Southeastern Estuarine Research Society

2023 ANNUAL MEETING

March 16-18 | Charleston, South Carolina

Southeastern Estuarine Research Society

The Southeastern Estuarine Research Society (SEERS) is a 501(c)(3) non-profit educational organization dedicated to the informal exchange of interdisciplinary information related to estuaries of the southeastern United States. SEERS promotes discussion of estuarine research, science, and management; promotes discussion of current research projects and management issues; and encourages participation of student colleagues. SEERS membership is largely, but not exclusively, from the states of NC, SC, GA and FL. SEERS typically meets twice per year, including the biennial Coastal and Estuarine Research Federation Conference. SEERS is an affiliate society of the Coastal and Estuarine Research Federation (CERF).
SEERS website: www.SEERS.org

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LETTER FROM THE PRESIDENT

Welcome to the Annual Meeting of the Southeastern Estuarine Research Society!

The one before the Big One….on behalf of the SEERS Board, I'm so excited to welcome you to the 2023 SEERS Meeting, in our 49th year as a professional society.

With that being said, we can't thank you, our members, enough for sticking with us for so long. As we continue on into the future, we will continue to ask you for input to shape SEERS. Thanks to all those that participated in our By-Laws vote! We did get a majority to switch around the election of our Board members so things continue to run smoothly.

The SEERS Board cannot run without our members' help and we encourage you to volunteer for Board positions. Currently, we are looking for a new Secretary and Student Representative. In 2024, it will be the BIG 5-0, and we'll need local hosts that are up to the task for planning another great meeting.

Our Meeting Planning Committee along with the help of local host dream team including Denise Sanger, Marie DeLorenzo, Britta Jessen, and Geno Olmi, have created a meeting program that is filled with great insight and science. As you mingle among your SEERS family this weekend, pat them on the back for a job well done. Our sponsors really came through as well contributing money to help offset our student travel expenses to Charleston.

We're excited you're here and we look forward to continuing the SEERS meeting fellowship.

Kind regards,

Jessica Reichmuth

President 2022- 2024

Southeastern Estuarine Research Society

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Cover Photo:

Thank you to Denise Sanger from South Carolina Department of Natural Resources for this year's cover photo for the program.

Abstract Book Photo:

Thank you to Shannon Gregory from Augusta University for this year's abstract book cover.

THANK YOU

SEERS would like to thank the following for their contributions to this meeting:

OUR LOCAL HOSTS:

Dr. Marie DeLorenzo is Branch Chief for the Ecotoxicology Branch at the NOAA, National Ocean Service, National Centers for Coastal Ocean Science laboratory in Charleston, SC. Dr. DeLorenzo received a B.S. in Environmental Resource Management with a minor in Marine Science from Penn State University, followed by a M.S. degree in Ecology from Penn State. She earned her Ph.D. in Environmental Toxicology at Clemson University. Dr. DeLorenzo serves on the graduate faculty at the College of Charleston, the University of South Carolina, the Medical University of South Carolina, Florida A&M University's School of the Environment, and Texas A&M University-Corpus Christi. Marie has served as NOAA representative to the National Water Quality Monitoring Council, President of the Carolinas Chapter of the Society of Environmental Toxicology and Chemistry, President of the Southeastern Estuarine Research Society. Dr. DeLorenzo's research has addressed a variety of coastal contaminant issues including pesticide runoff, pharmaceuticals, microplastics, climate stressor-chemical interactions, and oil spills.

Brita Jessen serves as the collaborative agent for the Consortium, building relationships and long-term investments across a collective of academic, private, government, and grassroots communities. Her work enables cross-sector and interdisciplinary teams to build research frameworks that prioritize and translate up-to-date science into actionable outcomes. Brita also serves on the Consortium's Diversity, Equity, and Inclusion working group.
Brita earned a Ph.D. in oceanography from the University of Rhode Island and a B.A. in biology from Wellesley College. She was a graduate fellow with the Coastal Institute IGERT Program in Rhode Island and a graduate research fellow with the Jobos Bay National Estuarine Research Reserve (NERR) in Puerto Rico. Prior to joining the Consortium, Brita was the research coordinator for the Rookery Bay NERR in southwest Florida where she oversaw a team of scientists and collaboratively led grant-funded programs in restoration science, fisheries, habitat change, and human-ecological systems.

Geno Olmi serves as the Coordinator for NOAA's Southeast and Caribbean Regional Team, which works to improve effectiveness of NOAA's products and services through communication and coordination amongst NOAA personnel and partners in the region. In this capacity, Geno coordinates a 22 member team of NOAA and partner representatives to identify regional issues and find innovative solutions to bring NOAA and partner resources to bear on those issues. Olmi serves on steering teams for several regional partnership activities. Geno has been with NOAA since 1996, working in several capacities, including environmental characterizations, working to help establish the regional component of the Integrated Ocean Observing System, and since 2009, in the current position of NOAA Regional Collaboration Team Coordinator. Prior to coming to NOAA Geno had positions with the Virginia Sea Grant Program, the Virginia Institute of Marine Science, and the SC Department of Natural Resources. Geno earned a BS degree in Biology from Furman University, a MS degree in Marine Biology from the College of Charleston, and a Ph.D. degree in Marine Science from the College of William and Mary School of Marine Science.

Dr. Denise Sanger is the ACE Basin National Estuarine Research Reserve Research Coordinator and a Marine Scientist at the South Carolina Department of Natural Resource's Marine Resources Research Institute. Her Doctorate is from the University of South Carolina in Marine Science (1998) and Bachelor's degree is from the University of California at Santa Cruz in Marine Biology (1993). She is an applied scientist and has experience in coastal and estuarine ecology and coastal zone management. She has been a member of SEERS and CERF since about 1994. She served as the SEERS Program Chair about 15-16 years ago as well as the three President positions. She is also a member of the CESN editorial board.

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Congratulations to our Student Travel Award Winners:

Amy Grogan - University of North Carolina Wilmington
Sarah Conner - Augusta University
Brielle Robbins - Georgia Southern
Ashley Reaume - University of Central Florida
Harrison Currin - Georgia Southern

AND A BIG THANK YOU TO ALL OF OUR JUDGES AND STUDENT VOLUNTEERS!

Schedule At-A-Glance

Time	Thursday, March 16, 2023	Friday, March 17, 2023	Saturday, March 18, 2023
8:00	Please note that breakfast is not provided in this meeting	*Registration Open*	
8:15			
8:30		**Career Panel Moderated by Amy Grogan, SEERS Student Representative**	*Registration Open*
8:45			
9:00			**Morning Session 3**
9:15			
9:30		**Morning Break**	
9:45		**Poster Session Lightning Round**	
10:00			**Morning Break**
10:15		**Morning Session 1**	**Morning Session 4**
10:30			
10:45			
11:00		**Morning Break**	
11:15		**Morning Session 2**	**SEERS Business Meeting All Members Invited**
11:30			
11:45			
12:00		**Lunch Break, Lunch Provided**	**President's Closing Address**
12:15			
12:30			
12:45			
13:00			
13:15			
13:30		**Afternoon Session 1**	
13:45			
14:00	**SEERS Board Meeting Board Members Only**		
14:15		**Afternoon Break**	
14:30		**Afternoon Session 2**	
14:45			
15:00			
15:15			
15:30			
15:45		**Poster Session Break**	
16:00	***Registration Open***	**Poster Session See Insert for Poster Information**	
16:15			
16:30			
16:45			
17:00			
17:15			
17:30	**President's Welcome Address and Introduction of Local Host**		
17:45			
18:00	**Welcome Reception with Plenary Panel from 6:30-7:30 (Elizabeth Fly Ph.D., Aaron Watson Ph.D., Paul Pennington Ph.D.)**	**Banquet**	
18:15			
18:30			
18:45			
19:00			
19:15			
19:30			
19:45			
20:00			

Plenary Panelists: Trans-disciplinary nature of coastal science: how we address complex issues in the coastal zone

Elizabeth Fly – The Nature Conservancy – Director of Resilience & Ocean Conservation for the South Carolina Chapter

Dr. Elizabeth Fly is the Director of Resilience and Ocean Conservation for the South Carolina chapter of The Nature Conservancy. She works with local communities, state government, and conservation partners to enhance resilience throughout the state using nature-based solutions. She is also expanding the chapter's engagement in important ocean conservation issues, including sustainable fisheries and offshore wind advancements. She received her Ph.D. in Biological Sciences from the University of South Carolina, studying climate change impacts on marine mussels around the world. Liz spent a year in Washington D.C. as a Knauss Marine Policy Fellow, working on ocean and coastal issues for the Third National Climate Assessment which was released in 2014

Paul Pennington – NOAA, National Ocean Service, National Centers for Coastal Ocean Science, Stressor Detection and Impacts Division, Ecotoxicology Branch, Research Environmental Scientist

Paul received his Bachelor's degree in Biology in 1991 and a Master's degree in Marine Biology in 1996 from the College of Charleston. He completed a Doctor of Philosophy degree in Environmental Health Sciences through the University of South Carolina's Arnold School of Public Health in 2002. From 2003 until 2010, Paul worked for Jardon and Howard Technologies (JHT), Inc. (a contractor to NOAA). During that time, Paul worked on many research projects mostly centered on the fate and effects of pollution in coastal estuaries of the Southeastern US and Gulf of Mexico. Paul currently works for NOAA in the Stressor Detection and Impacts Division of NCCOS researching oil spills in estuaries.

Aaron Watson – South Carolina Department of Natural Resources, Marine Resources Research Institute, Estuarine Finfish Research Coordinator, Associate Marine Scientist

Dr. Aaron Watson, from Winston-Salem, NC received his B.S. in Marine Biology from the University of North Carolina at Wilmington in 2005, a M.S. in Marine Science from the University of Texas at Austin in 2008, and a Ph.D. in Marine, Estuarine, and Environmental Sciences from the University of Maryland, College Park in 2013. In 2013 Dr. Watson was hired as an assistant marine scientist with SCDNR and managed the mariculture section for approximately nine years. In 2022 he was promoted to Estuarine Finfish Research Coordinator where he now oversees the mariculture, population genetics, and inshore fisheries groups and the growing and diverse research portfolio of the group including marine finfish stock enhancement, multiple fisheries independent surveys, population genetics projects from marine to terrestrial species, and independent section projects.

Career Panelists:

Government Employees

Dr. Amanda Kahn is the Lead Environmental Project Manager & Ecosystem Restoration Project Planning, at the South Florida Water Management District (SFWMD) and current president elect of the SEERS board. She began her academics with community college, receiving an AA in Dance, an AA in Theater, an ASc in Biology, and an ASc in Chemistry. She completed a BS in Biology & Marine Science at the University of Tampa and an MS and PhD in Marine Biology at the University of North Carolina Wilmington. She has now worked at the SFWMD since 2016, following an eight year stint in academia. Her career at SFWMD began in the Applied Sciences Bureau leading a seagrass monitoring program, crunching data, and providing information to decision makers on general estuarine ecology for the region. A key initiative in SFWMD's work is restoration of the Everglades as well as improvement of the Kissimmee River and its floodplain, Lake Okeechobee, and South Florida's coastal estuaries. In 2021 Amanda changed directions, taking position of Lead Environmental Project Manager in the Everglades Restoration Bureau working on the Comprehensive Everglades Restoration Plan (CERP) projects. She currently facilitates communication among scientists and CERP Project Managers, across agencies, with a focus on conducting comprehensive science to inform CERP restoration projects through planning and implementation. Amanda's primary focus is on ecological monitoring plans and reports, adaptive management, and the National Environmental Policy Act documentation.

