projects can be managed in a resilient and sustainable manner in a sensitive coastal landscape. Topics covered will include minimizing site impacts, using the natural landscape as a means of resiliency, green design approaches, structural design, and utilizing the buildings themselves as a teaching tool.

Sam Clardy ¹*

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Larry Lewis ²

BMI Environmental Services, LLC

Resilience

Can Automated Recording Units be Used to Count Individual Marsh Birds? *(Poster)*

Abstract Description : Marsh birds are known for being highly elusive and for selecting wetland habitats that are difficult to navigate, as well as easily damaged. Automated recording units (ARUs) have been used to determine presence or absence of marsh bird species, but little is known about detection probabilities at different distances. We arranged ARUs to record calls from common Gulf of Mexico marsh bird species (e.g., clapper rail, least bittern, seaside sparrow) broadcasted from Bluetooth speakers at fixed distances. By playing calls in different number combinations of individuals, ranging from 1 to 10 birds, we were able to replicate possible real-life scenarios. To reduce interference from real bird calls, we conducted our experiment in a recently burned pine savanna habitat that had a similar herbaceous vegetation structure to the coastal emergent wetland habitats marsh birds prefer. We used Raven Pro bioacoustics software to produce sonogram images of the broadcasted calls in order to count individuals in each recording. Preliminary results show that ARUs may be useful for counting individuals at close distances (< 100m). Clapper rails had the greatest accuracy rate at farther distances (>100m) while seaside sparrows had the least. Similar to distance sampling, counting accuracy decreased for all species as the call distance from ARU units increased. The results suggest that ARUs can be used to count individuals of some species, but some limitations should be considered. With further study, ARUs may be able to supplement marsh bird surveys in remote areas to reduce disturbance and limit logistical issues.

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Living Resources

Cellulose-Based Material for Removal of Microcystin from Contaminated Water Sources *(Oral)*

Abstract Description : With the increment in the surfaces water temperature, blooming seasons of algae last longer, resulting in toxins concentrations that exceed safe limits for human consumption and recreational use. Microcystin-LR has been reported as the main cyanotoxin related to liver cancer and its abundance in water is constantly monitored. The World Health Organization stipules that the maximum concentration in water should be 1 µg/L, but the Environmental Protection Agency reported a mean concentration of 3.0 µg/L in National Lakes, and concentrations of 110 µg/L in this year blooming at Lucie River, Florida. Traditional treatments are chlorination, filtrations and ozonating, but these are not effective during blooming seasons; therefore, a need to develop new methods to remove this toxin exists. Utilizing cellulose-based products as alternative materials for water treatment hold an exciting potential for generating value-added, environmentally friendly products, which production and use can promote an important portion of the forestry economy and pulp and timber industries. In this project, we used a cellulose-based material modified with β-cyclodextrin under different conformations; the produced materials were tested for recovery of microcystin from synthetic water with a novel surface sensitive method, Quartz Crystal Microbalance with Dissipation monitoring (QCMD), which allows the following in real time of the adsorption behavior; showing a maximum recovery of 195 mg/g, which is the double when compared with other natural derived systems. Characterization of the modified substrate was performed with Fourier Transform Infrared Spectroscopy (FTIR), Thermogravimetric Analysis (TGA) and Atomic Force Microscopy (AFM).

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Water Quality

Cetacean Stranding Demographics in Alabama from 1978 to 2017: Coverage Gaps, Stranding Hotspots, and Future Directions *(Poster)*

Abstract Description : Between 1978 and 2017, 750 cetacean strandings were reported along the Alabama coast. Designated stranding response agencies changed several times during these four decades allowing for variation in response coverage, likely affecting annual stranding numbers especially during times of coverage gaps. The most common locations for cetaceans to strand, or stranding “hot spots”, along the AL coast do not appear to have changed during the last 40 years with Dauphin Island, Fort Morgan, and Orange Beach consistently seeing more strandings than the rest of the AL coast. Monitoring shifts of these “hot spots” will enable the AL Marine Mammal Stranding Network (ALMMSN) to evaluate environmental or anthropogenic changes occurring in Alabama and nearby waters as well as direct efforts for public outreach and education. After the Deepwater Horizon Oil Spill (DWHOS) in 2010 and an elongated cetacean die-off from 2010-2014, yearly cetacean stranding numbers in AL have remained higher than the historical average. The cause of this on-going elevated number of strandings is not entirely clear, but may be due to a combination of factors, including: 1) dedicated, consistent response since inception of ALMMSN in 2011, 2) an expanded knowledgebase for reporting marine mammal strandings following DWHOS and ALMMSN inception, and 3) residual effects from the DWHOS and/or increasing stressors from other (as yet) undefined causes. Establishment of the ALMMSN based at the Dauphin Island Sea Lab, enables consistent stranding response across the coverage area and better reporting of reliable stranding data in AL into the future.

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Living Resources

Changes in Crab Zoeae Composition and Timing in a Southeastern Estuary 1982-2017: Responses to Climate Change and Seasonal Variability (*Oral*)

Abstract Description : Larval recruitment is a fundamental driver of population dynamics, yet our knowledge of how different larval species respond to environmental changes remains limited. Here, I investigated long-term trends between several guilds of crab zoea and the physical environment to assess the influence of climate change and seasonal variability on larval abundance and recruitment. Biweekly sample collections (156 μm) from 1982 – 2017 were characterized by strong seasonal patterns and large abundance fluctuations between years. Preliminary analyses indicate that crab abundances were best explained by the lowest temperatures and salinities observed over the two weeks prior to sampling. However, the strength of these relationships varied as fiddler crabs exhibited relatively strong positive relationships between temperature and salinity while mud crabs exhibited the weakest relationships. Species composition underwent modest changes over the 35 years as *Uca* and *Sesarma* decreased in numbers whereas the appearance of stone crabs increased. Additionally, the first annual appearance of zoeae occurred slightly earlier over the decades as the timing of zoeae significantly depended on average temperatures for the prior month. These results suggest that regular water temperature readings may help predict the occurrence of larval release and demonstrate that zoea responses to climate variability are highly species dependent.

Benjamin Belgrad ^{1*}

Dauphin Island Sea Lab

Resilience

Changing Negative Perceptions of Sharks Through Directed Outreach Programs *(Poster)*

Abstract Description : Historically, sharks have been negatively portrayed in the media as aggressive animals that pose a threat to humans. Before the advent of shark-centric research, the only information disseminated to the public involved shark attacks, augmenting a societal fear of sharks. With increased research and education, attitudes towards sharks have become more positive. However, in general, a widespread fear of these animals remains. Research has shown that the more an individual knows about sharks, the more likely he or she is to support conservation strategies. The Mississippi State University Marine Fisheries Ecology Lab is therefore targeting this gap in shark education to encourage more sustainable fishing techniques and positive attitudes towards sharks. Through directed outreach booths and activities at conservation events, fishing tournaments, and summer camps, children K-12, as well as the general public, have the opportunity to interact with preserved sharks, jaws, and more. The hands-on opportunities to touch real sharks and communicate directly with marine scientists working in the Gulf of Mexico engages young anglers to encourage sustainable fishing practices and bolsters a positive perception of sharks. Adult anglers in Mississippi and Alabama are also targeted at these events. While some anglers discuss frustration with damage to their target catch caused by sharks, others express interest in understanding the vast array of species in the region. Through direct communication, positive responses have become increasingly frequent, signifying that expanded education opportunities may shape attitudes towards sharks in a way that creates greater support for shark conservation strategies.

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Living Resources

Channel Width as a Proxy for Wave Climate (*Poster*)

Abstract Description : Boat wake is a major source of wave energy along waterways, often leading to erosion and bank destabilization. In response, land owners and managers have used a range of shoreline protections strategies of varying costs and effectiveness to mitigate land loss. Wave climate is one of the most influential considerations for project designs and costs. Yet current best practices in most waterways rely on expensive wave energy measurements or more often, best guesses on wave energy. To improve the design and success of projects, our understanding of the effects of wave energy on coastal processes must be improved and wave energy proxies must be developed. We hypothesize that channel width may serve as a proxy for wave energy with decreased boat activity (and waves) in narrow channels. Alternatively, wider channels may allow for increased wake dissipation. To test these hypotheses, we established a channel width gradient from 500 to 60 meters at 12 sites along the Fish River in Fairhope, Alabama. Wave gages were deployed at each site and left for a 5-day period. Wave gage data from each site will be analyzed for descriptive wave statistics (e.g., significant wave height) using Matlab to describe the wave climate at each site. These statistics will then be plotted along the channel width gradient to assess relationships between them using regression techniques. Results from this study could benefit landowners and managers who need verified proxy guidelines to make informed decisions about site specific wave climate while designing shoreline stabilization projects.

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Habitats

Characterization of Marsh Spit Hydrographic Variability in Relation to Marsh Vegetation Type *(Oral)*

Abstract Description : In 2016, a comprehensive watershed management plan was developed for the Fowl River Watershed, which identified degraded marsh spits in the estuary as a top priority for conservation and restoration. The marsh spits provide critical habitat for flora and fauna and are a major determinant of the system's geomorphology and circulation. However, the spits are rapidly disappearing, likely due to a combination of sea level rise, changing salinity, and reduced sediment loads. Thus, the goal of this study was to characterize the mean and range of water surface elevation, salinity, total suspended sediments, and other hydrographic variables across salinity zones where the spits transition from freshwater marsh and forest cover to mesohaline monotypic stands of black needlerush (*Juncus roemerianus*). Water surface elevation, salinity, temperature, and oxygen were measured continuously from April 2018 to present with loggers installed in shallow wells in a freshwater spit, a transition spit, and a black needlerush spit. Spatially synoptic hydrographic surveys of the Fowl River estuary were performed monthly from January 2018 to present. Vegetation surveys of the spits were conducted during summer 2018. Relationships among these data will be presented and posed in the context of a larger project that aims to understand the bio-geomorphic evolution of these spits in response to environmental change and variability.

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Habitats

Citizens, Oysters and Changing the Culture through POP (Pensacola Oyster Project) *(Oral)*

Abstract Description : The humble oyster, *Crassostrea virginica*, provides many ecosystem services and goods which have recently been valued in economic terms. These include creating habitat for aquatic and wildlife species, the removal and retention of contaminants, sediment traps and shoreline stabilization, and flood control to name a few. In addition, the biology of oysters offers a valuable way to assess varying coastal waterbodies conditions over time. Oysters throughout the Gulf of Mexico and East Coast have adapted to wide salinity ranges and temperatures extremes including the Perdido and Pensacola Bay Systems located in the Gulf of Mexico. Land use changes, sedimentation, and stormwater impacts have altered suitable oyster habitat with lower oyster populations compared to historic levels. The Bream Fishermen Association, a volunteer monitoring organization established in 1970, has developed a partnership with a newly established oyster aquaculture venture to use oysters as biological indicators in local waters. Citizens were recruited for a pilot project utilizing triploid oyster spat supplied by an aquaculture venture. Spat were placed in cages and hung on docks in several small bayous, bays and surrounding waterways. Survival, growth and water quality conditions were monitored throughout a seven-month period beginning in the spring, summer and into fall of 2018. Results have been interesting and may provide subtle clues about the differences in water quality between nearby waterbodies. Keywords: Ecosystem Services, Bioindicators, Triploid

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Water Quality

Climate Variability in Southeast U. S. Coastal Precipitation and Streamflow *(Poster)*

Abstract Description : Precipitation gages and unimpaired (no anthropogenic influences) streamflow gages were identified in coastal regions of the Southeast United States. The influence of climatic drivers such as the Pacific Decadal Oscillation (PDO), Atlantic Multidecadal Oscillation (AMO) and the El Nino-Southern Oscillation (ENSO) on these gages were evaluated. While both the ENSO and AMO signals have been previously identified in these regions, the coupling of the high frequency ENSO with the low frequency AMO resulted in below normal annual streamflow when a La Nina occurs during an AMO Warm phase. The AMO has been in a warm phase since ~1995 and multiple La Nina's since ~2000 has resulted in historic 10-year (filtered) low flows in several streams. In addition to the use of climate indices, Pacific and Atlantic Ocean Sea Surface Temperatures (SSTs) were used to identify teleconnections between climate and hydrologic response. The use of SSTs for entire regions rather than a climate index that is based on a specific SST region removes any spatial bias as to which oceanic SST regions affect hydrology. Singular Value Decomposition (SVD) is a powerful and preferable statistical tool applied to evaluate association between oceanic atmospheric indices and streamflow. The United States Environmental Protection Agency (EPA) Gulf of Mexico (GoM) program sponsors the current research. The MS-AL Sea Grant Consortium, the United States Environmental Protection Agency - Gulf of Mexico Program and the National Science Foundation - Paleo Perspectives on Climate Change program sponsor the current research.

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Resilience

Coastal Explorers: Getting the Community Involved in Coastal Education *(Oral)*

Abstract Description : The Marine Education Center (MEC) at the University of Southern Mississippi's Cedar Point teaching-site in Ocean Springs, MS serves as the education and outreach arm of the Gulf Coast Research Laboratory. The MEC endeavors to educate the community and produce informed stewards of coastal ecosystems. In January 2018, the MEC launched the three-hour Coastal Explorer program, designed to take advantage of the new marine education campus and provide a novel outdoor educational experience in a unique, coastal setting. Teachers tailor their field trip by choosing three of eight marine science educational modules. Allowing the teachers to control the subject content generates connections to their current curriculum and their students' interests. Coastal Explorer was assigned a low fee of \$10 per student, which is financially attainable by most teachers/students in the six Mississippi coastal counties. The objective is to reduce the cost of coastal learning to bring in local groups. Establishing a relationship of local groups with the environment fosters connection within the community, and a sense of responsibility and ownership to protect the environment. To date, 1,527 students from 23 groups have participated in the Coastal Explorer program. The opportunity to tailor each group's experience to match their requirements and low-cost per student has made the program successful, ultimately allowing increased engagement within the community. As an educational center this connection and development with and for the local community through programs and outreach activities is crucial to promote coastal education.

Danielle Bailey ¹ *

University of Southern Mississippi

Ben Weldon ²

University of Southern Mississippi

Anita Arguelles ³

University of Southern Mississippi

Sam Clardy ⁴

University of Southern Mississippi

Water Quality

Compound Coastal Flooding Driven by Tropical Cyclones *(Oral)*

Abstract Description : Coastal systems around the U.S.A. are densely populated regions with rich ecosystem diversity and economic resources. Despite agreement that rising sea surface temperature (SST) is likely to intensify the strongest tropical cyclones (TCs) in the North Atlantic Ocean amid the increasing likelihood of mean sea level rise (SLR), the lack of appropriate modeling capacity has prevented providing reliable and actionable information on the coastal flood hazard to decision-makers. In this presentation, analyzing observational data from recent TC events, we highlight the importance of developing integrated frameworks to investigate the TC-driven extreme compound flood risk more accurately. Such frameworks, accounting for regional fluvial and pluvial dynamics as well as dynamics of SST and SLR, would be useful for quantifying the risk of TC-driven flooding in the southeastern U.S.A.

Hamed Moftakhari ^{1*}

University of Alabama

Hamid Moradkhani ²

University of Alabama

Resilience

Conceptualizing Human Alteration and Natural Growth in Estuaries and Savannas (CHANGES) *(Poster)*

Abstract Description : The Grand Bay National Estuarine Research Reserve (NERR) is home to estuarine marsh connecting to more upland wet pine savanna habitat. These ecosystems undergo constant change due to selective pressures, requiring continuous application of management, monitoring, and restoration. This presents a perfect opportunity to use these unique habitats and current management applications as a platform to educate students about ecological processes and applicable restoration practices. Grand Bay NERR has been awarded a National Academy of Sciences, Engineering, Medicine Capacity Building grant for science education. Our program, CHANGES, will support the development of environmental literacy and stewardship in future generations and supply direct exposure to the real-world work of natural resource managers using student-centered, field-, project- and problem-based education. Grand Bay NERR scientists and educators will collaborate to develop scientifically accurate, high quality lesson plans, curricula, and programming aligned with state (e.g. MS-CCRS for Science) and national science education standards (e.g. NGSS). This hands-on education program will be designed for 9-12th grade students and middle-school aged summer campers and will take place in an informal science setting such as the Grand Bay NERR. These STEM-based curricula will focus on estuary and savanna habitats, their ecological processes, and management and restoration. We invite natural resource managers and restoration practitioners to share their effective management, monitoring, and restoration experiences to help inform the CHANGES curriculum development.

Sandra Huynh ^{1*}

Grand Bay National Estuarine Research Reserve

Dennis McGrury ²

Grand Bay National Estuarine Research Reserve

Habitats

Connecting Water Quality Parameters and EJSCREEN Values in Mobile County, AL (*Oral*)

Abstract Description : The concept of an Environmental Justice (EJ) community is often associated with large factories, landfills and toxic waste dumps. However, there are many other factors that can cause an area to be deemed an EJ community including frequency of Sanitary Sewage Overflows (SSOs). With an interest in finding out if EJ communities in Mobile County have impaired water quality, AmeriCorps Members of Mobile Baykeeper conducted a five month (January-May) investigation of water quality in Toulmins Spring Branch and Three Mile Creek. Sampling consisted of bacteriological (Enterococcus), dissolved oxygen levels, optical brighteners concentration, pH, total dissolved solids, conductivity, and water temperature at three sites along each stream. Water quality data was then compared to the Environmental Protection Agency (EPA) Environmental Justice value to determine if there was a correlation between EJ value and water quality. The EPA EJSCREEN values were determined by examining the EPAs ARC Graphic Information Systems (arcGIS) environmental Wastewater Discharge Indicator (WWDI) layer for each sampling site. Preliminary results suggest a correlation between the EJSCREEN value and water quality standards such as Enterococcus, optical brighteners, and conductivity. This is of concern as Enterococcus is an indicator for fecal contamination and can cause health problems if someone comes in contact with contaminated waters. Elevated optical brightener levels seen in the study also indicate possible wastewater contamination from poor infrastructure. The connection between poor water quality and EJ communities is vital to protect these communities and work toward clean water.

Ellie Mallon ^{1*}

Mobile Baykeeper

Diego Calderon-Arrieta ^{2*}

University of South Alabama

Outreach and Education

Conserving Coastal Alabama *(Oral)*

Abstract Description : I wanted to talk about land conservation organizations that are working diligently to conserve important conservation areas in the Mobile Bay watershed. The Pelican Coast Conservancy (PCC) is a land conservation organization. The PCC has worked diligently to conserve important properties with high conservation values in coastal Alabama. The PCC works with its sister land trust the Atlantic Coast Conservancy to accept donations of fee simple properties and perpetual conservation easements. This session will describe the conservation values that are being protected in coastal Alabama. The session will reiterate the importance of developing partnerships with other NGOs, state and federal agencies to conserve important areas in coastal Alabama. The session will also educate the attendee about the purpose of a land trust and the types of land conservation methods that are available. The session will discuss conservation easements and fee simple acquisition strategies. The attendee will be introduced to the States Forever Wild Program and other state and federal programs that can acquire land. The attendee will also obtain a brief overview of the concept of a nonprofit land trust . The conservation activities of the Pelican Coast Conservancy (Atlantic Coast Conservancy) and Dauphin Island Bird Sanctuaries will be discussed. The session will highlight several completed fee simple and conservation easement projects.

Walter Ernest ¹*

Pelican Coast Conservancy

Habitats

Contribution of Submarine Groundwater Discharge to Select Biogeochemical Fluxes in St. Louis Bay, Mississippi *(Poster)*

Abstract Description : St. Louis Bay (SLB) is a shallow semi-confined estuary along the nGOM that is important to the local area for recreation and tourism. This study aims to assess the role of submarine groundwater (SGD) discharge in SLB with respect to input of radium, methane, barium and an array of nutrients (NO₃, NO₂, NH₄, SiO₃ and PO₄). SGD is the flux of fresh groundwater and recirculated seawater from submerged sediments into coastal waters and estuaries. Because SGD can be enriched in substances of importance to the environment such as nutrients and possibly pollutants, it can play a significant role in water quality and the health of an estuary or coastal environment. To trace this groundwater, radium isotopes (Ra-224; Ra-223) are being used to determine SGD flux using a radium mass balance. To determine the radium from groundwater, other radium inputs to the environment (rivers, the ocean, and surficial sediment diffusion) are subtracted from the observed radium at SLB sample sites where samples were collected. Groundwater was also sampled to determine the concentration of select biogeochemical endmembers mentioned previously. Biogeochemical fluxes and total SGD flux are then determined using the values for groundwater-derived radium in the bay and the measured groundwater endmembers. Based on positive correlations between Ra-224 and methane from multiple sampling trips and low radium delivery by other inputs, there is strong evidence that there is SGD flux into the bay particularly within the paleochannel found along the eastern margin of the bay.

Haley Spaid ^{1*}

University of Southern Mississippi

Water Quality

Cultivating Future Coastal Environmental Educators Through Internships *(Oral)*

Abstract Description : Environmental literacy and workforce development is a nationwide focus area for the National Sea Grant College Program. Internships are an effective and proven tool that achieves both. The education and outreach group at the Dauphin Island Sea Lab, Discovery Hall Programs (DHP), has provided internship opportunities in environmental education for more than a decade supported in part by the Mississippi-Alabama Sea Grant Consortium. DHP's summer internship program provides an undergraduate or recent graduate the opportunity to work alongside DHP education staff during our 10-week summer schedule. Interns receive a stipend and room and board. They work with our summer overnight and day camps, a formal course in marine science, teacher workshops and a number of outreach events. Recently, applications have targeted underrepresented students (as defined by NOAA). In recent years, more than 40 individuals have applied for the single position. The internship provides numerous benefits to all involved. Interns not only learn about the living resources of the area, they experience a variety of education and outreach activities, observe a diversity of teaching styles, learn to work within a team and have opportunities to practice their teaching skills. DHP gains an enthusiastic addition to their education staff allowing us to serve more individuals at a relatively low cost. Additionally, we also benefit from their 'outsider's' perspective of our programs that has led to reflection and improvement. Most of our interns have remained in STEM fields and many indicate the internship was a formative experience in their career.

Chris Flight ¹ *

Dauphin Island Sea Lab Discovery Hall Programs

Tina Miller-Way ²

Dauphin Island Sea Lab

Greg Graeber ³

Dauphin Island Sea Lab Discovery Hall Programs

JoAnn Moody ⁴

Dauphin Island Sea Lab Discovery Hall Programs

Rachel McDonald ⁵

Dauphin Island Sea Lab Discovery Hall Programs

Lauren Still ⁶

Dauphin Island Sea Lab Discovery Hall Programs

Resilience

Cut it, Spray it, and Burn it: Landscape-scale Restoration of Wet Pine Savanna in the Grand Bay National Estuarine Research Reserve & Grand Bay National Wildlife Refuge *(Poster)*

Abstract Description : In coordination with the Grand Bay National Wildlife Refuge (GNDNWR), and the Mississippi Department of Environmental Quality (MDEQ), the Grand Bay National Estuarine Research Reserve (GNDNERR) has begun work to restore over 1,000 acres of wet pine savanna within an area historically called “Pecan,” in Moss Point, MS. Historical imagery from this area shows that grasslands dominated the landscape for most of the 20th century until the 1990s, when fire suppression led to increases in woody vegetation and simultaneous increases in invasive vegetation (e.g., *Triadica sebifera*, *Imperata cylindrica*, etc.). This project was designed to reduce areal coverage of woody and invasive vegetation using combinations of mechanical, chemical, and prescribed fire treatments. GNDNERR staff will assess the effects of restoration treatments through long-term monitoring of vegetation communities throughout the project area including a set of experimental sites. Experimental sites were previously homesteads where the sequence of mechanical, chemical, and fire treatments will be applied uniquely, and the effects will be closely monitored to inform future management actions. Additionally, invasive species will be mapped prior to and following treatments at experimental sites using a combination of Unmanned Aerial Systems and ground surveys. The primary objective of this project is to increase abundance and distribution of native herbaceous plant communities to restore a functioning wet pine savanna ecosystem within the GNDNERR/NWR. Other objectives include providing educational opportunities for local students and a living laboratory for researchers with interests in studying ecosystem restoration.

Jonathan Pitchford ^{1*}

Grand Bay National Estuarine Research Reserve

Jay McIlwain ²

Grand Bay National Estuarine Research Reserve

Habitats

Dauphin Island Citizen Science Program: Assessing Shoreline Change and Background Oiling Data for Oil Spill Response and Planning *(Oral)*

Abstract Description : Proficient citizen scientists foster a culture of community engagement that, when paired with scientific methods, generate valuable research. This NASEM Gulf Research Program funded citizen science project is developing an innovative community-based approach for documenting shoreline processes. Volunteers are trained and mentored by oil spill response and coastal geomorphology experts to collect critical data that are typically lacking during oil spill planning and response in regions with offshore oil and gas operations. Community members in Dauphin Island, Alabama attended a series of workshops addressing (1) key factors affecting the nearshore environment, (2) coastal spill science and response strategies, and (3) field training in shoreline data collection. The volunteers used a simple, standard beach profiling method with inexpensive tools, hand-held DGPS units, and cameras to generate important datasets for the program. Depositional and erosional cycles are documented by this method, providing an understanding of seasonal beach dynamics which becomes critical when evaluating whether burial or remobilization of oil may take place. Participants also learned how to identify tar balls and collected tar ball distribution data during the beach surveys, providing the first year-long perspective of background oiling data on select sections of Dauphin Island. These data will be compiled for long-term preservation after project completion and made publicly available for all end-users: contingency planners, responders, and researchers. Our approach provides a template for other communities who wish to build a coastal citizen science program that generates critically important baseline data for local shoreline spill response efforts.

Carrie Miller ¹ *

University of New Orleans

Diane Maygarden ²

University of New Orleans

Mark Kulp ³

University of New Orleans

Ed Owens ⁴

Owens Coastal Consultants

Lauren Glushik ⁵

Owens Coastal Consultants

Oil Spill

Delineating Isoscapes of Selected Fish Species in the Northern Gulf of Mexico *(Oral)*

Abstract Description : Stable carbon and nitrogen isotope values of consumers can differ between locations due to spatial and temporal variations in the base of food webs within ecosystems. Delineating such “isoscapes” to map the spatial variation of stable isotope values can improve food web models and further inform fisheries management decisions. We present spatial and seasonal variation of ^{13}C and ^{15}N values of Red Snapper (*Lutjanus campechanus*), prey items collected from stomachs and particulate organic matter (POM) across offshore Mississippi waters. The most numerous prey items were stomatopods and crab species which showed a latitudinal shift in stable isotope values between nearshore and offshore. The stable isotope values of Mississippi Red Snapper specimens also indicate latitudinal and temporal differences, with certain months showing more ^{13}C and ^{15}N depletion further offshore than inshore specimens collected in the same period. POM results indicate an overall latitudinal shift with seasonal component resulting in highly depleted ^{15}N values occurring in June coincident with a drop in C:N below the Redfield Ratio. Results from a companion study also show spatial variation of ^{13}C and ^{15}N values in many commercially and recreationally important fish species collected from Mississippi, Louisiana, Alabama and Florida waters. The Louisiana and Alabama Red Snapper stable isotope values indicate longitudinal isotopic differences with high variability at some sampling locations. The ^{13}C and ^{15}N values of the additional fish species with similar trophic levels indicates a latitudinal isotopic shift moving from Mississippi Sound to offshore waters.

Branden Kohler ¹ *

University of Southern Mississippi Division of Coastal Sciences

Kevin Dillon ²

University of Southern Mississippi Division of Coastal Sciences

Chris Fleming ³

University of Southern Mississippi Division of Coastal Sciences

Living Resources

Describing Intra-Annual Dynamics of Caloric Value of Gulf Menhaden, *Brevoortia patronus*, from the Northern Gulf of Mexico *(Poster)*

Abstract Description : Understanding energy densities of common prey species in ecosystems can provide key insight into system-level trophic ecology and predator prey dynamics. For example, in the northern Gulf of Mexico, “forage fishes” such as Gulf Menhaden *Brevoortia patronus* are considered critical links for transferring energy from primary and secondary producers to recreationally and commercially important fish species. The objectives of this research were to develop appropriate methodology for obtaining dry energy densities for Gulf Menhaden and evaluate intra-annual patterns of caloric value. Gulf Menhaden were collected from gillnet surveys conducted by the state resource agencies of Texas, Louisiana, and Alabama March to November, 2017. The range of length of fish sampled was 107 mm to 220 mm (fork length). To determine dry energy density, whole Gulf Menhaden were homogenized and freeze-dried for 48 hours. Bomb calorimetry was then used to determine caloric value of each individual sample, ~1 g. Gulf Menhaden dry energy densities were found to be high in the early spring, slightly decrease in the summer and later increase and peak in September, to approximately around 6.3 kcal g⁻¹ dry weight. Understanding seasonal patterns of energy density help to inform predator-prey interactions and we hypothesize that temporal shifts in diet patterns of predators may be influenced by caloric value of prey. Overall, this work is an initial investigation into energy density of abundance prey species in the Gulf of Mexico.

Kasea Price ¹*

University of Southern Mississippi Gulf Coast Research Lab

Robert Leaf ²

University of Southern Mississippi

Living Resources

Design Considerations for Enhancing Nutrient Removal in Restored Marshes *(Oral)*

Abstract Description : Marsh degradation has contributed to coastal eutrophication. In response, coastal land managers have implemented marsh restoration projects aimed at reducing nutrient pollution. However, the limited understanding of how design considerations affect marsh restoration success often leads to ineffective projects. Previous work suggests that, within a few years after planting, marshes initially planted at 50% cover have similar nutrient removal capacity to those planted with larger cover. Other design considerations, such as sediment type, slope, sea level rise (SLR) and wave exposure, can affect marsh-nutrient interactions, but their interactive effects have not been tested. To address this gap, we carried out field experiments on the Fish River shore and an adjacent protected canal (Alabama). At each of these two sites, we planted black needlerush (*Juncus roemerianus*) sods from a nearby donor marsh in three blocks, with each block having 24 treatment experimental units that resulted from the crossing of 3 planting covers (0%, 50%, and 100%), two slopes (gentle and steep), two sediment grain sizes (coarse and fine), and two SLR scenarios (current and 2050). For each experimental unit, we simulated nutrient runoff events using pre-mixed (i.e., inorganic nitrogen) solutions, and collected porewater samples across the units to quantify nutrient pollution removal. The importance of each of the factors tested in controlling nutrient removal in restored marshes, as well as their interactive effects, will be described in this presentation. Preliminary results suggest sediment grain size and initial planting cover most significantly impact nutrient pollution reduction by restored marshes.

Nigel Temple ¹

Mississippi State University

Just Cebrian ^{2*}

Dauphin Island Sea Lab; University of South Alabama

Sara Martin ³

Mississippi State University

Daniel Firth ⁴

Mississippi State University

Andrew Lucore ⁵

Mississippi State University

Eric Sparks ⁶

MS-AL Sea Grant Consortium; Mississippi State University

Habitats

Design of a Long-Term Monitoring Program for a Living Shoreline Project in Hancock County, MS *(Oral)*

Abstract Description : The 29,909-acre Hancock County Marsh complex is one of the largest in Mississippi and is part of the Pearl River estuary. The Hancock County Marsh Living Shoreline Project was developed with two main restoration goals: 1) build living breakwaters for shoreline protection from wave erosion and support secondary productivity; and 2) create subtidal reefs to support secondary productivity. The project includes 5.9 miles of living breakwater, 46 acres of subtidal reef, and 46 acres of marsh. The project design was a result of detailed geotechnical and hydrodynamic analyses. In 2017, the subtidal reef and first 2-mile section of the living breakwater were constructed. Project performance monitoring began at the completion of construction and will continue for seven years. Construction of the remaining 4 miles of breakwater was completed in fall 2018 and the first year of monitoring will begin in 2019. The long-term monitoring program is used to establish trends towards the restoration goals. The project performance monitoring was designed to determine if the restoration goals and project objectives are being met. The monitoring components of the living breakwater include: 1) annual biological monitoring; 2) elevation and shoreline surveys; 3) annual aerial photography; and 4) annual structural integrity monitoring. The monitoring components of the subtidal reef include: 1) annual biological monitoring; and 2) subtidal reef height, elevation, and area surveys. Each monitoring component was developed to inform adaptive management strategies or corrective action decisions if the long-term trends suggest the restoration goals will not be met.

Sarah Ballard ¹ *

Anchor QEA LLC

Wendell Mears ²

Anchor QEA LLC

Dan Van Nostrand ³

NOAA

Estelle Wilson ⁴

NOAA

Habitats

Detecting Coastal Marsh Change from Aerial Imagery: Pascagoula River Estuary, 1955-2014 (*Poster*)

Abstract Description : As sea level rise accelerates, coastal salt marsh ecosystems are increasingly vulnerable; vertical accretion rates must exceed or keep pace with rates of sea level rise to prevent transition to open water or inland migration of marsh vegetation. While some marsh systems along the northern Gulf of Mexico coast have remained stable, others, e.g., the marshes of the Louisiana Gulf Coast, have experienced high rates of conversion to open water. This study examined the historical extent of intertidal marsh at the mouth of the Pascagoula River in Jackson County, MS to determine whether marsh extent changed during the period 1955-2014 and to ascertain areas which experienced high degrees of change. Marsh extent was mapped at a 3-meter GSD using spectral and textural image data for image dates of February 13, 1955, February 12, 1996, and October 5-16, 2014. Waterways represented in the imagery were extracted using a near-infrared band threshold for 1996 and 2014 and a Coefficient of Variation-band threshold for 1955. Land cover was classified into three groups—marsh, woodland, and unvegetated—using a Maximum Likelihood Classifier. Change detection analysis revealed a net marsh loss of 1,266 ha (19.1%) between 1955 and 2014. Marsh extent declined by 986 ha (14.9%) between 1955 and 1996, and 280 ha (5.0%) between 1996 and 2014. While open-water conversion was high in the central marsh, woody vegetation replaced marsh in the most inland zone, suggesting that marsh extent will continue to decrease rather than remaining stable or migrating inland.

Margaret Waldron ¹ *

University of Southern Mississippi

Gregory Carter ²

University of Southern Mississippi

Patrick Biber ³

University of Southern Mississippi

Habitats

Developing a Living Shoreline Database and Gap Analysis for Gulf of Mexico *(Oral)*

Abstract Description : Coastal erosion is a natural process and shorelines are constantly changing in response to a variety of factors. The traditional approach to mitigate shoreline recession has been to install hard structures such as seawalls or bulkheads along the intertidal zone. The ecological effects of these hardened structures are highly detrimental on coastal habitats, which has been documented in numerous research and publications. The alternative shoreline erosion control method, also known as living shorelines / green infrastructures are suites of shoreline conservation, restoration and best management practice techniques, which provide a more sustainable long-term solution to shoreline retreat as well as provide additional ecosystem benefits through adaptive management solutions. The goal of this project is to create a shoreline database containing existing shoreline habitat datasets in the five Gulf States to improve restoration planning, permitting decisions, and living shoreline site suitability assessment. The value of this project is to (1) assimilate widely spread and not readily accessible information on shoreline condition, and (2) determine gaps in coverage that may exist where new data will need to be collected in the future. This project was funded by a GOMA Gulf Star award and upon completion of the project; the shoreline database will be publicly available via GOMAportal.org.

