Local adaptation of the temperate coral *Astrangia poculata*

Hannah E. Aichelman*; Daniel J. Barshis

Department of Biological Sciences, Old Dominion University

The Northern Star Coral (*Astrangia poculata*) is an understudied temperate scleractinian coral that inhabits hard bottom ecosystems from the northwestern Atlantic to the Gulf of Mexico and therefore can withstand significant annual shifts in temperature, salinity, and light. *A. poculata* is facultatively symbiotic, meaning that it can exist in both symbiotic (brown) and aposymbiotic (white) states. Here, brown and white colonies of *A. poculata* were collected from Virginia (VA) and Rhode Island (RI), USA and will be exposed to heat (18-30°C) and cold (18-6°C) acute temperature ramps during which photosynthesis (P), respiration (R), and variable fluorescence (Fv/Fm) will be measured. Thermal response curves of P, R, and Fv/Fm for *A. poculata* will be produced from experiments conducted in February and March 2017. Additionally, Q10 of the metabolic rates (a measure of thermal sensitivity) will be calculated for brown and white colonies of both populations and compared to look for evidence of local adaptation. This study will examine *A. poculata*’s response to heat and cold stress across symbiotic states and geography and provide insight into effects of future temperature increases on valuable hard bottom communities of VA and RI.

Presenting author contact info: haich001@odu.edu

Small Scale Effects of Oil Exposure on Food Webs in the Gulf of Mexico

Alford, S. B. *1*, Valentine, J. F. *1*; Martin, C. W. *2*

1Dauphin Island Sea Lab
2UF/IFAS Nature Coast Biological Station, University of Florida

The Deepwater Horizon Oil Spill exposed approximately 1773 kilometers of shoreline in the northern Gulf of Mexico to crude oil, impacting coastal aquatic communities through a variety of pathways including habitat loss and reduction in secondary production. Though recent research has documented a variety of impacts induced by oil exposure, few effects on ecosystem processes have been documented. Here, we report on the findings of sensitivity and predator-prey experiments that investigated impacts of oil exposure on coastal food webs. Three prey species common to the Gulf of Mexico were exposed to either no oil, Pulse (single inoculation), or Press (repeated inoculation) oil treatments in sensitivity trials. Oil exposure only affected animal recovery for one species under Press oiling conditions. These same polycultures were used in 24-hour predator-prey experiments using four predator species. Predator identity and oil exposure
both had a significant, negative effect on prey recovery compared to controls (p< 0.001 and p = 0.004 respectively, two-way ANOVA). However, oiling only significantly affected recovery for one prey species in three predator treatments. Our results indicate that oil can impact predator-prey interactions in coastal systems, but effects will most likely be species-specific.

Presenting author contact info: salford@disl.org

Author name: Brooke Anderson

Missing abstract

4th World Conference on Marine Biodiversity

Philippe Archambault*1; Cindy Grant2; Kim Juniper3; Paul Snelgrove4
(Archambault, P.; Grant, C.; Juniper, K.; Snelgrove, P.)

1 Université Laval (Québec, QC, Canada)
2 Université du Québec à Rimouski (Rimouski, QC, Canada)
3 University of Victoria (Victoria, BC, Canada)
4 Memorial University of Newfoundland (St. John’s, NL, Canada)

The World Conference on Marine Biodiversity has become the major focal assembly for sharing research outcomes, management and policy issues, and for discussions of the role of biodiversity and biodiversity conservation in sustaining ocean ecosystems. Arranged on a 3–4 year cycle, previous WCMB meetings have each attracted more than 1000 leading specialists and participants from around the world, and catalyzed numerous sidebar sessions on marine biodiversity issues. The 4th edition of the WCMB will be held in Montréal, Québec, Canada, from May 20–23, 2018. This meeting will bring together scientists, practitioners, and policy makers to discuss and advance our understanding of the importance and current state of biodiversity in the marine environment. Through a mix of keynote sessions, contributed talks and posters, and bookable venues for focused meetings, the conference program will address marine biodiversity across a deliberately wide range of relevant sectors. Participation will be encouraged from the broadest possible range of stakeholder groups from academics to industry. The theme, “Connecting with the living ocean,” will emphasize the connection between all segments of society and the ocean’s biodiversity.

Contact info: philippe.archambault@bio.ulaval.ca
Impact of Barnacle Colonization on *Spartina alterniflora* in Georgia Salt Marshes

Ashe E.*; Hines R.; Lane J.; Guidone M.; Joesting H.

Department of Biology, Armstrong State University

The smooth cordgrass *Spartina alterniflora* is used as a settlement substrate by barnacles in salt marsh ecosystems. Studies have documented this settlement along the southeastern coast of the U.S., however the effect on plant productivity has not been studied. Therefore, we quantified the spatial and temporal patterns in barnacle colonization on *S. alterniflora* to determine if barnacles inhibit *S. alterniflora* growth and/or reduce photosynthetic efficiency. Barnacle density, plant height, and photosynthetic efficiency were assessed for twenty randomly selected plants at three sites surveyed in June, July, and August 2016. We found that barnacle density varied with site and, between June and August, density decreased on plant leaves and increased on plant stems. However, barnacle density did not negatively impact plant height or photosynthetic efficiency. We conclude that marsh location and seasonality affected the susceptibility of *S. alterniflora* to barnacle colonization, but that colonization did not influence plant fitness. However, further study is needed, as our survey may have failed to detect an influence of barnacle presence due to the low number of randomly selected plants that possessed a high barnacle density.