Dr. Peter Kingsley-Smith is a senior Marine Scientist at South Carolina Department of Natural Resource's (SCDNR) Marine Resources Research Institute (MRRI) in Charleston, South Carolina. His two main roles with SCDNR are as Shellfish Research Section Manager and Assistant Director with the MRRI. Peter received his B.S. in Marine and Environmental Science in 1998 from the University of St. Andrews in Scotland and his Ph.D. in 2002 from the University College of North Wales-Bangor. In 2002, Peter moved to the U.S. for a post-doctoral research fellowship at the College of William & Mary's Virginia Institute of Marine Science. His post-doctoral research focused on the ecology of native and non-native gastropods, oyster restoration, and shellfish aquaculture. Peter began his position with SCDNR in 2008 where he has built a productive research team, comprising graduate students to doctoral researchers. His team implements a broad diversity of projects that focus on ecologically, recreationally, and commercially important molluscan and crustacean species, as well as coastal plain crayfishes and horseshoe crabs. He is also involved in regionally coordinated aquatic invasive species research and has served as Chair of the Gulf and South Atlantic Regional Panel on Invasive Species since 2020.

Non-Profit Employee

Jeffrey Beal currently works with Ducks Unlimited. He received a B.S. in Marine Biology, from Jacksonville University and an M.S. in Marine Science from Florida Institute of Technology. Over the past 30 years Jeff has worked with several other organizations including FWC's Marine/Estuarine Subsection, FDEP's Aquatic Preserves program, and Harbor Branch Oceanographic Institute. He has studied various aspects of marine and estuarine habitats in Florida with a focus on coastal wetlands. He has also worked on floodplains, seagrasses, shellfish beds, and coral reef communities. In his current position he conducts grant-funded projects involving the restoration of aquatic habitats and the associated monitoring of biological and environmental parameters used to determine restoration success. His primary research interests are water quality and habitat effects on fish and wildlife in Florida.

Academia

Dr. Risa Cohen is a Professor of Biology at Georgia Southern University. She received her B.S. in Biology and Environmental Studies from Tufts University and earned her Ph.D. in Biology from the University of California, Los Angeles. Her research interests include aquatic community structure, nutrient dynamics, restoration ecology, and ecotoxicology. Over the last 17 years, she has mentored graduate students while conducting projects on rivers, coastal marshes, and subtidal rocky reefs as well as researching freshwater and coastal systems in Georgia. She is currently investigating how changes in these environments affect organisms, communities, and ecosystems to address applied issues, including monitoring and restoration.

Young Professional

Dr. Eric Rosch is a Senior Lecturer in the Marine Science department at Coastal Carolina University (CCU). He earned a BA in Biology from the College of Wooster in 2003, a double-major MS in Marine Biology and Coastal Zone Management from Nova Southeastern University in 2007, and a Ph.D. in Zoology from Texas A&M University in 2013. His position at CCU consists primarily of teaching a variety of marine science courses, including a sea turtle biology study abroad course in Costa Rica. He also maintains an active lab for undergraduate research, focusing primarily on marine behavioral ecology, but has recently delved into projects involving anthropogenic impacts on marine life in coastal zones. His teaching goals include demonstrating the importance of being a well-rounded scientist and making the connections between what is taught in the classroom and how it is applied to field or laboratory research. He has been attending SEERS meetings since the spring of 2016 and currently serves on the board as Member-at-large.

Graduate Coordinator

Dr. James Pinckney is a faculty member of the Department of Biological Sciences and Marine Science Program at the University of South Carolina. He earned his BS and MS in Marine Biology at the College of Charleston, and PhD in Ecology at the University of South Carolina (USC). Following a postdoc at UNC-Chapel Hill and a tenured faculty position at Texas A&M University, he returned to USC. He has since served as the Graduate Program Director and Director of the Baruch Institute. Professor Pinckney's core research revolves around estuarine and coastal studies particularly microbial ecology, microalgal ecophysiology, phytoplankton-nutrient interactions, harmful algal blooms, and ecosystem eutrophication in estuarine and coastal habitats. Dr. Pinckney is an Associate Editor for the journal *Estuaries and Coasts* and an AAAS Fellow.

Friday, March 17, 2023

Time	Event	Description	Presenter
8:30 - 9:30 AM	**Career Panel**		
9:30 - 9:45 AM	**Morning Break**		
9:45 - 10:15 AM	Poster Session Lightning Round		
10:15 - 10:30 AM	Morning Session 1	Navigating Coastal Conservation Careers	Jessica Kinsella
10:30 - 10:45 AM		Using Community Input to Develop the Edisto Watershed Plan	Abi Locatis Prochaska
10:45 - 11:00 AM		Estuarine shoreline conservation and restoration in the urbanized watershed of Charleston County, South Carolina, USA.	Peter Richard Kingsley-Smith
11:00 - 11:15 AM	**Morning Break**		
11:15 - 11:30 AM	Morning Session 2	Provision of oyster reef habitat by the Pervious Oyster Shell Habitat (POSH) Along Two Energetic Shorelines in Northeast Florida	Hunter Mathews *
11:30 - 11:45 AM		Lessons learned from largescale wetland restoration projects in Florida: a Ducks Unlimited perspective	Jeff Beal
11:45 - 12:00 PM		An Overview of Science Application in Large-Scale Restoration: The Comprehensive Everglades Restoration Plan	Amanda Kahn
12:00 - 1:30 PM	**Lunch**		
1:30 - 1:45 PM	Afternoon Session 1	Georgia Coastal Ecosystems LTER Hydrodynamic and Water Quality Models	Joan Sheldon
1:45 - 2:00 PM		The influence of microplastic fibers on copper concentration in the ribbed marsh mussel (*Geukensia demissa*)	Risa A. Cohen
2:00 - 2:15 PM		Plankton community responses to microplastic fiber pollution	Conner Simon *
2:15 - 2:30 PM		Monitoring Microplastics in a Local Population of Estuarine Dolphins (*Tursiops truncatus*)	Bonnie Ertel *
2:30 - 2:45 PM	**Afternoon Break**		
2:45 - 3:00 PM	Afternoon Session 2	SAV community variation between areas of high and low submarine groundwater discharge	Brielle Robbins *
3:00 - 3:15 PM		Towering Spartina: Analyzing Growth, Density, and Richness of Vegetation in the Satilla River Estuary	Sarah Conner **
3:15 - 3:30 PM		Mycoremediation of Louisiana Sweet Crude Oil with *Pleurotus ostreatus*	Summer Star Crescent *
3:30 - 3:45 PM		Relating climate change to abundance and reproductive dynamics of Atlantic blue crab (*Callinectes sapidus*) in South Carolina	Michael Kendrick

Asterisks (*) indicate a graduate presenter, (**) indicate an undergraduate presenter

Saturday, March 18, 2023

Time	Event	Description	Presenter
9:00 - 9:15 AM	Morning Session 3	Cannonball Jellyfish: Population Dynamics and Potential Impacts on Food Webs	Joshua Stone
9:15 - 9:30 AM		Historical Studies of White Shrimp Migratory Behavior	David Whitaker
9:30 - 9:45 AM		Estuarine Fish Monitoring Cooperative	Rachel Guy
9:45 - 10:00 AM		The loss of SAV in the St. Johns River: an update and a puzzle about grazers	Bob Virnstein
10:00 - 10:15 AM	**Morning Break**		
10:15 - 10:30 AM	Morning Session 4	Phytoplankton variability in an artificially cut estuary	A. Loren Mathews
10:30 - 10:45 AM		Nutrient availability across the Lake Okeechobee Waterway: Relations to Microcystis blooms in the St. Lucie and Caloosahatchee estuaries	Brian Lapointe
10:45 - 11:00 AM		Evaluation of a functional assay for monitoring saxitoxins produced by cyanobacteria	Kandis Arlinghaus
11:00 - 11:15 AM		Understanding salt marsh loss through investigation of periwinkle fronts: a year in review	Norm Shea
11:15 - 12:00 PM	**SEERS Business Meeting**		
12:00 - 12:15 PM	**President's Closing Address**		**Dr. Jessica Reichmuth**

Poster Presentations

Poster Number	Title	Presenter
1	Assessing Interspecies Interactions in Tampa Bay Using Baited Remote Underwater Video	Georgia Ambrose**
2	The influence of water quality on eastern oyster, *Crassostrea virginica* , demographics and prevalence and intensity of two protozoan parasites on Sapelo Island, Georgia	Wil E. Atencio*
3	The Influence of Sex Ratios on the Foraging and Waving Behaviors of Fiddler Crabs in the South Carolina Low Country	Abigail Beaty**
4	Understanding the Visitor Experience at the ACE Basin National Estuarine Research Reserve	Tyler W. Cribbs, M.S.*
5	Remote Sensing of Georgia Tidal Marsh Habitats using Aerial Photography and PlanetScope Satellite Imagery	Harrison Currin*
6	Pathogenic parasites of Atlantic tripletail, *Lobotes surinamensis* : local and regional case studies	Isaure de Buron
7	Living on the edge: do mud crabs or biophysical factors differ across an oyster reef landscape?	Lillian Doll**
8	Examining variation in response to No. 2 fuel oil exposure between tall- and short-form saltmarsh cordgrass (*Spartina alterniflora)* : Implications for marsh restoration after an oil spill	Raven Ferguson*
9	Efficacy of Environmental DNA Methodologies in a Large, Productive Estuary Using Three Novel eDNA Primers	Kristina Flanigan*
10	Are Rising Seas Pushing Ghost Crabs Out of Their Comfort Zone?	Finn Gillette**
11	HARMFUL CYANOBACTERIA BLOOMS PREVAIL IN URABN WATERBODIES AND OUT-COMPETE A DIVERSE COLLECTION OF PHYTOPLANKTON GENERA	Amy Grogan*
12	Spatial Consequences of Ecophysiology in a Psammophytic Macroalgal Community Beneath Fringing Mangrove Canopies in Tampa Bay, FL.	Eamon Hennessy**
13	Inputs don't equal outputs: bacterial microbiomes of the ingesta, gut, and feces of the keystone deposit feeder *Ilyanassa obsoleta*	Kristina M. Hill-Spanik
14	Carbon Sequestration and Modern Sediment Dynamics	Danielle Jenkins*
15	Zooplankton Distribution, Abundance, and Biodiversity in Tampa Bay	Jonah Jimmerson**
16	The effect of salinity intrusion on the function and composition of aquatic macroinvertebrate communities on Sapelo Island, GA	Raymond P. Kidder II*
17	What's the Catch? Biodiversity Analysis of Benthic Organisms Across Select Southeastern Barrier Islands	Kathryn Linn**
18	Assessing mobile predator populations in Tampa Bay using Baited Remote Underwater Video	William Love**
19	Quantifying variability in areal extent and percent cover of North Carolina (USA) seagrass meadows using unmanned aerial vehicles (UAV).	Madison Lytle*
20	Effects of Lowered pH on Male *Uca Pugnax* from Georgia and South Carolina Islands	Cassandra C. McNeace**
21	USING MACHINE LEARNING CLASSIFICATION AND ESA SENTINEL 2 MULTISPECTRAL IMAGER DATA TO DELINEATE MARSH VEGETATION AND MEASURE ECOTONE MOVEMENT IN COASTAL GEORGIA	Thomas Pudil*
22	Biomonitoring for Estuarine Health: Developing a DNA Metabarcoding Toolkit for Assessing Changing Plankton Communities	Ashley Reaume*
23	Assessment of Atmospheric Correction Algorithms for the Remote Sensing of Water Quality in Southeastern US Estuaries	Jerome Reimers*
24	Using nanopore sequencing to analyze protist diversity and identify *Pseudo-nitzschia*	Elena Renshaw**
25	Growth and Recruitment of Eastern Oysters on Wave Attenuating Structures	Sarah Riedlin**
26	*Uca pugnax* and Glyphosate Contaminated Food versus Uncontaminated Food: A Behavioral Observation	Cheyenne Voorhies**
27	The effect of pH increases on oyster larvae in a controlled hatchery setting	Leslie Townsell*
28	Effect of water clarity on *Halodule wrightii* seasonal persistence	Ashton Zullo**

Asterisks (*) indicate a graduate presenter, (**) indicate an undergraduate presenter

Southeastern Estuarine Research Society

2023 ABSTRACTS

Oral Presentations

All abstracts are in order of presenting author's last name, which is also underlined. Asterisks indicate student Authors: (*) graduate and (**) undergraduate.