Saranee Dutta ¹*

University of Southern Mississippi Gulf Coast Research Lab

Habitats

Development and Evaluation of a Low-Cost Pressure Gage (*Poster*)

Abstract Description : Wave energy is a major driver of coastal processes that influences site selection, design, and success of many coastal conservation and restoration projects. However, the high cost of wave gages has hindered understanding of wave energy's influence on the coastal environment and their use in project planning. Recent advances allow construction of scientific equipment from inexpensive components. Scientists have begun to use these inexpensive parts to construction do-it-yourself (DIY) equipment, thereby reducing cost and increasing scientific capacity. This approach was used to build DIY pressure (wave) gages and assess their usefulness. These gages utilized an Arduino-based pressure sensor to measure waves, paired with a microcontroller and accessories to collect continuous pressure data. The housing for the electrical components was constructed out of PVC. This design costs only \$250 which is significantly cheaper than commercial designs that could cost over \$30,000. After construction, thirty gages were deployed for twenty days in July 2018 to assess data quality and durability. Clear, high resolution, and consistent wave data was collected from these easy-to-use and cost-effective wave gages. Less than ten percent of the gages experienced data collection or waterproofing issues during the study period. Most of the issues encountered were due to biofouling around the pressure sensor. Future study will seek to improve housing design and decrease biofouling to limit issues affecting gage performance and durability. This cheaper pressure gage could be broadly utilized to further understanding of coastal processes and related conservation or restoration project design.

Matthew Virden ^{1*}

Mississippi State University

Haley Moss ²

Mississippi State University

Andrew Lucore ³

Mississippi State University

Nigel Temple ⁴

Mississippi State University

Anna Linhoss ⁵

Mississippi State University

Eric Sparks ⁶

MS-AL Sea Grant Consortium; Mississippi State University

Habitats

Development of a Fecal Coliform Bacteria Loading Model for Fowl River Bay *(Oral)*

Abstract Description : A loading model was developed to estimate the primary source(s) of fecal coliform bacteria to Fowl River Bay. Loading rates were based on a combination of literature-derived algorithms, locally-developed estimates of potential sources, ambient water quality, and monitoring results from permitted point sources. Model results suggest that the dominant bacteria source is ambient conditions - watershed-wide loads without specific human sources. Other significant sources were septic tank systems, cattle, wastewater discharges from seafood processing plants, and birds from offshore islands. The city of Bayou la Batre's current wastewater treatment plant was not a significant source of fecal coliform bacteria to Fowl River Bay. Recent actions to reduce and/or eliminate anthropogenic impacts from septic tanks and the seafood processing plant are expected to result in reduced loads, and the expectation of unimpaired conditions in Fowl River Bay under normal climatic conditions. However, should annual rainfall across the watershed exceed 70 or 80 inches, background loads would be expected to be sufficient to cause impairment in downstream waters, even with anthropogenic sources addressed.

David Tomasko ¹ *

Environmental Science Associates (ESA)

Water Quality

Dietary Habits of *Gymnura lessae* Revealed through DNA Meta-Barcoding of Stomach Contents (*Oral*)

Abstract Description : The northern Gulf of Mexico is home to a diverse assemblage of benthic rays. One of the most common rays, the smooth butterfly ray, was recently reclassified as three separate species of ray; as such, there are no diet studies for the species of butterfly ray found in the Gulf of Mexico (*Gymnura lessae*). We analyzed stomach contents of *Gymnura lessae* from a trawl survey performed in Mobile Bay, Alabama. A total of 482 stomachs were extracted and 147 of those contained prey items. This high percentage of empty stomachs is consistent with other *Gymnura* species, and can be attributed to intermittent feeding, extended periods of digestion, and high rates of regurgitation. Most prey items were heavily digested, so we employed the use of DNA metabarcoding to gain finer resolution and thus greater insight into feeding habits for this species. Compared to traditional stomach content analysis, the number of specific prey items identified via DNA metabarcoding increased fivefold, and prey species richness doubled. No non-teleost prey were found in any stomach or revealed through metabarcoding. Of the identified prey species, fish in the families *Sciaenidae* and *Engraulidae* accounted for 81% of the prey-specific index of relative importance (%PSIRI). Diet variability was significantly different across sex, water temperature, and season, but not disc width, maturity stage, location, or year. Their high degree of teleost specialization, combined with their high abundance, suggest that *Gymnura lessae* plays a considerable role in the Mobile Bay ecosystem.

Matthew Jargowsky ¹ *

Mississippi State University

Pearce Cooper ²

University of South Alabama; Dauphin Island Sea Lab

Marcus Drymon ³

Mississippi State University

Living Resources

Do We Know What We Don't Know About Living Shorelines?

Perspectives from End-Users (*Oral*)

Abstract Description : Coastal erosion is a complicated issue that land managers, practitioners, and researchers have struggled to address. Often, land managers and practitioners are extremely knowledgeable about coastal erosion, methods for mitigation, site history, and knowledge gaps. However, these audiences are often not consulted at all steps of project scoping, design, implementation, monitoring, and evaluation. Failure to include these audiences, among many other factors, can lead to unanticipated outcomes or, in worst case scenarios, failed projects. To address some of these issues, a team of land managers, practitioners, researchers, and Extension professionals collaborated to adaptively design an evaluation plan and identify knowledge gaps related to the Swift Tract living shoreline project in Bon Secour Bay, Alabama. This group is collectively termed the Management Application Team (MAT) and has been meeting biannually for three years to discuss this project. Through these interactions the MAT designed monitoring and evaluation plans that directly addressed management needs. These plans were implemented by a research team and directly led to the identification of knowledge gaps and informational needs necessary to enhance the effectiveness of projects like this in the future. Examples of knowledge gaps identified by this team include more comprehensive vegetation surveys, site specific wave energy measurements, and flow measurements around breakwaters. Future research will address these knowledge gaps for this project specifically. However, the process of adaptively integrating local knowledge into portions of this project could serve as a template for enhancing the design, goal setting, and evaluation of future conservation and restoration projects.

Eric Sparks ¹ *

MS-AL Sea Grant Consortium; Mississippi State University

Just Cebrian ²

Dauphin Island Sea Lab

Mike Shelton ³

Weeks Bay National Estuarine Research Reserve/ADCNR

Eric Brunden ⁴

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Weeks Bay National Estuarine Research Reserve/ADCNR

Judy Haner ⁶

The Nature Conservancy

Outreach and Education

Don't Drink the Water! Impacts of Wild Pig Disturbance on Water Quality in Low Order Streams of the Southern Coastal Plain *(Oral)*

Abstract Description : The wild pig (*Sus scrofa*) is one of the most destructive invasive wildlife species in the United States and causes an estimated \$1.5 billion of damage annually. While the physical damage is obvious, their impacts on local watersheds and coastal floodplains are relatively unknown. Understanding this relationship may improve management strategies and help predict changes in ecosystems, especially as wild pigs are rapidly expanding their range. We hypothesize that wild pigs have a pronounced impact on water quality in riparian areas through activities such as rooting, wallowing, and defecation. These impacts may include bank erosion, shifts in nutrient flux, and the introduction of fecal coliforms into the watershed. To test this, we are examining water quality in watersheds in southeast Alabama. Water samples are being collected to measure concentrations and loads of sediment (TSS), nitrate and ammonium, base cations and chloride (Ca, Mg, Cl), and *E. coli* and other fecal coliforms. Preliminary results indicate that water quality is severely impacted by the presence of pigs. Analyses show that *E. coli* levels are much greater on average than reference levels in watersheds absent of pigs, and DNA analyses detected *E. coli* of wild pig origin at 7 of our 14 sampling sites. Nitrite concentrations are elevated while nitrate is low due to low oxygen levels, which are likely linked to pig activity. This information is further evidence that pig eradication and control initiatives should be high priority for landowners and land managers to protect water resources, economic interests, and human health.

Sara Bolds ^{1*}

Auburn University

Water Quality

Dreams Do Come True... Partnering with State Agencies to Provide Environmental Education to Schools *(Oral)*

Abstract Description : During the D'Olive Creek Watershed restoration, the City of Daphne discovered an environmental jewel within the Baldwin County Cooperative Extension System that helps the City meet its education outreach goals. The Master Environmental Education (MEE) Program is "Making a World of Difference" in the City's effort to reach local schools. Created in 1995, MEE trains volunteers to teach environmental lessons in schools and to community groups. Lesson topics include: Aquatic Nuisance Species, Backyard Wildlife Habitat, Energy, Groundwater Pollution, Invasive Plant Species, Nonpoint Source Pollution, Recycling, and The Water Cycle.

Ashley Campbell ¹ *

City of Daphne

Outreach and Education

Dune Restoration and Enhancement for the Florida Panhandle Manual

(Oral)

Abstract Description : The purpose of this online resource is to provide an overview of the Florida Panhandle coastal dune system and provide information on coastal dune restoration and restoration enhancement activities for the northern Gulf of Mexico. These restoration techniques have been developed and tested through research and monitoring activities for the northern Gulf of Mexico region. The authors have worked for many years with homeowners, local government officials, land managers, plant nurseries, and restoration project managers. Requests from these various audiences for a common resource that would provide both basic and targeted information pertinent to coastal dune restoration inspired us to create this manual. This manual may serve as a tool to assist managers and homeowners with development of restoration goals; introduce restoration practitioners to required permitting processes; provide information to producers of plants for restoration or assist contractors with timelines for implementing restoration activities based on the knowledge of the impacted flora and fauna. This manual begins with basic information about coastal systems along the western Florida Panhandle and provides a context for the importance of dunes. The second section of the manual focuses on the restoration of coastal dunes within the western Florida Panhandle. The third section of the manual provides detailed information on 28 plant species found in the many plant communities in the western Florida Panhandle including propagation, production and/or out planting information for many of these species. This presentation will showcase the various sections of this valuable tool.

Chris Verlinde ^{1*}

University of Florida; Institute of Food and Agricultural Sciences; FL Sea Grant

Debbie Miller ²

University of Florida, Wildlife Ecology and Conservation Department

Mack Thetford ³

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Gabriel Campbell ⁴

University of Florida

Ashlynn Smith ⁵

University of Florida

Habitats

Early Recruitment of *Crassostrea virginica* to Restored and Historic Oyster Reefs in the Western Mississippi Sound: Larval Supply and Post-Settlement Success (*Oral*)

Abstract Description : The eastern oyster (*C. virginica*) is an important foundation species within coastal ecosystems. Oysters improve water quality, provide refuge for smaller fish and invertebrates, and serve as an important fisheries resource. The successful early recruitment of eastern oyster is vital for resupplying adult populations in the face of harvesting. Healthy coastal oyster populations are also challenged by various sources of stress, including pollution, freshwater input, hypoxia, disease, and predation pressure. Thus, considerable efforts have been dedicated toward oyster restoration within the northern Gulf of Mexico. The objective of our study is to evaluate the role and importance of early recruitment to oyster restoration success in western Mississippi Sound. During the summer 2018 recruitment period, we compared larval supply and spat settlement among eight sites, including four recently restored inshore reef sites (2 limestone, 2 relic shell), two historic unrestored inshore reef sites, an unrestored offshore reef site, and a previously restored offshore reef site (1 limestone). Variation in recruitment success will be quantified relative to region, restoration materials, and the degree of background predation on post-settlement oysters. Local oyster spawning stock biomass will also be considered as a potential source of early recruits. Preliminary results from zooplankton samples as well as from spat settlement plates both with and without predator exclusion cages will be discussed.

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University of Southern Mississippi Gulf Coast Research Lab

Chet Rakocinski ²

University of Southern Mississippi Gulf Coast Research Lab

Living Resources

Eastern Oyster (*Crassostrea virginica*) Settlement and Population Connectivity in a Freshwater-Dominated Estuary (*Oral*)

Abstract Description : The Northern Gulf of Mexico is home to one of few remaining harvestable oyster populations in the U. S., and knowledge of oyster population connectivity is needed to inform restoration and management activities. Along with data on settlement patterns, trace elemental (TE) signatures within shells of oysters have potential to serve as natural geochemical tags to define larval origins and infer population connectivity. To determine oyster settlement patterns, settlement plates were deployed in Mobile Bay/Mississippi Sound (MB/MS) bi-monthly from May-September 2014/2016. To determine oyster larval origins and population connectivity, we quantified TE concentrations in native adult oysters and newly settled spat (on 2016 settlement plates) along a ~40 km freshwater gradient and compared TE values in larval shell (origin) to settled and adult shell (grow-out sites). Overall, oyster settlement was higher in 2016 (70 ± 19 oysters plate⁻¹) compared to 2014 (18 ± 6 oysters plate⁻¹), with maximum settlement occurring at higher salinity sites in MS in both years. Settlement increased exponentially from July until September (end of field sampling) each year, suggesting larvae were available for settlement post-sampling. Linear discriminant function analysis (LDA) identified spatially distinct TE signatures, with Fe, Mn, and Cr accounting for 88% and Sr accounting for 69% of variation among sites in adult and settled shell, respectively. Preliminary classification results from LDA determined that larvae originated from northeastern MS, rather than MB. Future restoration efforts in MB/MS may benefit from grow-out in these areas that naturally promote oyster recruitment.

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Living Resources

Eastern Oysters (*Crassostrea virginica*) as Retrospective Bioindicators to Detect Oil Contamination in the Marine Environment (*Poster*)

Abstract Description : Bivalves are useful biomonitors because they assimilate particles from their environment into tissue and shell. To determine if bivalves assimilate oil-derived elements into their shells as a possible retrospective bioindicator of exposure to oil or other contaminants, we conducted a controlled laboratory experiment exposing juvenile oysters to various oil types and concentrations during a 4 month period. Oysters were exposed to one of six possible treatments: Macondo 252 source oil; weathered oil from surface water; highly weathered tarballs from local beaches; water collected from an industrialized area in the Mobile River, Alabama; spiked oil of known elemental concentration (positive control); and filtered artificial seawater (negative control). Trace element profiles from the shells of a subset of exposed oysters were obtained using laser ablation inductively coupled plasma mass spectrometry (LA-ICP-MS). To incorporate the effects of multiple stressors, oysters were exposed to locally relevant low salinity stress (14) or standard estuarine salinity (25). Biological response to oil exposure and salinity conditions was monitored by measuring oyster survival and growth throughout the experiment. Preliminary data suggest oil exposure during the study did not have a significant effect on oyster growth or survival. This research tests a new technique to improve detection and tracing of oil and other contaminants in coastal waters and could be applied to enhance existing monitoring programs for damage and recovery assessment.

Kimberly Peter ¹ *

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Oil Spill

Economic Benefits of the Restoration of D'Olive Watershed (*Oral*)

Abstract Description : MBNEP has served as the project owner for sixteen different projects in the D'Olive Watershed. These projects were supported wholly or in part by MBNEP as part of a grant from National Fish and Wildlife Foundation Gulf Environmental Benefit Fund. MBNEP also leveraged the resources of other entities through their many partnerships and associations, who have also significantly contributed to the effort. The projects have stabilized degraded streams and implemented management measures to reduce riparian and downstream impacts, including stream bank erosion, and wetlands loss. Many barren areas are now teeming with life where there were little to none. The environmental benefits are apparent. However, other benefits such as infrastructure enhancements are not so obvious. The projects are providing improvements that not only increase infrastructure resiliency but also result in millions of dollars of avoided, decreased, or delayed cost. This presentation primarily seeks to tell the story of those sometimes obscure economic benefits beyond water quality and habitat creation and provide attendees with real-world cost data of how the projects provide a positive impact to their communities from a different viewpoint.

Wade Burcham ^{1*}

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Resilience

Economic Recovery Paths of the Mississippi Oyster Fishery (*Oral*)

Abstract Description : It has been 13 years since H. Katrina devastated the coastal areas in the Northern Gulf of Mexico States in August 2005. The closures of significant portions of Gulf waters to commercial and recreational fishing due to the Deepwater Horizon oil spill in April 2010 altered the production, recreation, and consumption decisions of households in affected communities. Mississippi was in the process of restoring the public oyster reefs after H. Katrina and the oil spill when the Bonnet Carre Spillway opening in 2011 resulted to massive oyster mortalities in the shellfish growing waters. These mortalities halted the recovery process of the oyster fishery to its baseline levels in 2002-2004. The prolonged exposure to freshwater which caused massive mortalities of the oyster populations required restoration projects to enable the fishery to recover to its baseline status. The restoration efforts included but not be limited to the dredging of non-affected oyster seed stock and relaying them to affected reefs. Oyster shells and other cultch materials were purchased and planted in affected areas. These restoration efforts were expected to enable the oyster reefs to replenish the damaged oyster populations and became available for harvest when the resources reached market size. Long-term data were compiled to develop economic recovery models (ERM) for the oyster fishery. The ERM explains the individual and joint effects of the recent natural and technological disasters, output and input markets, environmental conditions, and regulatory and management strategies on the levels of commercial oyster harvests and dockside values.

Benedict Posadas ¹ *

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Living Resources

Effects of Burrow and Tube Construction by Infauna on Sound Propagation through Marine Sediments *(Oral)*

Abstract Description : Infauna, animals living in marine sediments, modify sediment structure by burrowing, constructing burrows and tubes, and irrigating burrows. These activities can change the bulk porosity and density as well as create heterogeneity in sediment structure. We test the hypothesis that these activities alter sound speed and attenuation in sediments by manipulating homogenized sediments to mimic animal activities. Specifically, we examine the effects of burrow excavation, burrow wall compaction, burrow irrigation, and construction of tubes from shell hash on sound speed and attenuation at 100, 200, and 400 kHz. Wavelengths corresponding to these frequencies span the size of the burrows constructed, and measurements were conducted at several depths within the upper 10 cm of sediment in which infauna are commonly found. Each of these activities or functions is performed by multiple species of animals that comprise a functional group. Our results will help identify functional groups that have important impacts on sediment acoustics and will be used to interpret field data in which deviations from predicted sound speed and attenuation are correlated with different and diverse communities of infauna.

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Dauphin Island Sea Lab

Will Ballentine ²

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Grant Lockridge ³

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Dauphin Island Sea Lab

Habitats

Effects of Land Use on the Source and Quality of Dissolved Organic Matter in Streams and Rivers *(Poster)*

Abstract Description : Anthropogenic activities have been found to impact the source and quality of dissolved organic matter (DOM) in lotic ecosystems, but inconsistent findings have been reported. In the present study, we synthesized previous studies on DOM from streams and rivers to evaluate whether watershed land cover plays a significant role in determining the source and quality of DOM. For each study, we collected data on DOC concentration, the proxies for DOM source and quality, and sampling coordinates. We used NHD dataset to extract information on watershed land use compositions and other relevant watershed attributes, including watershed size, watershed slope, watershed temperature, and stream order. For the assessment of DOM quality, we used DOC concentration, fluorescence index (FI), absorption indicators (mostly SUVA₂₅₄ and SUVA₂₈₀), DOC biodegradability, and fluorescence components identified by Excitation-Emission Matrix - Parallel Factor Analysis. Our analysis shows that the influences of watershed land use on DOM source and quality are highly variable in small watersheds, probably because of the confounding influences of other environmental factors. The influences, however, are more consistent and evident in large rivers.

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Yuehan Lu ²

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Water Quality

Effects of Residential Land Use on Fish Communities and Tidal Creek Habitats of Alabama and West Florida *(Oral)*

Abstract Description : The northern Gulf of Mexico coast is rapidly changing due to population growth and increasing urbanization. Much of this growth is in the form of residential development. A study was conducted to investigate the effects of residential land-use on the assemblage and condition of salt marsh resident fish along the Alabama-west Florida coast. A total of 23 fringing salt marshes within 6 low-order tidal creeks (3 surrounded by urban lands and 3 reference creeks surrounded by forest) were sampled seasonally for resident fish (using minnow traps) and other environmental data. *Fundulus grandis* (Gulf killifish) and *Poecilia latipinna* (sailfin molly) were the dominant species collected representing 65% (n= 3588) and 15% (n= 777) of the total fish caught over four sampling events. Fish abundance and biomass were significantly lower in urban marshes (10.1 $\hat{\pm}$ 1.3 fish per trap and 34.8 $\hat{\pm}$ 5.1 g per trap) compared to reference marshes (14.3 $\hat{\pm}$ 1.8 fish per trap and 77.4 $\hat{\pm}$ 10.0 g per trap). Assemblages were also different between urban and reference creeks and complementary analyses suggest that salinity and marsh slope were correlated factors. Further, *F. grandis* and *P. latipinna* had significantly lower condition measures (liver somatic index and caloric density) in urban creeks compared to fish in reference creeks. These results suggest that even surrounding low- to moderate-density residential land use may change tidal creek habitats and reduce suitability for common marsh resident fish. We explore important research questions remaining, upcoming research plans, and implications for local watershed management.

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Auburn University

Latif Kalin ²

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Dennis Devries ³

Auburn University

Habitats

Effects of the Diel Oxygen Cycle on Sediment Macrofaunal Behavior

(Poster)

Abstract Description : Dissolved oxygen is often used as a water quality indicator and proxy for ecosystem health. In shallow areas organic matter is remineralized in soft sediments by micro- to macrofauna that consume oxygen in the process. Oxygen consumption rate depends on the oxygen concentration of the overlying water but can also be altered by mixing and irrigating activities of sediment macroinfauna. Shallow coastal oxygen patterns frequently follow a diel cycle, caused by photosynthesis increasing oxygen during the day and respiration drawing down oxygen at night. These recurring nightly drops in oxygen concentration may induce taxa-specific changes in macrofaunal behavior that affect sediment oxygen consumption in different ways. The goal of this work was to characterize changes in macrofaunal activity and behavior over a diel oxygen cycle. We exposed macrofauna to a diel oxygen cycle generated in the lab and observed their sediment irrigating and mixing behavior throughout the cycle. These results will inform further research examining the connection between diel changes in oxygen consumption, sediment biogeochemical cycling and macrofaunal behavior.

Kara Gadeken ¹ *

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Kelly Dorgan ²

Dauphin Island Sea Lab

Water Quality

Embrace the Gulf – A Yearlong Campaign for the Gulf of Mexico *(Oral)*

Abstract Description : The Gulf of Mexico provides food, shelter, protection, security, energy, habitat, recreation, transportation, and navigation – playing an essential role in our communities, states, region, and nation. To highlight the value and the vitality of the Gulf of Mexico region, the Gulf of Mexico Alliance conceived an awareness campaign “Embrace the Gulf” for the entire year 2020. The promotion will culminate in a multi-stakeholder, cross-sector positive celebration for the Gulf of Mexico. In this presentation, we will highlight the five focus areas of the campaign (economy, environment, tourism, education, and communities) and share initial ideas for messaging associated with each one. In addition, we will present suggestions on how your organization can best participate as a partner or a sponsor. This region-wide effort will be an opportunity for all stakeholders to incorporate “Embrace the Gulf” messages into existing programs or develop new initiatives to take full advantage of this exciting yearlong celebration.

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Gulf of Mexico Alliance; Dauphin Island Sea Lab

Melissa Pringle ²

Allen Engineering and Science, Inc.

Christina Mohrman ³

Gulf of Mexico Alliance

Outreach and Education

Engaging Citizen Scientists to Assess Large-Scale Microplastic Distributions *(Oral)*

Abstract Description : Marine debris is a global issue that impacts aquatic environments. The most prevalent type of marine debris is microplastics, which is ubiquitous in marine and freshwater systems. Microplastics have become an emerging research topic and contaminant of concern due to their prevalence and potential impacts on aquatic and marine life. However, few education, outreach, and research projects address marine debris, specifically microplastics, and public perception of debris issues has remained relatively unchanged. To better understand microplastic distributions and increase awareness of this issue, we are conducting a citizen science based microplastic sampling project across the U. S. Gulf of Mexico coast. We have created a microplastic sampling guidebook and instructional videos for collecting and processing microplastics. These educational products were used for in-person trainings of thirteen organizations, ranging from Corpus Christi, TX to Key Largo, FL, that are collaborating on this project. Each partner organization has trained local citizen scientists to collect and process beach and water samples for microplastics in their respective area. Information collected by each citizen scientist includes: sample location, number of microplastics per volume or area, and type of microplastics (fibers, fragments, film, or beads). Collectively, over 500 microplastic samples from 2017-2018. To date, over 99% of samples contain microplastics, nearly 90% of all microplastics collected are microfibers, and there is a trend of microplastic concentrations increasing from east to west across the U. S. Gulf of Mexico. Data and a complimentary interactive map are freely available on the project website and updated in real-time.

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Caitlin Wessel ²

NOAA Marine Debris Program

Eric Sparks ³

MS-AL Sea Grant Consortium; Mississippi State University

Water Quality

Engaging the Fishing Community to Remove Marine Debris and Quantify Impacts *(Oral)*

Abstract Description : Commercial shrimpers frequently encounter various types of marine debris, which damage their nets and result in costly repairs and decreased fishing income due to lost fishing time. One of the most impactful and commonly encountered types of marine debris is derelict crab traps. Shrimpers often return the derelict traps to the water due to foul odors or a lack of boat space, which increases the chances of another vessel encountering the same problems. These compounding issues likely have a noticeable impact on the coastal economy. To encourage removal of derelict traps and quantify their impact on the commercial shrimping industry in Mississippi Sound, a team of researchers, Extension professionals, and fishing organization leaders have developed a trap disposal incentive program and complimentary economic impact study of marine debris in the Gulf of Mexico. Fishermen registered in the program will receive a reward of \$1-\$5 for each derelict crab trap removed from the Mississippi Sound and brought to any of four designated harbors along the Mississippi Coast. Twenty shrimping vessels will be selected and compensated to collect data for the economic impact study. Each vessel will keep a logbook of all marine debris encountered while fishing, including details on location, photographs, lost fishing time, and damage incurred. Results from this project will demonstrate the magnitude and economic impact of marine debris on the commercial shrimping industry and improve stewardship of the Gulf of Mexico.

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Water Quality

Ensuring Living Shorelines for the Long-Term Through Modeling and Maintenance: An Alabama Design Example (*Poster*)

Abstract Description : Lighting Point (Bayou LaBatre, AL) combines beneficial use of dredged material techniques to create 50 acres of marsh, beach, tidal creek habitat; breakwater engineering along 1.5 miles of shore; and managed public access with low impact development techniques for boat parking and boardwalks. The low-crested, rubble-mound shoreline protection feature was designed with the aid of an innovative modeling technique and will ensure marsh stability. Waves directly offshore of the project site were hindcast for decadal timescales using a Mike21-SW wave transformation and wind-wave generation model of the Mississippi Sound, both for present conditions and for the future incorporating the latest regional relative sea level rise estimates. Relevant empirical equations for wave transmission over low-crested breakwaters were then used to transform the full modeled offshore wave climate to what would impact the marsh edge directly. The breakwater crest elevation was then optimized so that the transmitted wave climate would allow for a stable, non-eroding marsh edge and a resilient living shoreline habitat. Once the site is constructed, the design team will develop a beneficial use of dredge plan that addresses a maintenance regime for disposal of dredge material using thin-layer techniques to raise the marsh elevation against projected sea level rise scenarios. This will not only increase longevity and resilience of the restored marsh and current marsh in the face of rising seas but also provide regular maintenance dredging of the ship channel, ensuring safe channel navigation for the Bayou LaBatre commercial fishing fleet.

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Mary Kate Brown ⁵

The Nature Conservancy

Judy Haner ⁶

The Nature Conservancy

Chris Williams ⁷

Moffatt & Nichol

Habitats

Environmental Drivers of Histamine-Producing Bacteria in Water Samples and Decomposing Spanish Mackerel Tissues *(Oral)*

Abstract Description : Histamine fish poisoning is one of the most common seafood-borne illnesses throughout the world, occurring after consumption of fish containing high histamine concentrations. Illness is attributed to extended storage of fish catches above 4.4°C, allowing histamine-producing bacteria (HPB) to proliferate, converting free histidine to histamine. However, other variables that may affect HPB are not well studied and the mechanisms of poisoning remain uncertain. To determine how levels and HPB species vary in the environment and affect histamine concentrations in fish during decomposition, we enumerated and identified HPB in marine and riverine water samples and in Spanish mackerel incubated at 4°C, 15°C, and 30°C. HPB were enumerated using a 3-tube most-probable-number (MPN) real-time PCR method, and isolated bacteria were identified using API and 16S sequencing. The range of HPB in water samples was < 0.001 to 93 MPN/mL, and preliminary results suggest variations in marine HPB concentrations have strong linear relationships with water temperature and dissolved oxygen. HPB isolated from marine water samples include *Photobacterium damsela* and *Morganella morganii*, high histamine producers previously isolated from Gulf of Mexico fishes. HPB isolated from riverine samples included less common high histamine producers, *Plesiomonas shigelloides* and *Enterobacter aerogenes*. In mackerel tissues, early findings suggest that HPB concentrations vary across fish sections, regardless of incubation time and temperature. The results from this ongoing study will enhance understanding of natural HPB populations and the mechanism of histamine production in fish, ultimately aiding the development of regulations for prevention of illness.

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Living Resources

Estimates of Red Drum (*Sciaenops ocellatus*) Movement and Mortality Via Acoustic Telemetry (*Oral*)

Abstract Description : Red Drum (*Sciaenops ocellatus*) is a valuable recreational fishery, however little information exists on the mortality and movements of these sub-adult fish. To estimate mortality and movement in coastal Alabama, fish were implanted with acoustic transmitters and external tags. Fates of fish were inferred from stationary receiver detections and active relocations, over one year. These fates were used in a multistate model to produce instantaneous monthly and annual mortality estimates and emigration rates. Adjusted center of activity positions were generated daily and distance between sequential positions were daily movement estimates. Monthly movement was the sum of daily movements in a month, and relationships with salinity and temperature were investigated. Fishing mortality (F) in Fowl River ranged from 0.001 – 0.130 (annual, 0.310) and natural mortality (M) ranged from 0.001 – 0.037. Dog River F ranged from 0.001 – 0.105 (annual, 0.464), and no M was detected. A combined river model produced an estimate of 0.472 for annual Z, resulting in discrete survival of 0.624, indicating that the 30% escapement goal is likely being met. Mean monthly movement estimates were 7019 and 5222m in Fowl and Dog River, however relationships with salinity and/or temperature were nonexistent, and fish were resident within rivers given low emigration rates. Mortality estimates are higher than recent catch-curve analyses and provide important data for the sub-adult Red Drum fishery. Furthermore, riverine residency coupled with river specific F values indicate regional-specific groupings that experience different mortality may occur and should be investigated further.

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Living Resources

Evaluating the Effect of Opening the Bonnet Carre Spillway on the Mississippi Gulf Coast Oyster Production and Current vs. Historical Spatial Relationships (*Poster*)

Abstract Description : The Bonnet Carre Spillway was completed in 1931. It was constructed to protect New Orleans whenever the Mississippi River is at flood stage (Lane et al., 2001). The spillway drains into Lake Pontchartrain, a brackish-water lagoon north of New Orleans (Lane et al., 2001). Lake Pontchartrain then drains into Lake Borgne which subsequently drains into Mississippi Sound. The result of this inflow of water from the spillway is that it changes the water chemistry of all receiving water bodies and thus might have an effect on the Mississippi Gulf Coast oyster reefs. The Mississippi Gulf Coast oyster reefs make up an important coastal ecosystem and provide significant economic resources. However, in recent years the Mississippi Gulf Coast oyster reefs have been declining, with an approximate 15-fold decline over the past decade. As a result of this, the University of Mississippi was tasked by the Mississippi-based RESTORE Act Center of Excellence to identify the differences in abiotic and biotic stressors at current and historic oyster reef sites. The collection of data needed to assess the effect of the opening of the Bonnet Carre Spillway on historic and current oyster reefs was completed using ocean observing station which collected data on temperature and light, conductivity, and dissolved oxygen for the period of March 14 – March 30 and April 1 – April 25. Satellite imagery will also be used to quantify any temporal, spatial, and/or spectral relationship between the abiotic parameters and/or current and historic oyster reef locations.

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Water Quality

Evaluating Trophic Diversity in a North-central Gulf of Mexico Elasmobranch Assemblage *(Oral)*

Abstract Description : Robust marine ecosystems are imperative in the Gulf of Mexico for social, cultural, and economic stability and benefit. Elasmobranch species often serve as predators that are key to maintaining ecosystem structure and function. The north-central Gulf of Mexico supports high numbers of elasmobranch species, which suggests these species efficiently share resources and express high trophic diversity. To investigate elasmobranch trophic patterns in this region, we conducted a bottom longline survey in coastal waters from Mississippi to Florida to examine the spatial and temporal trends in carbon ($\delta^{13}\text{C}$), nitrogen ($\delta^{15}\text{N}$), and sulfur ($\delta^{34}\text{S}$) stable isotope ratios. Over 800 individuals were encountered, 380 of which were sampled for CNS stable isotope analysis. Overall, elasmobranch values for carbon, nitrogen, and sulfur ranged from -22.09‰ to -15.20‰ , 11.44‰ to 15.92‰ , and 11.57‰ to 18.07‰ , respectively. Much of this isotopic variation was accounted for by the following three species: Atlantic sharpnose shark (*Rhizoprionodon terraenovae*), blacktip shark (*Carcharhinus limbatus*), and southern stingray (*Hypanus americanus*). To quantify isotopic niches between species, we generated standard ellipses and found isotopic niche size varied seasonally and isotopically. This was particularly true for *C. limbatus*, which showed dramatic shifts in carbon and sulfur stable isotope ratios from spring to fall, suggesting a seasonal shift in baseline prey items. Additionally, all three species indicate trophic niche overlap across seasons, suggesting possible seasonal shifts in prey availability. These findings characterize an isotopically diverse predatory guild in the northern Gulf of Mexico and provide useful information to guide future ecosystem based management efforts.

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Living Resources

Faunal Assemblages Associated with Living Shorelines and Implications for High-Wave Energy Ecosystems *(Oral)*

Abstract Description : Shoreline erosion and the loss of intertidal habitats is a global issue. To mitigate these losses, land managers have implemented large-scale living shoreline projects with nearshore breakwaters to reduce wave energy and subsequent erosion of shoreline ecosystems. However, evaluation of the benefits (e.g., habitat provisioning) of these types of projects is limited, particularly in high energy environments. Understanding how breakwaters and shoreline vegetation, independently or complementarily, enhance fisheries is necessary to further restoration science. In this study, we investigated the complementary roles of nearshore breakwaters and marsh vegetation on faunal abundance and diversity along an eroded shoreline in Bon Secour Bay, Alabama. We established eight replicates of three shoreline vegetation treatments (naturally colonized marsh, planted marsh, and unvegetated) along both a breakwater-protected and an adjacent reference shoreline in summer 2016. After which, three methods were used to quantify nekton abundance and diversity quarterly from summer 2016 to summer 2018: Breder traps along the shoreline and lift nets and trawls in nearshore waters. To evaluate the interactive effects of breakwater and vegetation treatments, data was analyzed using the Shannon-Weiner diversity index and ANOVAs. Results showed breakwaters supported significantly more abundant and diverse faunal communities along the shoreline and in parallel nearshore waters than do similar areas at unprotected sites. However, independent and interactive vegetation treatment effects were not significant, regardless of breakwater treatment. These findings suggest that nearshore breakwaters can be beneficial for fisheries enhancement in high energy environments, though the complimentary vegetation effects were minimal.

