Southeastern Estuarine Research Society
Est. 1974

Semi-annual Meeting

March 12-14, 2015

Contributing over 40 years of estuarine and coastal research and management in the southeast

Jacksonville University Marine Science Research Institute
Jacksonville, Florida

PROGRAM & ABSTRACTS

This program has been provided courtesy of Jacksonville University Marine Science Research Institute.

SEERS

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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March 12, 2015

We are pleased and excited to welcome the SEERS Spring 2015 meeting to Jacksonville University Marine Science Research Institute. The institute sits on the banks of the St. Johns River and its associated estuary. The MSRI was opened in 2010 as the first LEED Gold certified building on campus. The goal of the university in establishing the new institute was to provide a premier biological and environmental research and education facility. The MSRI also houses the St. Johns Riverkeeper, the Florida Fish & Wildlife Conservation Commission Northeastern Fisheries Laboratory, and the Millar Wilson Laboratory for Environmental Chemistry. The institute has partnered with local public and private schools to offer marine and environmental science field experiences to K-12 students.

Jacksonville University has a long history with SEERS, having established the undergraduate marine science major in 1978 and established a masters program in 2011. Our location offers a wealth of estuarine, coastal and marine environments with research opportunities ranging from charismatic megafauna to harmful algal blooms.

Besides the St. Johns River, there are other estuaries along the coast of northeast Florida that you may consider visiting. Directly to the north are Ft. George Inlet and Nassau Sound, both surrounded by state parks loaded with recreational opportunities. To the south, one of NOAA's 28 National Estuarine Research Reserves, the Guana Tolomato Matanzas estuary, which spans from Ponte Vedra to Palm Coast, is involved in estuarine research, monitoring, education and stewardship. This Saturday, you have the opportunity to take a kayak trip on Guana River with local ecotour guides where you can get an up-close look at some of the beautiful salt marsh and oyster habitats that represent this region. If you travel a little further south, you can also enjoy cultural activities in the nation's oldest city, St. Augustine.

If you have any questions about the area, please find one of us. We hope you enjoy the meeting.

Quint

A. Quinton White, Jr., Ph.D.
Executive Director, Marine Science Research Institute
Professor of Biology and Marine Science

Nikki

Nikki Dix
Research Director
Guana Tolomato Matanzas National Estuarine Research Reserve

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

Our Sponsors:
North Carolina Sea Grant
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Jacksonville University Marine Science Research Institute
(for printing of the program book)
Jacksonville University Marine Science Research Institute
Guana Tolomato Matanzas National Estuarine Research Reserve
(for providing poster display boards and easels)
SweetWater Brewing Company
(for donating beverages for the receptions and banquet)

Our Local Hosts:
Quinton White, Jacksonville University Marine Science Research Institute
Nikki Dix, Guana Tolomato Matanzas National Estuarine Research Reserve

Our Student Volunteers:
Alison DeVivero, Jacksonville University
Summer Gagel, Jacksonville University
Brian Johnson, Jacksonville University
Hunter Stroble, Jacksonville University

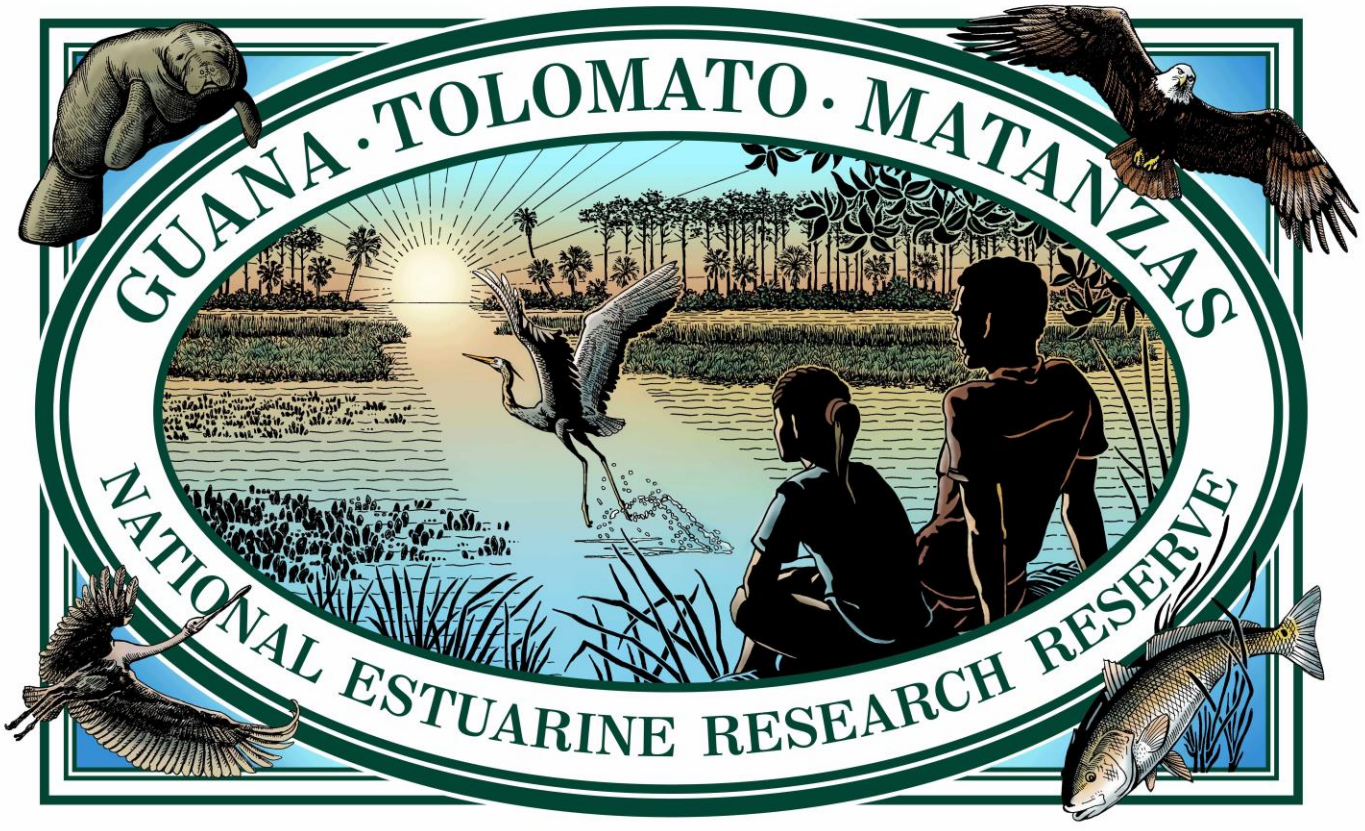
Session Chairs and Anonymous Judges

Chair of Student Promotions Committee (Travel Awards):
Erik Smith, University of South Carolina, Baruch Institute for Marine & Coastal Sciences, North Inlet-Winyah Bay National Estuarine Research Reserve

SEERS Congratulates our Student Travel Award Winners:
Yishen Li, University of Miami
Keri Ann Lydon, University of Georgia
Erik Neff, Georgia Regents University
Steven Vega, University of South Carolina

YSI Incorporated, a subsidiary of Xylem Analytics, designs and manufactures innovative water quality, water velocity, water level, and flow measurement sensors, instrumentation and monitoring systems for sampling and long term monitoring applications in the field and laboratory

Marine Science
RESEARCH INSTITUTE
JACKSONVILLE
UNIVERSITY



Be sure to stop by the sponsor exhibition tables and say thank you to all our sponsors for their support of the Spring 2015 Meeting!

Southeastern Estuarine Research Society
March 12-14, 2015
Jacksonville University, Marine Science Research Institute
2800 University Boulevard North, Jacksonville, FL 32211

Schedule at a Glance

Thursday, March 12

4:00 p.m. – 6:00 p.m.	Registration and poster set-up
5:00 p.m. – 8:00 p.m.	Welcome Reception
5:30 p.m. – 5:45 p.m.	Sponsor Demo – YSI / Xylem
5:45 p.m. – 6:00 p.m.	Sponsor Demo – OTT Hydromet
6:00 p.m. – 7:00 p.m.	Welcome & Poster Presenter Introductions

Friday, March 13

7:30 a.m. – 8:45 a.m.	Light Breakfast & Student Career Event
8:00 a.m. – 8:45 a.m.	Registration and poster set-up
8:45 a.m. – 9:00 a.m.	Welcome and Announcements
9:00 a.m. – 9:15 a.m.	Issues Facing the St. Johns River
9:15 a.m. – 10:00 a.m.	Session I – Ecosystem Processes / Hydrodynamics
10:00 a.m. – 10:30 a.m.	Break
10:30 a.m. – 11:30 a.m.	Session II – Ecosystem Processes / Water Quality
11:30 a.m. – 1:00 p.m.	Lunch
1:00 p.m. – 2:45 p.m.	Session III – Fish / Large Vertebrates
2:45 p.m. – 3:15 p.m.	Break
3:15 p.m. – 4:45 p.m.	Session IV – Submerged Aquatic Vegetation / Wetlands
5:00 p.m. – 7:00 p.m.	Poster Reception (Presenters should stand by their posters between 5:00 and 7:00 p.m. – Student posters will be judged during this time)
7:00 p.m. – 10:00 p.m.	Dinner Social – low country boil

Saturday, March 14

7:30 a.m. – 8:45 a.m.	Light Breakfast
8:45 a.m. – 9:00 a.m.	Welcome and Announcements
9:00 a.m. – 10:30 a.m.	Session V – Oyster Special Session
10:30 a.m. – 11:00 a.m.	Break
11:00 a.m. – 11:45 a.m.	Session VI – Outreach / Education / Resource Management
11:45 a.m. – 12:30 p.m.	Business Meeting & Award Presentations

During registration times, breaks, and lunch,
Please be sure to check out the SEERS merchandise table!

SEERS T-shirts and stainless steel water bottles will be available for purchase! They make great gifts!

Sales help to support student travel awards!

PLATFORM PRESENTATIONS

- **Presenting author is underlined**
- **Graduate student authors (*)**
- **Undergraduate student authors (**)**

Friday, March 13

8:45 Welcome and Announcements
Geno Olmi, SEERS President; Quinton White, Local Host; Nikki Dix, Local Host; Loren Mathews, SEERS Program Chair

9:00 Issues Facing the St. Johns River
Quinton White, Jacksonville University Marine Science Research Institute; Lisa Rinaman, St. Johns Riverkeeper

9:15 a.m. – 10:15 a.m. Session I: Ecosystem Processes / Hydrodynamics
Moderator: Yishen Li, University of Miami

9:15 Variability of the turbulent kinetic energy dissipation rate in Winyah Bay, SC
Diane Bennett Fribance, Erin E. Hackett, Coastal Carolina University

9:30 Importance of suspended sediments in controlling bacterial metabolism and associated oxygen consumption rates in nearshore coastal waters of South Carolina, USA.
Erik M. Smith, Tracy L. Buck, Susan Denham, University of South Carolina and the North Inlet - Winyah Bay National Estuarine Research Reserve

9:45 Survey of dragonflies in the Timucuan Preserve Estuary
Danielle D'Amato; Jacksonville University*

10:00 a.m. – 10:30 a.m. BREAK

10:30 a.m. – 11:30 a.m. Session II: Ecosystem Processes / Water Quality
Moderator: Mary Grace Lemon, Louisiana State University

10:30 Preliminary performance of a set of coastal BMPs in Wrightsville Beach, N.C.
Michael A. Mallin, Mary I.H. Turner, Matthew R. McIver, University of North Carolina Wilmington, Center for Marine Sciences; Byron R. Toothman, North Carolina Coastal Reserve, University of North Carolina Wilmington

10:45 Selection of *Vibrio* bacteria under pressure of triclosan in coastal ecosystems
Keri Lydon, Erin K. Lipp, University of Georgia*

Friday, March 13

11:00 Water quality and algal blooms in the Indian River Lagoon, Florida
Margaret Lasi, St. Johns River Water Management District; Edward Phlips, University of Florida; Wendy Tweedale, St. Johns River Water Management District; Charles Jacoby, St. Johns River Water Management District

11:15 Long-term trends in abundance of a larval fish in North Inlet-Winyah Bay National Estuarine Research Reserve: influence of freshwater input
Steven Vega, Ryan Rykaczewski, University of South Carolina; Dennis Allen, Baruch Marine Laboratory, University of South Carolina*

11:30 a.m. – 1:00 p.m. LUNCH

1:00 p.m. – 1:45 p.m. Session III: Fish / Large Vertebrates
Moderator: Jamie M. Alfieri, Georgia Southern University

1:00 Tests of reproductive isolation between *Fundulus heteroclitus* and *F. grandis*
Ruthie Barbas, Matthew R. Gilg, University of North Florida*

1:15 Presence of the invasive lionfish (*Pterois* spp.) in the Indian River Lagoon: Implications for ecological effects
Emily Dark, Antioch University; Jeff Beal, Florida Fish and Wildlife Conservation Commission

1:30 The value of long-term data sets: Seasonal flatfish abundance patterns in a shallow estuarine creek in Georgia
Mary Carla Curran, Katherine Doyle, Hannah Zook, Department of Marine and Environmental Sciences, Savannah State University*

1:45 Decadal-scale assemblage changes of salt marsh fishes in the North Inlet estuary, SC
Matthew E. Kimball, Dennis M. Allen, USC Baruch Marine Field Laboratory

2:00 Changes in the residency and distribution patterns of the Atlantic Stingray *Dasyatis sabina* in two Georgia creek systems over the course of three seasons
Sarah Ramsden, Mary Carla Curran, Department of Marine and Environmental Sciences, Savannah State University*

2:15 Variation in habitat selection in tidal creeks by the Atlantic Stingray *Dasyatis sabina* with changes in tidal height
Cameron Brinton, Mary Carla Curran, Department of Marine and Environmental Sciences Savannah State University*