Evaluation of a functional assay for monitoring saxitoxins produced by cyanobacteria

Kandis Arlinghaus, NOAA ORISE Fellow

Harmful algal blooms (HABs), and their potential for toxins, are persistent concerns for water quality and food safety. Saxitoxin and associated paralytic shellfish toxins (PSTs) are a group of neurotoxins produced by marine and freshwater phytoplankton species. Little is known about the extent of PST contamination of freshwater aquatic resources. The receptor binding assay (RBA), a detection tool that measures the composite response of all PSTs in a sample, has proved to be an effective method for PST monitoring in marine shellfish and phytoplankton. However, it has yet to be optimized for cyanobacteria in freshwater systems. Various extraction techniques were compared across five saxitoxin-producing cyanobacteria species to assess the effectiveness of each. Results indicate the freeze-thaw extraction, typically used for monitoring other freshwater HAB toxins, recovered 3-10x lower PSTs concentrations compared to extraction with hydrochloric acid and heat, which yielded the highest measured saxitoxin equivalence for the majority of the cyanobacteria species examined. Additionally, whole water Ohio lake samples were extracted using the freeze-thaw method and analyzed with RBA, Enzyme-Linked Immunosorbent Assay (ELISA), and liquid chromatography mass spectrometry/mass spectrometry (LC-MS/MS) to compare PSTs levels across multiple detection methods. Low RBA sensitivity of these samples compared to ELISA and LC-MS/MS suggests RBA is most effective with acidified solvent based extractions of concentrated samples. Further validation of this method may provide communities with a quick and accessible way to detect saxitoxin levels in diverse aquatic systems and help make more timely decisions about safe public drinking and recreational waters.

Lessons learned from largescale wetland restoration projects in Florida: a Ducks Unlimited perspective

Jeff Beal, Ducks Unlimited Florida

Florida contains the second largest area of wetlands of the 50 states despite having lost roughly half since achieving statehood due to over-draining and dredging and filling practices. The remainder are mostly altered due to ditching and impounding or are otherwise fragmented by manmade infrastructure such as roads. Numerous partners, including the non-profit Ducks Unlimited, have worked cooperatively to restore freshwater and brackish wetlands in the state. The impetus behind these efforts has become clearer as the importance of ecosystem services provided by wetlands has gained favor since the mid-1900s when they were relatively unstudied and considered wastelands. Largescale wetland projects have been successfully completed in Florida and offer a wealth of learned experiences. As with any restoration endeavor, defining performance measures and developing associated research and monitoring programs remain paramount to defining project success. Restoration practitioners often choose both structural and biological parameters to monitor projects pre- and post-construction. Following successful work in the past, Ducks Unlimited has recently expanded programs within the Sunshine State and foresees the need to develop innovative collaborations across governmental, non-governmental, and university jurisdictions to best study and conserve the remaining wetlands; in the wake of unprecedented urban growth and sea level rise projections.

The influence of microplastic fibers on copper concentration in the ribbed marsh mussel (*Geukensia demissa*)

Risa A. Cohen, Georgia Southern University; Alina Tucker, Georgia Southern University

Coastal ecosystems receive particulate and dissolved pollutants simultaneously via surface water transport. Microplastic fibers (MFs) are particulate contaminants that upon ingestion by marine invertebrates cause internal abrasion, intestinal blockage, and decreased survival. In addition, MFs adsorb dissolved chemical contaminants such as copper (Cu) to their surface. In trace amounts, Cu is essential for metabolic processes, but in excess, it is toxic to marine organisms. Therefore, the possibility that MFs enhance Cu uptake is problematic for filter feeding marine bivalves that ingest MF particles from the water column. We hypothesized that MFs increase Cu concentration in the ribbed marsh mussel (*Geukensia demissa*). Mussels were collected from a site with low MF and Cu concentrations and returned to the laboratory where they were exposed to one of four experimental treatments for 8 days: control (no addition), environmentally relevant Cu (18 μg L^{-1}) or MF (500 fibers L^{-1}) concentrations, and the combination of both Cu and MFs. The concentration of MFs in mussel tissue increased in a similar manner when MFs were added, regardless of the presence of Cu. In contrast, there was an interaction between MF and Cu treatments on tissue Cu concentration, with the MF+Cu treatment having the highest average tissue Cu concentration. The findings from this study suggest that the presence of MFs increased mussel Cu concentration, with the potential for adverse effects on bivalves and the organisms that rely on them in salt marsh ecosystems.

Towering Spartina: Analyzing Growth, Density, and Richness of Vegetation in the Satilla River Estuary

Sarah Conner**, Augusta University; Dr. Jessica Reichmuth, Augusta University; Dr. Stacy Bennetts, Augusta University

Estuaries support a unique array of plant life due to their brackish water and soil composition. In the southeastern United States, a common example of an estuarine-adapted plant is Spartina alterniflora, which can be found throughout the Satilla River Estuary in southeast Georgia. Since 1910, the Satilla's water flow has been altered due to the man-made Noyes Cut. With the disrupted water flow, sediment deposit patterns and metal accumulation have also changed. Additionally, a tidal node has formed at the Piney Bluff site downstream of Noyes Cut. Piney Bluff and other sites adjacent to Noyes Cut exhibit towering Spartina. From June 2014-2018, several sites throughout the Satilla River Estuary were surveyed monthly to record Spartina density, shoot height, and species richness. From 2016-2017, sites closest to the Noyes Cut (Piney Bluff, Parsons Creek, and Noyes Cut itself) exhibited Spartina with greater average heights compared to the control site, Todd Creek. Spartina was especially tall at the Noyes Cut and Piney Bluff sites compared to Todd Creek. However, Todd Creek exhibited the largest average density of Spartina when compared to all other sites. Spartina density at the Todd Creek site was especially high during the Fall and Spring seasons. Throughout 2017, Parsons Creek had the greatest species richness with five different species observed. Overall, due to the Noyes Cut causing altered water flow - thus, altered soil and metal deposits - it was expected that Spartina alterniflora average heights would be greatest at sites closest to the cut (Noyes Cut and Piney Bluff). This prediction was supported by the data analyzed. Obsolete channels adjacent to Noyes Cut will be closed in January 2023, and will undoubtedly change the plant composition at these sites.

Mycoremediation of Louisiana Sweet Crude Oil with *Pleurotus ostreatus*

Summer Star Crescent*, E. Pisarski, E. Wirth, R.A. Long

Pleurotus ostreatus (oyster mushroom) is a white rot fungus known to biodegrade recalcitrant molecules such as polycyclic aromatic hydrocarbons (PAH) in petroleum crude oil, which can have negative impacts to coastal ecosystems. A variety of restoration methods have been applied to oil spills, including the use of bioremediation, a strategy that employs naturally occurring or introduced biological organisms to consume and breakdown oil constituents. This study focuses on the ability of *P. ostreatus* mycelium to mineralize the saturate, aromatic, resin, and asphaltene (SARA) fractions constituting fresh and weathered Louisiana Sweet Crude (LSC) crude oil with the addition of nitrogen and phosphorus amendments. This work examined *in vitro* mycelium growth response with influence of nitrogen and phosphorus amendments based on this species' C:N:P ratio. We used image analysis in FIJI to track mycelium growth rates in response to LSC and nutrients, and then applied SARA analysis to the oil extractions. The practical application of this fungi as a remediation tool has been investigated in terms of potential trophic transfer of toxic PAHs to *Ilyanassa tritia* (eastern mud snail) from *P. ostreatus* post oil degradation. Oil spills in estuaries are devastating to their ecosystems and can negatively impact the blue economy and human health. With added knowledge about the efficiency of oyster mushrooms to remediate spilled LSC, they may be used in the future as an effective remediation tool.

Monitoring Microplastics in a Local Population of Estuarine Dolphins (*Tursiops truncatus*)

Bonnie Ertel*, NCCOS Contractor, CSS inc.; Wayne McFee, NCCOS, Key Species and Bioinformatics Branch; Austin Gray, Virginia Tech, Department of Biological Sciences

Within the tidal creeks of Charleston, South Carolina (SC), resides a local population of bottlenose dolphins (*Tursiops truncatus).* The Coastal Marine Mammal Assessments Program is investigating these locally-stranded dolphins as sentinel species to better understand our coastal ecosystem's health . Microplastics (particles less than 5mm) are anthropogenic contaminants of emerging concern that are ubiquitous in the environment and have been documented within marine biota, including in piscivorous predators such as dolphins. This research aims to quantify and identify microplastic particles in the gastrointestinal tracts of bottlenose dolphins stranded around the Charleston estuary dating back to 2016. We examined dolphin stomach and intestinal contents for microplastics by rinsing contents into stainless-steel sieves to retain particles ≥125µm, digesting biological remains with a 10% KOH solution, and using Raman spectroscopy to identify polymer types. The most common plastic polymer identified was polypropylene (35%), commonly used in fishing gear. Preliminary results from sixteen dolphins indicate high levels of contamination, ranging from 76-2967 total microplastics per animal (1575 ± 207 mean ± SE). This ongoing research will continue to assess archived dolphin samples and investigate levels of microplastics in local fish to elucidate the potential for trophic transfer of these contaminants into the diets of mammals, including humans. This study can help inform coastal managers by taking a One Health approach to assessing the changing health of our coastal ecosystem, animals, and humans.

Estuarine Fish Monitoring Cooperative

Rachel Guy, Bryan Fluech, James Deemy, Nathan P. Nibbelink, Lauren Carroll, Lisa Gentit

Estuarine fishes are vital components of estuarine ecosystems, serving as indicators of environmental health and supporting recreational and commercial fisheries. Species abundance can exhibit high interannual variability. Therefore, long-term monitoring datasets are needed to detect trends in species abundance or community structure. These datasets are critical as estuarine habitats face myriad stressors causing long-term shifts in their condition. In Georgia there are gaps in spatial coverage of estuarine species and their habitats. Current monitoring is not occurring in habitats that support ecologically important species and early-life stages of commercially and recreational species. Recognizing that long-term monitoring projects are resource intensive, in 2020 the Sapelo Island NERR and regional partners began a collaborative monitoring project of estuarine fishes by pooling partial resources. This effort not only intends to complement current monitoring projects but also provide a valuable mechanism for training future coastal scientists and generating public interest in estuarine fishes. As the Estuarine Fish Monitoring Cooperative (EFMC) enters its third year, we reflect on the successes and challenges of sustaining a monitoring project and training program. We also look to the future for opportunities to expand the program and develop potential research opportunities.

An Overview of Science Application in Large-Scale Restoration: The Comprehensive Everglades Restoration Plan

Amanda Kahn, South Florida Water Management District, West Palm Beach, Florida

The Comprehensive Everglades Restoration Plan is the largest ecosystem restoration program in the world. It is a programmatic 50/50 partnership between the federal government and the state of Florida designed to restore, preserve, and protect water resources in central and southern Florida. The South Florida Water Management District is the lead state agency, and the US Army Corps of Engineers is the lead federal agency in this effort, which will improve 2.4 million acres of the south Florida ecosystem, improve freshwater inflow patterns to the estuaries, Florida and Biscayne Bays, and enhance water supply. Ecological monitoring and applied science are essential throughout the planning and implementation process of project components. Examples of data application include developing and updating predictive models and performance measures for evaluation of alternatives; formulating and implementing adaptive management strategies; and assessing restoration performance. This presentation will provide an overview of key recent developments and applications of science and monitoring with the progress of CERP.