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Outreach and Education

Fintastic Fishes and Where to Find Them (at the Grand Bay NERR)

(Poster)

Abstract Description : Estuaries in the northern Gulf of Mexico (nGOM) contain diverse habitats that play an important role in fisheries recruitment and larval fish development. This study was designed to improve understanding of habitat selection of fishes within the Grand Bay National Estuarine Research Reserve (GBNERR), which could lead to improved understanding toward fisheries management throughout the nGOM. Water quality data and fish were collected seasonally at GBNERR from 2005-2014. Fish were sampled using a seine net across 14 sites, consisting of 5 habitats: beach, shell midden, submerged aquatic vegetation, erosional edge, and depositional edge. The fish collected were identified, counted, and measured. Length frequency histograms were calculated for every species at each habitat to determine a size range and the potential number of cohorts per species collected during sampling. Water quality parameters were measured alongside fish sampling and analyzed with a principle components analysis (PCA). The ordination reduced the data and spatially displayed similarities and/or differences between habitat types and locations. The PCA outputs suggest that water quality is not spatially different across sites or bayous. Habitat selection of fish communities were explored using non-metric multidimensional scaling (nMDS), and the results suggest that spatial distributions of fish communities are unique for each bayou. Additional analysis will be explored to further investigate spatial distribution and seasonal influence of the fish communities within our study sites.

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Paul Mickle ²

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Living Resources

Florida Manatee (*Trichechus manatus latirostris*) Diet in North-central Gulf of Mexico *(Oral)*

Abstract Description : Manatees are herbivorous mammals inhabiting the southeastern United States and are currently expanding their range to higher latitudes. Their diets have been studied throughout the Florida peninsula, but little is known about their diet at range edges, such as the north-central Gulf of Mexico (nGOM). To better understand manatee diets in the nGOM, we took vegetation surveys and behavioral observations of tagged and opportunistically sighted manatees in and outside of the nGOM. We analyzed $\delta^{13}\text{C}$ and $\delta^{15}\text{N}$ in vegetation and tissue of deceased manatees to determine the types of vegetation that contributed to manatee diet. Manatees were most often observed in freshwater/brackish habitats, eating freshwater vegetation. Studies of manatees along the Florida west coast indicate that seagrasses make up 48% of manatee diet, however our results indicate that freshwater submerged aquatic vegetation (SAV) was the primary diet source of manatees in the nGOM (from MS to Apalachicola, FL). Preliminary results indicate that tape grass (*Vallisneria*) was the most common plant observed in areas manatees were spending time, with Southern naiad and Eurasian watermilfoil as the second most common. Initial stable isotope results showed that $\delta^{13}\text{C}$ values of manatee tissues and vegetation ranged from -24 to -11, indicating that manatees consume a broad diet. $\delta^{15}\text{N}$ values were ranged from 3-11, suggesting manatees may exhibit carnivory via consumption of epibionts found on vegetation. Understanding manatee diet in the nGOM will provide information about resources that may be important to manatees as their population grows and they continue to expand their range.

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Living Resources

Food Web Dynamics and Trophic Interactions Associated with Pelagic Sargassum Features in the Gulf of Mexico *(Oral)*

Abstract Description : In the Gulf of Mexico, two pelagic brown algae species - *Sargassum fluitans* and *S. natans* - form floating mats, lines, and dispersed congregations that provide habitat for numerous fish and invertebrate species. This study aims to characterize residency and food web dynamics of commercially and recreationally important fish species common to these features through stable isotope analysis ($\delta^{13}\text{C}$, $\delta^{15}\text{N}$) of fish tissues (muscle, liver, blood, plasma), invertebrates (crabs, shrimp), marine primary producers, and particulate organic matter (POM). Samples were collected at Sargassum-associated locations during 2017 and 2018. Field observations and subsequent laboratory processing found community structure varied among sampling stations. Stable isotope values of fish muscle tissue cluster at the species level for Greater Amberjack, Blue Runner, Sargassumfish, White Spotted Triggerfish, and Orange Spotted Triggerfish. This suggests these species are more specialized in their feeding strategies. Other species such as the Grey Triggerfish exhibit a wider range of isotopic values, implying a varied diet that may encompass multiple trophic levels. Invertebrates feeding on Sargassum are a probable food source for many fish species, while top predators like Mahi Mahi feed on these smaller fish, occupy the highest trophic level within the food web, and are likely cosmopolitan and feed opportunistically. POM is isotopically distinct and appears to contribute less to the diet of the Sargassum related consumers than Sargassum itself.

Zabe Premo ¹ *

University of Southern Mississippi Division of Coastal Sciences

Kevin Dillon ²

University of Southern Mississippi Division of Coastal Sciences

Frank Hernandez ³

University of Southern Mississippi

Habitats

Forming and Sustaining the Alabama Oyster Shell Recycling Program

(Oral)

Abstract Description : In August 2016, the Alabama Coastal Foundation received a grant from the National Fish and Wildlife Foundation (NFWF) to establish an oyster shell recycling program for local restaurants. NFWF provided the funding for this project as a part of the Gulf Coast Conservation Grants Program. The Alabama Oyster Shell Recycling Program collects oyster shells from restaurants which previously threw them away and then paid someone to take them to landfills. Oyster shells that are collected through this program go back into Alabama waters to help more oysters grow, provide habitat, limit erosion and improve water quality. The program was set up in phases starting with the Causeway Route (on October 31, 2016) and the Gulf Shores/Orange Beach Route (Spring 2017) for Phase 2. To ensure the success of this project, ACF has formed an Advisory Committee that decides when and where to place the shells. The program met all of its grant objectives within a year and has been self-sustaining since September 2017.

Mark Berte ¹*

Alabama Coastal Foundation

Resilience

Freshwater Exposure, Successful Relocation and Subsequent Drowning of Sub-Adult Atlantic Bottlenose Dolphin (*Tursiops truncatus*) *(Poster)*

Abstract Description : In cetacean species, prolonged exposure to low salinity water (>5 days, < 5ppt) causes skin lesions, corneal edema and electrolyte abnormalities. Here we review a case of a subadult Atlantic bottlenose dolphin that refused to leave a freshwater lake in Seminole, AL. The animal was observed in the lake for 1 month (24 Feb 2016 to 25 Mar 2016), and then was relocation to a nearby brackish water bay (15-25ppt) in Orange Beach, Alabama because the animal was beginning to development freshwater skin lesion and corneal opacities. Blood samples and skin biopsies were collected during the rescue and revealed abnormalities consistent with prolonged freshwater exposure including decreased sodium, chloride and low osmolality. Twelve weeks following successful relocation, the dolphin was found dead with signs of fishery interaction. Full necropsy was conducted showing resolution of freshwater skin lesions and normal sodium, potassium and osmolality, however the corneal opacities had worsened. This case highlights the cumulative effects of natural and anthropogenic pressures on dolphins in Alabama and provides a unique opportunity to follow the effects of 1 month of freshwater exposure flowed by 3 months of recovery. In this Alabama watershed, there are seasonal salinity fluctuations and anthropogenic pressures, such as fishery interactions, that commonly impact the resident dolphins. Increasing urbanization or climate variations may enhance freshwater runoff and increasing human water-dependent activities, such as fishing. This case exemplifies the synergistic effects of these influences as well as provides useful information on prolonged freshwater exposure and the recovery process.

Alissa Deming ¹ *

Dauphin Island Sea Lab

Noel Wingers ²

Marine Animal Rescue Specialists

Debra Moore ³

Mississippi State University

Ruth Ewing ⁴

NOAA, Southeast Fisheries Science Center, Miami Laboratory

David Rotstein ⁵

Marine Mammal Pathology Service

Living Resources

GCRL's Marine Education Center, Form Follows Focus (*Oral*)

Abstract Description : In 1896 architect Louis Sullivan wrote the phrase “form ever follows function” to describe how the shape of a building or object relates to its intended function or purpose. In the case of the University of Southern Mississippi's Gulf Coast Research Laboratory's new Marine Education Center this principle has been reinterpreted to reflect how every aspect of the facility's design relates to the focus areas of the center's educational and outreach mission. The Marine Education Center's mission reflects its long-standing affiliation with the Mississippi Alabama Sea Grant Consortium and Sea Grant's national focus areas. As a long-term member of the Consortium's Education and Outreach Partnership the Center has developed an array of educational programs and platforms designed to enlighten the citizenry to produce a cadre of well informed and knowledgeable stewards of our coastal ecosystems. Accordingly, the design parameters and functionality of the new facility provide an excellent platform for providing science-based information to help local residents develop a more resilient community. The Center is located on the University's Cedar Point Teaching Site and serves as a example of how to employ sustainable, green, and effective coastal hazard resilient building techniques in harmony with the coastal environment in which it is located. This presentation will outline specific educational efforts and tools designed to meet these educational goals and advance our communities understanding of these issues. The discussion will show how the design of the center is an important teaching tool in the efforts to increase community resiliency.

Chris Snyder ¹ *

University of Southern Mississippi Marine Education Center

Resilience

Genomic Assessment of Population Structure in Sheepshead, *Archosargus probatocephalus* *(Oral)*

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

Pearce Cooper ¹ *

University of South Alabama; Dauphin Island Sea Lab

Shannon O'Leary ²

Texas A & M University, Corpus Christi

David Portnoy ³

Texas A & M University, Corpus Christi

Sean Powers ⁴

University of South Alabama

Living Resources

Get to Know the Alabama Coastal Heritage Trust (*Oral*)

Abstract Description : The Alabama Coastal Heritage Trust (ACHT) is a non-profit 501(c)3 organization founded in 1995 with an endowment provided by settlement of the first litigation brought on behalf of endangered species in the face of coastal development. The organization has preserved almost 200 acres in Mobile and Baldwin Counties. ACHT's highest achievement was its successful advocacy for the preservation of 114 acres Gulf Highlands property, the highest elevation beach and dune parcel on the Alabama Coast still in its pristine condition. Currently ACHT is pursuing acquisition of eight privately held parcels located within the Bon Secour National Wildlife Refuge. Additionally, we intend to share two new endeavors: 1) ACHT uses U.S. Fish and Wildlife Service permit fees assessed for "incidental take" of the endangered Alabama Beachmouse to acquire and preserve endangered habitat and restore and re-plant the dune systems which serve as a bulwark against storm surges. 2) Recognizing the problem and hazard of litter in our coastal areas, ACHT in 2018 has embarked upon a major project, "It's in the Bag" to enlist volunteers to routinely pick up litter in the coastal areas keeping more of it out of our waterways and wetlands.

Hank Caddell ^{1*}

Alabama Coastal Heritage Trust

Habitats

Getting Projects Shovel Ready (The Good, The Bad, and The Ugly)

(Oral)

Abstract Description : This group session is the sequel to the “Lessons Learned in Optimizing Restoration Design.” This session will showcase the same six restoration projects from Louisiana to Florida and highlight a range of concerns that were addressed throughout the lengthy permitting process. Each of the presenters will pinpoint tips for tackling success and briefly explain their methodology of receiving that magic piece of paper in their hands to implement their projects. For coastal restoration projects, unexpected issues in the post-design phase can cause increased costs and schedule delays. Questions that arise during permitting, unforeseen requirements, and how the project is presented to the public can introduce uncertainty. While no one can truly expect the unexpected, considering lessons learned from other projects can be a valuable step when planning and permitting a project. Permitting a restoration project can be a difficult road to navigate and these presentations will consider how some of these uncertainties may have been minimized or avoided throughout the project planning phase. Presenters will discuss various tasks including but not limited to pre-permitting coordination, modeling, monitoring, and involving stakeholders. Though some issues are unavoidable, different approaches during the project planning phase may pre-emptively address questions and comments or help avoid some requests for additional information altogether, leading to a smoother final design process. Information from each of the presenters on their respective projects will provide the audience an in-depth overview of the current permitting realm that will be beneficial for future restoration projects.

Mary Kate Brown ^{1*}

The Nature Conservancy

Chris Williams ²

Moffatt & Nichol

Erin Rooney ³

HDR Engineering, Inc.

Mindy Joiner ⁴

Moffatt & Nichol

Scott Jackson ⁵

Thompson Engineering

Habitats

Graham Creek Preserve: Balancing Nature and Recreation *(Oral)*

Abstract Description : Graham Creek Nature Preserve is almost 500 acres owned by the City of Foley and located in the southeast corner of Foley. Bisected by Graham Creek, it encompasses almost all of the headwaters for this watershed. The City of Foley has developed the nature preserve as a balance of preserved natural areas with habitat management operations, passive recreational opportunities and educational programs. Balancing the natural environment with the recreational and educational programs has been challenging but successful. With limited marketing, the Preserve has become a hot spot for eco-tourism, disc golf and archery. Events are held regularly on the grounds which exposes tens of thousands of visitors annually to the natural beauty of our headwater wetlands and pine forests. Over 300 acres of the property has prescribed burning every two years in order to maintain the pitcher plant and rare wildflower communities. With the City of Foley's funding and oversight, Graham Creek has blossomed into a stand-alone attraction for visitors and citizens alike. Partnerships have allowed even more amenities and opportunities for the park to grow. Graham Creek Nature Preserve demonstrates a balance of nature and recreation.

Leslie Gahagan ¹ *

City of Foley

Habitats

Gray Snapper (*Lutjanus griseus*) Abundance and Distribution in the Alabama Artificial Reef Permit Zone *(Poster)*

Abstract Description : Gray snapper (*Lutjanus griseus*), more commonly known as mangrove snapper among anglers, constitute a significant recreational and minor commercial fishery throughout the Gulf of Mexico. A 2018 assessment by the Southeast Data, Assessment, and Review (SEDAR) determined that the Gulf of Mexico stock is not currently overfished nor undergoing overfishing. However, geographical gaps in our understanding of the habitat requirements of these fish that could better inform fishery management still exist, particularly within Alabama waters. This study aims to address the abundance and distribution of the gray snapper population through the analysis of remotely operated vehicle (ROV) footage taken in the Alabama Artificial Reef Permit Zone (AARPZ), a more than 1000 square mile area offshore containing a variety of artificial reefs such as chicken coops and pyramids. Results will elucidate habitat preferences across different artificial and natural structures as well as estimate abundances on these structures throughout the spatial coverage of the AARPZ. The findings of this research will introduce new data to be taken into account in future stock assessments of this species in both Alabama and the Gulf of Mexico. Further work is anticipated for abundance and distribution of estuarine-dependent juvenile and subadult populations in coastal regions of the state as well as sex-specific age and growth modeling.

Edward Kim ¹*

University of South Alabama; Dauphin Island Sea Lab

Sean Powers ²

University of South Alabama

Living Resources

Gulf of Microplastics- Microplastic Abundance and Distribution Along the Continental Shelf in the Northern Gulf of Mexico (*Oral*)

Abstract Description : Recent calculations have shown that 10% of all plastic produced around the world ultimately ends up in the ocean. Eventually that plastic will break down into smaller and smaller pieces, less than 5mm, called microplastics that can harm sea life and end up in our food. In collaboration with NOAA Fisheries SEAMAP sampling in the Gulf of Mexico during September of 2016, 2017, and 2018 we collected the first Gulf-wide estimates of sea surface and water column abundances of microplastics ranging from offshore of Brownsville, TX in the west to the Florida Keys in the east. Using a combination of whole water sampling, and neuston and bongo tows we were able to capture microplastics ranging in size from 1 μ m to 5mm and document various types of plankton that had consumed microplastics. So far 97 separate stations have been sampled across the continental shelf of the northern Gulf of Mexico. Microplastics were found in every tow and of the whole water samples collected 99% contained microplastics with an average of 7 microplastics per liter. This is higher than estimates of less than 1 microplastic per meter squared that models produced in 2015 using data from the Atlantic Ocean predicted for the Gulf of Mexico and an order of magnitude less than samples reported from four sites off Louisiana in 2017. In addition, we also found an opposing trend when there were high concentrations of microplastics at the surface there were lower concentrations in the water column and vice versa.

Caitlin Wessel ¹*

NOAA Marine Debris Program

Just Cebrian ²

Dauphin Island Sea Lab

Water Quality

Gulf TREE (Tools for Resilience Exploration Engine) *(Poster)*

Abstract Description : Gulf TREE (Tools for Resilience Exploration Engine) is a filter-based search engine designed to match users with relevant climate resilience tools quickly, easily, and confidently. With over 100 tools relevant to the Gulf of Mexico (and more being added all the time), Gulf TREE sorts through all these options to match users with a climate resilience tool that meets their criteria. The web resource, released February 2018, was created by the Northern Gulf of Mexico Sentinel Site Cooperative, Gulf of Mexico Alliance, and the Gulf of Mexico Climate and Resilience Community of Practice. Gulf TREE is relevant for users of all experience levels and across a wide variety of sectors, such as natural resource management, community planning, restoration, and many more. Input from nearly 200 prospective end-users across the climate resilience spectrum was sought to understand what specific issues stakeholders are tackling, questions and needs for tool suitability, and to ensure an intuitive, user-friendly website. The result is a powerful and capable resource for Gulf of Mexico stakeholders and a solution to common obstacles faced by stakeholders interested in climate resilience. In this poster, the Gulf TREE project will be summarized, and the many uses of the resulting resource will be showcased. Feel free to explore the site at www.gulfTREE.org.

Mikaela Heming ¹*

Northern Gulf of Mexico Sentinel Site Cooperative

Resilience

Hardware and Software Components of an Oysters' Gape Measurement System *(Oral)*

Abstract Description : In this work we describe the hardware and software used in developing a bivalve gape measurement system as well as the techniques used to acquire gape data from bivalves in the field. The system uses a Hall Effect sensor (Symmetry Electronics H2425) and a small magnet that are glued to the outside of the shells of a bivalve. The Hall Effect sensor reports the magnet distance, and hence the gape opening, at a rate controlled by the user, to a microcontroller that records and transmits that data to ground station. Power consumption and bandwidth usage restrictions are the major challenges for our field sensor systems. When these data acquisition systems are located in the field, they are limited by the power that is generated naturally, such as solar power, and the visible communication hubs, or towers from the system's location. This places a limit to the rate at which data is collected and transmitted. Although higher data sampling rates allow for the capture of higher frequency information, it will increase the power needs of the system, and quickly deplete the battery. Also, continuous transmission allows for the instantaneous observation of the field data, however, it will push the power consumption and bandwidth usage beyond what is available. To reach a balance, many software and hardware optimization techniques have been used to make possible the transmission of rich data within the limited power and bandwidth budget. These techniques are discussed and evaluated in this work.

Ali Abu-El Humos ¹

Jackson State University

Kamal Ali ²

Jackson State University

Austin Ukpebor ^{3*}

Jackson State University

Md Hasan ⁴

Jackson State University

James Addy ⁵

Jackson State University

Habitats

Has Eutrophication Altered the Flow of Primary Production in the Fertile Fisheries Crescent? *(Oral)*

Abstract Description : Eutrophication has altered the magnitude and stoichiometry of riverine-nutrient input to the coastal ocean. In the Gulf of Mexico's Fertile Fisheries Crescent (FFC), a decline in riverine dissolved silicon (dSi) has been hypothesized to reduce diatoms' ecosystem significance. Increased hypoxia and the rise of the toxic diatom genera *Pseudo-nitzschia* have co-occurred with this dSi decline. To understand diatom productivity under these modified conditions, silicon cycling was examined to infer diatom-processes within the phytoplankton. Diatom Si uptake was limited by dSi availability ($< 10 \text{ } \mu\text{M}$), thereby reducing the accumulation of diatom silica. Kinetic experiments demonstrated dSi starvation by the diatom assemblage; however, *Pseudo-nitzschia* spp. was only mildly limited. Water-column diatom silica production reached $40 \text{ mmol Si m}^{-2} \text{ d}^{-1}$ within a 6-m euphotic zone. Regional diatoms still have the potential to reach high biomass, and unlike more productive upwelling systems (e.g. Monterey Bay), local diatom biomass/production can be highly concentrated within a shallow vertical layer. This concentration of diatom biomass may be one of the underlying mechanisms fueling the high secondary production of the FFC despite rates of primary production not being significantly higher than other systems. The reductions in dSi suggest a shift in the diatom assemblage toward *Pseudo-nitzschia* spp., which are better adapted for low dSi. And persistent blooms of *Pseudo-nitzschia* spp., which has lower-organic-matter content compared to larger and more silica-enriched species, may alter the flow of diatom organic matter in this system.

Jeffrey Krause ¹*

Dauphin Island Sea Lab; University of South Alabama

Living Resources

Have Anthropogenic Reductions in Dissolved Silicon Fueled the Rise of *Pseudo-nitzschia* spp. in the Coastal Gulf of Mexico? *(Poster)*

Abstract Description : Diatoms have an obligate Silicon (Si) requirement for growth. In the northern Gulf of Mexico, diatoms dominate the phytoplankton biomass and primary production in the water column. If dissolved silicon (dSi) concentrations are limiting, diatom biomass yield can be reduced, and/or their growth slowed due to limitation in the rate of uptake. Riverine dSi:NO₃⁻ has declined in many coastal systems due to anthropogenic factors, this has been concurrent with coastal phytoplankton shifting toward lower diatom proportions and the proliferation of slender and lower-silica content diatoms (e.g. *Pseudo-nitzschia* spp.). We examined trends in dSi uptake to answer whether *Pseudo-nitzschia* spp. is more efficient, and therefore better adapted to thrive, in the low dSi conditions, versus the aggregate diatom assemblage. In the coastal zone, the diatom assemblage was sometimes Si starved (e.g. linear/non-saturable Si uptake) or Si uptake at ambient dSi was significantly reduced relative to maximum uptake rates (i.e. saturable uptake). At the station where the diatom assemblage was Si starved, Si uptake for *Pseudo-nitzschia* spp. saturated at low dSi. The calculated half-saturation constant for the aggregated diatom assemblage was 24.4 μM Si, over an order of magnitude higher than that for *Pseudo-nitzschia* spp., 1.4 μM Si. These results suggest that *Pseudo-nitzschia* spp. can out-compete other diatom groups for Si at lower dSi, providing direct experimental evidence that anthropogenic reduction in coastal dSi may have shifted the diatom assemblage composition. Such shifts have significant ecological and biogeochemical consequences.

Sydney Acton ¹ *

Dauphin Island Sea Lab

Israel Marquez ²

University of South Alabama; Dauphin Island Sea Lab

Jeffrey Krause ³

Dauphin Island Sea Lab; University of South Alabama

Water Quality

How to Move Toward a Litter Free Mardi Gras: Assessment, Removal, Awareness, and Prevention (*Oral*)

Abstract Description : The annual Mardi Gras celebration has been identified as a significant contributor to debris accumulation in One Mile Creek. To address this, Mobile Baykeeper created a “Litter Free Mardi Gras” campaign. The project is specifically designed to address litter through a four-pronged approach of assessment, removal, awareness, and prevention. By focusing on the following four strategies, Baykeeper has created a cost-effective method of significantly reducing marine debris accumulation in One Mile Creek: 1. Assessment: A baseline trash assessment was created to determine the levels and types of debris accumulation at One Mile Creek and measure the success of the campaign over time. 2. Removal: Mobile Baykeeper partnered with the Mobile Bay National Estuary Program, the City of Mobile, Thomas Engineering, and Osprey Initiative to host extensive cleanups that have to date, removed approximately 2,500lbs from the creek by 256 volunteers. 3. Awareness: Baykeeper launched a targeted awareness campaign for Mobile Bay Area residents and tourists via local media regarding the pervasive effects of Mardi Gras-related litter on local waterways. The media campaign involved a strong presence across local television, print, web-based, and radio outlets. 4. Prevention: To prevent the introduction of debris into the watershed, 15 temporary Marine Debris Interceptors were installed in collaboration with the City of Mobile during Mardi Gras on parade routes. The presentation will show how each of the four strategies have helped reduce litter entering waterways and how this approach can be applied to other urban watersheds.

Laura Jackson ¹ *

Mobile Baykeeper

Cade Kistler ²

Mobile Baykeeper

Casi Callaway ³

Mobile Baykeeper

Water Quality

Hurdles for a Living Shoreline and Reef Project (*Oral*)

Abstract Description : The Hancock County Marsh Living Shoreline Project (project) was developed as an Early Restoration (RESTORE) project; intended to accelerate meaningful restoration of injured natural resources, and their services, resulting from the Deepwater Horizon oil spill. The Mississippi Department of Environmental Quality and National Oceanic and Atmospheric Administration (the federal and co implementing trustee) worked cooperatively to develop the project. This project would partially offset injuries by preserving and protecting existing marsh and providing for increased secondary productivity. It is the first Mississippi RESTORE project to be designed and constructed. The project consists of three components: • 6 miles of living shoreline from Pearl River to Heron Bay and from St. Joseph's Point to Bolan Bayou. • Forty-six acres of marsh. • Forty-six of subtidal reef in Heron Bay The project's purpose is to preserve and protect existing habitat while providing areas of secondary shellfish productivity. The selected alternative was a result of detailed geotechnical, wind-wave, and current analyses to locate and design the segmented breakwater, subtidal reef, and marsh components of the project. This project used traditional coastal engineering analyses to design natural features, as well as a low-relief stone breakwater, to reduce shoreline erosion, optimize circulation and re-establishing shellfish habitat. This presentation will focus on the engineering, permitting, public involvement and construction of the project. We will discuss the challenges and hurdles encountered during the design, permitting, public involvement and construction processes and how they were overcome.

Wendell Mears ¹*

Anchor QEA LLC

Renee Robertson ²

Anchor QEA LLC

Habitats

Impacts of the Energy System on Community Resilience *(Poster)*

Abstract Description : Community resilience is the dynamic ability of a certain population, or community, to use its assets to anticipate risks, minimize threats, and restore its activities whilst minimizing the social disruption. In this scenario, sustainability becomes an even more important word. Our current society has been passing through numerous technological, economic, and social advances. The problem is that the carbon-based fuels that have been supporting most of this progress are unsustainable and bring several environmental concerns. Thus, renewable energy represents the key change to a new era of smarter and sustainable power systems, but its reliable integration into the traditional energy grid still have several challenges to overcome. In this context, this paper studies the current energy grid power generation arrangement to establish a feasibility baseline for future smart grid implementation. The authors explore the current energy grid economic and environmental metrics related to power generation composition. The approach uses a regression methodology to determine the significant generation types that influence greenhouse gases emissions and energy cost in the U. S. energy system. The resultant metrics establish a baseline for future discussions regarding energy grid configurations, strategies, and investment decisions to enhance community resilience through power grid investments.

Ana Silveira ^{1*}

University of South Alabama

Resilience

Improving the (Off) Bottom Line: Assessing the Costs and Benefits of Different Culture Methods on an Alabama Commercial Oyster *(Poster)*

Abstract Description : Off-bottom oyster aquaculture has been expanding in the Gulf of Mexico in response to growing demand for premium, half-shell oysters. Farmers typically employ strategies that aim to either produce consistently high-quality oysters or minimize their costs. To date, it is not clear which strategies yield the most profit. Beginning in summer 2018, in collaboration with a commercial oyster farm in Grand Bay, Alabama run by a local high school program, we began a test of several decisions typically made by commercial oyster farmers in the region: oyster ploidy (diploid and triploid), drying tactics to control bio-fouling with desiccation (set daily with tides and air drying for 24 hrs once a week), tumbling schedule (monthly and quarterly), and gear types (two commercially available systems: Hexcyl and SEAPA). Within one acre, 16 lines were installed and operated according to the assigned experimental treatment (ploidy x drying x tumbling x gear type). Throughout this study, we have tracked all the input costs to establish, operate and maintain each line, including labor. Biological metrics such as growth, survival, and appearance were also tracked to determine any differences between each treatment. As the oysters come to market size, we will engage commercial wholesalers determine a fair market value and track sales to obtain qualitative feedback from customers for each line. The intent of this research is to allow farmers to make more informed business decisions on oyster farming in the Gulf of Mexico and beyond as the industry continues to grow.

Sarah Hensey ^{1*}

Auburn University

Rusty Grice ²

MS-AL Sea Grant Consortium; Auburn University Shellfish Lab

Matthew Parker ³

Julian Stewart ⁴

William Walton ⁵

Auburn University Shellfish Laboratory

Living Resources

Incident Boat Wake Energy and Implications for Restoration Design

(Oral)

Abstract Description : This presentation describes efforts to measure, analyze, and describe incident boat wake energy along marsh and spit shorelines in a portion of Fowl River, Alabama. As part of the larger comprehensive study assessing marsh health and land spit resilience, the purpose of this work is to develop an understanding of the frequency and magnitude of boat wakes impacting shorelines in the study area. The ultimate use of these results is to inform restoration design alternatives that aim to enhance marsh and land spit resilience for years to come. Accordingly, an objective of the study is to determine to what degree incident boat wake energy is responsible for erosion and degradation of the marshes and spits, either directly or indirectly. To accomplish these objectives, ten continuously sampling tide and wave gauges were deployed at select locations throughout the study area. The data collection period spanned from May through September 2018, with some short gaps required for instrument maintenance. Six of the gauges were maintained at the same locations for the duration of the study. The other four gauges were periodically rotated to other portions of the study area to achieve improved resolution of wave data at the marshes and spits targeted for future restoration. Preliminary results suggest that nearly 100% of the high frequency wave energy in this section of Fowl River is attributed to boat wakes. Boat wake signatures are nearly continuous during daylight hours, with activity increasing on weekends and major holidays as one might expect.

Bret Webb ¹*

University of South Alabama

Habitats

Increasing Capacity for Local Communities to Respond to Climate Change *(Oral)*

Abstract Description : Gulf communities are beginning to recognize the importance of adapting to increased flooding and inundation. Coastal flooding can have a negative impact on the built environment, natural systems, and the overall economy. In many cases, having the capacity to respond to such events requires technical expertise, knowledge, and resources from a variety of organizations. Expanding the capacity of coastal communities to identify and address issues related to these problems will greatly increase their resilience. The Gulf of Mexico Climate and Resilience Community of Practice (CoP) is a network of coastal communities and outreach and extension professionals working together to adapt to climate change in the coastal zone through the exchange of ideas, opportunities, and expertise. At the annual CoP meeting, attendees from 36 organizations worked together to identify key challenges associated with the impacts of saltwater intrusion, increased localized flooding, and the subsequent economic consequences to businesses and communities. Next steps to address these key challenges focused on: (1) outreach activities, (trainings, roadshows, documenting case studies and lessons learned), (2) higher regulatory standards at the local level (ordinance changes, participation in the Community Rating System), and (3) synthesizing tools and scientific data into accessible formats. This presentation will focus on how our team developed an online survey to rank recommended actions identified by CoP members, formed working groups, worked with local communities to execute “next steps” that improved their capacity to address flooding and coastal inundation, and are developing video case studies to share lessons learned and best practices.

Tracie Sempier ^{1*}

Gulf of Mexico Alliance; MS-AL Sea Grant Consortium

Melissa Daigle ²

Louisiana Sea Grant College Program

Katie Lea ³

Louisiana Sea Grant College Program

Renee Collini ⁴

Northern Gulf of Mexico Sentinel Site Cooperative

Casey Fulford ⁵

Baldwin County Soil and Water Conservation District

Amy Gohres ⁶

Northern Gulf of Mexico Sentinel Site Cooperative

Resilience

Inferring Ocean Velocity from Sequences of Ocean Images (*Poster*)

Abstract Description : Assimilation of observed ocean velocity information have been shown to have significant impacts on the quality of forecasts for ocean surface circulation. Additionally, previous studies have suggested that ocean velocity information can be estimated from sequences of images containing geophysical features. This work examines a unique opportunity of hypothetically estimating reliable ocean velocity information for regions where ocean images are available. The assimilation of the image sequences, using a four-dimensional variational data assimilation (4DVAR) analysis system is tested in a controlled environment. Synthetic images of the surface trace concentration are obtained from the solution of the advection-diffusion equation with prescribed velocity field. The velocity field is then reconstructed from synthetic images. The ability to invert images of the passive tracer concentration into surface velocity by assimilating tracer concentrations is a validation for the approach in these initial experiments. Other experiments focused on assessing the differences between the extracted velocities and independent velocity observations and assessing the impact of assimilated reconstructed velocities on model forecast.

Courage Klutse ¹ *

University of Southern Mississippi Department of Marine Science

Dmitri Nechaev ²

University of Southern Mississippi Department of Marine Science

Hans Ngodock ³

Naval Research Lab

Oil Spill

Infestation of Farmed Oysters (*Crassostrea virginica*) by Mudblister Worms (*Polydora websteri*) (Oral)

Abstract Description : Mudblister worms (*Polydora websteri*) infest oyster shells in off-bottom farms across the Gulf of Mexico. Worms bore into oysters, which cover mud-filled boreholes with layers of shell, creating the mudblister. When shucked, infested oyster shells can break easily and mudblisters burst, releasing anoxic mud. This devalues oysters in the half shell market. This study quantified settlement of mudblister worms over two full seasons of oyster growth, with the aim of identifying preventative methods for oyster farmers. Diploid and triploid oysters at different stocking densities were deployed at four Alabama oyster farms. Worms were extracted from oysters and condition index was quantified. Larval abundances of *P. websteri* adjacent to and away from farms were also measured. Oyster growth rates, manipulated by stocking density and ploidy, showed minimal effects on infestation, although abundances varied among seasons and farms. More frequent oyster sampling and shell reinfestation experiments were conducted in the summer, during the peak of infestation, in combination with monitoring of environmental data. Salinity variation was greatest at the least infested farm. Temperature and hypoxia did not differ between farms and turbidity did not show a clear pattern. Reinfestation of previously heavily infested shell was greater overall than lightly infested shell but depended mostly on overall infestation of the farm. Knowing when higher abundances of *P. websteri* adults and larvae occur and under what conditions will help inform oyster farmers in making decisions about when and how frequently oysters are treated to prevent infestation and reduce mudblisters in oyster shells.

Sarah Cole ¹*

University of South Alabama; Dauphin Island Sea Lab

Kelly Dorgan ²

Dauphin Island Sea Lab

William Walton ³

Auburn University Shellfish Laboratory

Living Resources

Influence of Freshwater Influx on Diet and Body Condition of Bottlenose Dolphin, *Tursiops truncatus*, in Mobile Bay, Alabama *(Oral)*

Abstract Description : The northern Gulf of Mexico (nGOM) is regularly influenced by freshwater discharge that can rapidly change the salinity and forage communities in coastal waters, including Mobile Bay, which is the third largest freshwater drainage in the country. It is unknown how the bottlenose dolphin (*Tursiops truncatus*) that resides within Mobile Bay and other nGOM waters manages potential changes in food resources and effects on body condition associated with possibly lethal freshwater exposure. To study the effects of freshwater influx on dolphins in a freshwater-dominated estuary, I will sample skin, muscle, liver, and teeth and quantify body condition of dolphins that stranded around Mobile Bay from 2011 to 2018. This 8-year period includes multiple wet and dry seasons to enable comparisons of diet and body condition relative to freshwater influence. I will use stable isotope ratios in dolphins and prey species and mixing models to compare the diets of dolphins between wet and dry periods. I will use trace element signatures along with sclerochronological techniques in teeth to relate changes in diet to freshwater sources through time within individual dolphins. Photographic analyses and histology will further determine the prevalence of pathologies related to freshwater exposure. This research will aid understanding of how highly mobile and high trophic-level, long-lived marine species manage potentially stressful low-salinity conditions associated with residency in freshwater-dominated estuarine environments. These data will also provide a baseline to assess effects of other stressors that are common to coastal waters, particularly in the nGOM.