Friday, March 13

2:30 Occurrences of bottlenose dolphins in oligohaline and mesohaline waters of the St. Johns River, FL
Rose Borkowski, DVM, Elizabeth Maitland, Jacksonville University; Jenell Larsen*, University of Alaska Fairbanks; Stephanie Sowa, Jacksonville University*

2:45 p.m. – 3:15 p.m. BREAK

3:15 p.m. – 4:45 p.m. Session IV: Submerged Aquatic Vegetation / Wetlands
Moderator: Cameron Brinton, Savannah State University

3:15 The Sebastian Inlet Flood Tidal Shoal Monitoring Program
D. Deis, L. Manzello, A. Gelber, Atkins; Smithson, M., Sebastian Inlet District

3:30 The seagrass' guide to surviving a Superbloom!
Lori J. Morris, Robert H. Chamberlain, St Johns River Water Management District

3:45 Disturbance history alters selection of morphological traits in seagrass communities
Kathryn A. Tiling, C. Edward Proffitt, Florida Atlantic University*

4:00 Associational resistance protects mangrove leaves from crab herbivory
Amy A. Erickson, Department of Integrative Biology, University of South Florida, Department of Biological Sciences, Louisiana State University Shreveport; Susan S. Bell, Clinton J. Dawes, Department of Integrative Biology, University of South Florida

4:15 Does genetic diversity of the foundation species, influence species diversity of the associated community?
Donna J Devlin, Dept of Biological Sciences, Florida Atlantic University

4:30 Year 1 of salt marsh monitoring in the GTMNERR: Where do we go from here?
Pamela Marcum, GTM Research Reserve; Jason Lynn, Nikki Dix, GTM Research Reserve/University of North Florida

5:00 p.m. – 7:00 p.m. POSTER SESSION

7:00 p.m. – 10:00 p.m. DINNER SOCIAL

Saturday, March 14

8:45 Welcome and Announcements
Geno Olmi, SEERS President; Quinton White, Local Host; Nikki Dix, Local Host; Loren Mathews, SEERS Program Chair

9:00 a.m. – 10:15 a.m. Session V: Oyster Special Session
Moderator: Nikki Dix, Guana Tolomato Matanzas National Estuarine Research Reserve

9:00 Biodiversity of living shoreline stabilization sites compared to natural and altered shorelines in Florida
*Melinda Donnelly, Michelle Shaffer**, Linda Walters, University of Central Florida*

9:15 Influence of restored habitat on faunal communities in a northeast Florida estuary
Shannon Dunnigan, Kelly Smith, University of North Florida*

9:30 Changes in sediment characteristics and benthic nutrient fluxes at a restored oyster reef
*Melissa Southwell, Jessica Veenstra, Charles Adams**, Elizabeth Scarlett**, Kristy Payne**, Flagler College*

9:45 Comparison of the common oyster, *Crassostrea virginica*, reef in three northeast Florida creeks
Kimberly Mann, Jacksonville University*

10:00 The effects of intertidal eastern oyster (*Crassostrea virginica*) reefs on whole-ecosystem processes in the Matanzas River Estuary, Florida
Ray Grizzle, Jackson Estuarine Laboratory, University of New Hampshire; Nikki Dix, Guana Tolomato Matanzas National Estuarine Research Reserve

10:15 Available interstitial space, not surface area, alters prey survivorship in a complex habitat
Stephen G. Hesterberg, Susan S. Bell, University of South Florida*

10:30 a.m. – 11:00 a.m. BREAK

Saturday, March 14

11:00 a.m. – 11:45 a.m. Session VI: Education / Outreach / Resource Management

Moderator: Loren Mathews, Georgia Southern University

11:00 Can students collect reliable, scientifically defensible monitoring data while becoming estuarine literate?
Kenneth Rainer, Josephine Spearman, Kaitlyn Dietz, Guana Tolomato Matanzas National Estuarine Research Reserve

11:15 Managing Everglades restoration, coastal flooding, and marsh droughts in light of climate change
Fred Sklar, Jayantha Obeysekera, SFWMD

11:30 Sea level rise: New, certain, and everywhere. What to do in response?
Robert Virnstein, Seagrass Ecosystems Analysts

11:45 a.m. – 12:30 p.m. BUSINESS MEETING & AWARD PRESENTATIONS

POSTER PRESENTATIONS (in alphabetical order by number)

- **Presenting author is underlined**
- **Graduate student authors (*)**
- **Undergraduate student authors (**)**

POSTER PRESENTATIONS (by poster number)

1 **Diverse parasite communities threatened by coastal development in Georgia**
James M. Alfieri, Tavis K. Anderson, Department of Biology, Georgia Southern University*

2 **State-of-the-art imaging instruments available for research at the Baruch Marine Field Laboratory, Georgetown, SC**
Dennis M. Allen, Matthew E. Kimball, J. Kyle Houser, Baruch Marine Field Laboratory, University of South Carolina

3 **Reef introductions: Quantifying the success of *Crassostrea virginca* in new areas of Brevard County**
*Lacie Anderson**, University of Central Florida; Sammy Anderson, Brevard Zoo; Virginia Barker, Brevard County Natural Resources; Paul Sacks, Linda Walters, University of Central Florida*

4 **Non-target effects of mosquito control pesticides on the sub lethal stress response of the reef building coral, *Porites astreoides***
*Rachel Bladow**, University of North Florida; Kevin Olsen, Smithsonian Marine Station; Richard Pierce, Mote Marine Laboratory; Cliff Ross, University of North Florida*

5 **The Impact of crown conch *Melongena corona* on the Eastern oyster *Crassostrea virginica* in Mosquito Lagoon, Florida**
*Courtney Buck**, Casey Craig**, Jordan Filipponi**, Chelsea Landau**, University of Central Florida*

6 **Seasonal variation in the quantification of fecal bacteria removal by micro-zooplankton grazing in stormwater BMPs**
Jade M. Burtchett, Michael A. Mallin, Matthew McIver, Center for Marine Science, University of North Carolina, Wilmington; Lawrence B. Cahoon, Department of Biology and Marine Biology, University of North Carolina, Wilmington*

7 **Lurking nutrients: changes in benthic macrophytes and their stored nutrients during the 2011 superbloom**
Robert Chamberlain, Lori Morris, St. Johns River Water Management District (SJRWMD)

8 **Tracers for groundwater-surface water interactions on the St. Johns River**
Justina Dacey, Jeremy Stalker, Department of Biology and Marine Science, Jacksonville University; Peter K. Swart, Department of Marine Geology and Geophysics, University of Miami*

9 **Analysis of marsh loss and erosion within Northern Barataria Bay, Louisiana: the effects of the Deepwater Horizon oil spill**
Donald R. Deis, Stefan M. Bourgoin, Atkins; Irving A. Mendelssohn, Qianxin Lin, Aixin Hou, John Fleeger, Louisiana State University

10 **The use of stable isotopes of nitrogen and carbon to identify relative foraging locations and trophic level of *Caretta caretta* and *Chelonia mydas* from nesting beaches in Northeast Florida**
Kaitlyn R. Dietz, Jeremy C. Stalker, Jacksonville University; Peter K. Swart, Rosenstiel School of Marine and Atmospheric Science, University of Miami*

11 **Behavior of the mangrove tree crab *Aratus pisonii* during its active season**
Margaret Renee Edwards, Aaron Lincoln*, Department of Biological Sciences, Louisiana State University Shreveport; Haven Holstein**, Department of Integrative Biology, University of South Florida; Amy A. Erickson, Department of Biological Sciences, Louisiana State University Shreveport, Department of Integrative Biology, University of South Florida*

12 **Habitat location using stable isotopes analysis of strontium in *Tursiops truncates* teeth**
Ivana Espinosa, Jeremy Stalker, Rosemarie Borkowski, Peggy Ostrom, Jacksonville University*

13 **Evaluation of two habitat complexity metrics for predicting flatback mud crab (*Eurypanopeus depressus*) abundance on oyster reefs in Tampa Bay, Florida**
*Jessyca E. Garlock**, Stephen G. Hesterberg*, Susan S. Bell, University of South Florida*

14 **Using hydrodynamic models and water quality data to predict restoration suitability of *Crassostrea virginica* in Apalachicola Bay, Florida**
Stephanie Garvis, John Weishampel, University of Central Florida*

15 **Indian River Lagoon Observatory: Real-time water quality data network for research, education, and outreach**
M. Dennis Hanisak, Kristen S. Davis, Ben Metzger, Harbor Branch Oceanographic Institute at Florida Atlantic University

16 **Physical monitoring of coastal waters: an educational experience**
*Diane B. Fribance, Sloan E. Hilton**, Greg Masessa**, Emilye Rybarczyk**, Anna Vidal**, Coastal Carolina University*

17 **Long-term variation of population attributes and *Perkinsus marinus* infection in oysters from northeast Florida**
Yungkul Kim, Bethune-Cookman University; Eric N. Powell, University of Southern Mississippi

18 **Integrating continuous ammonium measurements with real-time LOBO monitoring in Florida's Indian River Lagoon**
Brian E. Lapointe, Laura Herren, Marie Tarnowski, HBOI/FAU; Natchanon Amornthammarong, CIMAS/RSMAS/UM and AOML/NOAA; Jack Stamates, AOML/NOAA; Peter Ortner, CIMAS/RSMAS/UM; James Hendee AOML/NOAA

19 **Linking coastal water quality and eutrophication to land-based anthropogenic N footprint: a case study in Great Exuma, the Bahamas**
*Yishen Li**, University of Miami; Kathleen M. Sullivan-Sealey, Coastal Ecology Lab, Department of Biology, University of Miami; Maria L. Estevanez, Department of Marine Ecosystems and Society, Rosenstiel School of Marine and Atmospheric Science, University of Miami; Larry E. Brand, Department of Marine Biology and Ecology, Rosenstiel School of Marine and Atmospheric Science, University of Miami*

20 **Effects of wave exposure on the structure of fish assemblages in the Northern Gulf of Mexico**
Lauren Liddon, Jacob Schaefer, University of Southern Mississippi*

21 **A comparison of worm rock fauna on nearshore natural and artificial reefs in Palm Beach County, Florida**
Daniel A. McCarthy, Jacksonville University

22 **Morphometrics and possible endocrine disruption in two populations of fiddler crabs along the Georgia-Carolina coast**
*Jennifer Cannon, Jennifer Mercer**, Jessica Reichmuth, Georgia Regents University*

23 **Walk or stand? Activity budgets and responses to predators of three fiddler crab species**
*Erik Neff**, Samantha Anchor**, Jessica M. Reichmuth, Georgia Regents University*

24 **A comparison of mud fiddler crab response to varying levels of glyphosate**
*Alyssa Outhwaite**, Katlyn Gill**, Dr. Jessica M. Reichmuth, Georgia Regents University*

25 **Vertical settlement patterns of bivalves in a northeastern Florida estuary**
Jennifer Raabe, Matthew Gilg, University of North Florida*

26 **A comparison of nearshore hardbottom fish communities in Palm Beach County, Florida, 1990-2014**
Sara Schunter, Daniel McCarthy, Jacksonville University*

27 **Effect of patch size and vegetation type on marsh nekton**
Tom Sevick, Jake Schaefer, University of Southern Mississippi*

28 **Propagule trapping: examining the rate of successful *Rhizophora mangle* propagule recruitment along the restored shorelines of turtle mound**
*Michelle Shaffer**, Melinda Donnelly, Linda Walters, University of Central Florida*

29 **Comparison of benthic faunal abundance and diversity on restored and non-restored sites along the Tolomato River in the GTMNERR**
*Nadja Capps**, Shannon Dunnigan*, Kelly Smith, University of North Florida*

30 ***Amphitrite ornata* erythrocruorin functions with substantial dehaloperoxidase activity**
*Victoria R. Hearn**, Lauren A. Presnar**, Stephen A. Borgianini, Joseph L. Staton, and Edward L. D'Antonio, Department of Nature Science, USC-Beaufort*

31 **It's getting hot in here: Mummichog response to variable temperature and light expsosure**
*Brianna James**, Ima (Johnnie) Umoh**, Jessica Reichmuth, Georgia Regents University*

32 **Oyster reef declines and restoration in Mosquito Lagoon: 8 years of data**
Linda Walters, University of Central Florida; Paul Sacks, Winter Springs High School; Jody Palmer, Brevard Zoo

33 **Changes in estuarine salinity and inundation on the Georgia Coast**
Yuntao Wang, Renato Castelao, University of Georgia*

34 **The development of a baseline for spatiotemporal variability in planktonic communities of the lower St. Johns River estuarine system**
Madelyn N. Woods, Daniel A. McCarthy, Jacksonville University*

35 **Seasonal trends in blenny habitat use in a southeastern saltmarsh creek**
*E. Haffey**, K. Hoffman**, K. Gunning**, A. Yascavage**, L. King**, B. Richard**, Coastal Carolina University; D.M. Allen, Baruch Marine Field Laboratory, University of South Carolina; J.M. Harding, Coastal Carolina University*

ABSTRACTS FOR ORAL PRESENTATIONS
(in alphabetical order by presenting author's last name)

Tests of reproductive isolation between *Fundulus heteroclitus* and *F. grandis*

Ruthie Barbas, Matthew R. Gilg, University of North Florida*

This presentation is an update to the preliminary results that were presented at the fall 2014 SEERS meeting, and includes new data. The goal of this study is to elucidate the speciation of salt marsh fishes by investigating barriers to reproduction between similar species. Barriers to reproduction between *F. heteroclitus* and *F. grandis* are being investigated by analyzing the prevalence or lack of hybridization in a variety of laboratory experiments. This study focuses on two questions: 1) How strong is pre-zygotic isolation (barriers to the formation of hybrid zygotes) between *F. heteroclitus* and *F. grandis* and their hybrids under conditions when individuals do and do not have the opportunity to choose between conspecific and non-conspecific mates? 2) How strong is post-zygotic isolation (barriers to survival and reproduction of hybrid offspring) among *F. heteroclitus* and *F. grandis* and their hybrids? Preliminary results of no-choice breeding trials have revealed the presence of both pre-zygotic and post-zygotic barriers between these species. Specifically, the results indicated a decrease in heterospecific mating and fertilization success relative to the mating and fertilization success of conspecifics. Hatching success of heterospecific embryos was also lower than that of conspecifics. Post-zygotic barriers appeared to be stronger in one of the two heterospecific crosses, revealing a possible asymmetry in post-zygotic barriers between *F. heteroclitus* and *F. grandis*.