Relating climate change to abundance and reproductive dynamics of Atlantic blue crab (*Callinectes sapidus*) in South Carolina

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Understanding how shifting environmental conditions affect the biology and ecology of Atlantic blue crab (*Callinectes sapidus*) is critical to developing effective management strategies. The commercial blue crab fishery in South Carolina has historically ranked among the top three fisheries in the state, with recent increases in value due to regional growth in market demand. As such, effective management is especially important when there are indications of declines in abundance since intrinsic biology and interactions with the environment affect population dynamics. The complex life history of blue crab (*e.g.*, their use of oceanic and estuarine habitats at different points in their life cycle) means this species is susceptible to the impacts of climate change across multiple environments. While the physical effects of climate warming are becoming well documented (*e.g.*, warming ocean and estuarine temperatures), the mechanisms by which they impact biological and ecological processes are less clear. To better understand how shifting environmental factors are affecting Atlantic blue crabs in South Carolina, we compiled abundance and biological data from fisheries-independent sources across a 42-year time frame (1979-2021). Analyses on a subset of data show a significant effect of drought on adult crab abundance. Furthermore, winter temperatures have important effects on the abundance of juvenile crabs as well as on the timing of spawning activity. These results highlight how crustacean populations respond to climate change in the southeastern U.S. Future efforts should include working with various stakeholder groups to develop dynamic management approaches that account for ongoing changes in environmental conditions.

Estuarine shoreline conservation and restoration in the urbanized watershed of Charleston County, South Carolina, USA.

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Coastal salt marshes are currently being lost at a higher rate than any other wetland habitat. The loss of estuarine habitats, including tidal salt marshes and oyster reefs, is of particular concern as these habitats represent some of the most ecologically-valuable habitats in the coastal region. Such habitat losses are in part attributable to the synergistic relationships between sea level rise, increased storminess, coastline development, and shoreline hardening. With literally dozens of people moving to the Charleston metropolitan region daily, increased coastal development and human activities are generating stressors that can affect both oyster reef and salt marsh habitats. These stressors are leading to the degradation and alteration of coastal marine and estuarine habitats, thus decreasing overall ecosystem health and resiliency within the coastal zone. This presentation will provide highlights of a current NOAA-funded restoration project focused on the urbanized watershed of Charleston County, South Carolina, USA. The presentation will feature overviews of three types of oyster reef restoration (*i.e.,* bagged oyster shell, loose oyster shell, and modified wire reefs), natural fiber-based shoreline protection using coir logs, and community-based salt marsh plantings. It will also introduce a newly developed hybrid training course intended to facilitate the adoption and implementation of living shoreline approaches by the marine contractor industry. The presentation will also briefly touch on other shellfish restoration projects being conducted by SCDNR's Shellfish Research Section involving the use of drones to map coastal habitats and address marine debris in the South Carolina coastal zone.

Navigating Coastal Conservation Careers

Jessica Kinsella, South Carolina Department of Natural Resources (SCDNR)/ACE Basin National Estuarine Research Reserve (NERR); Binz, J., SCDNR/ACE Basin NERR; Bueno, O., SCDNR; Connery, E., SCDNR/ACE Basin NERR; Aristizabal. J., SCDNR

Establishing a career in a conservation-related field is long and strenuous, and many prospective individuals get lost along the way. Underrepresented communities have limited scientific literacy, preventing students from pursuing scientific and other coastal conservation careers, such as ecotourism, fisheries, aquaculture, or environmental communications (National Science Foundation, 2019). Although there are many paths that can lead to a successful career, they require equity and continued support to increase diversity in the workforce. The objectives of this project are to increase individuals' interest, experience, and professional identity in the conservation field, identify barriers to pursuing a career, and increase teacher and school capacity to support students pursuing a coastal conservation career. This project uses a five-step approach to build in-depth long-term engagement and effective relationships with local students and teachers to expand scientific literacy throughout South Carolina's Charleston, Beaufort, and Colleton counties. It includes expanding audiences for teacher workshops and middle school programs, conducting problem-based learning units with underrepresented high schools, creating and implementing an internship program with SCDNR's Marine Resources Division, and developing a guidance toolkit for local students. Through this approach, the students of the ACE Basin community can feel a sense of place while gaining interdisciplinary, hands-on experiences in the coastal field and increase their likelihood of achieving a coastal conservation career.

Nutrient availability across the Lake Okeechobee Waterway: Relations to *Microcystis* blooms in the St. Lucie and Caloosahatchee estuaries

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Water from the Lake Okeechobee (LO) watershed, historically flowed south as sheet flow through the Everglades. Some of this water is now periodically shunted east to the St. Lucie Estuary (SLE) and west to the Caloosahatchee River and Estuary (CRE). Recently *Microcystis* spp. blooms have developed in LO during the wet season and can be transported to the downstream estuaries during discharge events, resulting in significant impacts. To better understand drivers of *Microcystis* blooms across this waterway, two cruises were conducted (October 2019 and July 2020) from the SLE through LO to the CRE. ~20 sites were sampled for environmental parameters, chlorophyll, dissolved nutrients, and microcystins, as well as particulate organic matter (POM) stable nitrogen isotopes ($\delta^{15}N$). Additional sampling for nutrients, $\delta^{15}N$, and the artificial sweetener sucralose (a human wastewater tracer) was conducted at the LO Pahokee Marina in April 2021 during a *Microcystis* bloom. Significantly higher reactive nutrients (NH_4^+, NO_3^-, DIN, SRP, and TDP) and POM $\delta^{15}N$ values were observed in the estuaries, while N:P ratios (DIN:SRP and TDN:TDP) were significantly higher in LO. During the Pahokee *Microcystis* bloom, high NH_4^+ (142 µM), SRP (9.76 µM), TDN (261 µM), and TDP (12.2 µM) were observed with elevated algal $\delta^{15}N$ values (+9.20‰) and sucralose (150 ng/L) suggesting a human waste influence. These transects demonstrate the importance of local basin contributions to the development and maintenance of estuarine *Microcystis* blooms and suggest that decreasing nutrient loading within the SLE and CRE systems would help to mitigate the environmental and economic impacts.

Using Community Input to Develop the Edisto Watershed Plan

Amy Scaroni, Clemson University. Charley Greenthaler, Clemson Extension; Anna McClendon, Clemson University**; Brian Williams, Clemson University; Abigail Locatis Prochaska, ACE Basin NERR/SC Department of Natural Resources; Brook Saari, S.C. Sea Grant Consortium.

Edisto Island is often referred to as natural and undeveloped, but there are currently 32 impaired locations in its waterways. Our project team focused on creating a Watershed Based Plan to address bacteria (fecal coliform and enterococcus) and turbidity pollution in the watershed. We worked closely with community leaders and sought input at each stage of plan development through an advisory board and a resident survey. This input was essential for selecting the plan's major goals: reduce bacteria and turbidity impairments across the watershed, and to eventually reopen shellfish beds to harvest. Community input clarified potential pollution sources and highlighted watershed management strategies that may have a higher chance of being supported by residents, and thus successful implementation to reduce pollutant loads. Pollutant loads and load reductions were calculated for bacteria using the Center for Watershed Protection's Watershed Treatment Model to calculate surface water loading and demonstrate the potential load reductions for bacteria from septic tanks, pet waste, livestock and wildlife. We used the USEPA STEPL tool to estimate the total sediment load for the watershed, and the potential load reductions based on a series of recommended BMPs. The resulting plan lays out a roadmap and a timeline towards removing impairments and improving local water quality. With the support of several local organizations, project team members intend to continue working with the Edisto community to implement management strategies.

Phytoplankton variability in an artificially cut estuary

A. Loren Mathews, Georgia Southern University; Risa A. Cohen, Georgia Southern University; Jessica M. Reichmuth, Augusta University

Eight artificial cuts were made through the marshlands of the Satilla River Estuary, Georgia (USA) in the early 1900s to improve navigation and facilitate timber transport, although they are no longer maintained for their original purposes. Of these, Noyes Cut has been identified as the likely cause of increased sedimentation, disturbed salinity gradients, and decreased water quality in the Dover-Umbrella-Parsons Creek system that it connects to the Satilla River. These hydrological and physical-chemical changes likely influence the abundance and distribution of phytoplankton, which serve as an important food source for commercially and recreationally valued fish, crabs, and shrimp. The goal of this study was to identify spatial and temporal patterns in phytoplankton abundance (as chlorophyll *a* concentration) at sites impacted by the artificial cuts and compare them to an unimpacted reference site. Monthly integrated water samples were collected and analyzed fluorometrically from June 2014 to September 2019. The 5.5-year data set indicates that phytoplankton abundance is higher on average in the summer and fall with the largest peaks coinciding with increased salinities. This study is part of a collaborative holistic assessment of the ecological effects of Noyes Cut, which are currently being addressed by state and federal agencies as part of a multi-million dollar closure and restoration effort. The implications of the closure on the estuary's structure and function will be examined with respect to bottom-up processes.

Provision of oyster reef habitat by the Pervious Oyster Shell Habitat (POSH) Along Two Energetic Shorelines in Northeast Florida

Hunter Mathews and Kelly J. Smith

Department of Biology, University of North Florida, Jacksonville, Florida

The Pervious Oyster Shell Habitat (POSH) is a novel oyster reef restoration device, composed of oyster shell bound by a thin layer of Portland cement, into a mound. The POSH is environmentally friendly and contains ample vertical relief and interstitial space for habitat provision. Here, we have assessed the POSH for major metrics of oyster reef restoration success, compared to the oyster Reef Ball™, a similar and popular method for restoration. Structures were deployed along Kingsley Plantation (Timucuan NP) and Wright's Landing (GTMNERR) in northeast Florida in the summer of 2021. After a year in situ, oyster and barnacle densities and oyster size distributions on artificial reefs were assessed. Utilization of the artificial reefs by fish and mobile decapod crustaceans was assessed using 2 m^2 bottomless lift nets in summer, fall (2022), and winter (2023). The POSH recruited significantly greater oyster densities at both sites, while barnacle densities were low and highly variable. Fish densities and diversity did not differ between the structures, or a natural oyster reef control, throughout the year. Crustacean densities differed significantly throughout the year at the Kingsley Plantation site and in summer at the Wright's Landing site, with similar diversity. Communities using the POSH, Oyster Ball, and natural reef control were similar throughout the study period. Our results show that the POSH can be an optimal substrate for oyster recruitment and nekton habitat in high-energy systems and highlight the importance of increased complexity for oyster reef habitat provision.

Variation in areas of submarine groundwater discharge within the Florida Bay

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Seagrass die-off events in the Florida Bay have negative effects on the ecosystem services and economic outputs that the bay can provide. These impacts fuel ongoing research investigating the complex causes of seagrass die-offs. Studies have shown that although water quality parameters can lead to die-offs, there is still much to be explored regarding the proximate causes for these quality changes. The aquifers underneath the bay may hold the missing pieces in our understanding of die-off events, as submarine groundwater discharge (SGD) can provide as much groundwater input to the bay as the Everglades. Perforating through the limestone underneath the bay, the groundwater picks up the natural gas Radon and allows us to track SGD. Our project assessing the differences in SGD between basins of high, moderate, to low seagrass die-off intensity maps the basins based on collected radon data at the surface waters. Interpolating over the area of the basins from a grid displays patterns of SGD in the bay and pinpoints areas of high SGD for future inspection. These maps will inform the future of the project by indicating parts of the basins which will be surveyed for community variation. Once these surveys occur, insights as to the community characteristics between sites of low to high die-off and radon intensity will advise management decisions and provide valuable information about the potential affects of SGD on local communities.