Matthew Hodanbosi ¹ *

University of South Alabama; Dauphin Island Sea Lab

Ruth Carmichael ²

Dauphin Island Sea Lab; University of South Alabama

Living Resources

Intergenerational Effects of Crude Oil Exposure on Early-Life Growth and Development in the Gulf Killifish (*Fundulus grandis*) *(Oral)*

Abstract Description : The 2010 Deepwater Horizon oil spill, which released approximately 800 million liters of crude oil into the northern Gulf of Mexico, coincided with the spawning period of many fish species including the Gulf killifish, *Fundulus grandis*, a ubiquitous marsh resident. This study characterized the effects of Gulf killifish parental exposure of crude oil on the growth and development of progeny. Lab-reared adult fish were exposed to control (i.e., unoled) water or oiled water for up to 40 days, then used as broodstocks to generate four lineages of F1 offspring according to the following crosses: control female x control male (CxC), control female x oil exposed male (CxEx), oil exposed female x control male (ExCx), and oil exposed female x oil exposed male (ExEx). The F1 individuals derived from CxEx, ExCx, and ExEx lineages displayed craniofacial abnormalities as adults despite being reared in clean water until sexual maturity. Additionally, F1 adults resulting from both CxEx and ExCx lineages were significantly shorter (i.e., decrease in total and standard length) than the F1 progeny of the CxC lineage. F2 offspring from the CxEx and ExEx lineages continued to display significant craniofacial deformities and a significant decrease in total length relative to the F2 CxC lineage. This research suggests that exposure of adult Gulf killifish to crude oil can affect the development and growth patterns of their progeny for at least two generations.

Chelsea Hess ^{1*}

Louisiana State University

Charles Brown ²

Louisiana State University

Jane Park ³

University of California, Davis

Andrew Whitehead ⁴

University of California, Davis

Fernando Galvez ⁵

Louisiana State University

Oil Spill

Is Marsh Surface Tracking Sea Level Change? Developing Tools and Visualizations for SET Data *(Oral)*

Abstract Description : Can marsh vegetation communities keep pace with sea level rise? Planning for future environmental changes depends on understanding the elevation dynamics of these critical habitats. Surface Elevation Tables (SETs) are widely used to collect data on these processes, through precise measurements of the marsh surface over time. Grand Bay National Estuarine Research Reserve (NERR) in Mississippi is one of 26 NERRs currently collecting SET data. Grand Bay was one of the first NERRs gathering these data, so our adventures in quality-checking, visualizing, and analyzing them have been informative to broader discussions about data standardization and analysis within the NERR system. We are now undertaking a project to adapt Grand Bay's analytic scripts and data visualizations into tools that can be used more broadly within and beyond the NERRs, enabling other reserves to understand their data and communicate the important information therein to technical and non-technical audiences. Input from technical and outreach-oriented working groups ensures that our tools are appropriate and useful to a variety of end-users. This presentation will describe examples of the tools and visualizations we are developing, our approach to involving end-users from many backgrounds, ecosystems, and time zones, the challenges of synthesizing data sets from many collaborators and their distinct spreadsheet styles, and how you can be involved in developing or using these products.

Kim Cressman ^{1*}

Grand Bay National Estuarine Research Reserve

Jonathan Pitchford ²

Grand Bay National Estuarine Research Reserve

Margo Posten ³

Grand Bay National Estuarine Research Reserve

Kristin Evans ⁴

Mission-Aransas National Estuarine Research Reserve

Jenni Schmitt ⁵

South Slough National Estuarine Research Reserve

Kari St. Laurent ⁶

Delaware National Estuarine Research Reserve

Megan Tyrrell ⁷

Waquoit Bay National Estuarine Research Reserve

Brook Russell ⁸

Clemson University

Julia Cherry ⁹

Habitats

Katy Prairie Stream Restoration: An Illustrative Use of Stream Restoration to Create Resilient Ecosystems *(Oral)*

Abstract Description : This session will discuss the design of stream restoration to promote resilient ecosystems and will present the design approach and results of monitoring for the Katy Prairie project outside of Houston, Texas. This project, on land managed by the Katy Prairie Conservancy as part of a stream mitigation bank, included reconstruction of over 18 miles of stream restoration using the geomorphic approach. Goals of this project were to correct overall stream function by addressing the channel incision and bank erosion. Secondary effects included reestablishment of wetlands along the riparian corridor to improve water quality, enhance flood attenuation and expand near-stream habitat; re-introduction of wood into the channel to increase in-stream habitat and support the creation of perennial pools in an intermittent stream; and systemic improvements to the landscape to provide compensatory mitigation credits. The natural channel design techniques included consultation of reference reach parameters coupled with sediment transport analyses to design a stable, self-maintaining stream system. Floodplain access was also restored by reconnecting the stream to the floodplain, re-distributing energy throughout the cross section, and providing grade control to prevent future channel incision. The design also focused on re-establishing habitat by re-creating kettle wetland features. The resiliency of this site was recently tested during Hurricane Harvey. The hurricane produced an estimated 500-year flow event near the site. Results of monitoring indicate that the site withstood the event with minimal evidence of erosion or other indicators of instability.

Stephanie Coffman ^{1*}

Stantec Consulting Services, Inc.

Resilience

Legal Authorities for Beach and Shellfish Closures (*Poster*)

Abstract Description : Beach closures and shellfish closures are common events along the Gulf Coast, and with ocean warming and larger populations in coastal communities, closures are likely to become more frequent. This poster will present two separate flow charts mapping the laws and guidance that drive beach closures for recreation and shellfish harvesting closures. Each flow chart will identify the foundational law (federal and/or state), the state regulatory body for Alabama and Mississippi that is authorized to determine when a beach should be closed due to risks to human health or when a shellfish closure is required, and relevant policy or decision-making guidelines. In addition to outlining the federal and state authorities for these actions, the chart will identify the different pathogens that are covered by the laws and regulations and the typical causes of elevated pathogens that force closures. A map of the relevant coastline will provide context.

Kristina Alexander ¹*

Mississippi-Alabama Sea Grant Legal Program

Water Quality

Lessons Learned in Optimizing Restoration Design (*Oral*)

Abstract Description : This group session will showcase six restoration projects from Louisiana to Florida and highlight a wide range of project designs addressing specific goals. Each of the presenters will pinpoint tips for optimizing their restoration design and briefly explain their process of developing the restoration design specific to the project site and its goals. Each project site has its own quirks that make it unique from other coastal areas and require various types of investigations to design the best restoration layout to fit that site. The task of designing a successful restoration project with best available science and as much certainty as possible is a challenge for engineers and project managers, but there are ways to overcome hurdles. This session will allow presenters to discuss what information (modeling, science, data) is essential in designing a restoration project vs. what would be nice to have and what lessons they have learned over the course of the project planning phase. Information from each of the presenters and their respective projects will provide the audience an overview of the engineering and design methodology and will provide lessons to be applied to future restoration projects. This group session will be complemented by the “Getting Projects Shovel Ready (The Good, The Bad, and Ugly)” session explaining how the restoration design was carried throughout permitting process.

Mary Kate Brown ¹

The Nature Conservancy

Judy Haner ^{2*}

The Nature Conservancy

Chris Williams ³

Moffatt & Nichol

Erin Rooney ⁴

HDR Engineering, Inc.

Kevin Hanegan ⁵

Moffatt & Nichol

Ryan Waldron ⁶

Neel-Schaffer, Inc.

Habitats

Lessons Learned in the Post-Design Phase from a Living Shoreline Along the Southern Shore of Lake Pontchartrain, LA *(Oral)*

Abstract Description : The Pontchartrain Levee District, through funding from the Coastal Impact Assistance Program, funded the construction of approximately a mile of living shoreline. The permitting process was non-problematic and there were no major issues working with the U. S. Army Corp of Engineers New Orleans District. During permitting meetings, openings between the breakwaters were requested in order to allow movement of fish on either side of the breakwaters. These were added to the design. Outside of differential sediment and erosion, there were no major issues during the permitting phase.

Chris Williams ^{1*}

Moffatt & Nichol

Habitats

Lessons Learned in the Post-Design Phase from a Living Shoreline at Lightning Point, Bayou La Batre, AL *(Oral)*

Abstract Description : For coastal restoration projects, unexpected issues in the post-design phase can cause increased cost and delays. Questions that arise during permitting, unforeseen requirements, and how the project is presented to the public can introduce uncertainty. While no one can truly expect the unexpected, considering lessons learned from other projects can be a valuable step when project planning. The Nature Conservancy, through funding from the National Fish and Wildlife Foundation Gulf Environmental Benefit Fund, is investing in a 1.5-mile-long living shoreline project that combines breakwaters and approximately 40 acres of marsh creation, as well as managed access and amenities in Bayou La Batre, AL. In the post-design phase, the project has encountered inquiries and comments from several entities. While most were anticipated, such as input from nearby land owners and design specifics from the U. S. Army Corps of Engineers, others, such as input from FEMA and the AL Historic Society, needed more details than normally expected from these agencies. This presentation considers how some of these uncertainties may have been minimized or avoided throughout the project planning phase. The level of pre-permitting coordination, over or under permitting, over or under modeling, the level of monitoring, and presenting too much or too little information can all potentially lead to costly delays. Though some issues are unavoidable, different approaches during the project planning phase may pre-emptively address questions and comments or help avoid some additional requests for information all together, leading to a smoother post design process.

Mindy Joiner^{1*}

Moffatt & Nichol

Habitats

Leveraging Partnerships for Effective Educator Workshops (*Oral*)

Abstract Description : Achieving the goal of healthy coastal ecosystems requires restoration of current damage as well as education about their value to K-12 students who will be the next generation of environmental stewards. Reaching the next generation through professional development opportunities for educators has been an effective tool for Sea Grant programs nationwide. In Summer 2018, educators in Discovery Hall Programs at the Dauphin Island Sea Lab (DISL) developed and hosted a teacher workshop, Restoration: What's the Big Deal, to help participants better understand habitat restoration. DISL worked in partnership with The Nature Conservancy, the Mobile Bay National Estuary Program, the Grand Bay National Estuarine Research Reserve, Sea Lab researchers, Sea Grant extension personnel and restoration project managers to highlight activities in the Mobile Bay watershed. The 21 K-12 teachers participating visited coastal restoration sites, heard from project managers and research scientists studying restoration during a 4-day workshop funded by Mississippi-Alabama Sea Grant Consortium. Teachers also explored classroom activities highlighting concepts underlying ecosystem restoration. As a requirement for attending, teachers developed lesson activity ideas appropriate for their teaching environment (grade level, surrounding environment, available resources). Evaluations indicated that teachers greatly valued the field experiences and learning from the scientists working in the field of restoration. Most indicated that they would include discussion of restoration in their classrooms during this year and gave concrete examples of how they would do so. Interestingly, these examples included workforce development such as occupations needed for implementing restoration projects.

Tina Miller-Way ¹ *

Dauphin Island Sea Lab

Greg Graeber ²

Dauphin Island Sea Lab Discovery Hall Programs

JoAnn Moody ³

Dauphin Island Sea Lab Discovery Hall Programs

Outreach and Education

Local Sea-Level Rise Two-Pager: Access, How-To, and Application

(Oral)

Abstract Description : In the northern Gulf of Mexico, sea-level rise (SLR) is having and will continue to have disproportionately large effects on coastal ecosystems, economies, and communities. Understanding the range and probabilities of potential future conditions are critical to effective adaptation. Recently, NOAA has produced two related reports, Sweet et al. 2017 and Sweet et al 2018, that provide SLR projections at the regional level, probabilities associated with each scenario, and the projected days of future flooding associated with each scenario over time. This information, while incredibly useful, is not as usable as it could be. This is because it is presented in technical reports and large Excel spreadsheets. The Sentinel Site Cooperatives partnered with the study authors, extension and outreach professionals, and other key partners to develop a resource that will enable extension and outreach professionals to quickly produce a customized two-pager for their communities or stakeholders. In this presentation, the information in the resource will be reviewed followed by a short demonstration on how to access and generate the two-pager from the provided template. Best practices, suggestions, and lessons learned regarding potentially applications of the two-pager will also be shared.

Renee Collini ^{1*}

Northern Gulf of Mexico Sentinel Site Cooperative

Resilience

Magnitude and Fate of Sediment Loading in the Fowl River Estuary

(Oral)

Abstract Description : One of the primary issues related to water quality in the Mobile Bay watershed is sediment transport. Excessive erosion and sediment transport by streams degrades habitats and water quality and limits access of streams and estuaries for recreational use. However, a previous study of the upstream Fowl River watershed by the Geological Survey of Alabama in 2015 indicates that the watershed may be sediment starved. Although rare, streams in coastal environments with limited sediment loads may experience loss of estuarine habitat and degradation of marshes and paleo landforms due to subsidence. The most publicized examples are marshes in southern Louisiana that have become open water due to controls placed on the Mississippi River channel. In the case of Fowl River, marshes and spits (elongated, narrow land that extends into the river channel), which were most likely paleo point bars, are quickly becoming submerged and may not have adequate sediment deposition to be sustained. These prominent features in the Fowl River estuary, provide wildlife habitat and control riverine and tidal water movement. Ongoing sediment loading and transport research in the Fowl River estuary will provide information concerning the magnitude and fate of sediment loading as a part of the overall strategy to determine the eventual sustainability of the Fowl River marshes and spits.

Marlon Cook ^{1*}

Cook Hydrogeology, LLC

Habitats

Magnolia Bayou Watershed Education: Taking STEM to STEAM *(Oral)*

Abstract Description : In 2017 the Gulf Coast Community Design Studio received funding through NOAA's 21st Century Community Learning Center Watershed STEM Education Partnership Grant to design and implement a summer program focusing on Magnolia Bayou Watershed in Bay St. Louis, Mississippi. The pilot program helped connect teens at the Hancock County Unit of the Boys and Girls Club to their local waterway and other professionals working in Magnolia Bayou Watershed. The proposed conference session will share the overall experience and lessons learned. Over the course of the summer, students in the pilot program learned about the effects of stormwater runoff on the watershed and water quality in the Bayou in a series of workshops and field experiences. During each phase of the project, students interacted with local professionals from STEM, art and design fields that all have stewardship roles in the watershed. During the last couple of weeks of the program, students worked with local artists to translate their scientific data and what they had learned about Magnolia Bayou Watershed into a multi-media art exhibition that was open to the public. The exhibition and a documentary created about the project and impacts of development on the watershed, served and continue to serve as an important community outreach tool. The documentary created had been viewed over 1,000 times (<https://youtu.be/IJ-A4BQCCKU>) and the Sun Herald, a local newspaper created and distributed a video news piece on the project (<https://www.youtube.com/watch?v=kLsageKSIVg>).

Kelsey Johnson ¹*

Mississippi State University Gulf Coast Community Design Studio

Water Quality

Making Watersheds Great Again (*Oral*)

Abstract Description : In 2013, the Mobile Bay National Estuary Program (MBNEP) embarked upon a holistic, watershed-based approach to guide coastal ecosystem restoration and protection measures recommended through watershed management planning. The MBNEP's five-year Ecosystem Restoration and Protection strategy initiated this novel approach which prescribes development of watershed management plans (WMPs) to ensure that restoration projects are based in science and fit into an overall management program. A watershed approach is a shift from traditional land use planning, where geopolitical boundaries limit what can be done to address problems. Conversely, a WMP is concerned with areas, independent of political boundaries, that drain to common receiving waters. This planning process, guided by the MBNEP's Project Implementation Committee and watershed stakeholders, charts a conceptual course for improving and protecting the things people most value about living along the Alabama coast. In addition to meeting requirements for watershed planning specified by EPA's Nine Key Elements, these plans also encompass issues related to environmental health and resiliency, culture and heritage, public access, and critical coastal habitats identified by the MBNEP's Science Advisory Committee as most threatened by anthropogenic stressors. Improving water quality and maintaining healthy populations of fish and shellfish are at the base of ensuring what is most important to people living along the Gulf coast: access to Gulf waters; abundant fish and shellfish; protection of heritage; environmental health and resilience; and water that is fishable, drinkable, and swimmable

Christian Miller ^{1*}

Mobile Bay National Estuary Program

Water Quality

Microplastic Abundance and Ingestion Frequency by Juvenile Fishes Associated with Sargassum *(Oral)*

Abstract Description : Microplastics (plastic pieces less than 5 mm in size) are a growing concern because they are highly durable, ubiquitous in many marine environments and have the potential to be ingested by smaller organisms (e.g., larval and juvenile stages of fishes). Because plastics are buoyant, microplastics tend to aggregate at the ocean surface via atmospheric and oceanic processes (e.g., Langmuir circulation). This aggregation puts microplastics in contact with other floating habitats that converge in the same manner, such as the holopelagic brown algae complex, Sargassum. Sargassum provides a nursery habitat for many economically important larval and juvenile fishes. Larval and juvenile fishes are especially vulnerable because they may mistake microplastics for food which could potentially affect their development and survival. To better understand the species at risk of ingesting microplastics, juvenile fishes collected from Sargassum habitats in the Gulf of Mexico will be examined for the presence of microplastics and frequency of occurrence. Here we present preliminary results from these analyses and a comparison of microplastic abundances between Sargassum and open water habitats. The results from this project may have implications for future fisheries-based management strategies for Sargassum and associated fishes in the Gulf of Mexico.

Olivia Lestrade ¹ *

University of Southern Mississippi

Water Quality

Migratory Timing of Rails in Jackson County, MS *(Poster)*

Abstract Description : Virginia Rails, in addition to other rail species, can indicate marsh ecosystem health. A general lack of knowledge of the migration ecology of many rail species limits efforts to effectively conserve rail populations. This project focused on identifying changes in the migratory arrival/departure dates for Virginia Rails, King Rails, and Soras at the West Jackson County Regional Land Treatment Facility located north of Ocean Springs, Mississippi. Using eBird data collected by local Audubon Society members over the last 24 years, we inspected summarized data for patterns of primary arrival/departure windows indicated by first or last observations of each species at the lagoons, respectively. First observations of Virginia Rails occurred early-September through mid-October (x̄ = 273 Julian day) across all years, and last observations occurred mid-April through mid-May (x̄ = 113 Julian day) except for 2017 when the last observed Virginia Rail was on March 30. First observations of King Rails were similar (x̄ = 271 Julian day), but last observations occurred at the end of May (x̄ = 120 Julian day). Soras arrived slightly earlier (x̄ = 260 Julian day) with last observations occurring late-April to end of May (x̄ = 129 Julian day). eBird is useful for gathering baseline data among areas for future research goals such as climate change and habitat availability affecting migration ecology of rails.

Carson Kitaif ¹ *

Mississippi State University

Haley Holiman ²

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Auriel Fournier ³

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Ray B. Iglay ⁴

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Mark S. Woodrey ⁵

Mississippi State University

Habitats

Mississippi Coastal Map Revision Project Update (*Oral*)

Abstract Description : Southern Mississippi Planning and Development District, under the administration of the MS Department of Marine Resources, is working with Michael Baker International, Inc. in partnership with Arcadis to perform updated coastal flood analysis and mapping for Hancock, Harrison, and Jackson Counties. This updated analysis will ensure that these counties have maps which reflect the current flood risk based on modern ground elevation data, updated modeling, and inclusion of local resilient features. While borne from a grassroots effort within the communities themselves, and locally supported, this effort will be fully compliant with FEMA's guidelines and standards. The entire study process will be closely coordinated with FEMA Region IV to ensure that the resultant mapping can be smoothly incorporated into the National Flood Hazard Layer. These updated maps will ensure that residents of coastal Mississippi clearly understand their flood risk and empower these communities to proactively mitigate their risk. This presentation will provide an overview of the project and a discussion of the steps involved in a Physical Map Revision following FEMA Guidelines.

Kristyn Gunter ¹ *

Southern Mississippi Planning & Development District

Resilience

Mon Louis Island Restoration (*Oral*)

Abstract Description : The Mon Louis Island Restoration Project included construction of an approximate 1,540-ft. continuous rock dike breakwater and 4 acres of tidal marsh along the bay side of the northern tip of Mon Louis Island at the mouth of east Fowl River in Mobile County, Alabama. The project also included maintenance dredging of the Fowl River navigation channel. The constructed breakwater/marsh system provides protection for approximately 8 acres of pre-existing tidal marsh that were restored during a previous project. The project began with the construction of the temporary access channel and rubble mound breakwater. Hydraulic dredging was then conducted at a nearby off-shore disposal area to provide fill-material for marsh creation. Following completion of the marsh fill, the project was left to settle for several months, during which time, settlement monitoring was conducted. An additional topographic survey was performed on the marsh fill surface, when monitoring indicated that the majority of the marsh settlement had occurred. The post-settlement topographic survey was then utilized to develop the final marsh grading and planting plan. The final grading plan included excavation (in the fill area) to create a tidal creek, and the construction of a minimal earthen berm on the east and west sides of the marsh fill. The berm, which was constructed with material from the tidal creek excavation, was created to provide short-term protection of the marsh fill prior to establishment of the permanent vegetative cover.

Matthew Wahn ¹ *

Thompson Engineering

Habitats

Monitoring Status and Trends of Estuarine Habitats and Water Quality Using Web-Based Remote Sensing Assets (*Oral*)

Abstract Description : Advances in access to various remotely sensed data is greatly improving the ability of scientists to analyze trends in a variety of parameters. Data from numerous satellites are now accessible within minutes from on-line cloud-based resources, and generally for no cost to the user. Resource data, processed from NASA, USGS and the European satellite image inventories are directly accessible using several powerful online processing tools. For example, data from various satellites (LANDSAT, MODIS, Copernicus) can be directly accessed, manipulated and output directly for further analysis for GIS or mechanistic models. We present examples using Google Earth Engine (GEE) extraction of Copernicus data (10 m resolution) of both habitat parameter analysis for GIS analysis (Primary Productivity, Normalized Difference Vegetation Index -NDVI; False infrared images) as well as water quality time-series data for water surface temperature, chlorophyll a, total suspended solids (TSS) and particulate organic carbon accessed from MODIS. We also demonstrate how this data can be directly entered into the USEPA food-chain model AQUATOX and how the information was used for the Deepwater Horizon Natural Resource Damage Assessment (NRDA) baseline calibration for Mississippi Sound and Mobile Bay and for the calibration of an oyster model for Pamlico Sound, NC. We will also demonstrate how these data may be useful for monitoring status and trends of various parameters for the Mobile Bay National Estuary Program including land use and habitat changes in near real-time.

Don Blancher ¹ *

Moffatt & Nichol

Kari Servold ²

Moffatt & Nichol

Water Quality

Monitoring: The Key to Measuring Watershed Management Response

(Oral)

Abstract Description : Demands by funding agencies to document water-quality and habitat problems and improvements resulting from remedial and restoration activities has increased the importance of water-quality and biological monitoring. One of the best examples of the importance of monitoring comes from tributary watersheds of Mobile Bay, where multiple watershed planning and restoration projects are ongoing. The most active of these watersheds is D'Olive Creek in the cities of Daphne and Spanish Fort in west-central Baldwin County. Rapid commercial and residential growth in these communities led to impacts on the watershed including, loss of vegetative cover, increasing impermeable surfaces, increasing runoff, erosion, and sediment transport and deposition, causing loss of stream and bay habitat, damage to infrastructure, and quality of life issues. The Alabama Department of Environmental Management (ADEM), Alabama Department of Conservation and Natural Resources, and the Geological Survey of Alabama partnered in 2006 to begin monitoring water-quality, biological conditions, and sediment transport in D'Olive Creek and its tributaries. However, at the time, no remedial or restoration funds had been identified. The first restoration project was the Step Pool Conveyance System installed in an unnamed tributary to Joe's Branch in 2011, with funding from ADEM. With additional funding provided from the National Fish and Wildlife Foundation, fourteen restoration projects have been completed and two additional projects are planned. Post restoration monitoring is ongoing to document efficiency and improvements in water-quality resulting from remediation and restoration efforts.

Marlon Cook ^{1*}

Cook Hydrogeology, LLC

Water Quality

Obtaining, Understanding, and Using Stakeholder Feedback (*Oral*)

Abstract Description : Stakeholder engagement is critical for successfully developing new research and data products. Engagement builds trust and encourages product application. Gulf TREE (Tools for Resilience Exploration Engine) is an online, filter-based search engine designed to match users with relevant climate resilience tools quickly, easily, and confidently. With over 100 tools relevant to the Gulf of Mexico (and more being added all the time), Gulf TREE sorts through all these options to match users with a climate resilience tool that meets their criteria. In order to ensure relevance to a wide range of stakeholders, the project centered around two series of Gulf-wide workshops, reaching nearly 200 prospective end-users. The second series of workshops focused on beta testing. This set of seven workshops resulted in ample feedback in multiple formats, all of which needed to be organized and prioritized into actionable solutions to identified concerns. The goal in organizing these types of data is to do so transparently, fairly, and within any constraints (e.g., budget, time) a project may have while addressing as many stakeholder concerns as possible. This presentation discusses lessons learned through this process and analyzes the approaches used to transform an extensive, multi-format collection of stakeholder feedback into a prioritized list of 14 total changes.

Mikaela Heming ¹*

Northern Gulf of Mexico Sentinel Site Cooperative

Resilience

Oil Spill Science Outreach: Assimilating Emerging Science to Understand the Past While Preparing for the Future *(Oral)*

Abstract Description : The Sea Grant oil spill science outreach team (OSSOT), is a Gulf of Mexico-based initiative that identifies the best available science for a wide array of subjects and, using peer-reviewed research results, develops outreach materials based on target audience needs. Eight years after the largest marine oil spill in US history, the OSSOT has released 27 publications on diverse topics including the effects of oil and dispersants on wildlife, technology used to track spills, and the impacts of storms on spills. These publications have been distributed throughout the Gulf of Mexico and beyond and are used to help our stakeholders, people whose livelihoods depend on a healthy Gulf, understand potential impacts and latest science related to oil spills. Though many years have passed since DWH, the impacts to many coastal communities have lingered, necessitating continual engagement with stakeholders. Today, I will summarize the work that has been done by the research community and the OSSOT since Bays and Bayous 2016, as well as potential areas to be explored as we prepare for the future.

Melissa Partyka ¹ *

MS-AL Sea Grant Consortium; Auburn University

Steve Sempier ²

MS-AL Sea Grant Consortium

LaDon Swann ³

MS-AL Sea Grant Consortium

Oil Spill

Optimal Portfolio Design to Manage Oyster Resources *(Oral)*

Abstract Description : The State of Mississippi has an ambitious goal to produce “one million sacks of oysters per year and to increase ecological and economic benefits”. We propose an oyster resource management approach based on modern portfolio theory (MPT) to aid the state's efforts to achieve this goal. MPT is a method developed to overcome deficiencies in investment decision-making, with the objective of minimizing risk while maximizing expected returns, which we modified to incorporate multiple oyster-based technologies producing multiple ecosystem services. Data are collected using a modified Delphi (expert elicitation) approach. Estimates for four ecosystem services (oysters for harvest, improved water quality, habitat for blue crab and redfish, and shoreline protection), provided by three oyster-based technologies (natural oyster beds, off-bottom farms, and restored / constructed reefs) are elicited from oyster biologists over twelve environmental scenarios (covering oxygen, nutrients, sedimentation, and salinity). These service estimates are then assigned ecosystem service values taken from the economics literature and combined cost estimates for each technology to compute the means, standard deviations, and correlations of net benefits across all combinations of technologies and environmental scenarios. The anticipated result is identification of an efficient frontier of portfolios of oyster-based technologies.

Frederick Nyanzu ^{1*}

Mississippi State University

Daniel Petrolia ²

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Ardian Harri ³

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Just Cebrian ⁴

Dauphin Island Sea Lab

William Walton ⁵

Auburn University Shellfish Laboratory

Habitats

Optimizing eDNA Analysis Methods for Molecular Detection of Bull Sharks (*Carcharhinus leucas*) in the Mobile-Tensaw River Delta and Mobile Bay Environments (*Oral*)

Abstract Description : Identifying the distribution of elasmobranchs (sharks and rays) traditionally requires setting nets and handling the target species to collect tissue samples and attach tags. Such methods are costly, time consuming, and inflict stress on both target and non-target species. Environmental DNA (eDNA) sampling provides a non-invasive alternative to monitoring elasmobranchs through DNA traces, eliminating the need to capture or even observe the target organism. In the Gulf of Mexico, bull sharks (*Carcharhinus leucas*) are known to inhabit the interface between freshwater and marine systems; however, the extent to which they are present in the rivers feeding these systems is unknown. To investigate this question, we developed a standardized protocol for collecting and filtering highly turbid river and coastal water samples, preserving the filters, extracting the eDNA, and identifying a target sequence specific to *C. leucas* via polymerase chain reaction (PCR). Water samples were filtered with various filter pore sizes to test for efficiency and multiple DNA extraction protocols were compared to determine which yielded the highest quality and quantity DNA. Droplet digital PCR (ddPCR) was then used to detect *C. leucas* DNA in water samples, if present. ddPCR can identify minute amounts of target DNA with unparalleled precision by partitioning the sample into individual droplets, conducting PCR reactions, and quantifying resultant products from each droplet. In order to expand our knowledge of *C. leucas* distribution, it is imperative to utilize a reliable and consistent approach to detect this species' eDNA in a natural ecosystem.

Katherine Schweiss ^{1*}

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Nicole Phillips ²

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Toby S. Daly-Engel ⁴

Florida Institute of Technology

Living Resources

Otolith Shape Analysis for Gulf Menhaden (*Brevoortia patronus*) in the North-central Gulf of Mexico (*Poster*)

Abstract Description : Recent assessment of Gulf Menhaden (*Brevoortia patronus*) in the northern Gulf of Mexico (GOM) stock identified the determination of stock structure to be a “very high” priority in effectively managing the associated fishery. Genetic studies have traditionally been used to understand stock structure and examine the degree of homogeneity of the stock in the region. To corroborate previously reported results that indicate that the stock of Gulf Menhaden is homogenous in the region, we investigated the variability in otolith shape as an indicator of stock structure of Gulf Menhaden in the north-central GOM. We evaluated images of whole otoliths obtained from fishery-independent samples in Texas (n = 101), Louisiana (n = 178), and Mississippi (n = 32). We quantified the outline of each otolith using a Wavelet transformation to describe otolith shape and analyzed Wavelet coefficients using multivariate methods to evaluate the variation in otolith shape between sampling locations. We found that otolith shape differed significantly ($\alpha = 0.05$) among the three geographic regions. The greatest dissimilarity in shape occurred between samples taken from Mississippi and Texas. Shape coefficients associated with the dorsal rostrum and ventral antirostrum regions of the otolith accounted for the greatest proportion of the total variance in coefficients. Our results suggest the presence of subdivisions in the Gulf Menhaden stock and support the need for a more comprehensive genetic investigation.

Nathaniel Jermain ¹*

University of Southern Mississippi

Robert Leaf ²

University of Southern Mississippi

Living Resources

Our Wastewater Footprint: An Example of Adaptive Research and User-Driven Product Development *(Oral)*

Abstract Description : Developed at the request of local stakeholders, Our Wastewater Footprint is a product package designed to increase awareness of water quality concerns, provide up-to-date data to inform decision-making, and prompt changes in behavior needed to protect water quality. Products were developed based on data collected during a 4-year study to define how human activities and land-use change have affected water quality, using the Mississippi-Alabama coast as a benchmark. This project employed a unique adaptive research approach that involved stakeholders from design and data collection through product development. Products included a webpage focused on data transfer; an edutainment packet for end-users from eco-tour operators to schools and municipal authorities; and recommendations and resources to improve local water quality. Products are publicly accessible and modifiable in response to user feedback. Overall, we found that communication with stakeholders (local residents, watermen, managers, officials) improved our research plan and the application of scientific data to meet stakeholder needs. Involving stakeholders in the research process helped to invest them in research outputs, increasing the likelihood of local communities to engage in activities that protect coastal resources. Funding programs that want to support adaptive research and product development would benefit from incorporating flexibility into funding levels and timelines to allow for response to stakeholder needs.

Ruth Carmichael ¹ *

Dauphin Island Sea Lab; University of South Alabama

Elizabeth Hieb ²

Dauphin Island Sea Lab

Elizabeth Darrow ³

Bald Head Island Conservancy

Water Quality

Oyster Gardening Program at St. Stanislaus (*Poster*)

Abstract Description : Over the past two years, the Saint Stanislaus (SSC) Marine Science Program has participated in the Mississippi Oyster Gardening Program under the supervision of the Mississippi-Alabama Sea Grant Consortium (MASGC) and the Mississippi Department of Marine Resources (DMR). On June 1, 2018 we received approximately 400 oyster shells, covered in spat, from the MASGC and since have provided the juvenile oysters with a safe environment free from predation. When we received the spat they averaged around 0.5 centimeters in length and they are currently averaging around 5.5 centimeters in length. Every week we clean the oysters of sediment and algae that prevents filter feeding, measure their growth, remove predators and monitor water quality conditions. We currently have nine gardens at the end of our pier, with plans to expand to 13 gardens. Each garden contains about a dozen clusters of oyster shells, covered in juvenile oysters. We will continue to maintain and monitor the oysters' growth until they reach maturity, at which time we will return them to MASGC and Mississippi DMR. From there the oysters that we grow will be counted and distributed around the Mississippi Gulf Coast on permanent oyster reefs to reproduce and contribute to future oyster populations. There they will provide shelter to juvenile fish species as well as help prevent erosion of the coastline for the years to come. Last year Mississippi oyster gardeners raised 14,354 oysters; of those, SSC grew 7,614.

William Weber ¹ *

St. Stanislaus Marine Science

Jack Wikoff ²

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Living Resources

Oyster Recovery from Mudblister Worm Infestation (*Poster*)

Abstract Description : Shell-boring Mudblister Worms (*Polydora websteri*) have become a growing economic concern as the Eastern Oyster (*Crassostrea virginica*) aquaculture industry in the northern Gulf of Mexico expands. Sediment-filled worm burrows extend through the shell causing unsightly, dark blisters that can pop when shucked, releasing anoxic mud. While burrows in the oyster shell are permanent, blister recovery is possible as oysters secrete new layers of shell over the blisters. We examined the coupling between burrows and blisters to determine if recovery occurs. Tight spatial correlation between burrows and blisters would indicate low recovery, whereas burrows present with no blisters could indicate either higher recovery or a decoupling between burrows and blister formation (i.e., not all burrows result in blisters). Oysters were sampled from a coastal Alabama oyster farm in summer 2017; shells were X-rayed to show burrows, and color photos were taken to compare blister coverage to burrows. Burrows and blisters were quantified within a grid overlaid on both images. Overlap between the two was most common in the newest regions of shell. Burrow abundance decreased towards the edges, showing greater prior worm infestation in older regions of shell. Area of darker colored blisters increased towards the edges, consistent with more recent infestations. Our analysis indicates that burrows are not tightly coupled with blisters, suggesting that few burrows result in mudblisters. More darker blisters in the newer parts of the shell suggests that there is some recovery in older regions.