Presence of the invasive lionfish (*Pterois* spp.) in the Indian River Lagoon: Implications for ecological effects

Emily Dark, Antioch University; Jeff Beal, Florida Fish and Wildlife Conservation Commission

In this study, we examined the presence of lionfish (*Pterois* spp.) in the Indian River Lagoon, east-central Florida, to address estuarine use through ontogeny. We examined the known distribution in the IRL using the USGS Non-indigenous Aquatic Species (NAS) website, demographics (sizes and reproductive capacity) and use of mangroves as well as manmade habitats. We also examined lionfish diet in the IRL, finding a wide variety of prey items including decapods such as fishery species (pink shrimp, blue crabs). The wide range of estuarine lionfish size, the presence of sexually-mature adults, and fidelity to mangroves suggest that lionfish do not necessarily exhibit an ontogenetic shift to offshore habitats in the IRL region. These findings indicate the ability of the IRL to serve as a suitable ecosystem for lionfish throughout their life cycle. Furthermore, more than 600 lionfish have been reported in the IRL since 2008 as far as 14 km from inlets and in areas with salinities less than 10psu. The ecological and economic value of the IRL and other estuaries warrants the development of strategic removal efforts and consistent monitoring. Lionfish presence in the IRL signifies their threat to southern temperate, subtropical, and tropical estuarine systems.

Occurrences of bottlenose dolphins in oligohaline and mesohaline waters of the St. Johns River, FL

Rose Borkowski, DVM, Elizabeth Maitland, Jacksonville University; Jenell Larsen*, University of Alaska Fairbanks; Stephanie Sowa, Jacksonville University*

Bottlenose dolphins (*Tursiops truncates*) are well known for their inhabitance of coastal and estuarine waters, yet their use of oligohaline and mesohaline environments is less well understood. Dolphin utilization of interior regions of the St. Johns River (SJR), including areas south of downtown Jacksonville, has been the focus of increased research in recent years. Information regarding their use of these environments facilitates greater understanding of the ecological role that these cetaceans play in the St. Johns River. Additionally, such research fortifies efforts to census, monitor, and manage dolphins in NE Florida, particularly in the wake of Unusual Mortality Events that SJR dolphins and coastal Atlantic dolphins have experienced in recent years. Since the summer of 2011, Jacksonville University has conducted regular boat surveys to determine the occurrences of bottlenose dolphins in oligohaline and mesohaline environments of the SJR. Although dolphins can experience significant health concerns if they remain in oligohaline environments for extended periods of time, our research demonstrates that both adults and calves may regularly enter waters having salinity less than 6-10 ppt.

Variation in habitat selection in tidal creeks by the Atlantic Stingray *Dasyatis sabina* with changes in tidal height

Cameron Brinton, Mary Carla Curran, Department of Marine and Environmental Sciences Savannah State University*

Stingray behavior can be affected by environmental stimuli such as tide. The suitability of a habitat can vary with changing conditions, leading to emigration from or immigration to the habitat by stingrays. The purpose of this study was to determine how tidal stage affected the habitat use of the Atlantic Stingray *Dasyatis sabina* in tidal creeks near Savannah, GA. Stingrays were internally tagged with Vemco acoustic transmitters and actively (n=7) or passively (n=44) tracked between December 2012-December 2014. The geomorphology of the site was classified using the Horton concept of stream orders. In this system, the smallest creeks are classified as first order. Small-scale habitat features, such as intertidal flats and scour holes, were mapped with a Lowrance 7 HDI side-scan sonar system. Stingrays utilized first- and second-order creeks significantly more at high tide than low tide. The least overlap of habitat use occurred between high tide and low tide (41%). Stingrays typically occupied the channel of smaller tributaries at high tide and the edges of deeper tributaries at low tide. Stingrays were detected significantly more frequently in third-order creeks than other tributaries, and there was no significant effect of tidal stage in these tributaries. Third-order creeks are the shallowest tributaries that continually have water, and thus potentially provide a shallow-water refuge from predators while still being suitable habitat for foraging at all tidal stages.

The value of long-term data sets: Seasonal flatfish abundance patterns in a shallow estuarine creek in Georgia

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Temperature and seasonal changes may play crucial roles in the selection of nursery habitats by flatfishes. The purpose of the present study was to investigate the patterns in use of a shallow estuarine creek by flatfishes to determine the effect of season on species composition and abundance over multiple years. Monthly samples were collected during ebb tide in Wylly Creek (31°59'52"N, 81°03'18"W) in Savannah, Georgia beginning in January 2004. Three replicate tows were conducted for 2 minutes each using a 1 m-wide beam trawl with a 3 mm mesh net. Means were calculated as the number of individuals per sample date by season. Six species were collected throughout the study: the Blackcheek Tonguefish *Symphurus plagiusa*, the Bay Whiff *Citharichthys spilopterus*, the Fringed Flounder *Etropus crossotus*, the Summer Flounder *Paralichthys dentatus*, the Southern Flounder *Paralichthys lethostigma*, and the Ocellated Flounder *Ancylopsetta quadrocellata*. The flatfish species used the creek at different times of the year. The most abundant species was *Symphurus plagiusa* (6.60 ± 0.77 individuals d^{-1}), with peak abundance during summer (11.96 ± 2.14 individuals d^{-1}). *Citharichthys spilopterus* was most abundant during winter (12.28 ± 4.54 individuals d^{-1}) when mean size was shortest (18.1 ± 0.4 mm) and least abundant during fall (1.10 ± 0.51 individuals d^{-1}) when mean size was longest (81.9 ± 5.3 mm). The major finding of this study was that recently settled *Citharichthys spilopterus* used Wylly Creek as a nursery in early winter while the other species utilized this creek in later juvenile stages.

Survey of dragonflies in the Timucuan Preserve Estuary

Danielle D'Amato; Jacksonville University*

Mercury, a naturally occurring element which is found in air, water, and soil exists in various forms: elemental or metallic mercury as well as inorganic and organic mercury compounds. Due to its high toxicity, mercury has the capability to fatally affect numerous aspects of everyday life if anthropogenic exposure levels are not closely monitored. The purpose of this study is to a provide baseline organism mercury level, using dragonfly larvae, for five different estuary locations within the Timucuan Preserve. Sites were sampled for larvae during the summer of 2014. Larvae were measured, identified, placed in individual plastic bags, and frozen for mercury analysis. Areas within Timucuan will also be surveyed for both adult and larvae dragonflies to produce a species list. Discussion of the mercury levels found and dragonfly species recorded will be presented.

The Sebastian Inlet flood tidal shoal monitoring program

D. Deis, L. Manzello, A. Gelber, Atkins; Smithson, M., Sebastian Inlet District

Sebastian Inlet connects the Atlantic Ocean with the Indian River Lagoon (IRL) on the east coast of Central Florida. Historically, the terminus of navigation was a large flood tidal shoal, resulting in frequent vessel groundings and related damages to expansive seagrass meadows. In 2007, the Sebastian Inlet District (SID) obtained permits and constructed a clearly defined, navigable channel connecting the Inlet to the Atlantic Intracoastal Waterway. Construction impacted seagrasses in and around the flood shoal. SID implemented a comprehensive mitigation package. The monitoring program included detailed assessments of initial conditions and an annual monitoring of seagrass-related changes. Slow, steady gains in seagrass acreage, a reduction in propeller scarring, and recovery of previously scarred areas were reported through 2010. In contrast, examination of the 2011 and 2012 data revealed considerable seagrass losses on the flood tidal shoal from 2010 to 2011 and from 2011 to 2012. Region-wide seagrass losses were reported throughout the northern and central portions of the IRL over the same time period. The regional seagrass and water quality monitoring program conducted by the St. Johns River Water Management District (SJRWMD) has provided context for the losses experienced in the seagrass mitigation program over the past two years. The SID has been participating in an experimental seagrass transplantation program, in conjunction with SJRWMD and Florida Atlantic University at Harbor Branch, to evaluate the potential of stimulating regional recovery of seagrasses by transplantation. Results of the recovery of seagrass on the shoals and the transplantation experiment are provided.

Does genetic diversity of the foundation species, influence species diversity of the associated community?

Donna J Devlin, Dept of Biological Sciences, Florida Atlantic University

The community genetics theory predicts that the genetic diversity of keystone or foundation species can drive the higher order community processes such as species diversity and productivity. So that, as genetic diversity of foundation species population increases, the community species diversity will also increase. If species diversity of a community is generated by the genetic diversity of foundation species, then genetic diversity should be an important consideration in the design of restoration sites. In the Indian River Lagoon, *Rhizophora mangle* is one of the most important foundation species; *Rhizophora* supports subtidal, intertidal and terrestrial communities and thus this species is the target species for the majority of intertidal restoration projects in the Lagoon. In a manipulative experiment, I explore the role of genetic diversity in generating both species diversity of the associated community and productivity.

Biodiversity of living shoreline stabilization sites compared to natural and altered shorelines in Florida

*Melinda Donnelly, Michelle Shaffer**, Linda Walters, University of Central Florida*

Living shorelines are becoming recognized and promoted throughout the United States as a cost-effective type of ecological engineering to make coastal areas more resilient. A commonly cited benefit of living shorelines is support of higher levels of biodiversity, for species from both estuarine and terrestrial environments, compared to hard-armored shorelines. In March 2014, we began a two-year study in Mosquito Lagoon (Volusia County, FL) and Tolomato River (St. Johns County, FL) using a BACIPS design. We compared abiotic characteristics and community structure at four types of shorelines: 1) shorelines stabilized using living shoreline techniques; 2) natural shorelines; 3) seawalls; and 4) rip-rap. Living shoreline stabilization at historical shell middens occurred in July 2014 at Seminole Rest in Canaveral National Seashore (Volusia County, FL) and Ft. Mose State Historic Park in October 2015 (St. Johns County, FL). At Seminole Rest, we completed the stabilization of 200 m of shoreline with a combination of three native species of mangroves, *Spartina alterniflora*, and oyster bags. At the Ft. Mose shell midden, we used a combination of one species of mangrove (*Avicennia germinans*), *S. alterniflora*, oyster shell bags, and oyster restoration mats to stabilize 55 m of shoreline. Preliminary data suggest natural shorelines had higher diversity of fishes, crustaceans, and birds compared to hard-armored shorelines with seawalls. Abiotic conditions were also different for hard-armored shorelines compared to natural shorelines, particularly for temperature and shoreline slope. On-going monitoring will allow us to compare diversity of our stabilized sites post-restoration to natural and altered shorelines.

Influence of restored habitat on faunal communities in a Northeast Florida Estuary

Shannon Dunnigan, Kelly Smith, University of North Florida*

Native oyster reefs provide a variety of ecosystem services such as water filtration, shoreline defense, and serve as habitat for many coastal and marine animals. It is currently estimated that 85% of oyster reefs have been lost worldwide. Due to this decline and the economic and ecological value of oysters to their respective systems, many efforts have been made at restoring oyster reefs in hopes of re-establishing these shellfish populations. The Friends of the GTM Research Reserve organization installed a living shoreline of artificial oyster and fiber-coir logs with the goal of ceasing or reversing the erosion along the Guana Peninsula within the Guana Tolomato Matanzas National Estuarine Research Reserve. The use of these living shorelines also has the added benefit of providing habitat for many coastal species. Through a grant from the Atlantic Coastal Fish Habitat Partnership, monthly seine and gill net surveys were conducted to assess the nekton communities utilizing the artificial reef and natural reefs within the Tolomato River along the Guana Peninsula. In the seine data there were seasonal patterns between abundance and diversity with the restored sites having the highest abundance and lowest diversity within the spring and the unstructured sites having the highest abundance and lowest diversity in the Fall. There were no differences in catch per unit effort (#fish/soak time) or diversity in the gill net survey between the restored site, unstructured site, and natural reef sites. Further sampling may be needed in order to fully understand the communities present within this system and the role habitat plays in their abundance.

Associational resistance protects mangrove leaves from crab herbivory

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Associational defenses are well documented in terrestrial plant and algal ecosystems but not in mangroves. Mangrove tree crab (*Aratus pisonii*) density and herbivory on the red mangrove (*Rhizophora mangle*) were documented in pure red versus mixed-species and predominantly non-red mangrove stands containing black (*Avicennia germinans*) and white (*Laguncularia racemosa*) mangroves in 1999-2000 in Tampa Bay, Florida. This study established that *R. mangle* is the focal species in the context of associational resistance because it is damaged more than other mangrove species. It was hypothesized that crab density and leaf damage on *R. mangle* would be lower in mixed-species and non-red versus red mangrove stands. A non-significant trend suggested that crab density was lower in mixed-species and non-red stands, while crab damage on *R. mangle* leaves was significantly lower in both of them. Mechanisms to explain associational resistance were examined. Positive Pearson correlations between the percent of adult *R. mangle* in a stand and both crab density and leaf damage provided support for the resource concentration hypothesis. Limited support was found for the attractant-decoy hypothesis; the total amount of damaged leaves of all mangrove species combined typically differed among stands, suggesting that crabs were not shifting to alternative mangrove species to offset reduced availability of *R. mangle* leaves. Finally, intra-specific differences in *R. mangle* leaf chemistry and sclerophylly among stands failed to explain associational patterns. Experiments that elucidate mechanisms responsible for defensive plant associations in mangrove ecosystems and determine whether such associations could be used in mangrove restoration are needed.