Understanding salt marsh loss through investigation of periwinkle fronts: a year in review

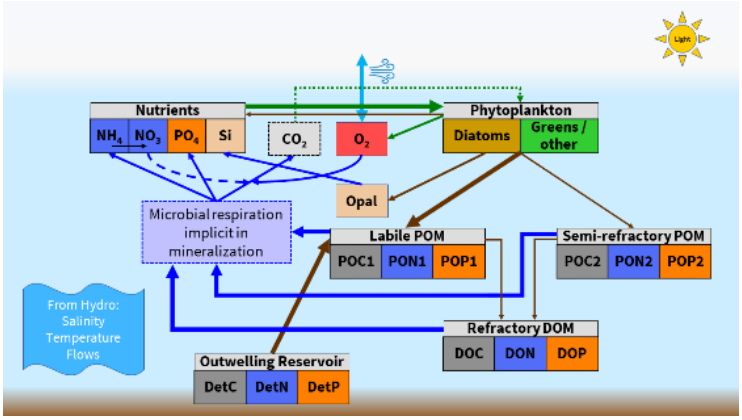
Norm Shea, Andrew Tweel, Pamela Marcum, Joe Cowan, Ethan Friend

Salt marshes are one of the dominant features of the coastal landscape in South Carolina (>344k acres) and provide food and habitat for numerous plants and animals and provide protection to uplands from coastal flooding due to storms and sea level rise. Coastal marsh loss (also referred to as die-off, dieback, submergence, or collapse) has been reported worldwide, including South Carolina, where large swaths of marshes have recently converted to mudflat. Periwinkle snails, *Littoraria irrorata*, have been identified as a potential mechanism for top-down control of salt marsh vegetation (Gustafson 2006, Silliman and Zieman 2001), and as such, this research aims to investigate their role in regulating salt marsh vegetative biomass, timing, and extent of marsh loss events. A summary of results of the first year of monitoring will be presented.

Georgia Coastal Ecosystems LTER Hydrodynamic and Water Quality Models

Joan Sheldon and Renato Castelao, Dept. of Marine Sciences, University of Georgia

The Georgia Coastal Ecosystems Long Term Ecological Research program studies three adjacent sounds and associated marsh and upland habitats on the Georgia coast with a focus on the effects of salinity and inundation as influenced by climate and anthropogenic drivers. We developed 3D hydrodynamic and water quality models using the Delft3D modeling platform to be able to organize our knowledge of the system's processes and to predict effects of changes to those processes. The models have 50-300 m resolution and were run using data for Mar. 2017 – Feb. 2018. Our baseline water quality model included monthly observed riverine inputs; reaeration; nitrification; nutrient uptake, growth, and mortality of two phytoplankton classes; and aerobic and denitrifying organic matter mineralization, yet the balance of processes was insufficient to fit TDN, TDP, and chlorophyll *a* well throughout the domain. We found that including simulated outwelling of organic matter from marshes improved TDN fit and including boundary inputs of nutrients improved TDP fit, implying that it is essential to consider connections both to intertidal habitats and to adjacent coastal regions in order to understand water quality at estuary scale. Chlorophyll *a* is the most difficult parameter to fit in the model because it is affected by changes to most of the model processes. Including organic matter outwelling improved the overall annual pattern of modeled chlorophyll, especially in the Altamaha River, but to the detriment of model bias in Doboy and Sapelo Sounds: more refinements are needed to balance water quality processes across the model domain.



Plankton community responses to microplastic fiber pollution

Conner Simon*, Georgia Southern University; Risa A. Cohen, Georgia Southern University

Surface waters receive megatons (Mt) of plastic waste each year with up to 2.7 Mt reaching oceans annually. In the environment, plastics degrade into many microplastic shapes including spheres, fragments, and fibers. Microplastic fibers (MFs) are most common, resulting from textile laundering and maritime equipment degradation. Despite their abundance, information on effects of MF exposure is limited although reports of decreased zooplankton feeding and survival exist. It is generally unknown whether MF characteristics such as length affect toxicity, and whether responses of individual species translate to changes at the community level. To test the hypotheses that MFs alter plankton abundance and community composition, and that length influences these effects, floating mesocosms containing ambient plankton communities were established in a pond in the southeastern coastal plain. Different lengths (0, 45, 70, or 100 µm) of the same concentration of MFs were added (1,000 MFs L^{-1}). Zooplankton community composition and phytoplankton abundance were sampled weekly over 28 days. Periphyton abundance was measured at the end of the experiment. During exposure, the proportion of cladocerans increased while copepods decreased regardless of treatment. Although there was no direct effect of MFs on zooplankton community composition, there was a trend toward an interaction between MF length and time, likely because the increases in cladocerans occurred in different MF treatments over time. Phytoplankton abundance was highly variable at all sampling times. However, the shortest MFs decreased periphyton abundance, suggesting potential for reduced food availability to zooplankton grazers in the presence of MFs over longer time frames.

Cannonball Jellyfish: Population Dynamics and Potential Impacts on Food Webs

Joshua Stone, Lauren Faulk

The cannonball jellyfish, *Stomolophus meleagris*, is the most abundant scyphozoan jellyfish in the South Atlantic Bight (SAB) of the southeastern USA. To better understand the population dynamics of this ecologically and commercially important species, we analyzed fisheries-independent abundance and biomass data of *S. meleagris* from 2001 to 2019 collected by the Southeast Area Monitoring and Assessment Program (SEAMAP) throughout the coastal zone of the SAB. *S. meleagris* medusae populations are highest in southern South Carolina and Georgia in the spring, and show consistent seasonal patterns of size and abundance. They also show high interannual variability, which may be related to the environmental conditions experienced by the polyps. In order to better understand the environmental controls on their interannual variability and their place in the food web, future research on their ecology and potential impacts of commercial fishing will be discussed.

The loss of SAV in the St. Johns River: an update and a puzzle about grazers

Robert Virnstein, Seagrass Ecosystems Analysts, Gainesville, FL

All the SAV, dominated by *Vallisneria americana* (Val, locally called eelgrass), disappeared following Hurricane Irma in 2017. Low light is assumed to be the primary cause. At a site near Palatka, Val had existed continuously as dense beds for at least 55 years. The Val has not recovered 6½ years later. As of February 2023, there are lots of plants, but only 2-3 cm tall compared to over 1.6 m long previously. Tiny!

The puzzle: If these small plants are fenced/caged, plants grow to 30-40 cm tall in a couple months. Remove the cage, and the plants are grazed down to stubs in a few days. Turtles have been positively identified as one grazer, but puzzlingly, grazing is uniform throughout the 160 km of loss. We also suspect tilapia as a culprit. The saga continues.

Historical Studies of White Shrimp Migratory Behavior

David D. Whitaker

The first tagging of penaeid shrimp began in 1936 in a project that spanned from North Carolina to Texas. As part of this project, Milton Lindner and William Anderson tagged and released 3,067 white shrimp (*Penaeus setiferus*) off South Carolina. Most of those shrimp were recaptured close to release locations, and very few long-distance migrations were recorded. However, the presence of large shrimp catches off Cape Canaveral during winters suggested there might be a significant annual southerly migration. In the 1970s, with the development of the Marine Resources Center in Charleston, biologists began tagging operations to more completely explore the migratory behavior of white shrimp. From 1976 to 1991, 46,157 white shrimp were tagged with the majority of the work being done in South Carolina along with one project conducted off Cape Canaveral. The overall recapture rate was 8.3 percent (range = 0 to 24.6 percent). Although the majority of tagged shrimp were recovered in South Carolina soon after release by commercial shrimpers, several large shrimp were found to migrate south to be recaptured off the central Florida coast. It appears that southerly migration begins during fall as estuarine water temperature reaches about 17˚C in conjunction with spring tides. These historical data provide a baseline for potential studies to determine if climate change has altered migratory behavior of shrimp.

Poster Presentations

All abstracts are in order of assigned poster number with the presenting author's name underlined. Asterisks indicate student authors: (*) graduate and (**) undergraduate.

Assessing Interspecies Interactions in Tampa Bay Using Baited Remote Underwater Video

Georgia Ambrose**, William Love, Laytr McQuarters, Advisor: Dr. Heather Mason

Understanding interactions between individuals of different species (interspecies interactions) are critical to assessing the food web and overall community structure. Tampa Bay is full of a diverse group of mobile organisms through which many interspecies interactions occur including predator-prey, competition, and symbiotic interactions. Baited Remote Underwater Video (BRUV) units are a non-invasive method for characterizing underwater environments and were used to study Tampa Bay shallow water habitats across a year with monthly sampling and a total of over 200 deployments. With the developments of the BRUV units in Tampa Bay we assessed water chemistry (including turbidity) as well as geographic influences such as proximity to seagrass beds and distance between deployments. Assessing the habitats of where the interspecies interactions are occurring in Tampa Bay is important for the understanding of habitat conservation, especially in seagrass beds.

The influence of water quality on eastern oyster, *Crassostrea virginica*, demographics and prevalence and intensity of two protozoan parasites on Sapelo Island, Georgia

Wil E. Atencio*, Department of Biological Sciences Georgia Southern University and Carroll, M. John, Department of Biological Sciences Georgia Southern University

Reef building eastern oysters, *Crassostrea virginica*, are both economically and ecologically important by providing valuable commercial products, forming complex habitats, improving water quality, and protecting shorelines. Despite this, oyster populations have experienced drastic declines worldwide, driving incentives for management and restoration. For these practices to be successful, it is important to investigate factors that currently influence oyster demographics and disease to understand how those factors might change in the future. Water quality parameters such as temperature, salinity, dissolved oxygen, and pH are all important environmental factors that influence oysters and will be affected by changing climate. To explore impacts of multiple water quality parameters on oysters, we leveraged long-term data from the four System-wide Monitoring Program (SWMP) stations at the Sapelo Island National Estuarine Research Reserve (SINERR) to examine seasonal and long-term trends in water quality conditions. Additionally, we conducted preliminary surveys of oyster populations at the SWMP stations to pair with long-term water quality data. Specifically, we used high-resolution drone imagery to examine variation in reef size and extent among the four SWMP sites, benthic surveys for oyster abundance, size, and condition, as well as disease prevalence and intensity, and monthly recruitment monitoring. Generally, sites exhibited the greatest variation in salinity and temperature, both important drivers of oyster populations. We found larger oysters and high recruitment at the site with the lowest temperature and greatest salinity.

The Influence of Sex Ratios on the Foraging and Waving Behaviors of Fiddler Crabs in the South Carolina Low Country

Abigail Beaty**, Coastal Carolina University; Eric Rosch, Coastal Carolina University

Fiddler crabs are known for their unique physical and behavioral characteristics. These traits are influenced by the local weather, food availability, composition of the habitat, and the composition of the community around them. Atlantic marsh and sand male fiddler crabs (*Minuca pugnax* and *Leptuca pugilator*, respectively) show varying behaviors when living in different combinations of the variables listed above in different environments. Male fiddler crabs of these two species were observed in the low country of South Carolina. One cluster of fiddler crabs were observed at a time, and male:female ratios were assessed for the herd. Waving and feeding behaviors were quantified for focal males in each group. The objective was to determine if sex ratios has an effect on foraging rates and the waving behavior that is used by males for both courtship and establishing territory/dominance. Overall, waving occurred in higher frequencies when a greater number of females were present, and foraging rates increased when females were less abundant. These results may have important implications for the success of populations in which male-female ratios may be highly skewed as a result of predation, harvest for the bait trade, or other factors.

Understanding the Visitor Experience at the ACE Basin National Estuarine Research Reserve

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Understanding visitor use within the ACE Basin NERR has begun to become a major research focus of reserve managers and staff. Increased visitor use may lead to impacts to the visitor experience and to natural resources. Empirical information and baseline data, collected through rigorous social science procedures, is needed to deliberately plan for and manage visitor use to protect reserves' natural resources and the quality of visitors' experiences. According to the results of a 2021 survey of NERR managers and staff about characterizing visitor use, two of the most important categories of visitor information needed were "*What activities the visitors engaged in while at the reserve?*" and "*What are the main draws of the reserve?*" Visitors to the ACE Basin NERR were surveyed to help answer these questions. Sampling efforts occurred over 23 days during the Spring and Summer of 2022. In total, 369 surveys were completed with a response rate of 76%. The outcomes and benefits of these studies are to create reliable visitor-based data and results necessary to better understand and manage visitor use at the ACE Basin NERR. These data are also intended to help inform and guide visitor use management decisions at these reserves and to allow future monitoring of the area to proactively protect both the visitor experience and key resources.