Ellen Titus ^{1*}

Dauphin Island Sea Lab; University of South Alabama

Kelly Dorgan ²

Dauphin Island Sea Lab

Sarah Cole ³

University of South Alabama; Dauphin Island Sea Lab

William Walton ⁴

Auburn University Shellfish Laboratory

Living Resources

Oyster Reef Diversity and Oyster Size Class Abundance in the Northern Gulf of Mexico (Terrebonne Bay, Louisiana to Apalachicola Bay, FL) After Deep Water Horizon (2015-2017) (*Oral*)

Abstract Description : Oyster reef communities of the northern Gulf of Mexico faced direct and indirect impacts from the 2010 Deepwater Horizon oil spill and recovery efforts, which included the release of freshwater in Louisiana marshes in 2010. These impacts are predicted to affect the recovery of oyster reef communities. We tested for differences in taxonomic diversity, oyster size class abundance, and community composition in relation to embayment, oiling history, depth (nearshore and subtidal), salinity, and time period (2015-16, 2017). We measured oyster reef community composition and abundance from four bays: Terrebonne Bay (TB), LA (20 sites); Barataria Bay (BB), LA (21 sites); Pensacola Bay to Apalachicola Bay (FL), FL (18 sites); and Mississippi Sound (MS), AL (17 sites). Sites were sampled twice, once in 2015 or 2016, and once in 2017. PERMANOVA analyses from all sites and sampling periods indicated differences in taxonomic composition related to (in order of importance) embayment, salinity, sampling period, depth, and oiling history. SIMPER analyses indicated that barnacle and hook mussel (*Ischadium sp.*) abundance contributed most to differences among factors. Univariate analyses indicated that in 2015, previously oiled sites in TB had higher oyster abundances than non-oiled sites. Throughout the study, in most bays, nearshore mesohaline sites tended to be most productive for oysters. These four bays differ in community composition, which may be an important consideration in future oil spills. In addition, our surveys indicate that abundance of smaller oyster size classes appears to have declined in TB, BB, and MS between 2015-2017.

Kelly Boyle ¹ *

University of South Alabama Department of Marine Sciences; Dauphin Island Sea Lab

Meagan Schrandt ²

University of South Alabama; Dauphin Island Sea Lab

Sean Powers ³

University of South Alabama

Oil Spill

Partnership Builds Wind and Flood Resilience Through Outreach (*Oral*)

Abstract Description : How do you connect and address risks from wind and water in coastal communities? Creating that connection and providing solutions to these shared hazards is the goal of the partnership between Smart Home America and the Mississippi-Alabama Sea Grant Consortium. Through a formal, unique partnership and shared project, both organizations have been able to increase their outreach capacities to increase the resilience of communities. Shared goals of the organizations include not only determining best practices to address both high wind and flood threats, but also promoting the importance of having proper insurance, and providing technical support and outreach for the Community Rating System. This presentation will highlight how Smart Home America and the Mississippi-Alabama Sea Grant Consortium are working together to achieve the project's outcomes, the activities utilized to increase community resilience, the mechanisms of the partnership itself, and the benefits provided to both public and private-sector stakeholders. Attendees will also learn about the IBHS FORTIFIED Home™ program, Smart Home America's "Don't Goof" campaign, and ways both entities have successfully worked with private sector service providers.

Hank Hodde ¹ *

Smart Home America

Resilience

"Pay Me Now or Pay Me Later:" Employing LID and GI to Avoid Future Restoration (*Oral*)

Abstract Description : The Mobile Bay National Estuary Program (MBNEP) secured funding from the National Fish and Wildlife Foundation's Gulf Environmental Benefit Fund and the Alabama Department of Environmental Management through the Clean Water Act Section 319 grant program to restore the ecological function of degraded streams and wetlands along the Eastern Shore of Baldwin County in Lower Alabama. With significant topographical relief, layers of erodible sand and clay, flashy hydrology, and ever-expanding hardened urban landscapes, this area presents "the perfect storm" of stormwater impacts including flooding, streambank erosion, wetlands degradation, and sedimentation. After implementing 12 projects over the past several years, MBNEP has learned one universal truth: restoration projects are expensive! This presentation will examine the costs of these projects in detail and argue that good urban planning and investment in green infrastructure and low impact development represent bargains when compared to the cost of post-development restoration.

Paul Lammers ^{1*}

Mobile Bay National Estuary Program

Habitats

Peer to Pier Learning Program (*Oral*)

Abstract Description : Within the last 5-8 years, a number of commercial off-bottom oyster farms have been established in Louisiana, Alabama, Florida, South Carolina and North Carolina, with significant interest in Mississippi, Georgia and Texas. Though newly established and relatively small-scale, these oyster farms have established the potential for off-bottom oyster farming in the southern region. These businesses have also found that there is a ready market in the region for locally produced, premium oysters. Despite these opportunities, this new industry faces significant challenges with regards to increasing production efficiency, improving product quality and consistency, assuring product safety, disaster preparation, permitting and marketing. There is an opportunity to improve the resiliency of these new oyster aquaculture businesses through regional training and outreach including business planning and best management practices. Paired with opportunities to network with established farmers and take advantage of personal networks, this will place new and beginning growers in the region on a quicker trajectory toward success. This program provides peer-to-pier learning opportunities for oyster farmers in the southern U. S. to both attend industry conferences and visit peers in other parts of the country, we request funds to provide competitive scholarships to regional commercial oyster farmers to 1) visit other oyster farms to gain hands-on experience and provide peer-to-peer learning opportunities, and 2) attend industry-focused workshops, meetings and trade shows that they might not otherwise be able to attend.

Rusty Grice ¹

MS-AL Sea Grant Consortium; Auburn University Shellfish Lab

William Walton ^{2*}

Auburn University Shellfish Laboratory

Resilience

Pensacola Bay Living Shoreline - Project GreenShores Site II (*Oral*)

Abstract Description : The Pensacola Bay Living Shoreline (PBLs) project includes the creation of salt marsh habitat and low-crested breakwaters that serve as benthic habitat. In addition to the typical design concerns from waves and tidal conditions, the high visibility of the project contributed to a significant amount of community input regarding project placement and aesthetics. Based on the community input, the project layout was reduced from two locations to focus the new marsh acreage at one location at Project Greenshores Site II (PGSII). The living shoreline aspect of the project introduced two competing goals for breakwater design. The first breakwater design goal to reduce wave energy in the new marsh area tends to be better accomplished with higher crest elevations. The second breakwater design goal to function as benthic habitat is better attained when the breakwater elevations are low and within the tidal elevation range. The project team balanced these goals to design a final product to meet both project needs. Marsh design includes placement of sandy sediment from hydraulic dredging in to a series of mounds to create low and high marsh planting areas. The variability in elevations will provide resiliency for marsh plant growth and migration in the short and long-term. The mounds are grouped to allow for the creation of primary and secondary channels within the marsh to enhance water circulation within the overall complex.

Erin Rooney ¹*

HDR Engineering, Inc.

Habitats

Pensacola Bay Living Shoreline - Project GreenShores Site II (*Oral*)

Abstract Description : The Pensacola Bay Living Shoreline (PBLs) project includes the creation of salt marsh habitat and low-crested breakwaters that serve as benthic habitat. Regulatory and permit requirements for this project exist at the federal and state levels. At the federal level, USACE required an Individual Permit Authorized under Section 404 of Clean Water Act, 33 CFR Part 323 and Section 10 of the Rivers and Harbors Act, 33 CFR Part 322. A United States Coast Guard permit for Private Aids to Navigation, 33 CFR Part 66 will be needed for any warning signs, buoys, or lights placed in the water. State level permits for construction, water quality, and coordination of potential cultural resources are also required through the FDEP, with concurrence from the Florida Department of Historic Resources (SHPO). The project team engaged with the permitting agencies early in the design process and took an active approach to anticipate permit requirements during data collection. The data collection plan included biological surveying to determine the presence of submerged aquatic vegetation and shorebird nesting areas, pursuant to USFWS and NMFS requirements under the Endangered Species Act. An extensive underwater cultural resource surveying program was conducted including dives at certain locations of interest. A chemical analysis of the proposed borrow and placement areas was performed. Several aspects of the design considered potential permitting requirements including the borrow area dredging limits, construction corridors, and breakwater layout to allow for movement of water and marine wildlife.

Erin Rooney ¹*

HDR Engineering, Inc.

Habitats

Permitting Challenges - Mon Louis Island Restoration (*Oral*)

Abstract Description : The Mobile Bay National Estuary Program's Mon Louis Island Marsh Restoration Project, required extensive permitting efforts. These efforts included alternatives analyses, costal engineering analyses, ecological analyses, geotechnical and settlement analyses, land-owner agreements and legal documentation, comparisons of breakwater structures, stake holder and community involvement / coordination, priority analyses, and development of construction and post construction long term monitoring plans. A significant obstacle included the sourcing of borrow material for the marsh fill. Initial plans were to borrow marsh fill material from the adjacent Fowl River Navigation Channel (FRNC), which was in need of maintenance dredging to minimize navigational hazards. Unfortunately, subsequent sediment sampling and geotechnical analysis indicated that material in the FRNC was not suitable for marsh fill. Without adequate over the road access to deliver material to the site by truck, use of off-site upland sites was ruled out. Ultimately, it was determined that the most viable option was to hydraulically dredge material from Mobile Bay. Unfortunately, permitting such a borrow area proved unattainable. Through creative thinking and agency cooperation, a compromise solution was identified. An offshore dredge material disposal area was identified near the project site which happened to contain suitable material for marsh fill. Funding to facilitate some dredging of the FRNC was then secured, and by combining the two projects, the offshore dredge material disposal area was able to provide suitable marsh fill material, while material from the FRNC dredging project was used to refill the excavated borrow area.

Scott Jackson ¹ *

Thompson Engineering

Habitats

Potential Shifts in Nutrient Filtration with Encroachment of Black Mangrove *Avicennia germinans* (Oral)

Abstract Description : Since 1989, warmer winter temperatures have facilitated black mangrove (*Avicennia germinans*) expansion into *Spartina alterniflora*-dominated salt marsh. Here, we investigated seasonal allocations of carbon and nitrogen to plant tissues and to sediment environments in coastal wetlands dominated by *A. germinans* or *S. alterniflora* near Port Fourchon, Louisiana. The two species have different seasonal growth patterns in subtropical regions where they coexist: tropical *A. germinans* retains leaves year-round but is susceptible to freeze damage, while most leaves of temperate *S. alterniflora* senesce each winter and resprout the following growing season. Despite *S. alterniflora*'s potential to uptake nitrogen for regrowth during the growing season, the baseline nitrogen-uptake of *A. germinans* was higher than *S. alterniflora* throughout the year. In the absence of freeze events, *A. germinans* consistently led to significantly lower pore water nitrogen concentrations than *S. alterniflora*. These results indicate that a vegetation shift from *S. alterniflora* to *A. germinans* could result in greater nutrient removal capacity, thereby mitigating eutrophication in coastal waters. Range expansion of dominant vegetation in response to climate change can drive large changes in the supply of ecosystem services – some good, some bad. Collectively, our results advance understanding of changes to nitrogen filtration capacity with climate-induced mangrove encroachment into salt marsh. However, nutrient filtration is just one of many ecosystem services, and the potential benefits of this single service must be considered within the context of the many other ecosystems services that are affected by mangrove expansion and replacement of salt marsh.

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Dauphin Island Sea Lab

Just Cebrian ²

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Michael Osland ³

USGS

Julia Cherry ⁴

University of Alabama

Living Resources

Predicting the Impact of Sea-Level Rise on Coastal Wetlands: Implication for Coastal Wetland Restoration (*Oral*)

Abstract Description : Coastal wetlands provide a variety of ecosystem services, but many have been degraded or lost in the last few decades due to natural and anthropogenic factors, including sea-level rise (SLR). It is important to understand how coastal wetlands respond to these drivers to help anticipate coastal vulnerability under climate change and improve outcomes of extensive conservation and restoration efforts. Here we develop a mechanistic model based on the marsh equilibrium model (MEM) and a hydrodynamic model to predict coastal wetland change under SLR at two contrasting systems – an undammed riverine dominated estuary and a marine dominated estuary in southeastern Mississippi. We derived SLR thresholds based on the model simulations to evaluate the nonlinear response of coastal wetlands to SLR and their regime shifts. The results show that coastal wetlands in the riverine dominated estuary are more resilient to SLR than in the marine dominated estuary. In addition, vegetation productivity and sediment availability are almost equally important for both estuarine systems to remain resilient to SLR, aligning with our findings at the regional scale that the restoration methods directly targeting at increasing vegetation productivity and sediment availability reduced coastal wetland loss. We further discussed the threshold characteristics of different spatial patterns of coastal wetlands under SLR, offering additional scientific basis to inform coastal wetland restoration projects. The research highlights how science can assist more-informed resource management.

Wei Wu ^{1*}

University of Southern Mississippi

Patrick Biber ²

University of Southern Mississippi

Matthew Bethel ³

Louisiana Sea Grant

Tyler Hardy ⁴

University of Southern Mississippi

Resilience

Promoting Nature Based Tourism in Coastal Mississippi (*Oral*)

Abstract Description : The rivers, bays, bayous, and Gulf shape a world of natural experiences and provide many nature-based adventures for travelers to South Mississippi. Whether paddling, hiking, biking or just leisurely exploring the area's many natural and cultural resources, visitors to Coastal Mississippi and locals residing in the six counties of South Mississippi can find a wealth of opportunities to reconnect with nature and recharge their spirits. The Mississippi Department of Marine Resources, (DMR), engaged Allen Engineering and Science (AllenES) to help lead a dedicated team of advocates in preparing the Nature-Based Tourism Plan for Coastal Mississippi. This Plan builds upon grassroots effort to identify the untapped value that distinguishes this unique region from other tourist destinations along the Gulf Coast and involves regional businesses in strengthening the tourism economy. This session will explore the methods the team used to engage far-flung stakeholders, how the distinct character of Mississippi Gulf Coast tourism activities were identified, and the development of a short and long-term plan of action. We will conclude with a description of activities currently underway to support nature tourism businesses while raising awareness of the cultural and economic value of protecting natural habitats.

Kimberly Miller ¹

Allen Engineering and Science, Inc.

Melissa Pringle ^{2*}

Allen Engineering and Science, Inc.

Outreach and Education

Proteorhodopsin (pR) Bacteria and Aerobic Anoxygenic Phototrophic Bacteria (AAPB) Abundance in the Pensacola Bay System (*Poster*)

Abstract Description : Bacterioplankton, including the photoheterotrophs, have a large effect on their habitat and are equally affected by environmental parameters. Photoheterotrophs, including proteorhodopsin (pR)-containing bacteria and Aerobic Anoxygenic Phototrophic Bacteria (AAPB), are microorganisms that mainly use heterotrophy but can supplement cellular energy needs by capturing light energy. Determining photoheterotroph community structures in aquatic ecosystems is essential to elucidating aquatic organic molecule and energy flow. We determined pR and AAPB gene copy numbers in the Pensacola Bay System (PBS) to answer these questions: (a) What is the abundance of pR and AAP bacteria in the PBS? (b) How do turbidity and other environmental parameters affect the distribution of pR and AAPB? We sampled waters in 6 river/estuary stations and one Gulf of Mexico station. A principal component analysis of AAPB and pR distribution explained 64% of the data variability, with abiotic principal components dominated by salinity, oxygen, pH, total suspended solids (TSS), dissolved inorganic phosphorous (DIP), and irradiance at depth. A non-parametric Bio-Environmental SStep analysis determined that the results were highly significant ($p=0.01$), with highest significant factors being temperature ($r=0.623$) and salinity, DIP and TSS in combination with temperature ($r=0.594, 0.583, \text{ and } 0.582$, respectively). The fraction of gammaproteobacterial “marine group” AAPB was significantly correlated with salinity ($r=0.74, p<0.001$). However, the abundance widely varied, depending on season. It appears salinity, temperature and trophic status are the most deterministic environmental parameters affecting photoheterotroph distribution and diversity, suggesting climate-induced changes will directly affect their biogeography, and hence physiological and metabolic capabilities.

Carrie Daniel ^{1*}

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Lisa Waidner ²

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Habitats

Public Opinion on a Gulf Coast Beach Conditions Reporting System

(Oral)

Abstract Description : The purpose of this study was to gauge public interest in a Gulf-wide beach conditions reporting system. Data were collected Spring 2018, via online survey of Gulf Coast beach visitors. Alabama and Florida beaches were most-often visited by our respondents, followed by Mississippi, Texas, and then Louisiana. Less than 15 percent of respondents believed that they could access the same information from other sources. Of the specific types of information considered, the ones of greatest interest to respondents were weather, swim hazards, water quality, red tide events, flag color, crowds, beach debris, surf conditions, and live video. About 40 percent of respondents indicated that the expanded beach conditions reporting system would increase their chances for a good day at the beach, with most of these indicating a one- or two-day increase. Respondents were then asked about their willingness to subscribe, for a monthly fee, for access to the beach conditions reporting system if it were available as a website and smartphone app. Of those asked if they would subscribe if the fee were \$1 per month, about 35 percent said yes; for \$5 per month, about 15-20 percent said yes; and at \$10 per month, about 10 percent said yes. Overall, however, about 80 percent of respondents indicated that they would not be willing to pay for access. Taking all of the above information into consideration, it was estimated that the average annual willingness to pay would be between \$12 and \$14 per year per household.

Daniel Petrolia ¹ *

Mississippi State University

Water Quality

Quantifying Vegetation and Soil Dynamics of Selected Coastal Habitat Types Within the Grand Bay NERR *(Oral)*

Abstract Description : The future of coastal marshes is uncertain when faced with the prospect of sea-level rise (SLR). Coastal marshes provide economic and ecological functions that will be lost if marshes are unable to maintain elevation relative to SLR or migrate into upslope habitats. Mechanistic models, such as the Marsh Equilibrium Model (MEM) developed by Dr. Jim Morris, can be used to forecast marsh response to SLR. This study had two main objectives: 1) provide biomass data to fill in missing variables and confirm previous data for use in the MEM, and 2) compare vegetation and nutrient characteristics along a coastal elevation gradient. Above- and belowground biomass data was collected from plots established along the coastal elevation gradient during peak growing season in 2015 at the Grand Bay National Estuarine Research Reserve (GBNERR). Biomass was sorted by species and living and dead material. Plant material was analyzed for carbon, nitrogen and phosphorus content and molar ratios were calculated. Results showed an increase in total biomass as elevation increased and that sites across the elevation gradient were nutrient poor with no clear evidence of either nitrogen or phosphorus limitation. Belowground nitrogen and aboveground phosphorus concentrations decreased as elevation increased. Results from this project will be used to update forecasts of marsh resilience at GBNERR and improve understanding of differing marsh habitat characteristics. Further, these results will assist in the estimation of carbon sequestration and help inform future land management practices such as the frequency of prescribed burns to promote upland marsh migration.

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Grand Bay National Estuarine Research Reserve

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Alabama Department of Conservation and Natural Resources, State Lands Division, Coastal Section

Resilience

Re-Occurring Patterns of Stratification and Hypoxia in Chandeleur and Breton Sounds *(Oral)*

Abstract Description : The Lake Pontchartrain Basin Foundation has been monitoring hypoxia in Chandeleur Sound since 2010 and in Breton Sound since 2013. LPBF collects a top, middle and bottom data along established transects with a YSI unit (temperature, salinity, D.O.). Cumulative data indicates two patterns. In Chandeleur Sound, the pycnocline is 10 to 20 feet deep with Gulf seawater intruding below “mixed” sound water. In Breton Sound, the pycnocline is general 2 to 8 feet deep with fresh Mississippi River water intruding above the “mixed” sound water. Therefore, to the north, mixed- normoxic water is above and to the south mixed sound water with reduced D.O. is below. The Chandeleur Sound hypoxia probably first develops in the Gulf in the Mississippi Bight, but then moves through the deep channel between Chandeleur and Ship Islands. Once in Chandeleur Sound, it may spread westward toward Mississippi Sound and southward toward Breton Sound. The Breton Sound hypoxia seems to move northward from the river and toward Chandeleur Sound. In some years, the two stratified areas may converge forming nearly continuous areas of hypoxia that can extend from Ship Island to the Mississippi River. These two patterns suggest genesis of the two hypoxic areas being driven by differing dominant influences- the low-energy, high salinity reservoir of Gulf water in the Gulf of Mexico, and the high-nutrient, freshwater discharge plumes from the Mississippi River.

John Lopez ¹*

Lake Pontchartrain Basin Foundation

Kristen Butcher ²

Lake Pontchartrain Basin Foundation

Water Quality

Recent Geologic History of Fowl River Marsh Spits Revealed Through Piston Core Geochronological and Sedimentological Analyses *(Oral)*

Abstract Description : As sea level has risen throughout the Holocene due to glacial retreat, the sinuous meanders and freshwater wetlands of Fowl River and other Gulf Coast rivers have gradually been inundated and replaced by broad basins surrounded by marshes. Although geomorphic evolution is a natural process, anthropogenic stressors including vessel traffic and land use changes may accelerate marsh loss. Here we investigate changes in marsh accretion in Fowl River using marsh spit piston cores. Loss on ignition and radiocarbon dating were employed to detect organic carbon and net accretion changes over the past millennium. Granulometric and cesium-137/lead-210 analyses are currently underway to characterize recent accretion over the last century. Results thus far demonstrate no temporal (i.e. depth) trends in organic carbon; however, there are spatial differences. Cores collected on upstream sides of marsh spits have less organic carbon (5 to 35 %) than cores collected on downstream sides (30 to 65 %). Despite spatial differences in sediment composition, linear net marsh accretion from radiocarbon dates are similar and average 1.15 mm/yr ($\bar{\Delta}f = 0.13$ mm/yr). Regression of depth versus radiocarbon age yields a net accretion from 880 to 590 BP of 1.0 mm/yr ($R^2 = 0.61$) which approximates subsidence; however, the intercept of the regression is 85 mm which is below the current 250 mm of post-industrial revolution sea level rise. These results suggest that the marshes are not accreting at a rate sufficient to keep pace with current sea level rise and are at risk of collapse.

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Habitats

Recommendations for Integrating Outreach and Research: Perspectives from the Gulf of Mexico Research Initiative *(Oral)*

Abstract Description : Broader impacts have become an increasingly important part of research program development. The Gulf of Mexico Research Initiative (GoMRI), an independent research program funded by BP following the Deepwater Horizon oil spill, dedicated significant resources to outreach at the research consortium level and consequently offered an unparalleled opportunity to collectively assess strategies. While GoMRI research consortia varied in size, budget, scientific focus, and outreach staffing, outreach programs reached a wide variety of audiences with a diversity of approaches and activities. Based on perspectives shared by GoMRI outreach coordinators, we make the following recommendations for the development and implementation of successful outreach programs. (1) Involve outreach expertise at the proposal stage to ensure a realistic and effective plan develops. (2) Clearly define a strategic plan with focused and measurable objectives. (3) Explicitly define audiences and the best ways to reach them. (4) Capitalize on unique areas of research and team member skills; leverage opportunities where possible. (5) Be sure that budgets reflect the outreach plan. (6) Determine evaluation metrics at the outset. (7) Effective communication is essential, both within and outside of the team. Specific examples from the GoMRI experience for each recommendation will be presented.

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GoMRI, Consortium for Ocean Leadership

Sara Beresford ³

ECOGIG; University of Georgia

Oil Spill

Reconstruction Potential for Gulf of Mexico Streams *(Poster)*

Abstract Description : Water planning and management decisions are generally based on observed (historic) records. For streamflow, these records typically have a very short period of record (e.g., 50 to 100 years). Thus, water system allocation and the subsequent risk posed by drought are based on a limited record of data. The ability to use dendrochronological (tree ring) proxies to extend the observed streamflow record back into the paleo period (300 to 1000 years) provides water managers and planners with a better understanding of the long-term natural variability of the watershed. Drought in reconstructed streamflow may be of greater severity, duration and / or magnitude than drought in the observed record. The current research compares both paleo reconstructed (tree-ring based) streamflow with observed streamflow for Gulf of Mexico watersheds in the Southeast United States. These comparisons provide water managers and planners useful information in determining water allocation risk due to drought. The MS-AL Sea Grant Consortium, the United States Environmental Protection Agency - Gulf of Mexico Program and the National Science Foundation - Paleo Perspectives on Climate Change program sponsor the current research. This research is being conducted by an undergraduate research team of University of Alabama Honors College students in partial fulfillment of course requirements for UH 300 – Paleohydrology.

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Resilience

Regional Genetic Diversity in *Spartina* and *Juncus* with Implications for Future Salt Marsh Restoration Success (*Oral*)

Abstract Description : The Gulf of Mexico is experiencing a dramatic increase in salt marsh restoration, resulting in unmet demand for nursery plants in Mississippi and Alabama. However, a lack of information on population genetics impedes knowing what is needed to maintain future diversity. This study characterizes genetic diversity, using modern molecular techniques, among *S. alterniflora* (smooth cordgrass) and *J. roemerianus* (black needlerush) populations along the Gulf Coast between Lake Pontchartrain, LA and Pensacola, FL. Field collections of 25 discrete plugs of each species were made at 10 stations; these included marshes at 1 site in FL, 2 sites in AL, 6 sites in MS, and 1 site in LA. For each collection location, plants were analyzed for genetic characterization using microsatellite markers. We genotyped 21 microsatellite loci in *Spartina* and 18 in *Juncus*. In both species, allelic richness and heterozygosity varied significantly among the 10 populations examined, with sites in MS generally having higher genetic diversity than LA and AL. In contrast, linkage disequilibrium suggested variation in effective population sizes among sites. This finding is consistent with varying numbers of clonal lineages segregating in these populations, but geographic patterns differed between the two species. Knowing the genetic makeup of the various populations will allow appropriate selection to enhance diversity. Future restoration projects can be composed of appropriate germplasm lines that when planted together have a long-term benefit. This information will be provided to local restoration and plant nursery businesses to improve access to appropriately sourced plant material for improved restoration outcomes.

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Habitats

Resilience Study of Interdependent Critical Infrastructures Centered on Power Infrastructure Systems Subject to Extreme Weather Events

(Poster)

Abstract Description : Power systems infrastructure fulfills the critical role of ensuring the continuous supply of the electrical energy. Electricity is one of the bare necessities of modern life and essential to the proper functioning of all the other critical infrastructure systems such as transportation, water, gas, oil, financial and telecommunication services. The paramount importance of the power systems infrastructure comes to the fore during extreme events such as major natural disasters, that often deals heavy damage to the energy infrastructures, causing widespread interruptions of electrical energy services. Understanding the dependency and interdependency relationships between power infrastructure systems and other critical infrastructure systems plays a key role in developing an effective recovery plan leading to a more resilient community. The purpose of this research is to explore these critical infrastructure systems and identify critical interrelations among them, by examining Hurricane Irma and Maria induced power system and other critical infrastructure systems disruptions and recovery patterns in Puerto Rico. The research uses regression analysis on post-disaster recovery data to extract and identify these critical relations. The results indicate that significant recovery dependencies exist between the power systems infrastructure and other critical infrastructures, namely telecommunication services, cell sites, financial services, and water system, of Puerto Rico. These recovery dependencies or associations grant valuable insight into critical infrastructure interdependencies and may, aid in integrating resilience thinking into the design of power systems infrastructure, specifically in disaster prone areas.

Partha Sarker ^{1*}

University of South Alabama

Resilience

Resilience to Future Flooding in the Gulf of Mexico *(Oral)*

Abstract Description : The Gulf of Mexico is an area of rich culture and beautiful coastlines; however, coastal living comes with ever-increasing risk. Communities are already experiencing increased flooding and exacerbated storm surge - both due in part to sea-level rise (SLR). Many Gulf communities are already taking steps to become more resilient to current and future hazards, helping them bounce back after storms or be ready for future conditions. Through a series of short films, a new video project showcases five communities - one per Gulf state - that have taken on various resilience strategies. Each video includes content to make it more relevant to the primary audience: communities and decision-makers in the northern Gulf (Mississippi, Alabama, and northwest Florida). Content includes local information about these types of strategies and available resources for the northern Gulf. Additionally, this project generated three 'sea-level rise 101' videos specific to the northern Gulf of Mexico. The 101 videos cover basic information about SLR in the northern Gulf, how SLR will change storm surge, and information on how SLR resilience can be integrated into planning. Altogether, this project aims to help communities across the northern Gulf prepare for this pressing issue.

Mikaela Heming ¹*

Northern Gulf of Mexico Sentinel Site Cooperative

Outreach and Education

Response of Alabama Marine and Estuarine Fishes to Artificial Reef Addition and Enhancement *(Oral)*

Abstract Description : Artificial reefs are often used to increase fishing opportunities, particularly in areas like the northern Gulf of Mexico, where natural reef habitat is limited. Yet, the ecological and fisheries benefits of such reefs remain a topic of debate. Reefs could serve to attract animals away from nearby habitats making them easier to catch. Reefs could also increase limited resources resulting in increased production. Beginning in the early 1970s, an extensive network of artificial reefs has been deployed in the coastal waters of Alabama to enhance fishing opportunities and increase the amount of high-quality habitat available for fisheries species. The Alabama Department of Conservation and Natural Resources, Marine Resources Division has recently (since 2016) deployed approximately 430 new reefs and enhanced approximately 100 existing reefs in this network. We used fishery-independent tools to assess changes in fish population structure and community composition on a subset of these reefs. Preliminary results indicate that fish abundance and biomass at offshore sites have increased dramatically since reef deployment. However, compared to controls, fish populations at inshore sites do not, as yet, appear to have been affected by reef addition or enhancement. Next steps include more detailed examinations of changes in size-structure of important fisheries species and changes in community composition on these reefs through time. We are also collaborating with other researchers to elucidate the links between primary production and fish production on these reefs to determine whether and to what degree the new reefs are resulting in increased fish production.

Mark Albins ¹ *

University of South Alabama; Dauphin Island Sea Lab

Crystal Hightower ²

University of South Alabama; Dauphin Island Sea Lab

Craig Newton ³

Alabama Department of Conservation and Natural Resources, Marine Resource Division

Sean Powers ⁴

University of South Alabama

Living Resources

Response of Songbirds to Hurricanes During Autumn Migration (*Oral*)

Abstract Description : Hurricanes are natural events that (1) cause disturbance to stopover habitats along the northern coast of the Gulf of Mexico (GOM) where migrants rest and fuel for long flights across the GOM not to mention (2) impact the movement of migrants while aloft. We examined the influence of hurricanes during autumn migration along a portion of the northern coast of the Gulf of Mexico. We adopted a multi-scale approach to determine how migrants respond to hurricanes using long-term (20+ years) banding data from coastal Alabama and remotely sensed data from the Mobile, AL and Slidell, LA weather surveillance radars (WSR). WSR captures changes at a regional scale, while banding data provide a case study of species-specific changes in the stopover biology and habitat use of migrating songbirds. Results at the regional scale suggest that migrants avoid hurricane-impacted areas, probably because of either habitat degradation or flight conditions aloft. At the local scale individuals of most of the 29 species for which adequate data existed were less likely to stopover following a storm, but a few species were characterized by increased post-storm capture rates. Hurricanes affect migratory songbirds in different ways at different spatiotemporal scales – information important in the development of coastal conservation plan in the face of increased frequency, severity, and unpredictability of severe weather as climate changes.

Frank Moore ^{1*}

University of Southern Mississippi

Theodore Zenzal ²

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Jeffrey Buler ³

University of Delaware

Jaclyn Smolinsky ⁴

University of Delaware

Living Resources

Restoration and Education Through Oyster Gardening *(Oral)*

Abstract Description : The Mississippi Oyster Gardening Program is designed to promote oyster restoration on the Mississippi Gulf Coast. Through the program, volunteers with access to a pier are provided hanging gardens in which to grow their oysters. At the conclusion of each season, oysters are collected and planted onto restoration reefs on the Mississippi Coast. Each volunteer will end the season having grown around 1,100 oysters and having a direct impact on the ecological health of the Mississippi Sound. Education plays a major role in the program and is achieved through a number of different avenues. Through the gardener recruitment process, presentations about the program and benefits of oyster gardening are made to environmental and community groups along the coast. Word of mouth is particularly important with recruitment, so the more visibility the program has within the community, the more successful it is. For the 2018 season, there were two high schools and three education centers participating in the program. This gave students, camp groups, and center visitors a hands-on opportunity to learn about oyster restoration and ecology. By bringing the reef environment to their schools, students have the opportunity to connect to oyster reefs, and to understand their importance to the Gulf Coast.

Emma Cochran ¹*

MS-AL Sea Grant Consortium; Auburn University

Habitats

Return on Investment from Wind Hazard Mitigation (*Oral*)

Abstract Description : Coastal properties are a complex combination of amenity, value, and risk. Hazard mitigation is one potentially valuable tool to increase the resilience of properties by reducing expected damages in the event of periodic and catastrophic storm events. The benefits of mitigation can accrue at both the individual and community level. There is actually very limited extant research related to the costs and benefits of wind-hazard mitigation, and what does exist focuses on one potential benefit or another, but not the full suite of benefits simultaneously. We propose to construct a discrete-time discounted net present-value framework that accounts for the flow of costs and benefits over time. Specifically, the project will take a forward-looking "what-if" approach that identifies a set of representative property types, and estimates the magnitude of the three key benefits accruing from each mitigation approach available to them: 1) wind policy premium savings based on mitigation discounts; 2) property value increases accruing to mitigation improvements, based on existing literature; 3) reduced expected damage costs and/or claim deductibles due to mitigation undertaken, based on existing literature and estimates of relationships between storm strike probabilities, wind ratings on building material, and expected damages. The analysis would be estimated over a 30-year time horizon, i.e., the length of a typical home mortgage, using appropriate discounting, to give both a short- and long-run outlook of benefits and costs. We will consider scenarios for new construction and existing properties.

Daniel Petrolia ¹ *

Mississippi State University

Hank Hodde ²

Smart Home America

Shea Gould ³

Mississippi State University

Resilience

Salinity Dynamics in Fowl River and Their Potential Impact on Marsh Health *(Oral)*

Abstract Description : The success of estuarine restoration efforts often depends on a range of interdisciplinary marine and fluvial processes that interact in complex ways. A major consideration in estuarine restoration is the environmental conditions at site locations due to their impact on biogeochemical processes and in determining whether biological organisms can survive and flourish. Times series of salinity and current velocity data from 4 stations during May-July 2018 as well as monthly CTD surveys along the length of Fowl River were used to determine salinity dynamics and there impacts on several marsh spits in this system. The work characterizes high frequency temporal and spatial variability in the vertical and horizontal salinity structure of the system during spring/summer when marsh growth is at a maximum. The system underwent a significant change in salinity conditions going from a freshwater tidal river to a brackish estuary over the observation period. Salt intrusions into the main stem of Fowl River from West Fowl River resulted in complex estuarine dynamics that requires an understanding of two salinity end members (Mississippi Sound and Mobile Bay). These mid-river salt intrusions drive changes to density gradients that modify the circulation and stratification. The strength of this salinity intrusions appears to be linked with wind forcing where southwest wind forced Mississippi Sound waters into West Fowl River. The connection to Mississippi Sound may expose the marsh spits to higher salinity levels and contribute to the marsh vegetation present on these sites and their resiliency to system change.