Variability of the turbulent kinetic energy dissipation rate in Winyah Bay, SC

Diane Bennett Fribance, Erin E. Hackett, Coastal Carolina University

Turbulence plays an important role in estuaries because it controls mixing of pollutants, biological microorganisms, and nutrients, as well as impacts temperature and salinity distributions. Furthermore, correct prediction (i.e., modeling) of these associated processes, including the overall circulation, requires accurate characterization of the turbulence usually implemented through highly simplified mixing models that depend on mixing parameters such as eddy viscosity. Variability of the turbulence over the tidal cycle and under various stratification conditions provides information as to whether turbulence models must also incorporate these factors. We examine the variability of turbulence in Winyah Bay, near Georgetown, SC, by making measurements of the turbulent kinetic energy dissipation rate, epsilon, using a microstructure shear probe. Winyah Bay is a tidally-driven estuary with velocities reaching 1.5 m/s and strong variations in salinity and temperature over each tidal cycle; therefore, we examine the variability of epsilon with respect to the tidal cycle as well as under different stratification conditions typical of all

estuaries. Tidal phase and stratification are evaluated using concurrent Acoustic Doppler Current Profiler, salinity, and temperature measurements. These results present the first estimates of epsilon in this region, moving towards the ultimate goal of understanding the implications of turbulence variability on model parameterizations, which in-turn will improve our understanding of the physical dynamics controlling the distribution of heat, salt, pollutants, and phytoplankton in this estuary.

The effects of intertidal eastern oyster (*Crassostrea virginica*) reefs on whole-ecosystem processes in the Matanzas River Estuary, Florida

Ray Grizzle, Jackson Estuarine Laboratory, University of New Hampshire; Nikki Dix, Guana Tolomato Matanzas National Estuarine Research Reserve

Intertidal oyster reefs represent a major habitat type in estuaries along the northeastern Florida coast, including the study area in the Matanzas River Estuary (MRE). Today, their bottom areal coverage in the MRE varies widely from what appears to be near-historical levels to locally extinct in highly urbanized areas. We identified three subestuaries (embayments) of the MRE that differed widely in oyster reef abundance ranging from ~none (fully urbanized) to near historical levels. Datasondes deployed in each subestuary for two 24-hr periods in Oct 2013 and Mar 2014 indicated dramatic differences in water quality metrics that could be interpreted as the result of differences in oyster feeding. Chlorophyll a (CHL) concentrations varied much less in the two systems with oysters, and had on average much lower concentrations during ebbing tides. In contrast, CHL fluctuated widely in the urbanized system with highest concentrations during ebbing tides. Alone, these data indicate that the embayments with oysters functioned as ecosystem-level sinks for CHL and the urbanized embayment was a source. Phytoplankton taxonomic composition also varied among the embayments with chain diatoms showing large decreases in the embayments with oysters, and dinoflagellates showing increases in the urbanized embayments. We are designing studies to better test a variety of hypotheses related to how oysters potentially affect ecosystem-level processes.

Available interstitial space, not surface area, alters prey survivorship in a complex habitat

Stephen G. Hesterberg, Susan S. Bell, University of South Florida*

For more than half a century ecologists have been intrigued with the relationship between habitat structure and local species diversity, but it remains unclear which physical aspect(s) of an object's shape are biologically meaningful, preventing a direct, cross-habitat measure of complexity from being established. Using a combination of field and controlled mesocosm manipulations, this study directly measures a commonly used habitat complexity metric, surface area (or amount of structure), and a less considered spatial property, interstitial space, to determine their separate and combined effects on predator-prey interactions in an oyster reef simulated habitat. Field experiments consisted of tethering prey items (*Eurypanopeus depressus*, i.e. mud crabs) to ceramic tiles onto which 3D printed oyster shells were attached so either the amount of interstitial space or surface area varied. A significant relationship was detected in tethering experiments between the amount of interstitial space available and prey survivorship after 24 hours, but when shell surface area was varied and interstitial space held constant, the amount of shell available was not a significant predictor of mud crab survival. These initial field experiments suggest that shape, particularly the usable space associated with a structure, and not just the amount of structure, should be considered when measuring habitat complexity for motile macrofauna.

Decadal-scale assemblage changes of salt marsh fishes in the North Inlet estuary, SC

Matthew E. Kimball, Dennis M. Allen, USC Baruch Marine Field Laboratory

Estuaries along the US east coast support abundant and diverse fish assemblages, and serve as important nursery grounds early life history stages of many species. Changes in environmental, physical, and biological factors, potentially operating at multiple temporal and spatial scales may alter fish assemblages over time. A bi-weekly trawl survey was conducted from 1981 to 1984 to examine the salt marsh fish assemblage of the North Inlet estuary. In 2012 we initiated a 4-year trawl survey using the same gear at the same tidal creek to examine changes in the fish fauna over the last 30 years. Preliminary comparisons of the two datasets revealed significant changes in both species composition and abundances. Overall, the total catch from 2012 - 2015 was approximately 15% of the earlier catch. The most abundant 5 species differed between the two periods; with the most abundant species from 1981 - 1984 (bay anchovy) nearly absent in later years at less than 1% of early abundances. We plan to

complete sampling at the end of 2015 and are currently exploring potential causes behind these drastic declines.

Water quality and algal blooms in the Indian River Lagoon, Florida

Margaret Lasi, St. Johns River Water Management District; Edward Phlips, University of Florida; Wendy Tweedale, St. Johns River Water Management District; Charles Jacoby, St. Johns River Water Management District

The Indian River Lagoon, located along the central east coast of Florida, historically has been the site of numerous algal blooms. Time series for chlorophyll-a concentrations, nutrient concentrations and species composition for selected locations indicated a relatively quiet period from 2006 – 2008 that was followed by a series of blooms. Over the past five years, the northern lagoon experienced a major bloom of chlorophytes and cyanobacteria in 2011, an intense brown tide event in 2012, and a red tide involving the toxic dinoflagellate *Pyrodinium bahamense* in 2014. Synchronous shifts in the status of nutrients and algal biomass point to the ubiquity of broad-scale forcing. Despite this temporal concordance, the magnitude and composition of the blooms varied among locations, which may be due to the capacity to use different forms of nutrients, differential nutrient limitation, physiological tolerances, and stochasticity.

Selection of *Vibrio* bacteria under pressure of triclosan in coastal ecosystems

Keri Lydon, Erin K. Lipp, University of Georgia*

One of the most ubiquitous antibiotic pollutants entering nearshore habitats is the hand soap antimicrobial triclosan. *Vibrio* bacteria, marine pathogens, may be naturally resistant to triclosan. We hypothesized that triclosan pollution selects for *Vibrio* in coastal waters. In this study, communities in natural seawater from 3 distinct locales were exposed to environmentally relevant concentrations of triclosan: North Inlet Estuary (Georgetown, SC), Doctors Arm Canal (Big Pine Key, FL), and Looe Key Reef (FL Keys). Surface water was collected in sterile 1L containers at each station and assigned, in triplicate, to time zero controls, no treatment (NT) controls, 5ppb triclosan, and 5ppm triclosan. Time-zero bottles were processed within 2 h of collection by spread plating onto TCBS for enumeration of *Vibrio*. All remaining treatments were processed the same way after 24 h exposures under ambient conditions. *Vibrio* counts after 24 h of exposure were normalized to time-zero to obtain mean relative *Vibrio* densities (T24/T0) and run through a one-way ANOVA, which indicated significant treatment effects ($p<0.0001$) at each location. Mean relative *Vibrio* densities were <5 for NT and 5ppb treatments for all locations (indicating no significant *Vibrio* response), while 5ppm treatments exhibited a significant *Vibrio* response with relative growth of 1696, 540.2, and 68.1 for North Inlet, Doctors Arm, and Looe Key, respectively. Tukey HSD analysis indicated mean relative *Vibrio* growth in 5ppm triclosan treatments were significantly higher in comparison with NT and 5ppb triclosan treatments ($p<0.0001$). Results suggest that *Vibrio* are selected for when exposed to triclosan in natural waters.

Preliminary performance of a set of coastal BMPs in Wrightsville Beach, N.C.

Michael A. Mallin, Mary I.H. Turner, Matthew R. McIver, University of North Carolina Wilmington, Center for Marine Sciences; Byron R. Toothman, North Carolina Coastal Reserve, University of North Carolina Wilmington

The Town of Wrightsville Beach, N.C. is an island resort community with beaches and other waterways used by the public for water-contact recreation. This community has had elevated fecal bacteria counts in some local waterways, and waterways adjacent to but outside of the town boundaries have had shellfish bed closures due to elevated bacteria counts. In an effort to curb such pollution, the Town collaborated with the National Estuarine Research Reserve, the North Carolina Coastal Federation, the University of North Carolina Wilmington, and the engineering firm Withers and Ravenel to install BMPs designed to retain, treat, and reduce stormwater discharges to local estuarine waters during fall 2014. A stormwater collection system draining a mixed commercial/institutional/roadway area with an outfall into the Atlantic Intracoastal Waterway was retrofitted with a series of rain gardens and water retention structures. Early results show that this has led to a 75% reduction in Enterococcus counts, a 68% reduction in fecal coliform bacteria counts, a 90% reduction in TSS counts, a 30% reduction in stormwater discharge, a 30% reduction in Enterococcus discharge, and a 98% reduction in fecal coliform discharge. A stormwater pipe collecting drainage from a residential area discharging into Bank's Channel was retrofitted with a sand filtration/stormwater retention box as well, and data acquisition is underway.

Comparison of the common oyster, *Crassostrea virginica*, reef in three northeast Florida creeks
Kimberly Mann, Jacksonville University*
Crassostrea virginica's importance to the estuarine ecosystem has long been acknowledged. In many locations, studies have been done to determine the status of *C. virginica* and find the best management practices to improve their population. This study was to determine the status of the oyster reefs in three creeks: the northern section of Sisters Creek (part of the Intracoastal Waterway), Clapboard Creek and Pumpkin Hill Creek. This study looked at three aspects of the oyster population, 1) looking at the macro-invertebrate community associated with oyster reefs, 2) determining the amount of spat settlement, and 3) looking at erosion of the creeks for the last 50-70 years. The macro-invertebrate study showed a relative low number of overall species found per creek, ranging from 4 to 13 taxa. In addition, the creeks appear to have moderate to poor community diversity values (H' values of 1.42 to 2.8). The spat settlement counts showed three very different creeks. Sisters Creek had very little settlement (average = 42 spat/m^2), Clapboard Creek had higher numbers but still low when compared to other studies (average = 313 spat/ m^2), and Pumpkin Hill Creek had values equivalent to many other oyster restoration areas (average = 1723 spat/ m^2). Photos from 1943/1960, 1990 and 2010 were uploaded into GIS and shoreline location were compared for erosion changes. The results show erosion has almost doubled in the last 20 years compared to the 30-50 years prior to 1990 for all three creeks.

Year 1 of salt marsh monitoring in the GTMNERR: Where do we go from here?
Pamela Marcum, GTM Research Reserve; Jason Lynn, Nikki Dix, GTM Research Reserve/University of North Florida
Salt marshes are a dominant foundational habitat along the coast of the southeastern United States and are subject to environmental and anthropogenic pressures throughout the region. To better understand salt marshes within the Guana Tolomato Matanzas National Estuarine Research Reserve (GTMNERR) in northeast Florida, detailed monthly monitoring of salt marsh vegetation and sediment elevation was conducted at six sites in 2014. Immediate goals of this research were to identify intra-annual (seasonal) and spatial patterns in salt marsh structure. Clear differences in dominant vegetation were observed among sites, but not among seasons. Peaks in vegetation abundance were observed in April-May at sites dominated by *Spartina alterniflora* and *Batis maritima*, while peaks at the site dominated by *Juncus roemerianus* were observed in October. Marsh sediment elevation was extremely variable among sample locations and will take more time to determine trends. Ultimately, these results will be used to inform research and develop a long-term monitoring strategy as part of the NERRS System-Wide Monitoring and Sentinel Site Programs.

The seagrass' guide to surviving a Superbloom!
Lori J. Morris, Robert H. Chamberlain, St Johns River Water Management District
Prior to a massive phytoplankton "Superbloom" event in 2011, many of the seagrass beds in the IRL were close to achieving their deep edge depth targets established by SJRWMD in 2005. However, despite seagrass expansion into deeper water, there appeared to be a "thinning" of seagrass density within many beds during the past 10 years. A standard depth range between 0.4 and 0.8m was found to have the densest and most stable seagrass cover. This depth range, named the core depth zone (CDZ), allows for comparison between seagrass transects. Analysis of seagrass density within the CDZ determined this thinning was more prevalent in areas of higher interannual variability. Stable CDZ appeared to be the most important factor affecting seagrass resiliency during and after the superbloom. The seagrass beds with highly variable density, and/or a density level lower than a functional threshold, have suffered the most loss and have been the slowest to recover.

Can students collect reliable, scientifically defensible monitoring data while becoming estuarine literate?
Kenneth Rainer, Josephine Spearman, Kaitlyn Dietz, Guana Tolomato Matanzas National Estuarine Research Reserve
National and state educational standards require K-12 students to take part in hands-on experiences while gaining knowledge and awareness about the subject at hand. At the same time, state and federal environmental agencies are tasked with conducting resource-intensive monitoring activities with limited budgets. The National Estuarine Research Reserve System (NERRS) is well-positioned to combine hands-on K-12 experiences with environmental monitoring efforts. At the Guana Tolomato Matanzas

(GTM) NERR in northeast Florida, K-12 students have been collecting environmental data since 2012. The objective of this project was to determine whether students attending onsite field experiences at the GTM NERR collected reliable data, while gaining awareness and knowledge about estuarine ecosystems. To test this, we compared 2014 student-collected monthly averages of air temperature, wind speed, water temperature, salinity, pH, and turbidity to nearby state and federal monitoring stations. To examine awareness, knowledge, and attitude changes we administered pre- and post-visit surveys. Overall, there were significant (p-value < 0.05) correlations between student- and agency-collected air temperature, water temperature, and salinity. However, there were no significant correlations among the remaining parameters. On average, student knowledge and awareness increased by 7.56% and attitudes shifted to reflect more positive outlooks on environmental conservation. Therefore, K-12 students are capable of collecting reliable, scientifically defensible data, but more work is needed to increase quality control and assurance. Closer attention paid to students at the time of data collection and training, prior to onsite field experiences, are suggested mechanisms to improve data quality.