Remote Sensing of Georgia Tidal Marsh Habitats using Aerial Photography and PlanetScope Satellite Imagery

Harrison Currin* and Dr. Christine Hladik, Georgia Southern University

Tidal marsh ecosystems provide numerous ecosystem services. This makes mapping these areas important in order to understand how the delivery of these services may change in the future due to the effects of sea level rise, changes in freshwater delivery, and climate change. The primary objective of this study is to generate an accurate classification of Georgia's salt, brackish, and tidal freshwater marshes using high resolution aerial imagery. The second objective is to create a classification of the three main coastal watersheds of Georgia (Ogeechee, Altamaha, and Satilla) using similar techniques but using and comparing PlanetScope 4- and 8-band satellite imagery. Unlike previous coastwide classifications of the Georgia marshes, this classification will put an emphasis on tidal freshwater marshes which have been historically understudied. Both classifications will be completed using the available spectral bands of each sensor, a DEM, the National Wetland Index and multiple vegetation indices as inputs into a random forest classifier in R. In order to assess the accuracy and compare the classifications, we will be using a confusion matrix, error matrix, and out-of-bag error. Based on preliminary data and analysis, an accurate classification of tidal marshes can be created using both 4- and 8-band PlanetScope imagery. Aerial imagery is still being processed but is expected to perform well for all marsh habitats based on previous studies. This study aims to provide information on the current extent and species distribution of Georgia tidal marshes while also assessing PlanetScopes ability in tidal marsh mapping.

Pathogenic parasites of Atlantic tripletail, *Lobotes surinamensis*: local and regional case studies

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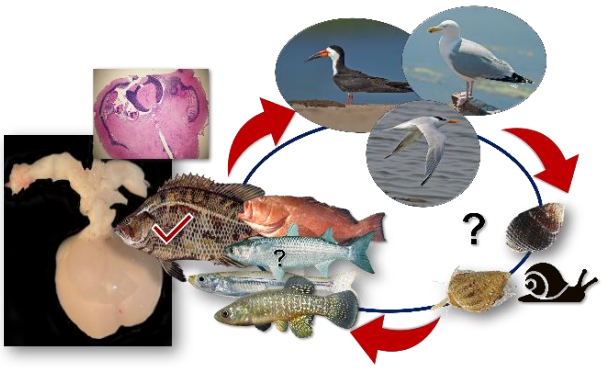
Wild specimens of Atlantic tripletail, *Lobotes surinamensis,* from South Carolina (SC) and Florida (FL) maintained in clean water for ~3 months displayed a profoundly altered swimming behavior and stopped feeding. Fish were found to be infected by trematode larvae (metacercariae) and microsporidians, which were identified molecularly via ITS2 region and 18S rRNA gene sequencing, respectively. Infected tissues were processed histologically. Fish from FL were infected in their eyes with numerous metacercariae of the bucephalid, *Prosorhynchus* sp. and along their optic nerve by an unidentified microsporidian. Tripletail from SC were infected in their brain by metacercariae of the strigeid, *Cardiocephaloides medioconiger* and in their liver by the microsporidian *Microgemma carolinus.* All parasites identified are pathogenic. Both trematodes are neurotropic, which may explain the altered behavior of the fish, and have complex, but not yet fully unraveled life cycles. Issues associated with infection by congeneric metacercariae *Cardiocephaloides* include their low host specificity and the fish behavior alteration that makes the fish more prone to predation. Infection by *Prosorhynchus* spp. may depreciate fillet value (not examined herein). Microsporidians have a simple life cycle: fish typically become directly infected after they swallow spores released in the water from infected fish. Consequently, transmission of all parasites found herein is enhanced in areas of anthropogenic activities, including aquaculture settings and carcass discarding at fish cleaning stations. If left unmonitored, infection by these parasites may propagate to other fish in neighboring natural ecosystems and aquacultural impoundments. Unraveling life cycles will allow for effective mitigation.

Key words: Tripletail, parasites, life cycle, pathology, aquaculture



Living on the edge: do mud crabs or biophysical factors differ across an oyster reef landscape?

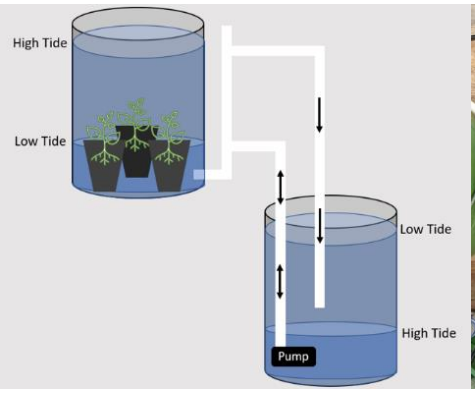
Lillian Doll**, Baruch Marine Field Laboratory, University of South Carolina; Robert P. Dunn, Baruch Marine Field Laboratory, University of South Carolina, North Inlet-Winyah Bay National Estuarine Research Reserve

Oyster reefs vary in their physical structure due to environmental conditions and biological interactions. In turn, aspects of reef structure can affect the habitat utilization of reef-associated fauna. Mud crabs (*Panopeus herbstii* and *Eurypanopeus depressus*) are key interactors on oyster reefs due to the predation pressure they apply to recruits and small oysters. They are also sensitive to structural features of the reef such as shell layer height and surface complexity. I characterized reef biophysical characteristics (shell height, clump height, rugosity, oyster density, and percent cover) within a landscape perspective to explore how these factors influence mud crab biological and ecological traits (body size, abundance) in addition to the composition of the overall reef community. I found no difference between biophysical attributes at the edge and interior of reefs, and though comparisons of *P. herbstii* and *E. depressus* mean body size did not differ significantly, the distribution of body sizes did vary between the reef edge and interior. Similarly, the overall communities observed at reef edge and interior locations were not distinct, though the edge community appeared to be more variable in composition. This suggests that some aspects of mud crab biology and the overall reef community structure can be impacted by landscape features despite limited impact of landscape location on the biophysical properties of the reef.

Examining variation in response to No. 2 fuel oil exposure between tall- and short-form saltmarsh cordgrass (*Spartina alterniflora)*: Implications for marsh restoration after an oil spill

Raven Ferguson*, College of Charleston, Grice Marine Laboratory, Charleston, SC, USA; Paul Pennington, NOAA NOS National Centers for Coastal Ocean Science, Hollings Marine Laboratory, Charleston, SC, USA

South Carolina saltmarsh vegetation is dominated by saltmarsh cordgrass, *Spartina alterniflora*, which is vital to the marsh ecosystem. Within marshes, there are often two genetically distinct forms of *S. alterniflora*, a tall-form (≥1 m tall) found along the edge of tidal creeks and a short-form (≤0.5 m) located further inland. No. 2 fuel oil above certain concentrations can negatively impact the growth and biomass of *S. alterniflora* and cause eventual plant death. However, little research has been conducted examining whether short- and tall-form *S. alterniflora* exhibit different responses when exposed to No. 2 fuel oil or other oil types. In a preliminary study, field collected short- and tall-form *S. alterniflora* plants were exposed to six doses of No. 2 fuel oil ranging from a slick thickness of 0 mm (control) to 1 mm. The 32-day LC_{50} for short-form was 146 mg oil/L seawater (95% CI 140, 152), which is equivalent to 0.074 mm slick thickness (95% CI 0.071, 0.078). The LC_{50} for tall-form was significantly higher at 276 mg/L (95% CI 257, 297) (0.133 mm (95% CI 0.124, 0.143)). EC_{50} values for chlorosis, a measurement of the amount of leaf yellowing, and percent increase in height throughout the study were not significantly different between the two forms. Therefore, the pilot study indicates that short-form *S. alterniflora* may be more vulnerable to oil exposure in regards to mortality, though additional research is needed. Future studies will further explore variation in response to No. 2 fuel oil exposure between the two forms.



Efficacy of Environmental DNA Methodologies in a Large, Productive Estuary Using Three Novel eDNA Primers

Kristina Flanigan*[1], Ryan Lowndes*[1], Erin Burge[1], Jeff Plumlee[2], Dan Abel[1]

Affiliations

1. Coastal Carolina University- Department of Marine Science
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Elasmobranch communities are heavily impacted by overexploitation and habitat destruction, resulting in declining populations. Population recovery can be slow due to k-selected life history strategies; creating a need for accurate and efficient community management for successful recovery. Environmental DNA (eDNA) analysis is an emerging, non-invasive community monitoring tool that is ideal for rare, transitory species like many imperiled elasmobranchs. This study aimed to determine if eDNA methods can be reliably used in a brackish, blackwater environment by developing and using three novel eDNA primers. Species-specific primers were created to detect the presence of Sandbar (*Carcharhinus plumbeus*), Blacknose (*Carcharhinus acronotus*), and Bonnethead (*Sphyrna tiburo*) Sharks. These primers were designed to target 109, 156, and 120 base pair (bp) fragments, respectively, of the highly conserved NAD2 gene in the mitochondrial genome of each species. Primer function was validated through testing against 102 known genomic source samples and 25 filtered aquaria water samples. A total of 198 water samples were collected alongside active longlines in Winyah Bay, South Carolina, and extracted for eDNA analysis. The results of this study provide evidence that species-specific primers of local Carcharhinid species can be developed and utilized for further study. This study also highlights the challenges of eDNA detection in a highly productive marine environment. Overall, these findings suggest that eDNA methods can effectively detect elasmobranchs in controlled environments, but additional research is needed to determine their efficacy in more complex ecosystems.

Are Rising Seas Pushing Ghost Crabs Out of Their Comfort Zone?

Finn Gillette**, Coastal Carolina University; Eric Rosch, Coastal Carolina University

Ghost crabs (Ocypode quadrata) can be found on sandy beaches bordering the western Atlantic Ocean. These semiterrestrial crustaceans are often found between the swash zone and the dunes on beaches. Dunes are critical refuges for ghost crabs during storms and extreme tide events. This makes them a useful indicator species for monitoring the effects of global warming induced sea level rise on beach biota, as their distribution patterns among beach zones may correlate with shifts found in other species. Beach surveys conducted from 2015 onward assessed the population density of ghost crabs on beaches of Horry and Georgetown counties in South Carolina. The surveys suggest that ghost crabs do indeed show a duneward shift in response to storms and that changes in sea level may lead to a more permanent change in their distribution.

HARMFUL CYANOBACTERIA BLOOMS PREVAIL IN URABN WATERBODIES AND OUT-COMPETE A DIVERSE COLLECTION OF PHYTOPLANKTON GENERA

Amy Grogan*

Harmful algae blooms are a prolific issue in stormwater ponds and other waterbodies receiving polluted stormwater runoff in coastal North Carolina. To date 87 algal blooms have been sampled in the Wilmington area (2019 – 2022) encompassing a diverse collection of taxa. Cyanobacteria were found to be the most dominant comprising 70% of the blooms surveyed. Eighteen total genera of cyanobacteria have been identified, 13 of which represent groups capable of producing toxins. An additional 19 genera of primarily chlorophytes made up the remaining 30% of blooms. The results of this study demonstrate that cyanobacteria species are capable of out competing a diverse group of other non-toxic phytoplankton including chlorophytes, chrysophytes, diatoms, and euglenoids. As many cyanobacteria are diazotrophic they can prevail over other taxa in nitrogen limited environments supporting a greater base population. Likewise, cyanobacteria akinetes can remain in the sediment during non-favorable conditions supporting perennial bloom events. Cataloguing cyanobacteria presence and abundance in urban waterbodies is an important foundational step in mitigating the spread and prevalence of harmful blooms and their impact on public and environmental health.

Spatial Consequences of Ecophysiology in a Psammophytic Macroalgal Community Beneath Fringing Mangrove Canopies in Tampa Bay, FL.