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Habitats

Salt Aire - Design & Construction of a Shoreline Restoration and Protection Project on Mobile Bay *(Oral)*

Abstract Description : The Salt Aire Shoreline Restoration project lies within Mobile County, adjacent to Goat Island, and the opening of the Fowl River into Mobile Bay. Over many years of exposure to unencumbered waves from Mobile Bay, the existing marsh has eroded approximately 300' over the past 20 years, particularly along the northern extent, where weaker soils are present. In addition, once present, healthy oyster reefs have been decimated by over-harvesting. To mitigate these effects, the project design consists of 1) restoration of approximately one mile of shoreline through creation of 30 acres of intertidal marsh and vegetative plantings, 2) shore parallel wave attenuation structures consisting of overlapping, intertidal breakwaters that allow for interlocking, stackable units, composed of concrete specially-designed to encourage oyster colonization and growth to facilitate reef development, and 3) shore-parallel and perpendicular structures placed around the exposed side of Goat Island and as containment at boundaries. To evaluate existing processes and develop proposed solutions, analyses utilized Delft3D models of both Future -Without-Project (FWOP) and Future-With-Project (FWP) scenarios. The simulation of hydrodynamics, wind-driven wave processes, and sediment transport reveal the effects of constructing the project on such properties on wave energy and sedimentation rates over a 50-year design life. Other aspects of the design include multi-lift dredged fill placements composed of spatially-varied lift-heights, and tidal creek networks. Progressing from the design process into bidding and construction, offers several lessons in the development of a multi-faceted living shoreline project.

Ryan Waldron ^{1*}

Neel-Schaffer, Inc.

Kirby Latham ²

Neel-Schaffer, Inc.

Tina Sanchez ³

Mobile County

Eddie Kerr ⁴

Mobile County

Habitats

Salt Aire Shoreline Protection and Restoration (*Oral*)

Abstract Description : The Salt Aire project on Mobile Bay is being performed for Mobile County Commission through a NFWF grant. Vittor & Associates managed the project with Neel-Schaffer, Inc. as project engineers. Our tasks included project design, impact assessment, and permitting. Vittor & Associates had been involved in similar projects in Mobile and Portersville Bays and in Bayou Casotte and used that experience to speed the review process for Salt Aire. The first step in our project planning was to hold a pre-application meeting of the County team, Corps of Engineers (Regulatory, Operations, Planning), and ADEM. This meeting (November 2016) allowed us to identify critical information needs, design approaches, analysis methods, and schedules that would facilitate agency reviews while ensuring that project goals could be met. Agreement was reached on types of data needed, wave energy modeling, a sediment source for marsh restoration, need to limit borrow site excavation depths, and not re-filling excavated areas. Our initial site plan was later expanded at the request of ADCNR to provide more protection for Goat Island. The County submitted its application in March 2017 and the Corps public notice was released in April. As a result of comments received, we held meetings with oyster fishery interests and Fowl River community residents, resulting in additional adjustments to the project. Although a late decision to require a cultural resources assessment added several weeks to the review process, we still obtained the final permit in December 2017, about 9 months after submitting the application.

Barry Vittor ¹*

Barry A. Vittor & Associates, Inc.

Habitats

Sand Deposition on Deer Island, Biloxi *(Oral)*

Abstract Description : Deer Island is a nearshore barrier island that protects Biloxi Bay from storms and is actively nourished to prevent erosion. Understanding sediment transport on Deer Island as well as other barrier islands and beaches is important when considering how to best protect and re-nourish these systems. Typically, fluorescent particle tracers are used in these studies. Fluorescent particle tracers require time intensive lab processing. We used a novel sediment tracer that has both a magnetic and fluorescent signature to study sand transportation in a coastal environment. The magnetic signature reduces lab processing time while the fluorescent tracer allows for real-time field assessments. Results indicate that sand on Deer Island is transported along shore in both the eastern and western directions and varies with wind direction. We are currently investigating how the fluorescent tracer signal can be remotely sensed in the field using unmanned aerial vehicles.

Anna Linhoss ^{1*}

Mississippi State University

Catie Dillon ²

USACE ERDC

Resilience

Sawfish CSI: Using Environmental DNA to Search for the Critically Endangered Smalltooth Sawfish in Mississippi Waters *(Oral)*

Abstract Description : The Critically Endangered Smalltooth Sawfish, *Pristis pectinata*, was once common throughout the Gulf of Mexico, but saw a significant reduction in range and number in the last century, with known populations currently restricted to Southwest Florida. Anecdotal catch reports suggest that *P. pectinata* were once also common in the coastal waters of Mississippi (MS), but declined substantially by the 1970's. Over the past decade, however, juvenile *P. pectinata* have sporadically been reported by recreational fishers in these waters, implying that they may still be present, returning, or recovering. The presence of juveniles, which tend to exhibit site fidelity, is a promising occurrence and suggests that they may be using these waters as a nursery. To determine the presence, and better understand the status of this species in MS waters, we conducted monthly environmental DNA (eDNA) surveys where bottom water samples were collected and filtered within 24 hours. Particulate matter collected on the filters was then extracted and analyzed using Droplet Digital PCR for the presence of *P. pectinata* DNA using species-specific primers targeting the mitochondrial ND2 gene. Using strict protocols to avoid contamination, eDNA can become a powerful tool for supporting sawfish recovery worldwide, especially in remote regions. If *P. pectinata* are reintegrating in MS Sound, it is imperative to designate and protect any critical habitat. Presence data from this research could be used to focus outreach by educating the public about the presence of this Critically Endangered species in MS waters, and maximize conservation efforts by optimizing fieldwork.

Ryan Lehman ^{1*}

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Fish and Wildlife Research Institute, Florida Fish and Wildlife Conservation Commission

Habitats

Sea Grant Offers Fellowship Opportunities for Grad Students (*Poster*)

Abstract Description : The Mississippi-Alabama Sea Grant Consortium has several fellowship opportunities each year for graduate students who are looking for opportunities. This poster will focus on making graduate students, professors and agencies aware of these opportunities. The Sea Grant John A. Knauss Marine Policy Fellowship places graduate students in Washington, D.C., to work with federal agencies or legislative offices on national marine policy decisions. The National Marine Fisheries Service-Sea Grant Joint Graduate Fellowship offers graduate students the opportunity to work with a mentor in two fields: population and ecosystem dynamics involving fish populations and marine ecosystems or marine resource economics. Finally, the NOAA Coastal Management Fellowship offers on-the-job training for two years with a state coastal resource agency project. The projects, and the states where the fellowships take place, vary from year to year.

Melissa Schneider ¹*

MS-AL Sea Grant Consortium

Loretta Leist ²

MS-AL Sea Grant Consortium

Habitats

Seagrass Monitoring in the Pensacola Bay System: A Partnership Between Citizens and the University of West Florida *(Oral)*

Abstract Description : In the Pensacola Bay System located in northwest Florida, seagrasses are a dominant habitat in the shallow estuarine region, particularly in Santa Rosa Sound and Big Lagoon. Many aquatic animals use seagrass beds as a nursery area, for foraging and as a refuge. In the summer of 2017 the University of West Florida (UWF), Escambia and Santa Rosa County Sea Grant Extension began a partnership to enlist citizens and UWF students to monitor seagrass beds. Each month during the growing season, local citizens identify seagrass species and use quadrats to estimate coverage of seagrass and macroalgae at different locations in Big Lagoon and Santa Rosa Sound. They also collect water samples which are analyzed at UWF by students who measure salinity and total suspended solids (TSS). Students also measure water quality and collect water samples for dissolved nutrients and chlorophyll a from these locations twice during the growing season. In 2018, salinity range was 10.13 to 25.89 for Santa Rosa Sound and between 15.8 and 27.1 in Big Lagoon. TSS during this year was usually below 8 mg/L in Santa Rosa Sound and below 19 mg/L in Big Lagoon. Seagrass coverage from 2017, by the citizen scientists, was comparable to earlier UWF data from 2016. The goals of this program are to develop an active community of citizen scientists, train students, develop long term monitoring of seagrass habitats in the Pensacola Bay system and an understanding of factors impacting seagrasses.

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University of West Florida Center for Environmental Diagnostics and Bioremediation

Victoria Henry ²

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Rick O'Connor ⁵

Florida Sea Grant

Christina Verlinde ⁶

University of West Florida; Sea Grant Extensions, Santa Rosa County

Outreach and Education

Sharing Science to Positively Impact Society (*Poster*)

Abstract Description : Research is expensive. Funders and society need to know that money has been invested wisely. Therefore, it is essential that scientists and technical experts share the positive impact of their research with audiences outside of their technical circle. Whether it is educating students or the public, or assisting a policy maker or decision maker, there are appropriate steps to follow to achieve clear communication with, and positive impact on, your target audience. These steps include: seek engagement and education experts, create an outreach plan, select the proper approach and messages, develop an evaluation plan, and establish a budget. We will present these steps in the form of a flow chart that guides scientists through considerations to ensure effective education, outreach, or engagement activities are completed in association with their scientific or technical projects. We will provide examples of effective science outreach. We will seek feedback and engage in dialog with scientists on the applicability of the flow chart in their own technical work.

Amy Clark ¹ *

NOAA Fisheries

Christina Verlinde ²

University of West Florida; Sea Grand Extensions, Santa Rosa County

Lee Yokel ³

Dauphin Island Sea Lab; Gulf of Mexico Alliance

Steve Ashby ⁴

Mississippi State University; Northern Gulf Institute

Resilience

Shoreline Protection and Enhancement in the LaBranche Wetlands, St. Charles Parish, LA *(Oral)*

Abstract Description : The Pontchartrain Levee District, through funding from the Coastal Impact Assistance Program, funded the construction of approximately a mile of living shoreline. The East LaBranche Shoreline protection project, located along the southern shoreline of Lake Pontchartrain in St Charles Parish, LA, provided an integrated and sustainable solution to restore and protect the Lake Pontchartrain shoreline and the LaBranche Wetlands. It combined the consolidation of shoreline protection and wetland restoration projects to date with proposed restoration measures into a unified strategy that included a stabilized shoreline, a healthy marsh, and a restored levee protection system, as part of the multiple-lines-of-defense strategy. The design features two sections of shoreline protection comprising marsh toe armoring with rip-rap and an off-shore perched breakwater with marsh fill and vegetative plantings between. The project constructed a protection feature to halt shoreline erosion. During construction, several modifications were needed. While most were anticipated, such as differential settlement, others such as erosion of the water bottom which required additional rock, were not.

Chris Williams ¹ *

Moffatt & Nichol

Habitats

Shoreline Restoration and Habitat Longevity: The Lightning Point Living Shoreline Project *(Oral)*

Abstract Description : The Nature Conservancy is investing in a 1.5-mile long living shoreline project that combines breakwaters, marsh creation, managed access, and public amenities in Bayou La Batre, AL. The Lightning Point shoreline has been significantly eroded over the 20th century, experiencing high episodic retreat from storm impacts (most recently by Hurricane Nate) that diminishes available wetland habitat. As large investments are made in this and other living shoreline projects, increasing project longevity in the face of sea level rise and storm volatility has become an important factor to consider in site design and long-term maintenance. Design features for the Lightning Point Restoration include 28 acres of marsh restoration with material from a nearby borrow area and previous dredge disposal site. Additionally, living shoreline concepts are implemented including breakwaters to reduce the high erosion rates experienced at the site, extending the life of the restored habitats. Functional tidal creeks are included between the breakwaters and the existing shoreline mimicking the natural tidal marshes in the area. Ecological design aspects of the project consider a diversity of habitat types for subtidal, intertidal, and higher scrub-shrub zones. In addition, existing beach features are preserved to prioritize establishment of locally threatened species and support community use. Resiliency and sustainability concepts were integrated early in the design phase for all project features. Robust shoreline protection, thoughtful fill and tidal creek design, and green public access features all ensure that the restored coastal habitats and revitalized waterfront continue to thrive in an uncertain future.

Kevin Hanegan ¹*

Moffatt & Nichol

Nicholas Cox ²

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Chris Williams ³

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Meg Goecker ⁴

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Mindy Joiner ⁵

Moffatt & Nichol

Don Blancher ⁶

Moffatt & Nichol

Habitats

Silicon Sorption Capacities at the Sediment Water Interface of Coastal Systems *(Oral)*

Abstract Description : Movement of silicic acid onto and from mineral surfaces in seawater has been known for decades, however, no studies have quantified the gross rate (opposed to net rate) in marine sediments. Here we report Si adsorption and desorption rates quantified with silicon-32 radioisotope tracer for fresh (field experiments) and frozen (laboratory experiment) Mississippi river plume sediments over a range of sediment solution ratios (SSR). Net release rates ranged from $0.3 \pm 2.3 \mu\text{mol Si g}^{-1} \text{ d}^{-1}$, with field experiments releasing 2 times the amount of Si at lower SSR but similar rates at higher SSR. The uptake of ^{32}Si into field sediments ranged from 86 - 494 $^{32}\text{Si DPM g}^{-1} \text{ d}^{-1}$ collectively, with both sets of experiments having similar trends with SSR. As SSR increases down-core, it was previously assumed that net release and uptake of Si slowed and eventually stopped. Extrapolating these data suggests that fluxes both onto and from sediments slow down but remain quantifiable even under deeper SSR conditions (e.g. 85 g L⁻¹) reflective of compact sediments. There appears to be significant particle/aqueous exchanges occurring on the order of minutes and hours which have previously not been quantified, thereby demonstrating that Si exchange in early diagenesis is much more dynamic than previously observed. These results may help explain, in part, why authigenic marine clay formation has been observed to be geologically rapid (e.g. months) in the marine systems examined to date.

Rebecca A. Pickering ¹ *

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Panagiotis Michalopoulos ²

Institute of Oceanography, Hellenic Center for Marine Research

Jeffrey Krause ³

Dauphin Island Sea Lab

Water Quality

Soundscape Ecology of Artificial Reefs in the Alabama Reef Permit Zone (*Poster*)

Abstract Description : Many reef fishes produce sounds during social and reproductive behaviors. Passive acoustic monitoring (PAM) can be used to monitor reef soundscapes and may provide information on species presence, composition, and behavior. We used PAM to characterize artificial reef soundscapes in the Alabama Reef Permit Zone during late spring and summer 2017. We recorded 2300+ hours from multiple reef types (7 pyramids, 3 tanks, 2 bridge rubble reefs, 2 chicken coops) over 42 days. Thus far, we have identified 12 distinct fish sounds, in addition to dolphin and boat sounds. Several known fish sounds were detected (e.g., leopard toadfish *Opsanus pardus*, damselfish *Stegastes spp.*, cusk-eels *Ophidiidae*). We quantified relative occurrence of sounds over time and among reefs using semi-automated screening methods. Some sounds were produced almost exclusively at night: leopard toadfish peaked at 20-22h, unknown ‘pulse train’ sounds peaked at dusk (19-20h), and unknown higher frequency (>600 Hz) ‘pop’ sounds peaked at 20-21h. Unknown ‘thud train’ sounds occurred mainly diurnally. Pulse trains and leopard toadfish calls occurred most on tanks and bridges, pops were most common on bridges, and thud train sounds often occurred on pyramids. Long-term spectral averages show differences among reefs and across the study period (e.g., an increase in cusk-eel sounds in early August). Future efforts will determine if reef types have unique soundscapes which may vary with species composition and have important ramifications for the behavior of associated fishes and reef fish larvae that use sound as a settlement cue.

Kelly Boyle ¹ *

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Crystal Hightower ²

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T. Reid Nelson ³

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University of South Alabama

Living Resources

Source Control Through Implementation of a Municipal Green Infrastructure Program *(Oral)*

Abstract Description : Green Infrastructure (GI) is an approach to stormwater management that uses integrated management practices to mimic the natural hydrologic cycle. Less than a decade ago, GI was expected to be incorporated into the next round of 5-year Municipal Separate Storm Sewer System (MS4) permits. However, the regulatory driver has been delayed for most communities that aren't faced with consent decrees to reduce combined sewer overflows. Nonetheless, communities in Alabama and surrounding states are voluntarily adapting their local stormwater management programs to incorporate GI for the many environmental, social, and economic benefits that it provides. Green Infrastructure represents an advancement in our approach to non-point pollution source control that should be one tool in our toolbox to improve water quality in our streams, bays, and bayous. National politics notwithstanding, the move toward GI will continue and communities subject to MS4 permits will be required, at some point, to incorporate GI, specifically volume reduction, into local stormwater management regulations. Some communities are choosing to develop a voluntary GI program before a program is mandated by state and federal regulations. Developing a voluntary program in advance of regulatory mandates has the advantage of providing much needed lead time to partner with the development community and jointly develop locally desirable and effective green infrastructure practices, regulations, design criteria, and incentives. Developing a voluntary program in advance of a regulatory mandate also allows time for regulators and the development community to adjust to another paradigm shift in stormwater management.

Byron Hinchey ¹ *

S&ME Inc.

Water Quality

Spatial Distribution and Abundance of Greater Amberjack (*Seriola dumerili*) in the Alabama Artificial Reef Permit Zone (AARPZ) (*Poster*)

Abstract Description : Greater amberjack (*Seriola dumerili*) are a popular sportfish found throughout the waters of the Gulf of Mexico and an important commercial and recreational fishery. This species occupies similar habitats as other popular reef fish, such as red snapper, resulting in increased fishing pressure on the population due to accidental catch. According to the 2017 stock assessment conducted by SouthEast Data, Assessment, and Review (SEDAR), Gulf of Mexico greater amberjack are designated as overfished and are subject to overfishing. This latest assessment indicated that the stock will no longer rebuild by 2019 as previously projected and triggered a reduction in acceptable biological catch (ABC) limits. The purpose of this study is to examine the spatial distribution of greater amberjack throughout the Alabama artificial reef permit zone (AARPZ) to determine habitat preferences among reef types and across depth strata, as well as determine relative abundance. This will be achieved through analysis of Fish catch data, along with remotely operated vehicle (ROV) video footage, obtained from fishery independent vertical longline sampling from 2010 through 2016. Future research will include a sex specific age and growth study. Results from this study will provide additional data that can be used for future stock assessments of greater amberjack in both coastal Alabama waters and the Gulf of Mexico.

Justin McDonald ^{1*}

University of South Alabama; Dauphin Island Sea Lab

Living Resources

Spatial Distribution of Atlantic Sharpnose (*Rhizoprionodon terraenovae*) in the Northern Gulf of Mexico (*Oral*)

Abstract Description : The elasmobranch fauna of the northern Gulf of Mexico (nGoM) are a conspicuous and valuable ecological resource. To understand the distribution and abundance of selected shark species in the nGoM we evaluated National Marine Fisheries Science Service, Southeast Fisheries Science Center, Mississippi Laboratories bottom longline survey data collected from July to September from 2001 to 2017. We focused our analysis on Atlantic Sharpnose Sharks (*Rhizoprionodon terraenovae*) and used Generalized Additive Models (GAMs) to describe how occurrence and relative abundance varies across the nGoM in relation to sex and a suite of environmental variables. We found contrasting patterns of occurrence and relative abundance in relationship to depth (m), bottom salinity (PSU), bottom temperature ($^{\circ}\text{C}$), bottom turbidity (% transmissivity), bottom dissolved oxygen (mg L^{-1}), and location (latitude and longitude, decimal degrees). We predicted the highest probability of occurrence for females to be around the Mississippi Delta with the highest relative abundance between Mobile Bay and the Mississippi River. Alternatively, we predict males to have the greatest probability of occurrence west of the Mississippi River. This work highlights differences in the occurrence and relative abundance between male and female Atlantic Sharpnose Sharks and indicates the abiotic factors that influence their distribution. Information about the distribution of male and female stocks at different life stages will help inform management and conservation measures.

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NOAA NMFS Southeast Fisheries Science Center Mississippi Laboratories

Living Resources

Spatial Ecology of Tiger Sharks (*Galeocerdo cuvier*) in the Northern Gulf of Mexico (*Poster*)

Abstract Description : Apex predators like sharks play important roles in marine ecosystems by structuring communities through top-down control of prey distribution and abundance. However, relatively little is known about their spatial ecology. To better understand these spatial patterns, we caught 17 tiger sharks (*Galeocerdo cuvier*) in the northern Gulf of Mexico from 2015 – 2017 and fitted them with satellite tags. 615 surface transmissions ranging from 3 days to 8.5 months were analyzed by sex, size, and season using one-way ANOVA and two sample t-tests. Male tiger sharks had larger home ranges than females and tended to travel further south into offshore waters (p-value = 0.08). Smaller sharks (stretch total length < 199 cm) traveled significantly smaller distances (p-value = 0.006) than larger sharks (stretch total length > 300 cm). Males traveled greater distances than females during winter, spring, and fall (p-value = 0.01). In summer, males traveled significantly less than during the rest of the year (p-value = 0.04), with movements similar to that of females, whose seasonal movements did not fluctuate significantly. Male territorial competition might contribute to their wide home ranges, while nursery ground fidelity and prey specialization might constrict the home range of smaller tiger sharks. Longer movements during winter might allow males to seek novel feeding opportunities, an unnecessary exertion during productive summer months. It is recommended that these spatial differences are considered when managing tiger sharks in the northern Gulf of Mexico.

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Living Resources

Stabilization Alternatives – Another Choice to Consider (*Oral*)

Abstract Description : Often times there are better design options to protect stream banks and shorelines than traditional hard measures. Ideally, we want to use Mother Nature as a template, and utilize design concepts that incorporate natural materials. However, projects occasionally present with situations such as schedule limitations (e.g. emergency repairs) or physical limitations (e.g. lack of space) that require the consideration of traditional measures. Designers must be able to rapidly sift through their toolbox of ideas to quickly determine the best solution. This presentation seeks to provide designers and planners with another tool to place in their toolbox; a tool that can meet many project limitations and is also regenerative. It can also be used to retrofit and enhance traditional designs and methods. This design tool is living walls. Living walls such as Filtrexx's GreenLoxx® products, applications, and resources will be presented, along with case studies that describe considerations for product selection, design, construction, and lessons learned. Examples of both Non-MSE and MSE living walls will be presented, as well as a summary of some quantitative environmental impacts.

Wade Burcham ^{1*}

Geosyntec Consultants, Inc.

Resilience

Stable Isotope Diet Patterns of Red Snapper (*Lutjanus campechanus*) in Mississippi Waters *(Oral)*

Abstract Description : Red Snapper (*Lutjanus campechanus*) are a highly regulated and contested fishery in the Gulf of Mexico with a fishing season that has been shortened significantly over the last several decades. While many studies have been done to determine their abundance, there are very few studies focused on Red Snapper life history or diet in Mississippi. Previous research has shown Red Snapper diet to be polyphagous, with some suggested ontogenetic shifts but their diet has not been well resolved in Mississippi state waters. We used stable isotopes (^{13}C and ^{15}N) and stomach content analysis to examine Red Snapper diets to inform food web models for more sustainable management of the species. Red Snapper showed little variation in ^{13}C and ^{15}N values while their prey items were highly variable in both species diversity and stable isotope values. Results from stomach content and stable isotope mixing models agree that stomatopods, other shrimps, and crabs explain a large proportion of Red Snapper diets, with squid and various fish (including some Red Snapper) making up the majority of the remaining dietary proportions. It is not clear from these data if Mississippi Red Snapper are feeding primarily on sandy bottoms around structures as shown by previous studies or utilizing other feeding strategies. Continued monitoring and compound specific isotopic analysis may clarify the Red Snappers' feeding ecology.

Caitlin Slife ¹*

University of Southern Mississippi Division of Coastal Sciences

Kevin Dillon ²

University of Southern Mississippi Division of Coastal Sciences

Laura Brown ³

University of Southern Mississippi Division of Coastal Sciences

Jim Franks ⁴

University of Southern Mississippi Gulf Coast Research Lab, Fisheries Center

Living Resources

Stakeholder Engagement: A Critical Component of the Great Red Snapper Count *(Oral)*

Abstract Description : Red snapper (*Lutjanus campechanus*) is one of the most valuable and culturally relevant fisheries in the Gulf of Mexico. Trends in fishing activity over the past century led to a depleted stock, which remains under a rebuilding plan. In 2017, a team of fisheries ecologists, mathematicians, and statisticians initiated a study to estimate the abundance of red snapper in the U.S. Gulf of Mexico. This project, also known as the Great Red Snapper Count, is independent from NOAA's stock assessment and incorporates several methods, including habitat classification, direct visual counts, depletion studies, and a tagging study. Given the complexity of the project and the controversial nature of the fishery, stakeholder engagement is a critical component of the project. Consequently, we developed a strategy to efficiently inform the public about the rationale, goals, methods, and results of the study, while prioritizing transparency and broad dissemination of the information. Phase I, which is nearly finished, involved creating and distributing a series of five informational videos and fact sheets detailing the rationale, goals, and methods of the project. Phase II will involve on-site workshops, planned and conducted in partnership with regional Sea Grant offices, in each of the Gulf States. Following completion of the project, Phase III will summarize its results and address stakeholders' concerns through a second series of videos and fact sheets. Our focused efforts to engage anglers in the research process serve to increase stakeholder buy-in and allay management controversy in the Gulf of Mexico red snapper fishery.

Amanda Jefferson ¹*

MS-AL Sea Grant Consortium; Mississippi State University

Marcus Drymon ²

Mississippi State University

Living Resources

Status of Small Stream Litter Collection Devices in Mobile and Baldwin Counties, AL *(Oral)*

Abstract Description : Since the fall of 2016, multiple prototype small stream litter collection devices (Litter Gitters) have been installed in Mobile and Baldwin Counties, AL. Current funding sources include the USEPA Gulf of Mexico Program and the USEPA Trash Free Waters Program. The purpose of the Litter Gitter is to provide tactical midstream litter reduction solutions at problem spots in our watersheds. We will discuss overall effectiveness, application, benefits and lessons learned over the past two years and discuss goals and plans for the future. Additionally, utilization of the Litter Gitter is identifying secondary benefits related to increased data acquisition related to in depth material assessments.

Don Bates ¹ *

Thompson Engineering

Jason Kudulis ²

Mobile Bay National Estuary Program

Water Quality

Strategic Watershed Awareness and Monitoring Program (SWAMP): Empowering Citizen Scientists *(Oral)*

Abstract Description : The Strategic Watershed Awareness and Monitoring Program (SWAMP) is an education and monitoring program designed to broaden students' understanding of watersheds, water quality, and how citizens impact the two. SWAMP attempts to make abstract concepts concrete by incorporating classroom educational presentations and place-based experiential monitoring to connect participants directly to the environment to encourage lifelong learning and stewardship. Mobile Baykeeper created SWAMP in 2015 to engage citizens on the importance of a healthy watershed and to improve water quality throughout the Mobile Bay Watershed. SWAMP started in Citronelle High School and has since grown to be implemented into five high schools throughout Mobile and Baldwin Counties. SWAMP has educated more than 8,000 individuals and trained 265 volunteers as water quality monitors. SWAMP received a Gulf Guardian award for its exceptional environmental education and has received funding from NOAA's BWET program, EPA's Environmental Education program, and from the Gulf of Mexico Alliance education team. SWAMP addresses the water quality issues in local watersheds by educational presentations, training teachers to implement the SWAMP module into their schools, training students to be water quality monitors, promoting the use of an interactive community web tool, and fostering student-lead solutions to issues identified through monitoring. Data collected can be utilized to implement best management practices, track progress, and generate specific projects or campaigns to address the core problem. Mobile Baykeeper will cover the aspects and activities of SWAMP, describe results and impact, talk about lessons learned, and present next steps for the program.

Laura Jackson ¹

Mobile Baykeeper

Ilka Porter ^{2*}

Mobile Baykeeper

Cade Kistler ³

Mobile Baykeeper

Casi Callaway ⁴

Mobile Baykeeper

Outreach and Education

Student Monitoring of Deer Island *(Poster)*

Abstract Description : Since 2012, students led by educators of the USM Gulf Coast Research Lab's Marine Education Center have been monitoring the restoration efforts on Deer Island located off the coast of Biloxi in the MS Sound. These students have successfully collected data on water quality, flora, fauna and elevation to understand the importance of the restoration and to determine its effectiveness. Student efforts have refined the data collection techniques to ensure a sustainable and standardized restoration-monitoring program. The elevation profiles illustrated in this poster show the importance of collecting information about both vertical and horizontal changes in island morphology. From such observations, the learning experience of students improves while their data collection documents the evolution of the island in response to natural and anthropogenic processes.

Aaron Lamey ¹*

University of Southern Mississippi Gulf Coast Research Lab's Marine Education Center

Jessie Kastler ²

University of Southern Mississippi

Habitats

Submarine Groundwater Discharge and Hypoxia in Mississippi Coastal Waters *(Oral)*

Abstract Description : Submarine groundwater discharge (SGD) is a critical component of coastal ecosystems, affecting biogeochemistry and productivity. The SGD flux and effect on the ecosystem of the Mississippi (MS) Bight has not previously been studied. We have determined Ba, $\delta^{18}\text{O}$ of water, and Ra-isotopes, together with nutrients, chlorophyll, and dissolved oxygen (DO) during multiple cruises from fall 2015 to summer 2016. Water isotope distributions ($\delta^{18}\text{O}$) show that, although the MS River Delta bounds the western side of the Bight, nonetheless, Mobile Bay and other local rivers are the Bight's dominant freshwater sources. But elevated dissolved Ba and Ra isotopes cannot be explained by river input. Spatially, SGD in the MS Bight occurs over a wide area, with hot spots near the barrier islands (e.g., Chandeleurs, Horn and Dauphin Islands) and the mouth of Mobile Bay, probably in association with old buried river channels, or dredged ship channels. Based on their high concentrations in saline groundwaters sampled on the barrier islands, the elevated Ba and Ra in MS Bight water are likely due to SGD. In subsurface waters, long-lived Ra isotopes were negatively correlated with DO during spring and summer 2016, suggesting direct discharge of DO-depleted groundwater and/or accumulation of SGD-derived Ra and microbial DO consumption under strongly stratified conditions. Our ongoing study suggests that seasonal variability in flushing, water stratification, and SGD input play important roles in biological production and bottom water hypoxia in the MS Bight.

Alan Shiller ¹ *

University of Southern Mississippi

Virginie Sanial ²

University of Southern Mississippi

Willard Moore ³

University of South Carolina

Water Quality

Supporting Science and Restoration Through the Mississippi-Based RESTORE Act Center of Excellence (MBRACE) *(Oral)*

Abstract Description : The Mississippi Based RESTORE Act Center of Excellence (MBRACE) was designated as Mississippi's Center of Excellence in September 2016. MBRACE is a consortium of Mississippi's four research universities (Jackson State University [JSU], Mississippi State University [MSU], University of Mississippi [UM], and The University of Southern Mississippi [USM]), with USM serving as the lead institution. The mission of MBRACE is to seek sound comprehensive science-and technology-based understanding of the chronic and acute stressors on the dynamic and productive waters and ecosystems of the northern Gulf of Mexico, and to facilitate sustainable use of the Gulf's important resources. MBRACE's Science Plan focuses on the State's directive toward sustainable coastal management through three major thrust areas: (1) monitoring and ocean observations, (2) modeling, and (3) process studies. The first awards funded by MBRACE in Fall 2017 under the Core Research Program focus on understanding oyster reefs and their sustainability. With these awards, researchers from JSU, MSU, UM, and USM are examining how ecological conditions relevant to oysters vary over time and between newly restored oyster reefs and adjacent unrestored oyster reefs in Mississippi Sound. Future funding opportunities will be made through a competitive award process on research topics detailed in the MBRACE Science Plan.

Kelly Darnell ¹*

University of Southern Mississippi

Denis Wiesenburg ²

University of Southern Mississippi

Landry Bernard ³

University of Southern Mississippi

Living Resources

Sustainability of Oyster Reef Habitat in Mississippi Sound: A Larval Transport Approach *(Oral)*

Abstract Description : A multi-scale ocean-atmosphere-wave-sediment transport modeling system and a water quality and ecological productivity assessment model are coupled to investigate the impacts of multiple environmental stressors and hydrodynamic processes on oyster larval transport and settlement paradigms between regional oyster seed grounds and harvestable reefs. We build upon a COAWST-based (Coupled Ocean Atmosphere Wave Sediment Transport Modeling System) regional ocean and ecosystem model. COAWST is used to simulate the physical dynamics and circulation in the Mississippi Sound and Bight and informs the variability of temperature, salinity, water levels, and particle transport to an ecosystem productivity assessment model, TroSim. TroSim is used in this application to predict consequences to larval transport, recruitment success, and overall oyster habitat condition, based on environmental and hydrodynamic stressors informed by the COAWST model. Model drifter simulations representing oyster larval transport during 2017 oyster spawning season are designed to understand the connectivity between Mississippi, Alabama and Louisiana waters. Drifters are released from known oyster spawning locations and tracked during model simulations for 30-days. A habitat suitability index (HSI) is calculated to analyze the combined effect of temperature and salinity on along-track condition of oyster larvae growth, prior to settlement. Model results show that oyster larvae supply in Mississippi coastal waters receives contributions from Louisiana and Alabama sources.

Kemal Cambazoglu ¹ *

University of Southern Mississippi

Jerry Wiggert ²

University of Southern Mississippi

Scott Milroy ³

University of Southern Mississippi

Chudong Pan ⁴

University of Southern Mississippi

Habitats

Swift Tract: Slow Down the Waves and Speed up the Oysters (*Oral*)

Abstract Description : The Nature Conservancy's Swift Tract living shoreline, located in Bon Secour Bay, was constructed in 2012. The project consists of five oyster reef breakwaters totaling 567 meters in length and protecting 641 meters of shoreline. The protected shoreline is part of the Weeks Bay National Estuary Research Reserve and is one of the longest stretches of natural shoreline in coastal Alabama. The five reefs that make up the breakwaters were constructed from Hesco barriers and filled with rock. A veneer of loose oyster shell was placed on top of the rock to promote oyster settlement. The project was built to protect the shoreline, increase hard substrate required by oysters and bivalves, and create habitat for many species of recreationally and commercially important fish and invertebrate species. Since 2012, The Nature Conservancy has conducted annual monitoring to assess the abundance and size of oysters and other bivalves and mapped the position of the shoreline to quantify shoreline protection. The monitoring data was recently synthesized as part of a Nation Academy of Sciences grant to assess the effectiveness of living shoreline techniques in coastal Alabama. The results of that synthesis will be presented, and lessons learned from this project will be discussed.

Jacob Blandford ¹ *

The Nature Conservancy

Outreach and Education

Temperature Effects on Life History Parameters of Two Copepods Cultured as Live Feeds (*Oral*)

Abstract Description : Copepods are superior live feed for many marine fish larvae but their large-scale production in hatcheries is limited by the insufficient control of culture productivity. Abiotic factors such as temperature significantly affect population dynamics, particularly growth and reproduction. Therefore, elucidating the responses of copepods to temperature is essential for predicting and managing cultured populations. In this work, the effect of five temperatures (20, 22.5, 25, 27.5, 29.5i, °C) on the life span and reproductive traits of *Acartia tonsa* and *Parvocalanus crassirostris* was evaluated. For each treatment, a cohort of copepods was reared from nauplius to adult in replicated (n=3) three-liter containers. At maturity, the sex ratio was determined and four groups, each comprising one female and two males from each replicate, were transferred to petri dishes. Daily egg production, percent hatch and mortality were monitored until all copepods in a group died or stopped producing eggs. For both species, life span and reproductive period were inversely related to temperature. Egg production was highest at 25i, °C for *A. tonsa* and 27.5i, °C for *P. crassirostris*. The female:male ratio was higher for *A. tonsa* than for *P. crassirostris*. Temperature had little influence on the sex ratio. On-going studies are examining the effects of salinity, diet and density on growth and reproduction in these two species. These data will be used to develop an individual-based model that will be applied to assess the influence of culture protocols on copepod population parameters and assist with the management of copepod production.