Changes in the residency and distribution patterns of the Atlantic Stingray *Dasyatis sabina* in two Georgia creek systems over the course of three seasons

Sarah Ramsden, Mary Carla Curran, Department of Marine and Environmental Sciences, Savannah State University*

The Atlantic Stingray *Dasyatis sabina* is a demersal mesopredator that consumes commercially important fish and crustaceans. It is also an ecosystem engineer because it forms feeding pits that disturb benthic meiofauna. There are discrepancies about whether *D. sabina* is a seasonal or year-round resident of its coastal habitats. The purpose of this study was to determine the effect of season on the residency and distribution patterns of the Atlantic Stingray in two creek systems near Savannah, Georgia. Forty stingrays were tracked using acoustic telemetry in Romerly Marsh Creek and the Herb River. Bottom-water temperature was monitored with a stationary logger attached to one receiver in each creek. A monthly residence index was calculated for each stingray for each creek system, and seasonal distribution was determined for each stingray at each receiver location. Monthly residence was positively correlated with average bottom-water temperature in both creek systems, with Atlantic Stingrays utilizing creek systems most often (>60% of days) when bottom-water temperatures were warmest (>20°C) and least often (<20% of days) when bottom-water temperatures were coldest (<15°C). Additionally, usage by Atlantic Stingrays was low at all receiver locations during winter in both creek systems, with stingrays utilizing no location for more than 15% of days during the winter. Seven stingrays left the Herb River in winter and returned the following spring. Knowledge about the seasonal movements of Atlantic Stingrays contributes to a better understanding of what time of year this species may most impact benthic habitats and commercial fisheries.

Managing Everglades restoration, coastal flooding, and marsh droughts in light of climate change

Fred Sklar, Jayantha Obeysekera, SFWMD

The Florida Everglades is threatened as a result of 100 years of human manipulation. It wasn't until a critical mass of political power was made aware of the significant environmental, social and economic capital that has been lost due to this manipulation, that an $8 billion restoration effort was authorized by President Clinton in 2000. It has been 15 years since that historic event and during that time some progress has been made on water quality, operations and water supply, but the heart of restoration is hardly beating. Climate change, Florida topography and sea level rise has brought us to a new management nexus where water for restoration comes with new paradoxes and trade-offs that will be difficult to solve. Water management over the next 30 years will have a profound impact on the economic and ecological vitality of much of the Florida coast. This presentation will demonstrate where and how restoration of the Everglades is critical to the sustainability of coastal ecosystems.

Importance of suspended sediments in controlling bacterial metabolism and associated oxygen consumption rates in nearshore coastal waters of South Carolina, USA.

Erik M. Smith, Tracy L. Buck, Susan Denham, University of South Carolina and the North Inlet - Winyah Bay National Estuarine Research Reserve

This study quantified the role of particulate versus dissolved organic matter in fueling microbial metabolic rates in nearshore waters of an open-ocean embayment (Long Bay, South Carolina). Bi-weekly (in summer) to monthly (in winter) sampling was conducted at a fixed location approximately 250 m off the

beach face, just seaward of the surf-zone, in a water depth of 6.0 – 7.5 m. Vertical profiles of turbidity revealed a nepheloid layer that would mix up into the water column under times of upwelling-favorable wind conditions. At these times, concentrations of particulate organic carbon greatly exceeded that of dissolved organic carbon. Rates of bacterial production (3H-leucine incorporation) associated with the particle-attached bacterial community significantly exceeded rates of the free-living bacterial assemblage (accounting for an annual mean of 76% of total bacterial production). Variability in particulate organic carbon and particle-attached bacterial metabolism strongly controlled variability in total plankton community respiration rates and associated water column oxygen demand. Concurrent measures of water column primary production rates were light-limited and tightly coupled to turbidity levels. Variability in suspended sediment concentrations thus affected both autotrophic and heterotrophic metabolism and resulted in a net heterotrophic water column throughout the year.

Changes in sediment characteristics and benthic nutrient fluxes at a restored oyster reef
*Melissa Southwell, Jessica Veenstra, Charles Adams**, Elizabeth Scarlett**, Kristy Payne**, Flagler College*
Restoration of oyster reefs is thought to confer many beneficial ecosystem services, including protection from shoreline erosion, habitat for fish and invertebrates, and increased water filtration. Such projects may also cause changes in biogeochemical cycling of carbon and nutrients across the sediment-water interface that are just as desirable, but less well understood. We measured changes in sediment characteristics, mud snail abundance, and benthic NH4+ fluxes 1-2 years after an oyster reef installation at the GTM NERR. Particle size distribution, organic matter content, NH4+ porewater concentration, and surface sediment chlorophyll a content all changed significantly compared to controls. Sediment changes appear to be driven mostly by the reduction in physical energy behind the reef, allowing for deposition of finer, more organic rich sediment. Though remineralization of this organic-rich material generated higher porewater NH4+ concentrations in sediments, the increased benthic microalgal abundance at the sediment surface appears to mitigate most of the benthic NH4+ flux when light is available. Our results show that significant changes in carbon and nitrogen cycling occurred rapidly after this restoration project, likely resulting in increased retention in the sediment through a variety of mechanisms. Furthermore, feedbacks between physical, biogeochemical, and biological components appear to be significant and will complicate efforts to predict the biogeochemical effects of similar restoration projects. Nevertheless, quantification of such “secondary” effects is necessary to adequately evaluate the full suite of ecosystem services provided by such restoration efforts and to assess their true economic value.

Disturbance history alters selection of morphological traits in seagrass communities
Kathryn A. Tiling, C. Edward Proffitt, Florida Atlantic University*
Intra-specific diversity of foundation species has important ecological consequences, particularly in communities where species diversity is low. Trait diversity of seagrass has been shown to confer resistance/resilience in response to disturbance events to affect habitat structure and long-term stability. Our objectives were to (i) demonstrate that seagrass individuals showed unique morphological traits under similar environmental conditions and (ii) how these traits varied with disturbance history of origin sites. From the Indian River Lagoon (IRL), Florida, we quantified morphological variation among clones of the seagrass *Halodule wrightii* in an experimental common garden (30 unique clonal types from six sites). The disturbance history of each site was quantified based on the relative amount of seagrass loss that occurred during the 2011 die-off events in the IRL. These clones were grown in the same environment for 11 weeks to identify if unique morphological traits were maintained between clonal types. We found that *H. wrightii* individuals differed in shoot, root, and rhizome production, but demonstrated trade-offs between rhizome production (e.g., ability to spread) and density of shoots and roots (e.g., denser clones) under different disturbance histories.

Long-term trends in abundance of a larval fish in North Inlet-Winyah Bay National Estuarine Research Reserve: influence of freshwater input
Steven Vega, Ryan Rykaczewski, University of South Carolina; Dennis Allen, Baruch Marine Laboratory, University of South Carolina*
Coastal ecosystems have been subject to increasing stressors over recent decades due to coastal development, human population growth, and climate change. Improving scientific understanding of the environmental factors which influence the productivity of fish populations in coastal ecosystems is vital to

their prudent management, especially as the potential influence of anthropogenic climate change grows. Estuaries act as critical habitat for many fishes of primary ecosystem, economic, and recreational importance. One such fish, the planktivorous bay anchovy (*Anchoa mitchilli*), is abundant along the Atlantic and Gulf coasts and is a key prey resource for many estuarine and coastal piscivores. Within North Inlet-Winyah Bay Georgetown, SC, the bay anchovy historically was one of the most abundant fishes in the system. However, scientific surveys have suggested their populations have declined over the past 30 years. To determine what has contributed to the decline in anchovy population, we used a suite of long-term data sets collected between 1981 and 2003 including biweekly collections of anchovy larvae, a calanoid copepod (*Acartia tonsa*), and chlorophyll-a (chl-a) concentration, and monthly river discharge. Long-term declines in abundance were noted in these time series. Additionally, significant interannual correlations between *A. tonsa* and larval anchovy abundances and between chl-a concentration and *A. tonsa* abundance were noted. Further analysis has revealed that declines in river discharge are associated with declines in plankton abundances during peak spawning of the bay anchovy, and we propose a hypothesis relating this decrease in discharge to the long-term decline in anchovy abundance.

Sea Level Rise: New, certain, and everywhere. What to do in response?
Robert Virnstein, Seagrass Ecosystems Analysts
Sea level is rising, including the Lower St. Johns River. The rate of sea level rise is increasing. Expect >1 foot by 2050, >3 feet by end of century (projection). There will be impacts. Some are scary. Planning must incorporate this impending rise. (I am presenting this for feedback on how to present to politicians.)

ABSTRACTS FOR POSTER PRESENTATIONS
(in alphabetical order by presenting author's last name)

Diverse parasite communities threatened by coastal development in Georgia

James M. Alfieri, Tavis K. Anderson, Department of Biology, Georgia Southern University*

Parasites may be indicators of salt marsh functioning because of their dependence on multiple host organisms to complete their life cycle and sensitivity to environmental contaminants. To determine whether complex life cycle parasites are indicators of salt marsh functioning, we surveyed the parasite community of *Fundulus heteroclitus*, a common inhabitant of salt marshes in Georgia. Five salt marsh sites along coastal Georgia (St. Mary's, Shellman Bluff, Skidaway Island, and Tybee Island) were selected using a proxy for anthropogenic disturbance (impervious surface) and which also fell along a latitudinal gradient. Percent impervious surface within a 100 m buffer from the collection site ranged from 5% (Skidaway Island) to 60% (St. Mary's). 30 fish were necropsied from each site: 78% of fish were infected with parasites, and included 10 parasite taxa and 1,532 individual parasites. The most abundant parasite was a larval tapeworm, *Glossocercus caribaensis*, that uses fish-eating birds (Family Ardeidae) as a definitive host. Prevalence of complex life cycle parasites was dependent on site ($G=66.5$, $df=4$, $p<0.0001$), while prevalence of directly transmitted parasites was independent of site ($G=8.02$, $df=4$, $P=0.09$). Parasite intensity was associated with fish length ($\rho=0.3299$, $P<0.0001$) and mass ($\rho=0.2481$, $P=0.0036$) but did not differ among sexes ($t=37$, $df=128$, $p=0.7153$). Further, parasite species richness, intensity, and prevalence depended on an urbanization threshold ($\lambda=0.01$, $F=3120.7$, $df=4,137$, $p<0.0001$). This study suggests that complex life cycle parasites can act as proxies for human disturbance and ecosystem functioning. Further, these data reveal how landscape patterns can affect the fine-scale parasite transmission dynamics.

State-of-the-art imaging instruments available for research at the Baruch Marine Field Laboratory, Georgetown, SC

Dennis M. Allen, Matthew E. Kimball, J. Kyle Houser, Baruch Marine Field Laboratory, University of South Carolina

The Baruch Marine Field Laboratory, University of South Carolina has assembled an array of scientific instruments to enhance field research capabilities in coastal and estuarine environments. This new technology can be used to map and quantify plant and algal production, marsh wrack, surface temperature, sediment types, water movement, animal distributions, bioturbation, and landscape features at scales of centimeters to kilometers. The instruments can be used to measure changes at specific locations over time and to investigate underlying mechanisms. The terrestrial laser scanner (TLS) generates high definition (mm), three-dimensional, topographic images or maps of tidal marshes, creek basins, mudflats, oyster reefs, beaches, and other habitats. Repeated measurements estimate plant growth and changes in density and distribution. The infrared or thermal camera produces images that distinguish warm and cool objects. It can be used to identify locations where cooler groundwater discharges emerges on the tidal marsh surface. The multispectral camera can be used to assess plant condition and stress or distinguish soil types. We have deployed the cameras from a helium-filled kite-balloon (Helikite) 100-300 ft. above the habitats of interest, as well as from a boom (3-15 ft.). With a bird's-eye view of study areas, the cameras provide new insights into patterns and relationships across complex landscapes. All of the instruments are available for visiting investigators to use for individual or collaborative research in the North Inlet estuary and adjacent areas. More information and archived images and data obtained from 2014 field deployments are available on the Baruch Institute web site (http://www.baruch.sc.edu/ecosystem-and-landscape-analysis).

Reef introductions: Quantifying the success of *Crassostrea virginca* in new areas of Brevard County

*Lacie Anderson**, University of Central Florida; Sammy Anderson, Brevard Zoo; Virginia Barker, Brevard County Natural Resources; Paul Sacks, Linda Walters, University of Central Florida*

Crassostrea virginica, the eastern oyster, is a native keystone species that inhabits many coastal and estuarine ecosystems along the Atlantic seaboard. Introduction of this oyster into estuarine areas with no current populations is considered a pro-active approach to improve water quality. In November 2014, adult oysters grown by community members under their docks through oyster gardening, were deployed

in three locations in Brevard County. These sites were a Merritt Island impoundment (Marsh Harbor), Nicol Park (Port. St. John), and Scout Island (Melbourne Beach). Prior to deployment, we collected morphometric data: live oysters were counted, individually measured (shell length), and weighed. After deployment and through April 2015, ongoing measurements of abiotic factors including salinity, air and water temperature, and wind speed are being collected monthly. This data will be compared to success of five additional reef treatments (control= no shell; oyster restoration mats; bagged clean shell; and adult live oysters collected in spring) deployed in spring 2015. The success of these oysters will allow us to determine if these locations are good areas for proposed large-scale oyster deployments. The data will help determine how effective moving eastern oysters to new locations within the Indian River Lagoon is as a method of natural water quality improvement.