Eamon Hennessy**, Department of Biology, University of Tampa; Kevin S. Beach, Department of Biology, University of Tampa

Boodleopsis and *Cladophora* are two genera of turf macroalgae that stabilize the sediment in fringing mangrove forests in Tampa Bay. These psammophytic seaweeds are spatially separated in mangrove understories such that the *Boodleopsis* is associated with higher canopy cover. The effects of two influential abiotic factors in the intertidal zone, desiccation and irradiance, were explored as potential drivers of this distribution pattern. Experiments were conducted to determine desiccation potential and tissue dehydration *in situ* as well as photosynthetic performance during simulated emersion in order to analyze differences in desiccation tolerance as a possible contributor to the spatial separation. The microhabitats in which *Boodleopsis* and *Cladophora* were found showed differences in desiccation potential ($p<0.05$), and there was a difference in the degree to which the tissues dried *in situ* ($p<0.05$). However, photosynthetic performance between the two seaweeds while drying did not differ ($p>0.05$). Average irradiance was recorded to characterize the microhabitats dominated by the respective algae. Photosynthetic responses to various levels of light were measured over one month, after which pigments were analyzed to evaluate differences in photoacclimation as a potential driver of the spatial distribution. Photosynthetic yield was significantly reduced in both genera when exposed to high light levels ($p<0.05$). Analysis of pigments and *in situ* irradiance is still underway. Because neither alga outperformed the other when desiccated to the same degree, it is likely that irradiance is the primary environmental factor determining the observed distribution pattern.

Inputs don't equal outputs: bacterial microbiomes of the ingesta, gut, and feces of the keystone deposit feeder *Ilyanassa obsoleta*

Craig J. Plante, College of Charleston, Grice Marine Laboratory; Kristina M. Hill-Spanik, College of Charleston, Grice Marine Laboratory; Rowan Emerson**, College of Charleston

Bacteria drive energy fluxes and geochemical processes in estuarine sediments. Deposit-feeding invertebrates alter the structure and activity of microbial communities through sediment ingestion, gut passage, and defecation. The eastern mud snail, *Ilyanassa obsoleta*, is native to estuaries of the northwestern Atlantic, ranging from Nova Scotia, Canada, to Florida, USA. Given their extremely high densities, their deposit-feeding and locomotory activities exert ecological influence on other invertebrates and microbes. Our aim was to characterize the bacterial microbiome of this 'keystone species' and determine how its feeding alters the native bacterial microbiota. We gathered snails from both mudflat and sandflat habitats in Charleston Harbor, South Carolina and collected their fresh fecal pellets in the laboratory. Dissection of these same snails allowed us to compare bacterial assemblages of ingested sediments, shell surfaces, gut sections (esophagus, stomach, intestine), and feces using DNA metabarcoding. We found a diverse, resident gut microbiota, with the stomach and intestines dominated by bacteria of the genus *Mycoplasma.* Comparison of ingesta and feces revealed digestion of several bacterial taxa, introduction of gut residents during passage, in addition to unique bacterial taxa within the feces of unknown provenance. Our results demonstrate that *I. obsoleta* has the potential to modify microbial community structure in estuarine sediments.

Carbon Sequestration and Modern Sediment Dynamics

Danielle Jenkins*, UNCW; Devon Eulie, UNCW; Sarah Ashley*, UNCW; Mariko Polk*, UNCW

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The shoreline of the lower Cape Fear River estuary is subject to a combination of erosive forces such as currents, wind waves, and vessel wakes. The estuary is also home to vital fringing marsh habitat and sites of significant cultural and historic value. To mitigate the impacts of erosion along one of these shorelines, novel wave attenuator structures were installed at Brunswick Town Fort Anderson (BTFA) in 2017. Vessel wakes from large cargo ships that pass close to the site have exacerbated the rate of erosion in recent years. This project aims to examine the impact of the attenuators on shoreline morphology and carbon storage. This will be done by collecting sediment data to examine grainsize, sediment composition, and to determine carbon sequestration. Additionally, changes in marsh shoreline morphology over time will be examined. The results of this study will provide insights into the long-term effects of shoreline protection structures on sediment dynamics. Findings can be used in future management and restoration efforts in riparian marsh habitats.

Zooplankton Distribution, Abundance, and Biodiversity in Tampa Bay

Jonah Jimmerson**, The University of Tampa, Tampa, FL; Rebecca Waggett, The University of Tampa, Tampa, FL

Zooplankton include the smallest animals in the oceans, but they serve as a vital trophic link between phytoplankton primary producers and the larger carnivores in the trophic web above. The health and diversity of zooplankton can be directly correlated to the amount of energy and resources available for larger marine organisms, many of which are ecologically or commercially important. Tampa Bay is a large, shallow estuary on Florida's Gulf Coast that is both ecologically and economically important for the state. Because zooplankton can act as an indicator for the health of coastal ecosystems, studying the ongoing trends of zooplankton communities in Tampa Bay could give insight into the condition of the broader ecosystem. For this study, samples have been collected from multiple locations throughout Tampa Bay over several years and zooplankton abundance and diversity have been quantified. This data was then compared to historic zooplankton diversity patterns in order to establish a reference for the observed trends. Among many of the noted patterns, zooplankton abundance appears to be greatest in the late summer and fall seasons, likely due to environmental influences. Furthermore, our sampling has indicated that crustaceans – particularly calanoid and cyclopoid copepods – were frequently the most abundant taxa, though there was some significant variation across seasons and sampling locations. The continuation of sample and data collection may inform monitoring of Tampa Bay health as more environmental challenges are faced in the future.

The effect of salinity intrusion on the function and composition of aquatic macroinvertebrate communities on Sapelo Island, GA

Raymond P. Kidder II*, Georgia Southern University, Dr. J. Checo Colon-Gaud, Georgia Southern University, Dr. Rachel Guy, Sapelo Island National Estuarine Research Reserve

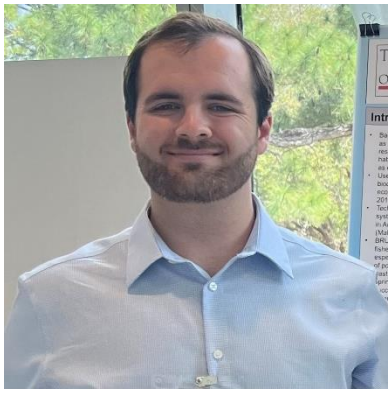
Sapelo Island, Georgia's fourth largest barrier island, has a long history of human inhabitation and landscape modification. In the early 1800's, a series of canals and ditches were dug on the island to drain interior wetlands in the pursuit of arable land for plantation-based agriculture. Though the island has reforested, this system of artificial channels is still present. Increased flooding events and anecdotal evidence of salinity intrusion has led local management staff to question the contemporary hydrological and ecological effects of these channels. To address these concerns, we established a network of water parameter sensors along Oakdale Creek, the island's most prominent artificial channel, to monitor the frequency and magnitude of intrusion events. Ecological integrity was quantified along the resulting salinity gradient using a standard leaf pack decomposition methodology. During two large storm events in Summer of 2022, the creek facilitated the transport of saline water into otherwise-freshwater sites. This was also reflected in the community composition of benthic macroinvertebrates collected with more saline sites containing a distinct assemblage when compared to more inland sites. Decomposition was highest at high-salinity sites, though this trend was likely driven by a relatively large biomass of decomposers. The project is ongoing with plans to collect data through the end of August 2023.

What's the Catch? Biodiversity Analysis of Benthic Organisms Across Select Southeastern Barrier Islands

Kathryn Linn**, Department of Biological Sciences, Augusta University; Leigha Campos, Department of Biological Sciences, Augusta University; Emma Vital, Department of Biological Sciences, Augusta University; Jessica M. Reichmuth, PhD, Department of Biological Sciences, Augusta University

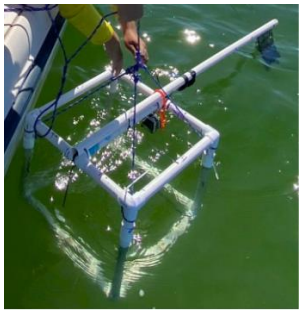
Diversity studies were conducted between three barrier islands along the southern coasts of South Carolina and Georgia: Edisto Island, SC, Hunting Island, SC and Tybee Island, GA. Population surveys were performed at each location in order to quantify and compare species diversity and evenness between each site. Collected data was then further interpreted using the Shannon Diversity Index to understand marine ecosystem dynamics between each island coast. Sampling at all three locations was accomplished using a perpendicular quarter arc set beach seining method, which was uniformly repeated three times per site visit. Additionally, collected specimens were placed in a separate container until the sampling sessions were completed, so as to avoid recapture. Our findings suggested that species evenness was relatively similar among all three locations, with Edisto Island exhibiting a slightly higher E_H value compared to the other barrier islands. Species diversity was most similar between Tybee Island and Edisto Island, with Hunting Island exhibiting the greatest amount of species assortment. These findings support the idea that biodiversity was relatively consistent across all three sites, despite being at markedly different locations along the Southeast Atlantic Bight.

Assessing mobile predator populations in Tampa Bay using Baited Remote Underwater Video



William Love**, University of Tampa; Georgia Ambrose**, University of Tampa; Latyr McQuarters**, University of Tampa; Dr. Heather Mason, University of Tampa

Traditional methods to study underwater communities focus on direct capture methods like trawling or underwater dive surveys, which either alter the ecosystem or introduce the effect of humans as part of the landscape. Remote video technologies are being developed worldwide as a tool to survey underwater community structure. While highly developed techniques are already in use in the southern hemisphere standardized methodology is yet to be established in the northern hemisphere. In this study, we utilized baited remote under water (BRUV) units to use to survey underwater seagrass and open bottom habitats to investigate changes in mobile predator populations over time in Tampa Bay. In addition, we assessed water chemistry and turbidity levels to determine the utility of the technique across a range of water quality parameters. Finally, these surveys are being used to standardize survey efforts and create a video catalog for behavioral studies of underwater organisms.



Quantifying variability in areal extent and percent cover of North Carolina (USA) seagrass meadows using unmanned aerial vehicles (UAV).

Madison Lytle*, J. Jarvis, B. Puckett, and W. Judson Kenworthy

North Carolina (NC) USA, located along the western Atlantic, has two dominant seagrass species, *Zostera marina* and *Halodule wrightii*. Both are at the edge of their geographic range and can be found as single or mixed species meadows, with temperate *Z. marina* most abundant during cooler periods (November – June) and tropical *H. wrightii* most abundant during warmer periods (July-October). This study aims to provide insight on the frequency and magnitude of intra-annual changes in meadow area during the transition periods between the two species, and if change can be related to environmental or biological driver(s) (e.g., temperature, turbidity, species co-occurrence). To assess shifts in seagrass species abundance, UAV imagery was collected monthly and paired with *in situ* measurements to quantify variability in areal extent, seagrass percent cover, and percent cover by species at three seagrass meadows. All sites displayed expected seasonal shifts; two meadows showed a shift in species abundance (*Z. marina* to *H. wrightii*) and were able to maintain seagrass cover and extent. At the third site there was spatial segregation between the two species leading to larger seasonal changes in extent. Mixed meadows show stability during the seasonal shift in species abundance, indicating species diversity could be contributing to maintaining meadow extent.

Effects of Lowered pH on Male *Uca Pugnax* from Georgia and South Carolina Islands

Cassandra C. McNeace**, Ty K. Carter**, and Jessica M. Reichmuth, PhD, Augusta University

The ocean's acidification due to anthropogenic carbon emissions will have many effects on marine animals, particularly those who have calcium carbonate and chitin shells. Much research has shown lowered growth in these marine animals when exposed to lowered pH conditions. On the coast of Georgia and South Carolina, there are many marine animals who have shells and are in danger of ocean acidification's effects, like *Uca pugnax*, the mud fiddler crab. The question, if these crabs can adapt to decreasing pH, is not well studied yet. This study looked at carapace growth in lowered pH and in between three different islands. It was believed that those crabs who lived in more populated, polluted areas may be able to adapt and survive better in lower pH habitats. Fiddler crabs were collected by hand and trowel at Tybee, Hunting, and Edisto Islands. In the lab, crabs were exposed to a pH of 6.0, 7.0, and 8.0 for 12 days, when the experiment ended. There was not a significant difference in carapace growth between the different islands or in between different pH. Our results suggest that fiddler crabs are not affected by lowered pH and their island of origin, but it may be important to note that some crabs on the coast of the southeastern United States may already be exposed to lowered pH because of increased motor vehicle traffic and pollution due to some beaches having heavier tourism than others.