Adam Daw ¹ *

University of Southern Mississippi

Reginald Blaylock ²

University of Southern Mississippi

Eric Saillant ³

University of Southern Mississippi

Living Resources

Temporal and Spatial Distributions of Trace Elements (Ba, Cs, Mn and V) in Mississippi Coastal Waters: Influence of Hypoxia, Submarine Groundwater, and Episodic Events in a River-Dominated System (*Oral*)

Abstract Description : Monthly sampling across the western Mississippi Sound and the northwestern corner of Mississippi Bight from late 2007 to 2011 revealed that hypoxia occurred in the Mississippi Bight during late spring and summer, except for 2009. We investigated the causes of hypoxia in this estuarine-coastal system and the factors affecting the distribution of trace element. Key findings include the frequent development of bottom water hypoxia in MB during late spring-summer, the likely contribution of submarine groundwater discharge (SGD) to the material flows, and observation of effects of episodic events including tropical storms and the opening of the Bonnet Carré Spillway. Results of delta-O-18 and Cs in surface waters suggest that the influence of local riverine inputs (i.e., Pearl River and St. Louis Bay) is limited to the Mississippi Sound and not further into the Bight. During April 2008 and May 2011, the opening of the Bonnet Carré Spillway discharged Mississippi River water into the western Mississippi Sound and Bight and subsequently strength water column stratification, especially in the Mississippi Bight. In hypoxic bottom waters, enriched nutrients, Mn, and Ba as well as depleted V were commonly observed. Overall, the Mississippi River and the SGD are mainly causes for Mississippi Bight hypoxia. The occurrences of hypoxia and SGD in the bottom water change the inventory of trace elements in the estuarine-coastal system.

Peng Ho ¹*

University of Southern Mississippi

Alan Shiller ²

University of Southern Mississippi

Water Quality

Testing Living Shorelines Design Assumptions: Site Specific Considerations for Boat Wake and Wind Driven Waves *(Oral)*

Abstract Description : Living shorelines are effective and environmentally superior erosion-control alternatives to hardened structures when consideration is given to site-specific challenges during project design. All living shoreline projects must be designed with wave climate in mind, as it is often the primary driver of project success. However, methods for wave climate assessment often rely on proxies or models that do not account for boat wake, which produces most waves in fetch-limited (i.e., narrow) water bodies such as rivers, bayous, and sloughs. In fact, established guidelines outlining living shoreline design in fetch-limited waterways suggest boat wake waves produce a wave climate significantly weaker than those produced by winds and boats along open shorelines such as bays. This assumption, however, lacks evidence. Here, we compare wave climates of fetch-limited and open shorelines in and around Mobile Bay, AL using low-cost wave gages. Ten gages were deployed within each fetch-limited shoreline (< 1 km channel width) at Bon Secour River, Fish River, Fowl River, and Magnolia River, and at open shoreline sites within Mobile Bay for four consecutive five-day (i.e., Thursday through Monday) sampling events over summer 2018. Matlab software was then used to derive descriptive wave statistics from site data (e.g., significant wave height) for wave climate comparisons. Contrary to the current paradigm, preliminary results indicate comparable wave climates (i.e., significant wave height and period) in the two environments. These results highlight the need to incorporate site-specific wave energy measurements in project design.

Nigel Temple ¹ *

Mississippi State University

Matthew Virden ²

Mississippi State University

Haley Moss ³

Mississippi State University

Andrew Lucore ⁴

Mississippi State University

Anna Linhoss ⁵

Mississippi State University

Eric Sparks ⁶

MS-AL Sea Grant Consortium; Mississippi State University

Habitats

The Effects of Lipid Extraction on Delta ¹³C and Delta ¹⁵N Ratios Across Taxa, Tissues, and Trophic Groups *(Oral)*

Abstract Description : Lipid extraction is often necessary in stable isotope analysis, and general patterns for when it is necessary need more exploration. We studied the effects of lipid extraction on delta¹³C and delta¹⁵N ratios in liver, muscle, and skin of West-Indian manatees (*Trichechus manatus*) and bottlenose dolphins (*Tursiops truncatus*). We also performed a meta-analysis to more broadly determine how the effects of lipid extraction vary across taxa, tissues, and trophic groups. Lipid extraction did not affect delta¹³C ratios of the three tissues in manatees but significantly affected all tissues in dolphins. The effects of lipid extraction on delta¹³C ratios increased with lipid content of tissues and was greatest in liver, followed by skin and muscle. Lipid extraction did not affect delta¹⁵N ratios of any tissue in manatees or dolphins. Across 103 species, lipid extraction significantly affected delta¹³C ratios in all tissues, and the effects were stronger in lipid-rich tissues. Lipid extraction significantly affected delta¹⁵N ratios in muscles, marginally in liver, but not at all in skin. Finally, lipid extraction had a much smaller effect on herbivores than carnivores or omnivores, potentially explaining why lipid extraction did not affect manatee tissues. Our results strengthen the growing body of evidence that the necessity of lipid extraction is tissue- and species-specific. Furthermore, trophic group may forecast the necessity for lipid extraction, possibly due to differences in diet composition or the physiology of lipid synthesis, both of which may lead to variation in lipid composition and subsequently affect the need for extraction.

Carl Cloyed ¹ *

Dauphin Island Sea Lab

Kayla DaCosta ²

Dauphin Island Sea Lab; University of South Alabama

Matthew Hodanbosi ³

University of South Alabama; Dauphin Island Sea Lab

Ruth Carmichael ⁴

Dauphin Island Sea Lab; University of South Alabama

Living Resources

The Environmental Studies Center and Project SEA ICE (*Poster*)

Abstract Description : At the Environmental Studies Center (ESC) teachers, students, and public access a variety of learning experiences in native wildlife and issues facing the environmental health of Alabama's coastal ecosystems. Through funding from the MS-AL Sea Grant Consortium and collaboration with Dauphin Island Sea Lab, Auburn University Marine Extension and Research Center, and State and local agencies, the ESC educates over 22,000 visitors annually in the biological bounty of our coast and its threats. Professional development activities are provided to enhance teacher knowledge of coastal biology and conditions influencing successes and declines in species diversity. The ESC provides field experiences for students in grades Pre-Kindergarten through High School in various environmental based lessons. Furthermore, the ESC offers outreach programs for students and the general public that are centered in native coastal wildlife. The focus of the current Sea Grant is public high school students. Project SEA ICE is an ongoing project involving teachers and students from Mobile County Public Schools. Curriculum concepts identified in the project are aligned with National Science Education Standards (1996) and the Alabama Science Course of Study. Teachers engage students in classroom and field experiences designed to: 1) identify coastal and marine species, 2) highlight examples of environmental efforts to promote species recovery, 3) identify populations currently classified as endangered, threatened, or of concern, and 4) promote behavioral changes regarding individual stewardship. This poster covers the ESC's natural and man-made resources and programs available to schools and general public and summarizes Project SEA ICE.

Tracy Jay ¹*

Mobile County Public School System

Troy Latham ²

Environmental Studies Center

Living Resources

The Impacts of Submarine Groundwater Discharge on Hypoxia in the Mississippi Sound *(Poster)*

Abstract Description : Submarine groundwater discharge (SGD) in the Mississippi Sound is an understudied component of nutrient, trace metal, and carbon dynamics. Submarine groundwater discharge is the combined flow of freshwater from aquifers and the recirculation of seawater through sediments that occurs along the coastline and across the continental shelf. In July 2017, a low oxygen (less than 2 mg/L) event occurred off the coast of Mississippi, causing a 'jubilee' event, where large masses of demersal organisms came towards shore. During this period of low oxygen there were increased groundwater signatures, suggesting a correlation between the hypoxic conditions and groundwater release. Two common groundwater indicators, dissolved methane and Ra-224 (half life = 3.66 d), were around three times higher than what is considered normal conditions. The high levels and short half lives of both indicators suggest that there was a nearby source of groundwater. This type of low oxygen event happens frequently along the coastline, so it is important to understand what causes it, and how to manage inputs to decrease loss of marine life. In order to determine if SGD may enhance or lead to hypoxia in the Mississippi Sound, an ongoing time series along the coastline has been collecting radium, nutrients, methane, and oxygen data. Correlations between oxygen and radium, and methane and radium, indicate that the groundwater entering into the sound may be anoxic at some locations, enhancing local coastal hypoxia.

Amy Moody ¹ *

University of Southern Mississippi

Water Quality

The Influence of Salinity on the Toxicity of Corexit at Multiple Life Stages of Gulf Killifish *(Oral)*

Abstract Description : During the 2010 Deepwater Horizon oil spill, approximately 7 million liters of the chemical dispersant Corexit was applied in the Northern Gulf of Mexico. The goal was to investigate the physiological effects and toxicity of Corexit in Gulf killifish at four different life stages. We showed that Corexit was most toxic in hyperosmotic waters than in isosmotic water or hypoosmotic water. However, the effect of salinity on dispersant toxicity was strongly influenced by life stage. Paradoxically, Corexit was most toxic to adult fish and least toxic to embryos and larvae. Dispersant tended to increase sodium and chloride burdens in killifish when exposed to hyperosmotic waters and reduced the concentrations of these ions in hypoosmotic waters. However, in adults, sodium regulation was affected by Corexit to a much greater extent than was chloride balance. These data will be interpreted based on differences in the development of ion transport mechanisms in developing animals.

Charles Brown ¹ *

Louisiana State University

Kendra Williamson ²

Fernando Galvez ³

Louisiana State University

Oil Spill

The Mississippi Coastal Cleanup Program (*Poster*)

Abstract Description : Marine debris constitutes any persistent solid material that is manufactured or processed and, directly or indirectly, disposed of or abandoned in the marine environment. The presence of marine debris has been shown to have significant environmental and economic impacts. Unfortunately, the quantity of marine debris is increasing at accelerating rates due to increased production of single-use items and poor stewardship practices. To address these issues, a team of coastal Extension specialists started the Mississippi Coastal Cleanup Program (MSCCP) in 2016. The mission of the MSCCP is preventing and removing litter from the coastal environment through education, outreach, research, and cleanup events. During cleanup events, thousands of citizen scientists collect marine debris data that is then used to inform decision-making and the development of outreach programs. In 2016 and 2017 alone, over 4,000 citizen scientists removed and categorized over 27 tons of marine debris from coastal Mississippi. Cigarette butts were by far the most numerous item collected during these events with over 76,000. Plastic items made up over 77% of the collected marine debris by count. This locally relevant information is utilized to create marine debris focused outreach materials that are distributed through a variety of methods, including social media and direct presentations. Feedback gathered during outreach events has led to several additional activities and materials for the program in 2018 and beyond. These activities include the addition of a July 5th cleanup and monthly cleanups at sites suggested by citizens through a portal on the MSCCP website.

Alyssa Rodolfich ¹ *

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Amanda Sartain ²

MS-AL Sea Grant Consortium; Mississippi State University

Sarah Cunningham ³

Mississippi State University

Eric Sparks ⁴

MS-AL Sea Grant Consortium; Mississippi State University

Water Quality

The National Water Extension Program: Water Information for Everyone *(Oral)*

Abstract Description : Threats to water security arise from several factors, including increased water demand from population growth and weather- and water-related impacts of climate variability and change. To address, and build resilience to, these risks all water-related entities must work together. NOAA, The University of Alabama, and the Mississippi-Alabama Sea Grant Consortium have combined efforts to create a National Water Extension Program (NWEP), based at the National Water Center, to foster collaboration among the organizations, communities, and stakeholders who need water data and tools to help support their decision-making processes. The goal of the NWEP is to facilitate the delivery of resources that will allow communities and organizations to accurately and efficiently make vital short- and long-term planning decisions regarding the safety and security of their citizens and water resources. Such tools will allow individuals, governmental entities, emergency response personnel, resource managers, and businesses to plan for and protect citizens, water resources, property, and the long-term sustainability of public health and the economy. The increased collaboration, and communication of this effort is designed to facilitate the two way transfer of information that will help identify what data and information are needed, and in what format, to support effective decision making. Success for the NWEP will directly relate to progress towards realizing the goal of the NOAA Water Initiative. This session will provide an introduction to the work being done by the NWEP to bring needed water information to the communities and citizens of the United States.

Karen Bareford ¹*

MS-AL Sea Grant Consortium; University of Alabama

Outreach and Education

The National Water Model: Transforming Water Modeling *(Oral)*

Abstract Description : Water resources stakeholders across the U.S. have revealed the need for consistent, high space and time-resolution, integrated water analyses, predictions, and data to address critical unmet information and service gaps related to floods, droughts, water quality, water availability, and climate change. The National Water Model (NWM), launched in 2016, is a continental scale hydrologic model developed to address these gaps through forecasts of streamflow, soil moisture, evapotranspiration, runoff, snow water equivalent, and other components of the water cycle. Representing NOAA's first foray into high-performance computing for water prediction, the NWM expands NOAA's current water quantity forecasts from approximately 4,000 USGS stream gage sites to 2.7 million stream reaches across the country. This new NWM guidance augments and supports the generation of official forecasts at National Weather Service River Forecast Centers. NOAA envisions that the NWM will eventually support water quality applications for challenges, such as harmful algal blooms, hypoxic zone development, and contaminant tracking. The vision is for a suite of systems that can: • Show and predict the movement of water onto and through the nation's land and water bodies. • Report current weather and water conditions, and make short- (18-hour), medium- (10-day), and long-range (30-day) predictions for all water conditions across the United States. • Forecast flooding, drought, and water quality events and predict how long these conditions will last. This session will provide a non-technical overview of the NWM and upgrades planned over the next few years.

Karen Bareford ^{1*}

MS-AL Sea Grant Consortium; University of Alabama

Outreach and Education

The NOAA Water Initiative: A New Era of Water Information *(Oral)*

Abstract Description : In the United States and around the world, water security is at risk. Too much water, too little water, or water of poor quality endangers life, property, economies, and ecosystems. Unfortunately, these threats are intensifying, and risk is difficult to predict. The National Oceanic and Atmospheric Administration (NOAA) is working, across the agency, to provide people and governments access to the critical information needed to address these challenges. The NOAA Water Initiative (NWI) is a collaboration of partners across NOAA, and with all levels of government (federal, state, regional, local, and tribal); academic; non-governmental; private sector organizations; and stakeholders. The NWI is designed to advance the nation's capacity to analyze and link data in critical ways, and at scales, previously not possible. This information will facilitate actions and planning to address water-related risks and manage water resources more efficiently and effectively. NOAA's National Water Center (NWC), located on The University of Alabama campus in Tuscaloosa, is pivotal to the NWI. The center serves as a hub for incorporating innovative research into operational water prediction models. It also functions as a platform for the integration and advancement of regional field operations and services, provides improved preparedness for water-related disasters and informs high-value water decisions in communities, states, regions and the country. This session will provide a brief introduction to the NWI and the work being done at the NWC, and across NOAA, to revolutionize water information.

Brenna Sweetman ¹ *

The Baldwin Group, Inc.; NOAA Office of Coastal Management

Karen Bareford ²

MS-AL Sea Grant Consortium; University of Alabama

Outreach and Education

The Northern Gulf of Mexico Sentinel Site Cooperative: Connecting Research, Service, and Decision-Makers *(Oral)*

Abstract Description : Sea-level rise (SLR) is causing negative effects throughout the northern Gulf of Mexico. Stakeholders and partners across the science to stewardship continuum are working to better understand, communicate, and prepare for rising seas. Through the northern Gulf of Mexico Sentinel Site Cooperative (Cooperative), researchers, non-profits, local, state, and federal officials and agencies, natural resource managers, tool developers and others are coming together to integrate SLR into decision-making. This takes the form of many different projects and activities, with a common theme of building strong, two-way dialogue between stakeholders and partners from different sectors. The result is a robust partnership that provides access to SLR experts, communicators, tool developers, and decision-makers. In this presentation, the purpose, partnerships, activities, and resources of the Cooperative will be reviewed. Additionally, opportunities and best practices for participating in the Cooperative will be presented.

Renee Collini ¹*

Northern Gulf of Mexico Sentinel Site Cooperative

Resilience

The Watershed Game: An Engagement Tool to Build Awareness About the Connections Between Land Use and Water Quality *(Poster)*

Abstract Description : The Watershed Game has proven to be an effective tool for teaching about land use impacts on water quality in schools and community venues across 14 states for over 10 years. The game, developed by Minnesota Extension and Minnesota Sea Grant, builds an understanding of the connection between different lands use and water quality by engaging and educating individuals on the benefits of best management practices (BMPS) to reduce pollutant runoff. Distinct stream, lake and river system versions have allowed the game to be widely used with various Sea Grant programs and diverse audiences across the country. A classroom version, for use with middle and high school students, complements three local leaders' versions, for use with elected and appointed officials, community leaders, and watershed organizations. The local leader versions utilize an interactive, non-confrontational approach to begin the discussion of developing plans, practices, and policies that help achieve clean water goals while realistically working to balance community and economic growth with available funds. This resource provides a unique approach to engage local communities on critical water and land issues and educate on potential solutions for improved water resources management.

Karen Bareford ¹*

MS-AL Sea Grant Consortium; University of Alabama

Carly Jones ²

University of Alabama

Water Quality

Threats to Groundwater, Surface Water, and Dam Stability at a Coastal Coal Ash Impoundment *(Oral)*

Abstract Description : More than 21 million tons of coal ash is stored in a 597-acre pond near Bucks, AL in the Mobile-Tensaw Delta. Due to new federal regulations, Alabama Power plans to close the pond in 2020. With a critical decision on closure method pending, Mobile Baykeeper and partner groups performed sampling of surface water and groundwater in the vicinity of the pond over the course of two years. Mobile Baykeeper retained the services of Burgess Environment Ltd. to assess the ash pond's stability and safety. Assessment included site visits, records review, aerial observations, and water and sediment sampling. Mobile Baykeeper's sampling revealed common coal ash contaminants (lead, selenium, vanadium, barium, cadmium, cobalt, manganese, and arsenic) present above Maximum Contaminant Levels and other regulatory standards. These findings are consistent with studies conducted by the EPA and Alabama Power where arsenic has been found in groundwater, soil, and sediment samples at up to 80 times greater than background levels. On two separate dates surface water samples collected by Mobile Baykeeper were sent to an independent laboratory for analysis and confirmed to have as much 55 - 80% fly ash. These results indicate coal ash pollutants are leaving the pond and entering nearby surface water bodies and groundwater. The Mobile Baykeeper team will elaborate on the impetus of this study, explain how data was gathered, present the implications of identified threats as pond closure is implemented, and discuss how they attempted to make a technical issue accessible and understandable to the public.

Laura Jackson ¹

Mobile Baykeeper

Cade Kistler ^{2*}

Mobile Baykeeper

Casi Callaway ³

Mobile Baykeeper

Water Quality

Three Communities, Three States, Three Paths to Enhancing Resilience

(Oral)

Abstract Description : While Gulf coast communities share many commonalities, each locality faces its own set of unique challenges as it strives for increased resilience. Therefore, a “one-size fits all” approach is ineffective. Rather than developing new tools, our team pulled together regional resources and technical expertise to match community needs with experts and solutions. Each team consisted of Resilience Subject Matter Experts and Local Knowledge Experts which mobilized to address community challenges. Team members worked together to tackle real world problems at the municipality level and develop realistic solutions. This approach promotes a dynamic resilience response to individual community needs while formalizing a process that is flexible and can be tailored to other situations and municipalities. Teams strategically designed and assisted with implementing individually tailored Resilience Action Plans (RAPs) for three local governments: Fairhope, Alabama; Biloxi, Mississippi; and Terrebonne Parish, Louisiana. The City of Fairhope is working to improve stormwater management at their marina, designing marina slips to better weather rising seas, and promoting green infrastructure to re-imagine a shared sense of place for local residents to enjoy. The City of Biloxi is working to promote living shoreline sites around the city and educate the public about their importance in protecting the shoreline from coastal storms and increasing healthy habitat. Terrebonne Parish is conducting a feasibility study to examine the possibility of utilizing a floating grocery store for First Responders after disasters. In each example, communities are mitigating future damage and increasing the dialog about preparedness, response, and recovery.

Tracie Sempier ¹

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Louisiana Sea Grant College Program

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Mississippi-Alabama Sea Grant Legal Program

Stephen Deal ⁵

MS-AL Sea Grant Legal Program

Resilience

To Plant or Not to Plant Along Breakwater-Protected Shorelines in a High Energy Environment (*Oral*)

Abstract Description : Shoreline erosion threatens the many ecosystem services provided by tidal marshes. To combat this loss, land managers often employ nearshore breakwaters in shoreline conservation and restoration projects. However, little monitoring has been done to determine the impact of these structures on enhancing vegetative growth and the suite of ecosystem services they provide. To evaluate the effects of a nearshore breakwater project, we established 24 plots on the shoreline behind a 6-year-old large-scale breakwater complex and 24 plots on an adjacent reference shoreline in Bon Secour Bay, AL during Summer 2016. Plots were selected for one of three vegetation treatments: natural *Spartina alterniflora*, planted with *S. alterniflora*, and unvegetated. Each vegetation treatment was replicated 8 times along both breakwater and non-breakwater protected shorelines. Quarterly monitoring has taken place along both shorelines from Fall 2016 to present to determine the effects of the breakwaters on plant cover and biomass. Plant cover was determined by visual estimation and biomass was determined by use of a stem height to biomass regression. Breakwater effect on plant data was then analyzed using Kruskal-Wallis tests. Results suggest that, in highly dynamic systems like Bon Secour Bay, AL, breakwaters neither promote growth of already vegetated shorelines nor enhance the success of plantings. The results of this study show that to maximize the effectiveness of shoreline protection projects, further research is needed to determine how to best design and appropriately place nearshore breakwaters that enhance shoreline vegetation, minimize erosion, and provide associated ecosystems services.

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MS-AL Sea Grant Consortium; Mississippi State University

Outreach and Education

Toxic Element Concentrations in Muscle Tissue of Atlantic Tripletail (*Lobotes surinamensis*) in the Northern Gulf of Mexico *(Oral)*

Abstract Description : Toxin pollution in marine systems and subsequent bioaccumulation in marine organisms is a global health concern for consumers of marine species. Fish are known to concentrate toxic elements in their tissue, which is then consumed by humans and other species. Therefore, for any fish that is eaten by people, analysis of toxin loads and their potential risks is vital. The Atlantic tripletail, *Lobotes surinamensis*, has been increasing in popularity as a target species but little is known about their toxin concentrations. This study examines the concentration of five heavy metals in muscle tissue of over 100 legal-sized Atlantic tripletail, collected from the northern Gulf of Mexico. We examined arsenic, cadmium, mercury, lead, and selenium, all of which are known to have detrimental effects on humans in high doses. Mean (\pm standard error) concentrations of these elements in tripletail muscle tissue were 1.06 ± 0.06 ppm, 0.048 ± 0.01 ppm, 0.02 ± 0.002 ppm, 0.63 ± 0.13 ppm, 0.84 ± 0.03 ppm dry weight, respectively. The value for mercury is below FDA recommended guideline for food consumption. Arsenic, cadmium, selenium, and lead levels are above those allowed for water; however, there are no current food tolerance levels, which tend to be higher. Additionally, the mean molar mercury to selenium ratio is 1:123.4. Given the importance of selenium as a mercury toxicity buffer, this ratio could have important implications for food safety. Due to high concentrations of potentially toxic metals, consumers should proceed cautiously before eating Atlantic tripletail in high volume.

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Living Resources

Tracking Tarpon Across the Northern Gulf of Mexico: A Citizen Science Success (*Oral*)

Abstract Description : Atlantic tarpon (*Megalops atlanticus*) are long lived, highly migratory, enigmatic fish with deep cultural significance to residents of the northern Gulf of Mexico. Once abundant throughout the coastal waters of the northern Gulf, tarpon populations have experienced substantial declines, likely due to a combination of habitat loss and fishing mortality. Given the cultural relevance and historical abundance of this fish, we sought to investigate the movement and migration of tarpon using satellite telemetry. Tarpon were targeted with rod and reel off the coast of Alabama using the expertise of multiple tarpon angling experts. Multiple vessels were involved in the tagging effort; specifically, a scientific sampling vessel maintained contact with multiple fishing vessels. Once a tarpon was landed, two scientists boarded the fishing vessel and applied a Wildlife Computers Smart Position or Temperature (SPOT) tag to the tarpon just below the first dorsal fin. Over a three-day period in July 2018, 10 adult tarpon were fitted with SPOT tags and have subsequently submitted position estimates. Mean size of tagged tarpon was 162cm, and fish ranged in size from 146-187cm. During the first month, greater than 5000 messages were transmitted, generating over 1000 position estimates. Most tarpon showed westward movements to the Chandeleur Islands before stopping at the mouth of the Mississippi River, although some individuals made off-shelf movements, perhaps for spawning. Our findings illustrate the utility of SPOT tags for identifying migration patterns and habitat use for this unique species, and characterize a citizen science success story.

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University of South Alabama

Living Resources

Transforming Bulkheads and Eroding Sedimentary Shorelines Into Healthy Living Shorelines *(Oral)*

Abstract Description : Living shorelines are a soft-armoring technique used to prevent erosion and provide ecosystem services to coastal regions. However, in areas like Mobile Bay, bulkheads are the most common solution to deteriorating shorelines. These solid vertical walls tend to increase erosion on either side and in front of them by reflecting wave energy instead of absorbing it. Here we determine the effectiveness of new living shoreline designs in which gabion baskets are filled with sediment and planted with marsh species. Our first strategy is attaching these cages to the outside of a bulkhead to create an outward marsh. The second design for these constructed gabion marshes involves placing them behind the bulkhead with the intention of bulkhead removal in the future. Both designs will then be compared to bulkheads alone. Additionally, we are protecting eroding sedimentary shorelines from further erosion through the installation of coir logs and planted marsh, and comparing the protected shoreline with adjacent non-amended eroding shoreline. Effectiveness will be determined by marsh plant cover, shoreline stabilization, and creation of habitat. A pilot trial done to support this approach suggests attaching marsh-filled baskets a bulkhead helps reduce erosion and creates valuable habitat for fish and invertebrates. Our study follows a BACI design, in which measurements are taken before and after construction. The project is in its post-construction phase and will continue through summer 2019. This study will further enhance collaboration among researchers, stakeholders, and property owners who wish to transition from armored to living shorelines.

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Just Cebrian ²

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Josh Goff ³

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Eric Sparks ⁴

MS-AL Sea Grant Consortium; Mississippi State University

Resilience

Transforming Three Mile Creek Through Watershed Management Plan Implementation: An Invasive Species Control Plan *(Oral)*

Abstract Description : The Three Mile Creek (TMC) Watershed Management Plan (WMP), published in 2014, described the ecological challenges of abundant invasive species, including island apple snails and upland, riparian, wetland, and submerged aquatic vegetation impairing this drainage area. Responding to TMC WMP recommendations, the Mobile Bay National Estuary Program secured funding from the EPA through the Gulf Coast Ecosystem Restoration Council and the RESTORE Act to develop an Invasive Species Control Plan (ISCP) for the Watershed, focused on apple snails and riparian, wetland and submerged aquatic vegetation. Following a request for qualifications protocol, MBNEP selected an EnviroScience team that included Volkert, Gena Todia, and Jess Van Dyke. The Scope for the TMC ISCP includes the following elements: • Identifying target non-native/invasive nuisance plant and animal species. • Identifying priority areas to direct implementation of control measures. • Identifying risks posed by target species. • Describing existing conditions within the Watershed. • Identifying prioritizing, and prescribing control/management options for target species, including: - Identifying constraints, - Prescribing schedule of control activities - Identifying required resources, - Prescribing monitoring components, and - Determining anticipated costs. The Plan will be completed prior to December 31, 2018. This planning initiative was funded with assurances of subsequent funding to implement the plan.

Tom Herder ¹ *

Mobile Bay National Estuary Program

Water Quality

Update on Coastal Alabama Volunteer Water Quality Monitoring (*Oral*)

Abstract Description : In coastal Alabama, comprehensive watershed management planning guides project implementation. Stakeholder engagement and water quality monitoring are two important components of plan development and implementation. Citizens are valuable local resources during watershed plan development and provide boots-on-the-ground to assist in implementation. Monitoring is vital to understanding the overall health of a watershed and can be used to evaluate success or failure of implemented projects or planning strategies and determine where additional focus is needed. The Community Action Committee (CAC) of the Mobile Bay National Estuary Program, working with place-based grassroots organizations and individual volunteers, continues to facilitate, train, and supply citizen-driven volunteer monitoring programs to meet these critical needs. The CAC remains focused on building the capacity of the Coastal Alabama Volunteer Monitoring Network and serving as a hub for place-based grassroots organizations and monitoring entities to strengthen their individual group's efforts and foster a unified volunteer monitoring community to advocate for water quality and wise stewardship. This presentation will provide an update on progress to date and program objectives moving forward.

Jason Kudulis ¹ *

Mobile Bay National Estuary Program

Water Quality

U. S. EPA Gulf of Mexico Program Funding (*Oral*)

Abstract Description : The United State Environmental Protection Agency Gulf of Mexico Program is committed to working with our partners to fund projects that Improve water quality; improve coastal community resilience; increase environmental education; and restore critical habitat in the Gulf of Mexico. In this session, US EPA GMP will present examples of recently funded projects, ongoing GMP initiatives, and highlight upcoming funding opportunities.

Amy Newbold ^{1*}

U. S. Environmental Protection Agency Gulf of Mexico Program

Resilience

Using LID to Mitigate Thermal Pollution in Urban Streams and Coastal Receiving Waters *(Poster)*

Abstract Description : Thermal pollution impacts aquatic species such as fish, especially in colder, highly oxygenated streams, however, relatively little data has been collected regarding the temperature of stormwater exiting urban heat islands. The thermal regime (surface, air, and water) of the surrounding environment is altered as urbanization and build-out occur. Heated stormwater runoff flows into receiving waters where it mixes and potentially increases the base temperature of surface water in lakes, streams, bays, and estuaries. The amount of heat transferred, and the degree of thermal pollution is of great importance for fisheries management and the ecological integrity of receiving waters. This research reports on controlled laboratory test to assess low impact development (LID) stormwater control measures as a way to reduce the negative impact of the thermal characteristics of stormwater runoff. This project hypothesizes that pervious surfaces and rain gardens/bioretention can be used to mitigate ground level thermal loads in stormwater runoff. The methods used implemented captured and infiltrated simulated stormwater runoff from infrared heated impervious and pervious pavement cells and routed the stormwater through planted microcosms. A data logging system and thermistors located within the cells and microcosms recorded the temperature flux. Water temperature exiting the cell was also measured. Surface thermal imaging was recorded using an infrared camera. Results from this project established a baseline measurement of heat removal effectiveness of pervious material when used as a solitary stormwater control measure, and when used in combination with other stormwater control measures (rain gardens/bioretention).

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Water Quality

Using Local Branding to Tell the Living Shorelines Story: A Case Study from the City of Biloxi (*Oral*)

Abstract Description : Living Shorelines are an environmentally friendly alternative to bulkheads that employ natural systems, such as marsh plantings and oyster reefs, to protect against land loss and the impact from hurricanes. It is estimated that 15 feet of coastal marsh can absorb up to 50% of incoming wave energy. However, many coastal residents still prefer bulkheads as opposed to more natural means of protection. One barrier to the further pursuit of this practice is the lack of knowledge and familiarity coastal residents have with living shorelines. Few demonstration projects exist to highlight living shorelines techniques, which means that living shorelines are seldom perceived as a viable alternative to ocean armoring techniques such as bulkheads and jetties. As part of an EPA-funded grant to provide technical assistance to communities to implement projects to improve resilience, staff from Mississippi-Alabama Sea Grant has worked with the city of Biloxi and local non-profits to develop signage at three living shorelines locations along the Mississippi coast. Each location has a unique story to tell, both from a historic and cultural perspective, as well as from a project management perspective. This presentation will provide a brief overview of the project, the process developed to create the basic design template for the signs, and some of the challenges that had to be overcome at each individual site. The presentation will conclude with some thoughts on how coordinated branding and signage can help in the promotion and retention of basic knowledge associated with living shorelines practices.

Stephen Deal ¹*

MS-AL Sea Grant Legal Program

Resilience

Vegetation, Elevation and Sediment Characteristics of Land Margins Along Fowl River, Alabama *(Oral)*

Abstract Description : The land margins along the central mesohaline part of Fowl River are being lost at an alarming rate. Stopping this land loss was one of the main priorities identified in the Fowl River Watershed Management Plan funded by NFWF. Following up on this recommendation, MBNEP obtained funding from the NFWF Gulf Environmental Fund to carry out a cross-disciplinary study aimed at elucidating the causes of land loss, with the intent of devising effective management actions to stop it. The study, which forms the group session "Cross-Disciplinary Integrated Assessment of Marsh Health and Land Spit Resilience in Fowl River, Alabama", includes a comprehensive hydrological analysis of the River, an in-depth examination of sediment movement and budgets, and a thorough characterization of the vegetation along the land margins of the River. This presentation will address sediment dynamics, flooding and elevation profiles, and plant communities of the River land margins. We are examining a total of ten sites, seven of them representing decaying lands in the mesohaline part of Fowl River, and one in the oligohaline and two in the euhaline reaches of the River for comparison. We are taking these measurements through a comprehensive network of transects established at each of the sites. In this presentation, we will describe how flooding and sediment dynamics, as well as plant communities, compare between decaying land margins and more stable, healthier land margins. Preliminary results suggest flooding and salt stress, combined with limited sediment supply, are likely causing the observed land loss.

Just Cebrian ¹ *

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Tim Thibaut ²

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Habitats

Vegetative Community and Health Assessment of a Constructed *Juncus*-dominated Salt Marsh in the Northern Gulf of Mexico *(Oral)*

Abstract Description : Deer Island is a coastal habitat which provides a buffer from storm and flood damage as well as shore-line stabilization to the mainland of Biloxi, MS. A third of the land has been lost since 1850, largely driven by tropical storm and hurricane impacts as well as sea level rise. The United States Army Corps of Engineers and Mississippi Department of Marine Resources have targeted the shores of the island as sites for restoration with beneficial use material, and two sites have since been planted with native salt marsh and sand-berm vegetation. If successful, the sites are anticipated to function similarly to the *Juncus roemerianus* dominated salt marshes natural to the northern Gulf of Mexico. Ecological assessment of this restoration project during the early development of the marsh provides a test case for the success of future salt marsh loss mitigation using *J. roemerianus* marsh. The proposed study will assess the vegetative health of the constructed sites using vascular plant community diversity and biomass, as well as relating these parameters to sediment and geomorphological characteristics of the area. Sampling in Spring and Fall 2017 and Spring 2018 has shown establishment of planted salt marsh and naturally-recruited sand-berm vegetation. Planted *J. roemerianus*, however, has failed to establish and exists sparsely on the marsh platform. The rhizosphere and canopy development of restored sites is in some cases comparable to a reference site. Future assessment is needed to evaluate the success of the constructed marshes in the long term.