Non-target effects of mosquito control pesticides on the sub lethal stress response of the reef building coral, *Porites astreoides*

*Rachel Bladow**, University of North Florida; Kevin Olsen, Smithsonian Marine Station; Richard Pierce, Mote Marine Laboratory; Cliff Ross, University of North Florida*

The declining health of coral reefs is intensifying worldwide at an alarming rate due to the combined effects of land-based sources of pollution and climate change. Despite the persistent use of mosquito control pesticides in coastal populated areas, studies examining the physiological impacts on non-targeted organisms such as corals are limited. In order to better understand the effects of mosquito control pesticides on adult corals, specimens of *Porites astreoides* were exposed to ecologically relevant concentrations of two major pesticide ingredients, naled and permethrin. Following an acute exposure period of 24 h, specimens were allowed to recover for either zero, one or two days. Coral samples were assessed for photosynthetic efficiency and sub-lethal signs of stress using cellular biomarker assays. Biomarker and photosynthetic responses to pesticide exposure were variable and contingent upon the pesticide type as well as the specific biomarker being employed. Furthermore, the time of recovery usually had a significant impact on the endpoints examined. The importance of considering the complexity and differential responses encountered with this resilient species of coral will be discussed.

The impact of crown conch *Melongena corona* on the Eastern oyster *Crassostrea virginica* in Mosquito Lagoon, Florida

*Courtney Buck**, Casey Craig**, Jordan Filipponi**, Chelsea Landau**, University of Central Florida*

Oyster harvesters throughout Florida have complained that the crown conch, *Melongena corona*, is in competition with them for oysters, and has led to a large decline in intertidal oyster populations. In 2014, we conducted a three-part experiment in Mosquito Lagoon focusing on *M. corona* feeding preferences, abundance, and movements to determine their impacts on oysters. Our results indicated *M. corona*: 1) did not selectively forage on larger oysters, 2) moved a mean of 63.5 meters in 24 hours, and were rarely encountered with the exception of hotspots, where *M. corona* were found in high densities. We estimate that there are 5137 *M. corona* across 2802 oyster reefs in Mosquito Lagoon (0.01 conch/m^2). Therefore, it is not likely that *M. corona* plays a significant role in oyster population declines in this estuary.

Seasonal variation in the quantification of fecal bacteria removal by micro-zooplankton grazing in stormwater BMPs

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Stormwater runoff has a number of negative impacts on aquatic resources, including excessive nutrient loading, turbidity that interferes with aquatic plant photosynthesis, and loading of BOD that drives down dissolved oxygen. Stormwater contains elevated fecal microbes that cause health issues for many organisms, including humans. Best management practices (BMPs) are needed to help control the issue, and different BMPs should be analyzed to determine the best fit for varying situations, such as smaller vs. larger drainage areas, and specific land use. We performed seasonal experiments examining the effect of grazing by micro-zooplankton (protozoans, copepod nauplii and rotifers) on fecal bacteria removal within two different BMPs, a standard wet detention pond with little vegetation, and a vegetation-rich constructed wetland in Wilmington, North Carolina, during summer and winter of 2014-2015. Experiments were performed during dry and active rain periods for both sites. The experiments were conducted in 500mL flasks on a shaker table in the dark. Both 3-day grazing experiments and 24hr dilution assays were used.

Micro-zooplankton grazing impacts on fecal bacteria were often statistically significant in both the wet detention pond and constructed wetland. Three day grazing experiments consistently showed a significant grazing effect in summer and winter. One-day dilution experiments showed fewer significant grazing effects, and no evident seasonal patterns were seen. Future studies will examine the role of individual macrophyte vegetation species in stimulating micro-zooplankton grazing as a fecal bacteria removal process.

Lurking nutrients: changes in benthic macrophytes and their stored nutrients during the 2011 superbloom

Robert Chamberlain, Lori Morris, St. Johns River Water Management District (SJRWMD)

Drift macroalgae (DMA) is one of the three major autotrophic communities in the Indian River Lagoon. DMA extends important nutrient cycling and habitat functions into deeper water than seagrasses occupy. Studies sponsored by the St. Johns River Water Management District indicate that in many lagoon locations, DMA is the dominant benthic macrophyte, often contributing more biomass than seagrasses and their epiphytes combined. The preliminary estimates of nutrients stored in benthic macrophytes was approximately equivalent to nutrient loads from the watershed. Therefore, the unusual loss of DMA, concomitant release of nutrients, and subsequent lack of uptake is hypothesized to have fostered the unprecedented phytoplankton superbloom of 2011.

Tracers for groundwater-surface water interactions on the St. Johns River

Justina Dacey, Jeremy Stalker, Department of Biology and Marine Science, Jacksonville University; Peter K. Swart, Department of Marine Geology and Geophysics, University of Miami*

The geochemical and isotopic composition of surface waters and spring water was investigated to determine the relative contributions of source waters to the St. Johns River. Stable isotopes of oxygen ($\delta^{18}O$) and hydrogen (δD) as well as ion concentrations of Ba, Ca^{2+}, K+, Mg^{2+}, Na+, SO_4-, and Sr^{2+} were used as tracers to quantify groundwater from first- and second-magnitude springs discharging into the St. Johns River This method uses natural variation in source waters from isotopic precipitation/evaporation processes, and dissolution of carbonate ions in groundwater. Previous data demonstrates that groundwater discharges in the karst areas of central Florida may contribute proportionally more water to the St Johns River than historically predicted. Groundwater from springs in this section of the river is distinguished by elevated concentrations of Ca^{2+}, Mg^{2+}, Na+, and SO_4-, and lower concentrations of Sr^{2+} compared to river surface waters. Additionally, the δ18O and δD of spring water show depleted values of heavy isotopes, while inflowing surface water show enriched ratios of heavy isotopes. Together these tracers are used to differentiate relative contributions of surface water and spring water over one year.

Analysis of marsh loss and erosion within Northern Barataria Bay, Louisiana: the effects of the Deepwater Horizon oil spill

Donald R. Deis, Stefan M. Bourgoin, Atkins; Irving A. Mendelssohn, Qianxin Lin, Aixin Hou, John Fleeger, Louisiana State University

The release of an estimated 3.19 million barrels of oil from the Deepwater Horizon (DWH) event exposed the nation's largest and most productive wetland-estuarine environment to an unprecedented potential for environmental damage. Coastal Louisiana sustained widespread damage to its ecological structure and function, potentially affection wetland resilience and sustainability. The impact of wetland oiling on shoreline erosion has direct consequences to the sustainability of these important coastal systems. The goal of our project was to examine the effects of oiling on shoreline stability, specifically shoreline erosion. What are background erosional rates in Barataria Bay, and have marsh erosional rates increased in response to shoreline oiling? Does shoreline response to oiling differ with different degrees of oiling and different shoreline locations? Aerials used included 1998, 2004, 2005, and fall of 2010, 2011, 2012, 2013. No results were presented with spring imagery. Sampling sites span northern Barataria Bay, LA, from Wilkinson Bay to Bay Jimmy and represent areas of marsh shoreline classified as reference (no oil impact), moderately oiled (some oiling observed), and heavily oiled (significant oiling observed) as determined from SCAT surveys and soil TPH analyses. Available aerials of the region were obtained pre- and-post-spill to examine a time series of erosion rates. The distance from sampling site to marsh edge (+/- 0.45 m) was measured using ArcGIS at a 1:1500 scale; additional measurements were taken from two sites located to either side (approximately 10m) of the sampling site and an average distance to

marsh edge was calculated. Average distance to marsh edge was compared across aerials to give an estimate of marsh loss during the time period; all time periods were normalized to an annual basis.

The use of stable isotopes of nitrogen and carbon to identify relative foraging locations and trophic level of *Caretta caretta* and *Chelonia mydas* from nesting beaches in Northeast Florida

Kaitlyn R. Dietz, Jeremy C. Stalker, Jacksonville University; Peter K. Swart, Rosenstiel School of Marine and Atmospheric Science, University of Miami*

Studies of stable isotopes can allow understanding of biological and chemical natural cycling. With migratory species, stable isotopes aid in spatial and temporal migratory patterns, prey selection, primary productivity shifts, and changes in habitats. Urgency has been stressed to understanding migratory regions due to the want to understand how climate changes and habitat loss will impact species. This project proposes using stable isotope ratios of nitrogen ($\delta^{15}N$) and carbon ($\delta^{13}C$) to determine the relative foraging location and trophic level of Green (*Chelonia mydas*) and Loggerhead (*Caretta caretta*) sea turtles from nesting beaches in Northeastern Florida. We have used the mentioned stable isotopes from 264 turtle egg shells from the hatched nests from Mickler's Landing, Vilano Beaches, and Guana Tolomato Matanzas National Estuarine Research Reserve. Of those samples, 231 are from loggerheads and 33 samples are from green sea turtles. Carbon and nitrogen isotope ratios have been be compared to published carbon and nitrogen known ratios of variety of species within the prey portfolio of sea turtles in the region (Godley, 1998). They are also compared to recently published carbon and nitrogen isoscapes from Ceriani (2014). Of the preliminary data analysis, the $\delta^{13}C$ isotopic concentrations for loggerheads averages -15.37+/-0.024, for greens -12.43+/-0.279. For $\delta^{15}N$ loggerheads average 11.63+/-0.071, for greens 10.53+/-0.089. It appears that there are at least two distinct clusters of loggerheads and two clusters of greens. With further analysis, we plan to show the distinct clusters and the regions they foraged prior to nesting on the northeastern Florida beaches.

Behavior of the mangrove tree crab *Aratus pisonii* during its active season

Margaret Renee Edwards, Aaron Lincoln*, Department of Biological Sciences, Louisiana State University Shreveport; Haven Holstein**, Department of Integrative Biology, University of South Florida; Amy A. Erickson, Department of Biological Sciences, Louisiana State University Shreveport, Department of Integrative Biology, University of South Florida*

The mangrove tree crab *Aratus pisonii* is one of the dominant crab species found in tropical and subtropical mangrove forests of the neotropics. This crab co-occurs with the red mangrove *Rhizophora mangle*, relying on it for food and shelter. *Aratus pisonii* is one of few crabs in the world to feed on live mangrove leaves. This study documents behavioral patterns of *A. pisonii* during its active season. A time budget analysis was performed to demonstrate the percent of time this crab spends on inter- and intra-specific interactions (ie. feeding, competition), grooming, crawling, and remaining stationary. Most of its time was spent resting, which was followed by crawling and foraging. Foraging related activity was most frequently performed on bark. Crabs also spent more time avoiding vs. chasing one another.

Habitat location using stable isotopes analysis of strontium in *Tursiops truncates* teeth

Ivana Espinosa, Jeremy Stalker, Rosemarie Borkowski, Peggy Ostrom, Jacksonville University*

This project will utilize stable isotopes of strontium (δ87Sr) as a tracer of bottlenose dolphins' migration patterns over their lifetime in Northeast Florida. Stable isotopes of teeth will be analyzed from deceased bottlenose dolphins in the St. Johns River and coast of Northeast Florida. Stable isotopes can be used to differentiate and identify an organism's migration. δ87Sr will differentiate estuary resident dolphins from migratory dolphins or ocean resident dolphins by means of their appetite. These stable isotopes are strongly bonded to tooth enamel due to the fully crystalline apatite which is never replaced during an animals' lifetime (Kohn, Matthew J et al., 1998). The composition of previous layers of enamel are unaffected by changes in an animals' behavior or location. The current layer of enamel is a recorder of the current conditions. δ87Sr in aquatic animals indicate its environment. Strontium isotope ratios are signatures from local geology (Price, T. 2000). Strontium signatures in tooth enamel derive from food living/ growing in a specific geologic area and reflect the source of the animal's diet around the time of birth. Strontium ratios will be compared to know ratios in fresh water and oceanic water. Marine Biologists have been tracking the movement of dolphins for years but have been unable to gather a life sequence of foraging and migration. Unfortunately it is difficult to determine where specific dolphins migrate from once

they are stranded or deceased. Using these stable isotopes we hope to be able to track a dolphins' life pattern.

Evaluation of two habitat complexity metrics for predicting flatback mud crab (*Eurypanopeus depressus*) abundance on oyster reefs in Tampa Bay, Florida

*Jessyca E. Garlock**, Stephen G. Hesterberg*, Susan S. Bell, University of South Florida*

Measurements of surface rugosity are preferred over quantifying interstitial space in habitat complexity studies due presumably to the ease of their collection in the field. However, surface rugosity may not be meaningful when trying to predict motile invertebrate abundance; rather, the usable space in a structure may be a better predictor in complex habitats. To test this hypothesis, the relationship between density of the most common motile macroinvertebrate on oyster clumps, the flatback mud crab, (*Eurypanopeus depressus*) and estimates of both interstitial space and surface rugosity of oyster clumps was examined at three sites in Tampa Bay, Florida. Interstitial space was measured in the field using a "crab on a stick" to estimate space accessible to an average-sized mud crab (COAST method). There was no clear relationship between surface rugosity and mud crab density across all sites. However, significant positive relationships between interstitial space and mud crab densities were observed. These results suggest that the usable space associated with an object's structure may be a more accurate predictor of mud crab abundance than surface rugosity. Additionally, we propose that the COAST method may be a potentially effective and efficient approximation for interstitial space in the field.