USING MACHINE LEARNING CLASSIFICATION AND ESA SENTINEL 2 MULTISPECTRAL IMAGER DATA TO DELINEATE MARSH VEGETATION AND MEASURE ECOTONE MOVEMENT IN COASTAL GEORGIA

Thomas Pudil* and Christine Hladik, Department of Geology and Geography, Georgia Southern University, Statesboro, GA, 30460

Tidal marshes are unique communities that are subject to environmental stressors including sea level rise, salinity change, and drought, resulting in constant change. It is important to monitor these changing areas because of the ecosystem services these areas provide to us, such as protection from storms and carbon sequestration. Remote sensing provides a reliable method for wide scale monitoring of these systems. Ground cover mapping, plant species distribution movement, and remote estimation of biomass and plant health can all be done with minimal *in-situ* field work and can be scaled up to large areas, preserving the integrity of these ecosystems.

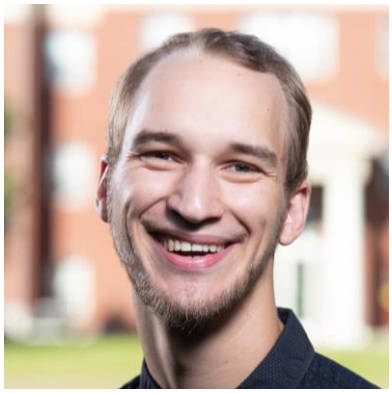
The two objectives of this study are to 1) examine machine learning and deep learning algorithms to determine the best supervised classification method for the Georgia coast, and 2) quantify the relationship between species-specific aboveground biomass of vegetation with ecotone movement between the three tidal marsh domains. Objective one of this study will compare two different supervised classification methods, Random Forest and Artificial Neural Networks, to determine which performs best in mapping vegetation species and ground cover within the study area. In objective 2, the most accurate classifier will be used to examine ecotone movement over time and quantify the relationship between aboveground biomass of vegetation and ecotone movement.

Biomonitoring for Estuarine Health: Developing a DNA Metabarcoding Toolkit for Assessing Changing Plankton Communities

Ashley Reaume*, University of Central Florida; Nikki Dix, Guana Tolomato Matanzas National Estuarine Research Reserve; Gabby Canas, Guana Tolomato Matanzas National Estuarine Research Reserve; Michelle R. Gaither, University of Central Florida.

Estuaries are dynamic coastal ecosystems uniquely intertwined with human life and subject to a diversity of anthropogenic pressures. Monitoring the ecological health of these systems and pinpointing stressors for mitigation is of high importance for management decisions. Plankton communities are key components of estuarine ecosystem functioning and are often used for bioindication of ecosystem status because they respond rapidly to environmental change. Data on plankton community composition are traditionally obtained through visual identification by trained experts but processing samples is time-consuming and limited in taxonomic resolution. A solution is DNA metabarcoding, a molecular technique that utilizes universal primers and high-throughput sequencing to identify multiple species within a single sample that contains DNA from mixed sources. Here we describe 1) our methods to optimize a metabarcoding “toolkit” that most efficiently captures the biodiversity of plankton within the Guana Tolomato Matanzas National Estuarine Research Reserve (GTM NERR) and 2) how we will use these tools to investigate the relationships between environmental parameters, anthropogenic influences, and plankton community composition within the reserve.

Assessment of Atmospheric Correction Algorithms for the Remote Sensing of Water Quality in Southeastern US Estuaries



Jerome Reimers*, Christine Hladik, Georgia Southern University Geology and Geography

Water quality acts as a key indicator in understanding and representing an environment's overall health. Through developments in satellite technology and remote sensing, we can utilize satellite imagery to determine the quantity of water parameters in each aquatic system. Water reflectance measurements are characterized by the strong absorption characteristics of water at longer wavelengths and the variable effects of scattering and absorption from water quality constituents, namely phytoplankton pigments, inorganic matter, and colored dissolved organic matter. Water reflectance is further compounded by inaccurately or un-atmospherically corrected data, which can make it challenging to separate the various components of water quality. When accurate atmospheric correction has been performed, remote sensing can account for atmospheric attenuation and scattering effects to better measure the reflectance and optically active constituents (OAC) present in water. Atmospheric Correction for OLI lite (ACOLITE) is an atmospheric correction algorithm designed specifically for robust atmospheric correction compared to algorithms designed more specifically for land surfaces such as Sen2Cor. While ACOLITE has been tested in a variety of water bodies, an evaluation of atmospheric correction methods for coastal water quality for Georgia, USA, where contributions from pigments, inorganic matter, and organic matter are variable, has not been performed. This project will conduct an analysis of the accuracy of atmospheric correction methods for two Georgia estuaries with variable concentrations of water quality constituents using both satellite imagery, in situ close range spectral remote sensing match up data, and water samples.

Using nanopore sequencing to analyze protist diversity and identify *Pseudo-nitzschia*

Megan Cevasco, Coastal Carolina University; Aramis Lawson**,Coastal Carolina University; Zachary Padgett**,Coastal Carolina University; Elena Renshaw**,University of South Carolina

Harmful algal blooms (HABs) pose a risk to human and environmental health, especially in coastal areas. A particular taxon of interest when considering shellfish harvesting grounds is *Pseudo-nitzschia*, as some species produce domoic acid, a neurotoxin that can bioaccumulate in shellfish and cause amnesiac shellfish poisoning in humans. Thus, this study aimed to explore the use of nanopore sequencing with ribosomal primers of varying specificity to reveal both the ecological diversity of protists and detect *Pseudo-nitzschia*. It was hypothesized that species-specific and diatom-specific primers would amplify *Pseudo-nitzschia*, and the broader eukaryotic primer sets would be less taxonomically sensitive.

Water samples were collected from Huntington Beach State Park in June-July 2022. DNA was extracted from the filtered samples and then amplified, cleaned, and quantified. The samples were prepared using Oxford Nanopore's protocol for ligation, cleaning, and library preparation. The MinION nanopore sequencer was used on the prepared DNA library to obtain sequence results.

The two *Pseudo-nitzschia* specific primers and the two broad eukaryotic primers both recovered sequence reads identified as *Pseudo-nitzschia*, while the diatom-specific primer set did not. These results suggest that both specific and broader primers can be useful in detecting target species. Our results also indicate that broader primer sets could be useful in the development of comprehensive taxonomic assays to capture protist diversity in environmental DNA. Such approaches have applications in refining methods of detecting the presence of *Pseudo-nitzschia* and other HAB taxa in shellfish harvesting waters, which could be used to mitigate the health impacts of HABs.

Growth and Recruitment of Eastern Oysters on Wave Attenuating Structures

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Humans continue to modify natural environments in response to anthropogenic activities and natural processes. A notable example of this effort is the use of engineering structures to mitigate coastal erosion and flooding in high-risk areas. Historically, hard structures such as revetments or seawalls have been used for this purpose. In recent years there has been an increased recognition of the negative effects associated with these. An alternative option would be to implement living shorelines that can provide protection, and as a co-benefit, restore ecological functions to the area. A third option would be a hybrid between grey (hard structures) and green (soft structures) with the intention of combining the benefits of both. The aim of this research is to investigate the effectiveness of a hybrid-engineered structure, Atlantic Reefmakers, implemented in the lower Caper Fear River. An environmental monitoring survey has been done over the past few years to evaluate the sediment accretion, marsh migration, and biological components associated with these structures. This research will focus on the efficacy of Atlantic Reefmakers as an artificial reef promoting oyster growth and recruitment

Uca pugnax and Glyphosate Contaminated Food versus Uncontaminated Food: A Behavioral Observation

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There is an increasing number of contaminants leaked into the salt marshes of southeastern United States such as herbicides. Therefore, species survival is becoming more concerning as these pollutants cause unknown consequences that could later devastate the ecosystem overall. Do these species have cognitive abilities to protect themselves against contaminants and learn the difference between contaminated and non-contaminated food? If mud fiddler crabs have the cognitive abilities to learn avoidance behaviors for contaminated food sources, then their likelihood of survival would increase. A series of observational experiments were designed to test whether a native fiddler crab species to these communities (*Uca pugnax*) could differentiate between the two food sources. Mud fiddler crabs were collected from three different sites: Tybee Island, Edisto Island, and Hunting State Park. They were observed in a mesocosm with contaminated food, that was exposed to Roundup (26.5 % glyphosate-based), on one end and non-contaminated food on the other. The crabs were given a limited amount of time to choose between food types over the course of three trials. All behavioral responses were recorded, and it was found that there was not enough evidence to support whether mud fiddler crabs could discern between contaminated and non-contaminated food sources. It was suggested that more trials should be conducted to make evidentiary conclusions.

The effect of pH increases on oyster larvae in a controlled hatchery setting

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With the decline in water quality, coastal leaders may look to increase the role of hatcheries in resource management and restoration. Georgia was once a leading producer in the nation's oyster fishery, but its harvest is now the smallest in the Southeast. Oyster aquaculture, supported by a thriving hatchery program, could contribute to the revival of the shellfish industry in Georgia and the regeneration of vital oyster habitats. Most hatcheries depend on intake water from local estuaries, which is subject to coastal acidification. Growers often amend low pH intake with bicarbonate, but the optimum range has not been established. We evaluated the larvae of Georgia's cultivated variety of *Crassostrea virginica* and their ability to tolerate high pH conditions. A series of incubation experiments were conducted to measure the growth, survival, and mortality of *C. virginica* larvae at the University of Georgia, Shellfish Research Lab in Savannah, GA. pH levels were manipulated by adding sodium bicarbonate to seawater to identify the optimum pH range. Oyster larvae did not grow or survive at the expected rate based on their life cycle stages measure by sieve size, causing a decline in larval survival and indicating that life cycle day played a larger role in the growth and survival than the pH treatment. We also found mortality was not impacted by pH treatment or life cycle day. This study suggests that maternal lipids may play an important role in supporting *C. virginica* growth and survival prior to day nine of the life cycle.

Keywords: aquaculture, mariculture, coastal acidification, incubation

Effect of water clarity on *Halodule wrightii* seasonal persistence

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Seagrass provides essential habitat for fishery species, contribute to carbon storage, and support nutrient cycling and shoreline stabilization. North Carolina (NC) is a transition zone between temperate and tropical seagrass bioregions. As a result, temperate species *Zostera marina* dominates during colder months (November-June), while tropical species *Halodule wrightii* is more abundant during warmer periods (June-October). In NC *H. wrightii* experiences thermal cold stress when water temperatures fall below the thermal optimum range (20-30ºC). During this stressful cold period light availability is sufficient, yet plant aboveground growth is reduced. It is unknown how prolonged periods of cold thermal stress (<15°C for ≥ 2 weeks) impact the resilience and persistence of *H. wrightii* or how resilient this species will be if light conditions deteriorate. Field manipulation experiments were used to assess stress response of *H. wrightii* to cold temperatures reduced light over 4 weeks. Beginning in January 2023 field plots of *H. wrightii* were manipulated to receive ambient, 11% and 22% bottom irradiance. Weekly measurements of shoot density, canopy height (cm), leaf width (mm), and C:N were collected to quantify structural and physiological responses to cold stress. Results of this study will determine if light limitation influences *H. wrightii* growth and survival under thermally stressful conditions.