Nickolas Murphy ¹*

University of Southern Mississippi Gulf Coast Research Lab

Patrick Biber ²

University of Southern Mississippi

Habitats

Water Biogeochemistry Affecting the Oyster Beds in the Western Mississippi Sound *(Poster)*

Abstract Description : Mississippi's oyster beds are important economic assets for the state and the nation. Currently, most of the oyster beds located along the western Mississippi Sound are facing problems due to frequent storms, harmful algal blooms, pathogen discharge, hypoxia, and freshwater input as a result of flooding of rivers draining to the Mississippi Sound. Terrestrial inputs play a major role in the coastal water biogeochemistry and affects the oyster population negatively. The main objective of this study was to investigate the potential impact of water quality on the Henderson Point and Pass Christian Oyster Reefs. A total of 46 samples were collected in the months of March, May, June, and July, 2018. The samples were analysed for chlorophyll-a (Chl-a), phycocyanin (PC), colored dissolved organic matter (CDOM), suspended particulate matter (SPM), dissolved organic carbon (DOC), dissolved inorganic carbon (DIC), trace metals, major anions, and pathogens. The results indicated an increase in average salinity, PC, Chl-a, organic SPM, DIC, PO₄³⁻, and NO₃⁻, and a decline in CDOM and DOC concentrations from March to July. These trends were attributed to the increased photosynthetic activities and dissolution of CaCO₃ during summer and freshwater input in March (late winter). Trace metal analysis showed a substantial increase in concentrations of As (80.8±34.0µg/L), Ni (17.3±3.94µg/L), Zn (10.9±5.80µg/L), Se (4.82±3.67µg/L), Cr(8.88±3.02µg/L), Co(1.67±0.57µg/L), Sb(0.15±0.13µg/L), and U(1.05 ±0.38µg/L) from March to July. Additionally, an increase in pathogens- heterotrophic, total coliform, and fecal coliform, and a decline in enterococcus bacteria was observed from late winter to summer.

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Zikri Arslan ³

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Geosystems Research Institute; Northern Gulf Institute; Mississippi State University

Water Quality

Weeks Bay Watershed Management Plan *(Oral)*

Abstract Description : In 2017, Thompson Engineering finalized the Weeks Bay Watershed Management Plan with input from key stakeholders throughout the Fish and Magnolia River basin. Priority issues and action items were identified to ensure better water quality and a more resilient tomorrow. These issues include but are not limited to stormwater management, low impact development measures, and tributary impairment reduction. A watershed coordinator has been appointed to coordinate between the nine municipalities and other government and non-profit agencies to begin finding funds and tackle these issues. Creating an Implementation Working Group was the first task completed in the plan that will set up priority issues to be tackled.

Casey Fulford ¹*

Baldwin County Soil and Water Conservation District

Water Quality

What's New at NOAA's National Centers for Environmental Information? *(Oral)*

Abstract Description : NOAA's National Centers for Environmental Information (NCEI) houses and provides access to one of the most significant archives on Earth, with oceanic, atmospheric, coastal, and geophysical data. We provide data and information products and services to private industry and businesses, local to national governments, academia, as well as the public. These products and data answer increasingly important questions pertaining to oceans and coasts, natural disasters, marine transportation, and the improved management of coastal and marine resources. The Stennis-based component of NCEI was first created as a Coastal Data Development (CDD) center to provide for the archive of and access to, the long-term coastal data record and to provide this information to the coastal user community. While NCEI continues to provide coastal data stewardship services, NCEI has begun to build a coastal science component to address the complex dynamics of shoreline, near-shore water column, and sea bottom. Unlike some other types of environmental data, most of the coastal data needed for these types of records are collected by other federal, state, and local agencies, academia, and NGOs. Because coastal science relies on the integration of these data collections to develop baseline records, especially with compounding environmental disasters, NCEI Coastal Ecosystem Data Assembly Center will be deployed at Stennis in conjunction with the Northern Gulf Institute (NGI). NCEI and NGI will collaborate to develop data synthesis methods to reduce uncertainty and to forecast ecosystem responses, and to develop effective and efficient data management systems supporting a data-driven economy.

Kirsten Larsen ^{1*}

NOAA National Centers for Environmental Education

Oil Spill

X Marks the Spot: Case Studies of Stranded Bottlenose Dolphins (*Tursiops truncatus*) Along the Alabama Coast *(Oral)*

Abstract Description : The northern Gulf of Mexico has experienced a steady increase of direct and indirect human caused mortalities in common bottlenose dolphins (*Tursiops truncatus*) during the last decade, including cases of intentional harm (Vail 2016). Mortality events such as gunshots, arrows, boat strikes, and blunt force trauma have been documented throughout the northern Gulf of Mexico, with cases as recent as 2018. Since its inception in 2011, the Alabama Marine Mammal Stranding Network (ALMMSN) has responded to more than 300 marine mammal strandings. Among these strandings were 63 documented cases of human interaction (HI; 1978-2018), with 53% of these cases including signs of fishery interactions. In addition to these known cases of HI, there are many potential HI cases of unknown origin. Since 2016, deep distinctive x-shaped marks have been documented on at least two stranded dolphins, suspected to be HI related. These X's differ from usual fishery interaction marks both in size and in depth. To help determine the origin of these marks and links to HI-associated stranding, we: 1) established a background of Alabama fishery trends, and compared known fishery interaction cases, which exhibit similar characteristics to the X cases of unknown origin; 2) researched commonly used fishing gear and weapons for comparison to mark shapes, and tested these using modeling clay and 3) shared data with experts in HI indicators in an effort to link these Alabama cases, to cases from other locales.

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Living Resources

Day One: Wednesday, November 28, 2018					
7:30-8:00	Registration/Breakfast				
8:00-8:15	Welcome				
8:15-9:00	Intergenerational Panel				
9:00-9:15	Break to Sessions				
	Living Resources, Room 201C	Habitat Management, Room 201B	Oil Spill Impacts, Room 202B	Water Quality, Room 201D	Resilience, Room 201A
Moderator	Dr. Jim Franks, University of Southern Mississippi	Judy Haner, The Nature Conservancy	Dr. Amy Hunter, ADCNR - State Lands Division	Dr. Alex Beebe, University of South Alabama	Renee Collini, Mississippi State University
Time	Title/Presenter	Title/Presenter	Title/Presenter	Title/Presenter	Title/Presenter
9:15-9:30	<u>Dietary Habits of <i>Gymnura lessae</i> Revealed Through DNA Meta-Bar-coding of Stomach Contents</u> - Matthew Jargowsky (S), Mississippi State University	<u>Lessons Learned in Optimizing Restoration Design</u> - Judy Haner, The Nature Conservancy <u>Lessons Learned in the Post-Design Phase from a Living Shoreline Along the Southern Shore of Lake Pontchartrain, LA</u> - Chris Williams, Moffatt & Nichol <u>Design of a Long-Term Monitoring Program for a Living Shoreline Project in Hancock County, MS</u> - Sarah Ballard, Anchor QEA LLC <u>Pensacola Bay Living Shoreline-Project GreenShores Site II</u> - Erin Rooney, HDR Engineering, Inc.	<u>Oil Spill Science Outreach: Assimilating Emerging Science to Understand the Past While Preparing for the Future</u> - Melissa Partyka, Auburn University/MS-AL Sea Grant Consortium	<u>Silicon Sorption Capacities at the Sediment Water Interface of Coastal Systems</u> - Rebecca Pickering (S), University of South Alabama/Dauphin Island Sea Lab	<u>Compound Coastal Flooding Driven by Tropical Cyclones</u> - Hamed Moftakhari, University of Alabama
9:30-9:45	<u>A Hierarchical Bayesian Surplus Production Model for Blue Crabs (<i>Callinectes sapidus</i>) in the Northern Gulf of Mexico</u> - Megumi Oshima (S), University of Southern Mississippi	<u>Design of a Long-Term Monitoring Program for a Living Shoreline Project in Hancock County, MS</u> - Sarah Ballard, Anchor QEA LLC <u>Pensacola Bay Living Shoreline-Project GreenShores Site II</u> - Erin Rooney, HDR Engineering, Inc.	<u>Oyster Reef Diversity and Oyster Size Class Abundance in the Northern Gulf of Mexico (Terrebonne Bay, Louisiana to Apalachicola Bay, FL) after Deep Water Horizon (2015-2017)</u> - Kelly Boyle, University of South Alabama/Dauphin Island Sea Lab	<u>Don't Drink the Water! Impacts of Wild Pig Disturbance on Water Quality in Low Order Streams of the Southern Coastal Plain</u> - Sara Bolds (S), Auburn University	<u>Transforming Bulkheads and Eroding Sedimentary Shorelines into Healthy Living Shorelines</u> - Jamie Amato (S), University of South Alabama/Dauphin Island Sea Lab
9:45-10:00	<u>Spatial Distribution of Atlantic Sharpnose (<i>Rhizoprionodon terraenovae</i>) in the Northern Gulf of Mexico</u> - Alex Benecke (S), University of Southern Mississippi	<u>Shoreline Restoration and Habitat Longevity: The Lightning Point Shoreline Project</u> - Kevin Hanegan, Moffatt & Nichol <u>Salt Aire - Design & Construction of a Shoreline Restoration and Protection Project on Mobile Bay</u> - Ryan Waldron, Neel Schaffer	<u>Alabama Coastal Bird Stewardship Program (ALCBSP)</u> - Katie Barnes, Birmingham Audubon	<u>Cellulose-Based Material for Removal of Microcystin from Contaminated Water Sources</u> - Diego Gomez-Maldonado (S), Auburn University	<u>Application of Geotextile Tubes in Coastal Environments</u> - Cody Colvin, Industrial Fabrics
10:00-10:15	<u>Black Mangrove Expansion into Texas Salt Marshes</u> - Meredith Diskin (S), University of South Alabama/Dauphin Island Sea Lab	<u>Salt Aire - Design & Construction of a Shoreline Restoration and Protection Project on Mobile Bay</u> - Ryan Waldron, Neel Schaffer	<u>Building Bridges to Better Understand Fishing Communities Cooperative Research Project</u> - Thao Vu, Mississippi Coalition for Fisher Folks and Families	<u>An Interactive Gulf-Based Water Quality Visualization Tool for the Gulf of Mexico</u> - Wondimagegn Beshah (S), Mississippi State University	<u>Return on Investment from Wind Hazard Mitigation</u> - Shea Gould (S), Mississippi State University
10:15-10:30	<u>Stable Isotope Diet Patterns of Red Snapper (<i>Lutjanus campechanus</i>) in Mississippi Waters</u> - Caitlin Slife (S), University of Southern Mississippi	<u>Mon Louis Island Restoration</u> - Matthew Wahn, Thompson Engineering	<u>Recommendations for Integrating Outreach and Research: Perspectives from the Gulf of Mexico Research Initiative</u> - Tina Miller-Way, Dauphin Island Sea Lab	<u>A Novel Entry Pathway for Domoic Acid into the Marine Food Web</u> - Israel Marquez (S), University of South Alabama/Dauphin Island Sea Lab	<u>Three Communities, Three States, Three Paths to Enhancing Resilience</u> - Jody Thompson, Auburn University/MS-AL Sea Grant Consortium

10:30-11:00	Break				
	Living Resources, Room 201C	Habitat Management, Room 201B	Oil Spill Impacts, Room 202B	Water Quality, Room 201D	Resilience, Room 201A
11:00-11:15	Environmental Drivers of Histamine-Producing Bacteria in Water Samples and Decomposing Spanish Mackerel Tissues - Ashley Frith (S), University of South Alabama/Dauphin Island Sea Lab	<u>Design Considerations for Enhancing Nutrient Removal in Restored Marshes</u> - Just Cebrian, University of South Alabama, Dauphin Island Sea Lab	<u>The Influence of Salinity on the Toxicity of Corexit at Multiple Life Stages of the Gulf Killifish</u> - Charles Brown (S), Louisiana State University	<u>Addressing Marine Debris Through Field Work and Extension</u> <u>Gulf of Microplastics-Microplastic Abundance and Distribution Along the Continental Shelf in the Northern Gulf</u> - Caitlin Wessel, NOAA Marine Debris Program	<u>Benefit-Cost Analysis of Using Offshore vs. Nearshore Sand for Coastal Restoration</u> - Daniel Petrolia, Mississippi State University
11:15-11:30	<u>Estimates of Red Drum (<i>Sciaenops ocellatus</i>) Movement and Mortality Via Acoustic Telemetry</u> - T. Reid Nelson (S), University of South Alabama/Dauphin Island Sea Lab	<u>Testing Living Shorelines Design Assumptions: Site-Specific Considerations for Boat Wake and Wind-Driven Waves</u> - Nigel Temple (S), Mississippi State University	<u>Dauphin Island Citizen Science Program: Assessing Shoreline Change and Background Oiling Data for Oil Spill Response and Planning</u> - Carrie Miller (S), University of New Orleans	<u>Engaging Citizen Scientists to Assess Large-Scale Microplastic Distributions</u> - Amanda Sartain (S), Mississippi State University/MS-AL Sea Grant Consortium	<u>Changes in Carb Zoaeae Composition and Timing in a Southeastern Estuary 1882-2017: Responses to Climate Change and Seasonal Variability</u> - Benjamin Belgrad, Dauphin Island Sea Lab
11:30-11:45	<u>Potential Shifts in Nutrient Filtration with Encroachment of Black Mangrove (<i>Avicennia germinans</i>)</u> - Aaron Macy (S), Dauphin Island Sea Lab	<u>Optimal Portfolio Design to Manage Oyster Resources</u> - Frederick Nyanzu (S), Mississippi State University	<u>Intergenerational Effects of Crude Oil Exposure on Early-Life Growth and Development in the Gulf Killifish - <i>Fundulus grandis</i></u> - Chelsea Hess (S), Louisiana State University	<u>Engaging the Fishing Community to Remove Marine Debris and Quantify Impacts</u> - Sarah Cunningham (S), Mississippi State University	<u>Katy Prairie Stream Restoration: An Illustrative Use of Stream Restoration to Create Resilient Ecosystems</u> - Stephanie Coffman, Stantec Consulting Services, Inc.
11:45-12:00	<u>Temperature Effects on Life History Parameters of Two Copepods Cultured as Live Feeds</u> - Adam Daw (S), University of Southern Mississippi	<u>Assessing Ecosystem Services Supply for Restoration Scenarios</u> - Rich Fulford U. S. EPA Gulf of Mexico Program	<u>What's New at NOAA's National Centers for Environmental Information</u> - Kirsten Larsen, NOAA National Centers for Environmental Education	<u>Microplastic Abundance and Ingestion Frequency by Juvenile Fishes Associated with Sargassum</u> - Olivia Lestrade (S), University of Southern Mississippi	<u>Sand Deposition on Deer Island, Biloxi</u> - Anna Linhoss, Mississippi State University
12:00-12:30	Lunch				
12:30-1:30	Keynote Speaker - Eli Murphy <i>Driving Change Through Effective Messaging</i>				
1:30-1:45	Break to Sessions				

	Living Resources, Room 201C	Habitat Management, Room 201B	Outreach/Education, Room 202B	Water Quality, Room 201D	Resilience, Room 201A
Moderator	George Ramseur, Mississippi Department of Marine Resources	Dr. Becky Allee, NOAA - Coastal Management	Cade Kistler, Mobile Baykeeper	Jason Kudulis, Mobile Bay National Estuary Program	Jody Thompson, MS-AL Sea Grant Consortium
1:45-2:00	<u>Toxic Element Concentrations in Muscle Tissue of Atlantic Tripletail (<i>Lobotes surinamensis</i>) in the Northern Gulf of Mexico</u> - Garrett Dunne (S), Mississippi State University	<u>Getting Projects Shovel Ready (The Good, The Bad, and The Ugly)</u> - Mary Kate Brown, The Nature Conservancy Shoreline Protection and Enhancement in the LaBranche Wetlands, St. Charles Parish, LA - Chris Williams, Moffatt & Nichol	<u>Leveraging Partnerships for Effective Educator Workshops</u> - Tina Miller-Way, Dauphin Island Sea Lab	<u>Temporal and Spatial Distributions of Trace Elements (Ba, Cs, Mn and V) in Mississippi Coastal Waters: Influence of Hypoxia, Submarine Groundwater, and Episodic Events in a River-dominated System</u> - Peng Ho (S), University of Southern Mississippi	<u>A Vision for Sustainable Restoration of Salt Marsh in an Age of Rising Seas</u> - David Vance, Geosyntec Consultants, Inc.
2:00-2:15	<u>Delineating Isoscapes of Selected Fish Species in the Northern Gulf of Mexico</u> - Branden Kohler (S), University of Southern Mississippi	Hurdles for Permitting a Living Shoreline and Reef Project - Wendell Mears, Anchor QEA LLC	<u>Graham Creek Preserve: Balancing Nature and Recreation</u> - Leslie Gahagan, City of Foley	<u>Development of a Fecal Coliform Bacteria Loading Model for Fowl River Bay</u> - David Tomasko, Environmental Science Associates (ESA)	<u>Peer to Pier Learning Program</u> - Rusty Grice, Auburn University/MS-AL Sea Grant Consortium
2:15-2:30	<u>Early Recruitment of <i>Crassostrea virginica</i> to Restored and Historic Oyster Reefs in Western Mississippi Sound</u> - Leah Morgan (S), University of Southern Mississippi	Pensacola Bay Living Shoreline-Project Greenshores Site II - Erin Rooney, HDR Engineering, Inc. <u>Lessons Learned in the Post-Design Phase from a Living Shoreline at Lightning Point, Bayou La Batre, AL</u> - Mindy Joiner, Moffatt & Nichol	<u>Strategic Watershed Awareness and Monitoring Program (SWAMP): Empowering Citizen Scientists</u> - Ilka Porter, Mobile Baykeeper	<u>Submarine Groundwater Discharge and Hypoxia in Mississippi Coastal Waters</u> - Alan Shiller, University of Southern Mississippi	<u>GCRL's Marine Education Center, Form Follows Focus</u> - Chris Synder, University of Southern Mississippi Marine Education Center
2:30-2:45	Eastern Oyster (<i>Crassostrea virginica</i>) Settlement and Population Connectivity in a Freshwater-Dominated Estuary - Haley Gancel (S), University of South Alabama	Salt Aire Shoreline Protection and Restoration - Barry Vittor, Barry A. Vittor & Associates, Inc.	<u>Dreams Do Come True??? Partnering with State Agencies to Provide Environmental Education to Schools</u> - Ashley Campbell, City of Daphne	<u>ADEM Water Quality Monitoring Programs: Current Status</u> - Fred Leslie, Alabama Department of Environmental Management	<u>Forming and Sustaining the Alabama Oyster Shell Recycling Program</u> - Mark Berte, Alabama Coastal Foundation
2:45-3:00	<u>Florida Manatee (<i>Trichechus manatus latirostris</i>) Diet in North-central Gulf of Mexico</u> - Kayla DaCosta (S), University of South Alabama/Dauphin Island Sea Lab	Permitting Challenges-Mon Louis Island Restoration - Scott Jackson, Thompson Engineering	<u>Sea Grass Monitoring in Pensacola Bay System: A Partnership Between Citizens and the University of West Florida</u> - Jane M. Caffrey, University of West Florida Center for Environmental Diagnostics and Bioremediation	Biogeochemical Evaluation of Dissolved Organic Matter and Trace Elements Over an Oyster Bed in Western Mississippi Sound Using Multivariate Statistics - Sankar Manalilkada Sasidharan (S), Mississippi State University	<u>Cultivating Future Coastal Environmental Educators Through Internships</u> - Chris Flight, Dauphin Island Sea Lab Discovery Hall Programs
3:00-3:30	Break				

	Living Resources, Room 201C	Habitat Management, Room 201B	Oil Spill Impacts, Room 202B	Water Quality, Room 201D	Resilience, Room 201A
3:30-3:45	<u>Tracking Tarpon Across the Northern Gulf of Mexico: A Citizen Science Success</u> - Marcus Drymon, Mississippi State University	<u>Vegetative Community and Health Assessment of a Constructed <i>Juncus</i>-dominated Salt Marsh in the Northern Gulf of Mexico</u> - Nickolas Murphy (S), University of Southern Mississippi/Gulf Coast Research Lab	<u>Evaluation of the Swift Tract Living Shoreline Project</u> <u>To Plant or Not to Plant Along Breakwater-Protected Shorelines in a High Energy Environment</u> - Sara Martin, Mississippi State University	<u>Making Watersheds Great Again</u> - Christian Miller, Mobile Bay National Estuary Program	<u>Increasing Capacity for Local Communities to Respond to Climate Change</u> - Tracie Sempier, Gulf of Mexico Alliance/MS-AL Sea Grant Consortium
3:45-4:00	<u>Optimizing eDNA Analysis Methods for Molecular Detection of Bull Sharks (<i>Carcharhinus leucas</i>) in the Mobile-Tensaw River Delta and Mobile Bay Environments</u> - Katherine Schweiss (S), University of Southern Mississippi	<u>Hardware and Software Components of an Oyster's Gape Measurement System</u> - Austin Ukpebor (S), Jackson State University	<u>Swift Tract: Slow Down the Waves and Speed Up the Oysters</u> - Jacob Blandford, The Nature Conservancy <u>Faunal Assemblages Associated with Living Shorelines and Implications for High-Wave Energy Ecosystems</u> - Daniel Firth (S), Mississippi State University	<u>Re-Occurring Patterns of Stratification and Hypoxia in Chandeleur and Breton Sounds</u> - John Lopez, Lake Pontchartrain Basin Foundation	<u>Quantifying Vegetation and Soil Dynamics of Selected Coastal Habitat Types Within the Grand Bay NERR</u> - Michael Archer, Grand Bay National Estuarine Research Reserve
4:00-4:15	<u>Genomic Assessment of Population Structure in Sheepshead, <i>Archosargus probatocephalus</i></u> - Pearce Cooper (S), University of South Alabama/Dauphin Island Sea Lab	<u>Effects of Burrow and Tube Construction by Infauna on Sound Propagation through Marine Sediments</u> - Kelly Dorgan, Dauphin Island Sea Lab	<u>A GIS Approach to Determining the Impact of Large-Scale Breakwaters on Fringing Marsh Vegetation</u> - Gillian Palino (S), Mississippi State University	<u>Weeks Bay Watershed Management Plan</u> - Casey Fulford, Baldwin County Soil and Water Conservation District	<u>Obtaining, Understanding, and Using Stakeholder Feedback</u> - Mikaela Heming, Northern Gulf of Mexico Sentinel Site Cooperative
4:15-4:30	<u>Evaluating Trophic Diversity in a North-central Gulf of Mexico Elasmobranch Assemblage</u> - Emily Seubert (S), Mississippi State University	<u>Sawfish CSI: Using Environmental DNA to Search for the Critically-Endangered Smalltooth Sawfish in Mississippi Waters</u> - Ryan Lehman (S), University of Southern Mississippi	<u>Do We Know What We Don't Know About Living Shorelines? Perspectives from End Users</u> - Eric Sparks, Mississippi State University/MS-AL Sea Grant Consortium	<u>Transforming Three Mile Creek through Watershed Management Plan Implementation: An Invasive Species Control Plan</u> - Tom Herder, Mobile Bay National Estuary Program	<u>Economic Benefits of the Restoration of D'Olive Watershed</u> - Wade Burcham, Geosyntec Consultants, Inc.
4:30-4:45	<u>Influence of Freshwater Influx on Diet and Body Condition of Bottlenose Dolphin, <i>Tursiops truncatus</i>, in Mobile Bay, Alabama</u> - Matthew Hodanbosi (S), University of South Alabama/Dauphin Island Sea Lab	<u>Food Web Dynamics and Trophic Interactions Associated with Pelagic Sargassum Features in the Gulf of Mexico</u> - Zabe Premo (S), University of Southern Mississippi		<u>Monitoring: The Key to Measuring Watershed Management Response</u> - Marlon Cook, Cook Hydrogeology LLC	<u>A Holistic Assessment of Resilience to Climate Change Hazards Along the Mississippi and Alabama Gulf Coast, USA</u> - Chris Burton, Auburn University Department of Geosciences

Day Two: Thursday, November 29, 2018					
7:30-8:00	Registration/Breakfast				
8:00-8:30	"Flight of the Frigate Bird" Movie				
8:30-9:15	Keynote Speaker - John Englander <i>Rising Seas and Changing Coastlines</i>				
9:15-9:30	Break to Sessions				
	Living Resources, Room 201C	Habitat Management, Room 201B	Outreach/Education Room 202B	Water Quality, Room 201D	Resilience, Room 201A
Moderator	Tom Herder, Mobile Bay National Estuary Program	Patric Harper, U.S. Fish & Wildlife Service	Ashley Campbell, City of Daphne	Christian Miller, Mobile Bay National Estuary Program	Rhonda Price, Mississippi Department of Marine Resources
Time	Title/Presenter	Title/Presenter	Title/Presenter	Title/Presenter	Title/Presenter
9:30-9:45	<u>Assessing the Status of Diamondback Terrapins (<i>Malaclemys terrapin</i>) in Northwest Florida</u> - Rick O'Connor, Florida Sea Grant	<u>Is Marsh Surface Tracking Sea Level Change? Developing Tools and Visualizations for SET Data</u> - Kim Cressman, Grand Bay National Estuarine Research Reserve	<u>Broadening the Audience for Conservation using Art Programs</u> - Ayesha Gray, Grand Bay National Estuarine Research Reserve	<u>Monitoring Status and Trends of Estuarine Habitats and Water Quality Using Remote Sensing Assets</u> - Kari Servold, Moffatt & Nichol	<u>Stabilization Alternatives-Another Choice to Consider</u> - Wade Burcham, Geosyntec Consultants, Inc.
9:45-10:00	<u>Bivalves at Work</u> - Jessica Lunt, Dauphin Island Sea Lab	<u>Developing a Living Shoreline Database and Gap Analysis for Gulf of Mexico</u> - Saranee Dutta, University of Southern Mississippi/Gulf Coast Research Lab	<u>Citizens, Oysters, and Changing the Culture Through POP (Pensacola Oyster Project)</u> - Barbara Albrecht, Panhandle Watershed Alliance	<u>Our Wastewater Footprint: An Example of Adaptive Research and User-Driven Product Development</u> - Ruth Carmichael, University of South Alabama/ Dauphin Island Sea Lab	<u>Ten Things That Need to Be Considered in Ecological Planning and Design</u> - Christopher Grant, Watermark Design Group
10:00-10:15	<u>The Effects of Lipid Extraction on Delta 13C and Delta 15N Ratios Across Taxa, Tissues, and Trophic Groups</u> - Carl Cloyed, Dauphin Island Sea Lab	<u>"Pay Me Now or Pay Me Later:" Employing LID and GI to Avoid Future Restoration</u> - Paul Lammers, Mobile Bay National Estuary Program	<u>Africatown Connections Blueway: Healing Begins by Reclaiming Our Heritage & Happiness</u> - Liz Smith-Incer, National Park Service Rivers, Trails & Conservation Assistance Program	Threats to Groundwater, Surface Water, and Dam Stability at a Coastal Coal Ash Impoundment - Cade Kistler, Mobile Baykeeper	The Northern Gulf of Mexico Sentinel Site Cooperative: Connecting Research, Service, and Decision-Makers - Renee Collini, Northern Gulf of Mexico Sentinel Site Cooperative
10:15-10:30	<u>X Marks the Spot: Case Studies of Stranded Bottlenose Dolphins (<i>Tursiops truncatus</i>) Along the Alabama coast</u> - Merri Collins, Dauphin Island Sea Lab/AL Marine Mammal Stranding Network	<u>Effects of Residential Land Use on Fish Communities and Tidal Creek Habitats of Alabama and West Florida</u> - Christopher Anderson, Auburn University	<u>A 21-Year Evolution of Environmental Advocacy in Coastal Alabama</u> - Casi Callaway, Mobile Baykeeper	<u>Update on Coastal Alabama Volunteer Water Quality Monitoring</u> - Jason Kudulis, Mobile Bay National Estuary Program	<u>Mississippi Coastal Map Revision Project Update</u> - Kristyn Gunter, Southern Mississippi Planning & Development District
10:30-11:00	Break				

	Living Resources, Room 201C	Habitat Management, Room 201B	Outreach/Education Room 202B	Water Quality, Room 201D	Resilience, Room 201A
11:00-11:15	Has Eutrophication Altered the Flow of Primary Production in the Fertile Fisheries Crescent? - Jeffrey Krause, University of South Alabama/ Dauphin Island Sea Lab	<u>Dune Restoration and Enhancement for the Florida Panhandle Manual</u> - Christine Verlinde, University of Florida/Institute of Food and Agricultural Sciences/FL Sea Grant	<u>Promoting Nature-Based Tourism in Mississippi</u> - Melissa Pringle, Allen Engineering and Science, Inc.	<u>Advanced Hydrologic and Hydraulic Modeling Technologies</u> - John Curry, Hydro LLC	<u>Predicting the Impact of Sea-Level Rise on Coastal Wetlands: Implication for Coastal Wetland Restoration</u> - Wei Wu, University of Southern Mississippi
11:15-11:30	<u>Response of Alabama Marine and Estuarine Fishes to Artificial Reef Addition and Enhancement</u> - Mark Albins, University of South Alabama/Dauphin Island Sea Lab	<u>Sustainability of Oyster Reef Habitat in Mississippi Sound: A Larval Transport Approach</u> - Kemal Cambazoglu, University of Southern Mississippi	<u>Resilience to future Flooding in the Gulf of Mexico</u> - Mikaela Heming, Northern Gulf of Mexico Sentinel Site Cooperative	<u>Status of Small Stream Litter Collection Devices in Mobile and Baldwin Counties, AL</u> - Don Bates, Thompson Engineering	<u>Using Local Branding to Tell the Living Shorelines Story: A Case Study from the City of Biloxi</u> - Stephen Deal, MS-AL Sea Grant Legal Program
11:30-11:45	<u>Economic Recovery Paths of the Mississippi Oyster Fishery</u> - Benedict Posadas, Mississippi State University/Coastal Research and Extension Center	<u>Regional Genetic Diversity in <i>Spartina</i> and <i>Juncus</i> with Implications for Future Salt Marsh Restoration Success</u> - Patrick Biber, University of Southern Mississippi	<u>Connecting Water Quality Parameters and EJ Screen Values in Mobile County, AL</u> - Ellie Mallon and Diego Calderon-Arrieta, Mobile Baykeeper	<u>Source Control Through Implementation of a Municipal Green Infrastructure Program</u> - Byron Hinchey, S&ME Inc.	<u>A Paleoclimate Perspective on Water Policy in the Southeast</u> - Matthew Therrell, University of Alabama
11:45-12:00	<u>Response of Songbirds to Hurricanes During Autumn Migration</u> - Frank Moore, University of Southern Mississippi	<u>Restoration and Education Through Oyster Gardening</u> - Emma Cochran, Auburn University/MS-AL Sea Grant Consortium	<u>Embrace the Gulf - A Yearlong Campaign for the Gulf of Mexico</u> - Lee Yokel, Dauphin Island Sea Lab/Gulf of Mexico Alliance	<u>Aging Infrastructure and How to Keep Water Working</u> - Charles Hyland, Mobile Area Water and Sewer System	Local Sea-Level Rise Two-Pager: Access, How-To, and Application - Renee Collini, Northern Gulf of Mexico Sentinel Site Cooperative
12:00-12:30	Lunch				
12:30-1:30	Panel - Harmful Algal Blooms				
1:30-1:45	Mike deGruy Student Awards Presentation				
1:45	Break to Sessions				

	Living Resources, Room 201C	Habitat Management, Room 201B	Outreach/Education Room 202B	Water Quality, Room 201D	Resilience, Room 201A
Moderator	Dr. Robert Leaf, University of Southern Mississippi	Debbie Devore, U.S. Fish & Wildlife Service	Dr. Melissa Partyka, MS-AL Sea Grant Consortium	Kim Cressman, Grand Bay NERR	Paul Lammers, Mobile Bay National Estuary Program
1:45-2:00	<u>Supporting Science and Restoration Through the Mississippi-Based RESTORE Act Center of Excellence (MBRACE)</u> - Kelly Darnell, University of Southern Mississippi	<u>Cross-Disciplinary Integrated Assessment of Marsh Health and Land Spit Resilience in Fowl River, AL</u> <u>Vegetation, Elevation, and Sediment Characteristics of Land Margins along Fowl River, Alabama</u> - Just Cebrian, University of South Alabama/Dauphin Island Sea Lab, and Tim Thibaut, Barry A. Vittor & Associates, Inc.	<u>The Future of NOAA and Water Information</u> <u>The NOAA Water Initiative: A New Era of Water Information</u> - Brenna Sweetman, The Baldwin Group/NOAA Office of Coastal Management <u>The National Water Model: Transforming Water Modeling</u> - Karen Bareford, University of Alabama/MS-AL Sea Grant Consortium	<u>Coastal Explorer: Getting the Community Involved in Coastal Education</u> - Danielle Bailey, University of Southern Mississippi	<u>Partnership Builds Wind and Flood Resilience Through Outreach</u> - Hank Hodde, Smart Home America
2:00-2:15	<u>Stakeholder Engagement: A Critical Component of the Great Red Snapper Count</u> - Amanda Jefferson, MS-AL Sea Grant Consortium/Mississippi State University	<u>Characterization of Marsh Spit Hydrographic Variability in Relation to Marsh Vegetation Type</u> - John Lehrter, University of South Alabama/Dauphin Island Sea Lab	<u>Adapting Stormwater Management for Coastal Floods</u> - Brenna Sweetman, The Baldwin Group/NOAA Office of Coastal Management <u>The National Water Extension Program: Water Information for Everyone</u> - Karen Bareford, University of Alabama/MS-AL Sea Grant Consortium	<u>How to Move Toward a Litter-Free Mardi Gras: Assessment, Removal, Awareness, and Prevention</u> - Laura Jackson, Mobile Baykeeper	<u>U. S. EPA Gulf of Mexico Program Funding</u> - Amy Newbold, U. S. EPA Gulf of Mexico Program
2:15-2:30	<u>Infestation of Farmed Oysters (<i>Crassostrea virginica</i>) by Mudblister Worms (<i>Polydora websteri</i>)</u> - Sarah Cole, University of South Alabama/Dauphin Island Sea Lab	<u>Recent Geologic History of Fowl River Marsh Spits Revealed Through Piston-Core Geochronological and Sedimentological Analysis</u> - Alex Beebe, University of South Alabama		<u>Public Opinion on a Gulf Coast Beach Conditions Reporting System</u> - Daniel Petrolia, Mississippi State University	<u>Conserving Coastal Alabama</u> - Walter Ernest, Pelican Coast Conservancy
2:30-2:45	<u>An Assessment of Southern Flounder in Alabama Coastal Waters</u> - Sean Powers, University of South Alabama/Dauphin Island Sea Lab	<u>Magnitude and Fate of Sediment Loading in the Fowl River Estuary</u> - Marlon Cook, Cook Hydrogeology LLC <u>Salinity Dynamics in Fowl River and Their Potential Impact on Marsh Health</u> - Brian Dzwonkowski, University of South Alabama/Dauphin Island Sea Lab <u>Incident Boat Wake Energy and Implications for Restoration Design</u> - Bret Webb, University of South Alabama		<u>Magnolia Bayou Watershed Education: Taking STEM to STEAM</u> - Kelsey Johnson, Gulf Coast Community Design Studio, Mississippi State University	<u>Get to Know the Alabama Coastal Heritage Trust</u> - Hank Caddell, Alabama Coastal Heritage Trust
2:45-3:00	<u>Assessing the Current Status of Adult Red Drum (<i>Sciaenops ocellatus</i>) in the Northern Gulf of Mexico</u> - Crystal Hightower, University of South Alabama/Dauphin Island Sea Lab				<u>Building Storm Resilient and Environmentally Sustainable in a Coastal Landscape</u> - Sam Clardy, University of Southern Mississippi
3:00-3:30	Break				
3:30-4:30	Panel - The Next Wave: Future Trends in Environmental Data Collection, Synthesis, and Analysis				