Using hydrodynamic models and water quality data to predict restoration suitability of *Crassostrea virginica* in Apalachicola Bay, Florida

Stephanie Garvis, John Weishampel, University of Central Florida*

In light of declining oyster populations in Apalachicola, the state of Florida is investing $4.5 million dollars to an oyster restoration program designed to restore oyster densities and create a sustainable oyster harvest. These restoration practices often include shell dumping or hand-shelling, which are focused on increasing available substrate (cultch) for oyster larvae to settle. Unfortunately, these restoration efforts do not account for possible changes to the hydrodynamic environment that could impact oyster settlement and growth. Our proposed research focuses on creating a series of restoration suitability models for oyster habitat that incorporate environmental parameters such as: high-resolution topography/bathymetry, nutrient runoff, tides, wave energy, salinity, and sediment transport. Once the candidate restoration suitability models have been built in ArcGIS, we will use a model selection procedure to select the model that has the most predictive power with the least number of model parameters. The selected model will identify which hydrodynamic parameters are positively or negatively associated with current oyster habitat distributions. We will use those associations to predict areas that are highly suitable for restoration but do not currently have oyster habitat, and validate the selected model with experimental oyster restoration plots. This information will be used to predict how the ideal oyster restoration habitat will change as a result of sea level rise by the year 2050 under different sea level rise and climate change scenarios, informing both the long-term sustainability of restoration efforts as well as future restoration plans.

Indian River Lagoon Observatory: Real-time water quality data network for research, education, and outreach

M. Dennis Hanisak, Kristen S. Davis, Ben Metzger, Harbor Branch Oceanographic Institute at Florida Atlantic University

The goal of the Indian River Lagoon Observatory (IRLO) is to investigate ecological relationships in the Indian River Lagoon (IRL) and how they are impacted by natural and human-induced stressors. An important IRLO component is a network of advanced observing stations. We are deploying a network of 10 Land/Ocean Biogeochemical Observatories (LOBOs) in the IRL and St. Lucie Estuary to provide real-time, high-accuracy, and high-resolution water quality data through an interactive website. Continuous, high-resolution measurements are being made for: temperature, conductivity, depth, turbidity, current speed and direction, chromophoric dissolved organic matter, nitrate, phosphate, dissolved oxygen, pH, and chlorophyll *a*. These reliable, continuous observatory data will enable better quantification and modeling of relationships between environmental factors and biological processes in the IRL and enable scientists, managers, educators, students, and the public to directly observe long-term ecosystem changes and those driven by events, such as freshwater discharges, droughts, storms, and algal blooms.

Physical monitoring of coastal waters: an educational experience

*Diane B. Fribance, Sloan E. Hilton**, Greg Masessa**, Emilye Rybarczyk**, Anna Vidal**, Coastal Carolina University*

Undergraduate Marine Science majors are more likely to continue with the major if they are able to have direct, hands-on experience with research early in their academic careers. Coastal Carolina University's Marine Science Department has made an effort to provide one-credit experiential learning courses that provide these opportunities for students. In order to identify students with an aptitude for physics early on, and to contribute to University-wide experiential learning efforts, the course MSCI 399Q: Physical Monitoring of Coastal Waters began in the spring of 2014. Students maintain and deploy instruments at White Point Swash, a tidal creek along the South Carolina coast. Measurements include time series of temperature and salinity at several locations along the swash for a total of seven months in 2014, and the loggers have been redeployed in 2015. Students also measured water velocities including one six hour survey surrounding low tide. Prior student projects evaluated volume flux as it relates to tidal phase, and developed analytical models to predict changes in temperature and salinity. This data set could be used in the future to look at correlations with water quality being measured by another group on campus, and a variety of other process related questions. Course assessments include a final oral presentation incorporating demonstration of data analysis capabilities, a detailed lab notebook, and a reflective essay at the end of the semester.

Long-term variation of population attributes and *Perkinsus marinus* infection in oysters from northeast Florida

Yungkul Kim, Bethune-Cookman University; Eric N. Powell, University of Southern Mississippi

NOAA's National Status and Trends Mussel Watch Program is the longest continuous, nationwide contaminant monitoring program in U.S. coastal waters. As part of the Program, oysters were sampled each winter at two sites along the northeast Florida coast (i.e. Chicopit Bay and Crescent Beach) from 1995 to 2007. To examine the interannual variation and to assess temporal trends, oysters were analyzed for population indicators (e.g. length, sex, reproductive stage), and also for prevalence and infection intensity of the oyster pathogen *Perkinsus marinus*. Initiation of infection and progression of oyster Dermo disease caused by this pathogen are favored by high temperature and high salinity. Long-term mean and median infection intensity, and long-term prevalence of *P. marinus* infection will be compared between the two sites and also among the sampled years with the expectation of close relationships between the *P. marinus* epizootics and the long-term climatic changes. Temporal variability of other biological and environmental variables will be also discussed.

Integrating continuous ammonium measurements with real-time LOBO monitoring in Florida's Indian River Lagoon

Brian E. Lapointe, Laura Herren, Marie Tarnowski, HBOI/FAU; Natchanon Amornthammarong, CIMAS/RSMAS/UM and AOML/NOAA; Jack Stamates, AOML/NOAA; Peter Ortner, CIMAS/RSMAS/UM; James Hendee AOML/NOAA

The Indian River Lagoon (IRL) is a shallow, biodiverse estuary that extends for 156 miles along Florida's east-central coast. Nutrient pollution associated with rapid urbanization has been a major contributing factor to the development of phytoplankton blooms in 2011 and 2012, which were followed by extensive seagrass die-off and wildlife mortalities involving manatees, dolphins and pelicans. Most water quality monitoring efforts in the IRL have relied largely on analysis of grab samples, which have limited value in observing stormwater-driven phytoplankton bloom dynamics. To better understand these important ecological events in the IRL, FAU/Harbor Branch developed a LOBO (Land-Ocean Biogeochemical Observatory) network in the central IRL as part of the Indian River Lagoon Observatory (IRLO). Currently, four LOBOs are operational and measure temperature, salinity, dissolved oxygen, turbidity, colored dissolved organic matter (CDOM), chlorophyll a, nitrate, and phosphate. An autonomous batch analyzer (ABA) was deployed adjacent to a LOBO in the Harbor Branch ship channel during the wet season between September 23 and October 12, 2013. High ammonium concentrations (up to 10 µM) were associated with high rainfall during the first week of the deployment, which was followed by a period of lower ammonium concentrations and reduced rainfall. Pulses of ammonium were repeatedly followed by increased chlorophyll a concentrations (up to ~ 8 µg/l) during the deployment, whereas no such temporal relationship occurred for nitrate. The ammonium pulses followed sharp decreases in conductivity,

demonstrating the importance of stormwater in driving ammonium-enrichment and phytoplankton blooms in the central IRL.

Linking coastal water quality and eutrophication to land-based anthropogenic N footprint: a case study in Great Exuma, the Bahamas

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Great Exuma is a growing tourist destination in the central Bahamas and has been subject to increasing anthropogenic coastal impacts in the last 15 years. Symptoms of coastal eutrophication were observed in a recent 10-year ecological monitoring program, particularly around the major settlement George Town where only poorly managed sewage treatment facilities were in place. Water samples from 35 stations across the island were collected in November 2014 for analyses of phosphate (PO_4^{3-}), combined nitrate/nitrite (NO_2^-/NO_3^-, NO_x^-), total nitrogen (TN), dissolved organic carbon (DOC), chlorophyll-a (chl-a), and nutrient bioassay. The "N footprint" concept was employed to characterize land-based anthropogenic nitrogen pollution from food consumption and waste, and to explain nutrient levels of coastal waters through GIS analysis and spatial statistics. The total N footprint of George Town was estimated at 5597.63 kgN/year. Spatial analysis showed that the profile of land-based N footprint explained elevated nutrient levels in many adjacent sites. A semi-enclosed coastal lagoon surrounded by buildings in George Town had significantly higher levels of TN ($p=0.046$) than other water bodies. In that lagoon, stations far inshore had significantly higher levels of PO_4^{3-} ($p=0.025$), TN ($p=0.046$), DOC ($p=0.007$), and chl-a ($p=0.081$). Most stations across the island were strongly P-limited, characteristic of many tropical carbonate islands, but there was a tendency that P limitation was reduced at more polluted sites. Before irreversible coastal ecosystem phase shifts occur in Great Exuma, better solid and food waste management and effective sewage disposal facilities are needed to reduce nutrient loading from anthropogenic processes.

Effects of wave exposure on the structure of fish assemblages in the Northern Gulf of Mexico

Lauren Liddon, Jacob Schaefer, University of Southern Mississippi*

Wave exposure can have a significant effect on the structure of fish assemblages of any coastal area. Few studies have explored the extent of this in salt marsh estuarine habitats, which is vulnerable to coastal erosion. Therefore, a study to better understand the possible effects of increased wave exposure on fish assemblages is needed as the threat of coastal erosion becomes increasingly prevalent. The Mississippi coastline has salt marsh habitat with many small bays and estuaries that provide shelter and produce gradients of wave exposure ideal for this study. We sampled fish assemblages monthly for 4 years at several coastal sites to address questions about how wave action impacts fish assemblages. The sites were categorized based on the intensity of exposure (high/intermediate/low wave action). To quantitatively show the different wave actions at different sites, two plaster balls will be deployed and allowed to soak for 24 hours at each site. The amount of plaster dissolved correlates with intensity of wave action. After drying, the weight loss will be compared across the sites to form a wave exposure gradient. We predict that sites with similar wave exposures will exhibit similar trends in both species richness and fish abundance. We also hypothesize that the sites with intermediate wave exposure will have the most fish diversity. The samples previously collected were taken on days with minimal wave action for the safety of the collection crew. We plan to further this study by sampling these sites on waver days to determine if the trends continue.

A comparison of worm rock fauna on nearshore natural and artificial reefs in Palm Beach County, Florida

Daniel A. McCarthy, Jacksonville University

Shallow hard bottom habitats along the east Florida coast can harbor a high diversity and abundance of fish and invertebrates. These habitats often need to be mitigated when they are covered by sand during beach restoration projects. It is unclear how well currently used artificial reefs restore ecological function of lost habitat. As part of a larger state funded project, this study compared invertebrates encountered in worm rock clumps in artificial versus natural habitats at four depths (0-1, 1-2, 2-3 & 3-4 m) during six

surveys that were conducted from 2009 to 2013. Over 225 worm clumps were sampled for invertebrates within natural and artificial reefs in Palm Beach County, Florida. More than 28,000 individual invertebrates representing over 90 taxa were counted among samples. More than 54% of the invertebrates found consisted of amphipods, although isopods, crabs, and sipunculans were fairly abundant as well. Various species of shrimps, bivalves, polychaetes, and echinoderms accounted for 3.3% to 1.5% of the samples. Unfortunately, the strongest comparison among treatments could only be made for 2009. This is because worm rock was not found at many natural sites during remaining surveys. For 2009, the numbers of invertebrates found in worm rock were highly variable and similar among natural versus artificial habitats. However, natural reefs had higher numbers of taxa compared to those in artificial habitats. Although worm rock was relatively scarce during the study, when present it enhanced structural complexity and supports numerous invertebrates likely important in the nearshore hard bottom food web.

Morphometrics and possible endocrine disruption in two populations of fiddler crabs along the Georgia-Carolina coast

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Fiddler crabs fill an important niche in salt marsh ecology: they are a crucial food source for crabs and birds, their burrowing provides aeration of marsh soils, stimulates nutrient turnover and promotes marsh grass growth, and they are bioindicators of environmental contaminants. Such contaminants affect normal reproductive development and functioning, thus acting as endocrine disruptors. A common marker for endocrine disruption is expression of the female egg yolk protein vitellogenin (VTG), with increased expression documented in males of various species inhabiting polluted environments. This study investigates the presence of anthropogenic influences on morphology and VTG expression in sand fiddler crabs (*Uca pugilator*) and mud fiddler crabs (*Uca pugnax*) from two locations: Fort Pulaski in Savannah, GA, and Hunting Island in SC. Crabs were collected and carapace width (CW) and cheliped length were measured. Hepatopancreases were harvested in the field and placed in RNAlater for future RNA isolation and RT-PCR to determine VTG expression. Vitellogenin primers were designed using homologous sequences from closely related species and are in the process of being optimized. Cheliped length to CW ratio was used to analyze morphological differences between the two populations, and statistical significance will be determined.

Walk or stand? Activity budgets and responses to predators of three fiddler crab species

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Predator-prey dynamics have strong influences among many communities. In the salt marshes of Tybee Island and Hunting Island three species of fiddler crabs were captured and observed in a lab setting in order to determine if predator avoidance behavior differed among them: *Uca pugnax*, *Uca pugilator*, and *Uca minax*. At Tybee Island, there is an overlap in where *U. pugnax* and *U. pugilator* are found, but in Hunting Island there is a clear separation where there are elevation increases in the marsh. *Uca minax* is often found interspersed between the other two species. Birds and crab predators (*Sesarma* spp.) are found throughout the marsh. Marsh mesocosms were constructed with native sediment and artificial seawater. Twenty fiddler crabs chosen for observation were randomly selected and marked to represent their population. Activity budget results were calculated and results showed significance among the species for walking and standing in the presence of a predator. However, there was no significance among the species in the behaviors of hiding, climbing, cleaning, burrowing, fighting, bubbling, pushing mud and sand, and feeding. More trials would be necessary to determine if the other behaviors would show significance among the species.

A comparison of mud fiddler crab response to varying levels of glyphosate

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As land use changes and urbanization increase in coastal zones, more pollutants are entering into estuaries and salt marshes. Here, organisms are often exposed to damaging concentrations of pollutant that are detrimental to basic functions such as behavior. Mud fiddler crabs (*Uca pugnax*), a common inhabitant of southeastern salt marshes, are important in these ecosystems. The purpose of this experiment was to determine the effects of varying concentrations of glyphosate, a common weed killer ingredient, on growth, burrowing behavior, and general activity. Crabs were collected from two locations: Tybee Island, GA and Hunting Island, SC. Four mesocosms with 10 crabs each and concentrations of glyphosate at 0%, 1%, 3%, and 6% were maintained for two weeks; each mesocosm was repeated 3

times for a total of 3 trials each. No significant difference was found for the number of deaths between sites or among treatments, but Tybee Island crabs made significantly more burrows than Hunting Island crabs. Tybee Island receives many visitors, and is downstream of Port Royal and Port of Savannah, and data collected by the EPA suggests it is highly polluted. The Tybee Island behavior may be associated with this exposure, but more research is needed.

Vertical settlement patterns of bivalves in a northeastern Florida estuary

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The ability of larvae to migrate vertically can be crucial in strengthening dispersal potential as it allows the larvae to somewhat control dispersal. Therefore, understanding larval behavior and depth structure at different life stages can be important to identifying source populations and for predicting range expansion of invasive species. This study examines settlement of bivalves in a northeastern Florida estuarine system. We compared settlement of several bivalve species among different depths and between main channel and feeder creek sites. Vertical distribution of settlement was tested by placing spat collectors at multiple depths at 4 sites, 2 main channel sites and 2 feeder creek sites, and collected every month for 3 months over the summer for 2 years. Spat of the introduced mussel species, *Perna viridis* and *Mytella charruana*, and native species, *Crassostrea virginica* (oyster), and, *Geukensia demissa* (mussel) were enumerated under a stereoscope. We found that all species were more abundant in the main channel than the feeder creeks with virtually no settlement of introduced species in feeder creeks. *Crassostrea virginica* was the only species to show significant settlement high in the water column, while *P. viridis* and *G. demissa* were most abundant at the lowest depth.

A comparison of nearshore hardbottom fish communities in Palm Beach County, Florida, 1990-2014

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Shallow hard bottom habitats along the east Florida coast are suggested to be very important for both adult and juvenile fish species. Unfortunately, these habitats are often impacted by sand burial or scour during neighboring beach restoration projects. Considering that such potential impacts having been occurring for over thirty years along with increased fishing pressure, eutrophication and climate change, it is unclear how fish communities may have changed over time in south Florida. The purpose of this study is to assess potential long term temporal changes in fish communities found on nearshore hard bottom habitats (< 4 m depth) in Palm Beach County, Florida. The presence and life stage of fish encountered on over 50 transects were scored during July 2014 in a manner similar to those from a study conducted in 1989. Data were statistically compared between year, latitudinal section of the County (North, Middle, South) and proximity to shore (inshore vs. offshore) using PRIMER. Over 80 fish species were identified during summer 2014 versus 118 during summer 1989. However, preliminary results suggest that the frequency of occurrence of many fish species was lower for 2014 than 1989. This in part because members of the Families Scaridae and some Pomacentridae were less frequently encountered during 2014. Latitudinally, most fish species were generally encountered throughout the County with the exception of Black Margates which were most abundant to the North. Finally, generally more Molly Millers and Hairy Blennies were encountered inshore than offshore for both years.

Effect of patch size and vegetation type on marsh nekton

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Coastal wetlands are extremely productive ecosystems that support an abundance of organisms at higher tropic levels. Coastal wetlands also act as important buffers from storms and help protect major cornerstones of coastal economies, such as tourism and fisheries. Despite the clear need for the protection of these habitats, anthropogenic use of coastal wetlands has increased in frequency and intensity, resulting in the fragmentation of once continuous habitats. A central challenge to assessing the impact of marsh fragmentation is the lack of quantitative distribution and abundance data from specific habitat types. This is especially true for species that are not commercially or recreationally harvested and are, therefore, not regularly monitored by state and federal resource management agencies. This study makes use of quantitative abundance, habitat use, and distribution data for non-harvested marsh nekton collected in oligohaline marshes (salinity 0.5-5ppt) of coastal Mississippi. To assess how nekton assemblages varied by habitat, patch geometry and position in patch (core vs. edge), four sites along coastal Mississippi were sampled in the summer of 2014. Nekton were sampled in adjacent patches of

submerged aquatic vegetation and emergent vegetation using a 1-m2 throw trap. Marsh patch geometry was quantified, using aerial pictures taken with a GoPro camera secured to the end of a 20ft telescoping pole. Points around the patch were digitized in TPS software and analyzed using R. The results of this study indicate that diversity and abundance of nekton in the Mississippi marshes vary significantly based on habitat type.

Propagule trapping: examining the rate of successful *Rhizophora mangle* propagule recruitment along the restored shorelines of turtle mound

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The red mangrove *Rhizophora mangle* plays an essential role in erosion prevention along Florida's coastlines. With its large prop roots, *R. mangle* also creates a natural sanctuary for many species of fishes and invertebrates. It is benefits such as these that attract ecologists and conservationists into using mangroves for "living shoreline" stabilization projects. For this study, we monitored the recruitment of *R. mangle* propagules along the restored shoreline of Turtle Mound National Historic Site in Canaveral National Seashore. Three types of shoreline in this area were examined: natural intact, natural damaged, and restored shorelines. To evaluate *R. mangle* propagule recruitment rates at these sites, the study was broken into two parts. First we recorded *R. mangle* propagule and seedling counts as well as individual plant morphometrics (e.g. damage, seed length, seedling height). In the second part of this study, we tagged 243 *R. mangle* propagules and haphazardly deployed them within the different sites. Each site was marked with GPS. When a tagged propagule was later recaptured, the location was again marked with GPS to analyze movement of propagules. Comparing the settlement success rates from each shoreline category indicates a relationship between shoreline type and long-term recruitment. Current data suggests that time since restoration has a statistically significant influence on long-term recruitment. As *R. mangle* planted at restored sites continue to grow, increased recruitment is predicted for the restored shorelines of Turtle Mound.

Comparison of benthic faunal abundance and diversity on restored and non-restored sites along the Tolomato River in the GTMNERR

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Oyster reefs are an invaluable resource both locally and nationally. They provide an array of ecosystem services which include stabilizing shorelines and supporting recreational and commercial fishing. Due to human impacts such as increased wave erosion and overfishing, oyster reef habitat has significantly decreased. Along the Tolomato River in the Guana Tolomato Matanzas National Estuarine Research Reserve, oyster shell reefs and fiber logs were used to restore habitat and prevent further shoreline erosion. To assess the assemblage of benthic fauna, an important component of the estuarine food web, this study compared benthic invertebrate and fish abundance and diversity in restored and non-restored sites. Settlement trays were used to collect the benthic fauna. Four trays were placed at each of the five sites. At each site, three trays were collected monthly while the fourth was collected every three months to look at effect of disturbance on settlement assemblages. Abundances, species richness, and Shannon-Wiener diversity index values among treatments were used to analyze the potential impacts of the restorations on the benthic faunal community. The dominant species included *Palaemonetes pugio* (grass shrimp) and *Petrolisthes armatus* (green porcelain crab). There were some differences in abundance and diversity among treatments. Further analysis may be needed to fully understand the impacts of these restoration projects, but the results showed that the oyster shell reefs and fiber logs create valuable habitat that has the ability to support a relatively diverse and abundant benthic faunal community in comparison to eroding river edge habitats.

***Amphitrite ornata* erythrocruorin functions with substantial dehaloperoxidase activity**

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Some marine annelids that live in mudflats of benthic ecosystems (e.g. *Amphitrite ornata*) are amidst relatively toxic naturally occurring bromophenols, which serve as putative allelochemical defense compounds that are secreted by other polychaete species, such as *Notomastus lobatus* and *Thelpus crispus*. Although *A. ornata* does not produce bromophenols, they are able to detoxify them through the enzyme activity of dehaloperoxidase (DHP). Their intracellular DHPs are globins with evolved/enhanced peroxidase function. The well-studied *A. ornata* DHP isoenzymes (A and B) are located in the coelom of

the worm; however, no experimental studies have been carried out on the extracellular hemoglobin (erythrocruorin) as a candidate for DHP activity. In this study, we isolated the *A. ornata* erythrocruorin from freshly excreted extracellular fluid and tested it for DHP activity. The results reveal significant DHP activity and Michaelis-Menten kinetics for the degradation of substrate 2,4,6-trichlorophenol in the presence of H_2O_2 will be presented.

It's getting hot in here: Mummichog response to variable temperature and light expsosure
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Mummichogs, *Fundulus heteroclitus*, can tolerate a wide variety of temperatures and salinity concentrations. This ability makes them a model organism and they have been used in many studies ranging in the fields of toxicology, cancer biology, physiology, and endocrinology. The coastal environments in which they are found are subject to constant changes in temperature and salinity, and as climate change effects these regions, salinity and temperature are expected to depart from normal conditions. The purpose of this experiment was test behavioral responses such as motility and feeding, in response to varying light exposure and temperature. We hypothesized that increasing the water temperature the activity of the fish would also increase. Mummichogs were collected from coastal Georgia and South Carolina. Three tanks with 10 fish each were set up simultaneously: fish in extreme cold temperatures, fish in extreme hot temperatures, and a control. Fish activity was monitored for 3 months. Our initial results suggest mummichogs prefer warmer temperatures under regular lighting. Based on the literature, our results are similar to the described activity and feeding habits of the fish.
As coastal environments change due to climate change, mummichogs appear to be within their physiological limits.

Oyster reef declines and restoration in Mosquito Lagoon: 8 years of data
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In Mosquito Lagoon, one of the primary threats to reefs of the intertidal oyster *Crassostrea virginica* is wakes from recreational boats. Wakes dislodge live clusters and tumble them into piles that extend above mean high water. Because the area is microtidal, the clusters do not roll back down and the oysters subsequently perish, with only bleached piles of disarticulated shells remaining. These piles of shells then migrate shoreward at a rate of 0.9 m/yr until the reefs have completely washed into the marsh. No-wake zones are unlikely to be developed for this popular fishing area, so restoration protocols were developed that could withstand intense boating activities. Since 2007, 68 reefs (2.01 acres) have been restored with the assistance of over 42,000 volunteers. With an average of over 900 live oysters m^2 on restored footprints, significant increases in live oyster numbers are also now documented in intertidal areas surrounding these footprints. Restored reefs are also able to increase in thickness to keep up with local sea level rise.

Changes in estuarine salinity and inundation on the Georgia Coast
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The Georgia coast is characterized by complex estuarine systems that contain inter-connected channels and are associated with high-diversity of biological resources. Increases in freshwater withdrawal from rivers to support upstream urbanization, changes in the frequency of drought occurrence, and sea level rise can potentially lead to changes in estuarine salinity and inundation frequency. A high-resolution hydrodynamical model is used to describe salinity and inundation variability in the estuary. Numerical simulations show that different levels of sea level rise can lead to substantial changes in salinity and inundation. As sea level rises and the majority of creeks and intertidal areas become inundated, freshwater from the Altamaha River flowing toward the ocean is partially blocked and diverted toward the adjacent marsh areas, leading to reduced salinity in those regions. Near the river mouth and at Sapelo Sound farther north, salinity is predicted to increase significantly.

The development of a baseline for spatiotemporal variability in planktonic communities of the lower St. Johns River estuarine system
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Estuarine waters worldwide are facing increased habitat destruction, over-exploitation, and rapid species decline. High temporal variability of estuarine systems renders health assessments difficult without

baseline knowledge of the local interactions occurring at the primary producer and consumer levels. Shifts in these community compositions, such as cyanobacterial blooms, can alter food-web dynamics and the flow of carbon and energy, thus compromising the stability of the surrounding ecosystem. To better understand these interactions, spatiotemporal distributions of meso-, microzooplankton and phytoplankton taxa were quantified to develop a baseline for seasonal planktonic community structure and the relative influences of biotic and abiotic factors. Monthly neuston 200 and 20µm net samples with continuous and discrete abiotic data (temperature, conductivity, D.O.) were collected at three distinct sites along the Lower St. Johns River (LSJR) salinity gradient, (Marine, Estuarine, and Freshwater) in northeast Florida from September 2013 to October 2014. Mesozooplankton between 200 and 1000µm dominated the majority of samples at all sites, though taxonomic composition varied significantly between freshwater and marine sites throughout the sampling period ($p<0.05$). Calanoid Copepods dominated estuarine and marine samples, reaching maximum average abundances of 0.34 individuals/L, while Cladocera (*Bosmina* spp.) dominated freshwater samples, with maximum average abundances of 0.21 individuals/L. Abiotic factors did not appear to significantly affect zoo- or phytoplankton community structure. However, a large *Microcystis* bloom from October to December correlated significantly with a decrease in mesozooplankton richness at the freshwater site ($p<0.05$). This potential relationship may have resulted in an overall shift of mesoplankton abundances.

Seasonal trends in blenny habitat use in a southeastern saltmarsh creek

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Striped *Chasmodes bosquianus*, freckled *Hyposblennius ionthas*, feather *Hypsoblennius hentz*, and crested *Hypleurochilus geminatus* blennies are common sympatric demersal fishes in southeastern US estuaries. We investigated potential differences in fish habitat use between four fringing oyster *Crassostrea virginica* reefs in North Inlet, SC from May-Nov 2013 and Feb-Oct 2014. Presence/absence data for four blenny species were evaluated with respect to environmental data including: water temperature, salinity, geomorphology, and percent cover of oyster shell. The annual period was characterized into four periods (winter, spring, spawning season, fall) based on water temperature and related fish behavior. Daily water temperatures during the sampling period ranged from 5.6 to 31.3°C with observed salinities from 17.8 to 37.0. Reef slope ranged from 0.08 to 0.11 with site-specific oyster shell percent cover ranging from 18.5 to 85.0%. The blenny fauna (n = 430 fishes) across all sites was dominated by striped blennies (54%) followed by freckled (23%), crested (16%), and feather (6%). While all blenny species occurred at all reefs, striped blennies were the most common blennies (87/94 fishes) on the reef with intermediate (52%) shell cover. The occurrence of striped, crested, and freckled blennies was approximately equal when shell cover was highest. In general, blenny occurrence increased with decreasing slope and increasing shell cover. This study suggests that condition, complexity, and slope of intertidal oyster reefs influence the composition and abundance of resident blenny species.

NOTES