Presenting author contact info: ea5328@stu.armstrong.edu

The Effect of Artificial Light Pollution upon Loggerhead Sea Turtle (*Caretta caretta*) Hatchling Orientation in the Grand Strand Region, South Carolina

Asp, E.*; Koepfler, E.; Rickard, H.E.; Keiner, L.

Coastal Carolina University

Elevated levels of artificial light along the coast infringe upon suitable habitat for sea turtles and can alter hatchling response upon emergence when sight is utilized. Hatchlings detect differences in light intensity cues and elevation changes to navigate across the beach. The addition of artificial light disrupts this response, resulting in disorientation (aimlessly wandering in circular paths) or misorientation (moving in distinct paths away from ocean). A spectrum of artificial light was examined to identify if there is a threshold of light permissible before decreased orientation is observed. During the 2016 nesting season, a Geovision GV-FER5303 non-illuminating infrared camera recorded loggerhead emergences (n=21) from four light intensity ranges in the Grand Strand region. Dynamics of hatchling speed, sinuosity, range, and compass
bearing movements were measured from each nest to determine if parameters of overall orientation were significantly affected by total radiance values. Of the hatchlings observed, 18.7% (n=226) were considered disoriented/misoriented, with 79% (n=179) from high radiance areas under new moon conditions and 0% from very high radiance areas under near full moon conditions. Results could contribute to current management practices to enhance survival efforts at the northern extent of loggerhead distribution where the majority of male hatchlings emerge from.

Contact Information: esasp@g.coastal.edu

Author name: Tyler Aulffo

Missing abstract

Effects of Macrofauna on Oxygen Consumption and Nutrient Fluxes in Sediments

Will M. Ballentine*1; Kelly M. Dorgan1,2; Kara Gadeken1,2; Behzad Mortazavi1,3; Ryan Parker1,2; Erin Kiskaddon1; Sarah Berke4; Susan Bell5

1Dauphin Island Sea Lab, 2Department of Marine Science, University of South Alabama, 3Department of Biology, University of Alabama, 4Department of Biology, Siena College, 5Department of Integrative Biology, University of South Florida

Sediment oxygen consumption (SOC) is an integrative metric of ecosystem function that reflects oxygen consumption by both infaunal and microbial communities. SOC has been measured in many different environments, though little has work has focused on how specific macrofaunal functional groups influence oxygen consumption, or how different taxa affect nutrient fluxes. We measured the effect of functional groups and oil induced stress on SOC and nutrient fluxes using sediment mesocosms inhabited by taxa from different functional groups, both in monoculture and mixed assemblages. We tested the impact of sublethal exposure to oil contamination using control mesocosms maintained in seawater, and mesocosms held in seawater contaminated by WAF, the water accommodated fraction of oil. We predict that increased macrofaunal activity will consume more oxygen and transport oxygen and nutrients to the microbial community. Exposure to WAF is predicted to decrease infaunal activity, and therefore reduce the rates of oxygen metabolism and nutrient fluxes. These data will advance our understanding of how different functional groups alter SOC, and how those relationships are affected by stressors such as oil.

Presenting author contact info: wballentine@disl.org

If you encyst: documenting trematode taxa and origin in native and non-native crab hosts
Barnard, R.; Blakeslee, A.

Biology Department, East Carolina University

Throughout maritime history, humans have facilitated the introduction of species to new and previously inaccessible environments. One such species, the European green crab (*Carcinus maenas*) was introduced to Western North Atlantic (WNA) via shipping ~200 years ago, and in doing so has escaped two-thirds its native parasite load. Even so, microphallid trematode prevalence in WNA can be high in some *Carcinus* populations. A morphologically-similar microphallid infects WNA native *Cancer irroratus* crabs, but it is unclear whether these microphallids infecting the two crab species represent the same trematode species, or genetically distinct taxa. It is also uncertain whether *Carcinus* introduced trematode(s) from Europe, whether these trematodes are native and have host switched to *Carcinus*, or a combination of the two. Pilot data suggests that there could be genetically distinct trematode lineages infecting the two crab species, but further research is needed to resolve their origins. Our ongoing analyses will resolve these questions to establish the baseline evidence necessary for assessing the effects infection has on native and non-native hosts at the individual, population, and community levels.

Presenting author contact info: barnardr16@students.ecu.edu

---

**Apparent timing of *Siderastrea siderea* density banding in relation to colony growth and physiology**

Benson BE*1, Rippe JP2, Bove CB1, Castillo KD1,2

1Curriculum for the Environment and Ecology, University of North Carolina at Chapel Hill

2Department of Marine Sciences, University of North Carolina at Chapel Hill

Massive reef-building corals are increasingly used as valuable proxies for environmental records due to semiannual density growth bands deposited within their skeletons. The bands, arising from seasonal patterns in light and temperature, reflect both short-term variability and long-term trends in environmental conditions. Conflicting reports about the apparent timing of semiannual high- and low-density coral growth bands has led to uncertainty about the physiological and environmental factors driving their formation. Consequently, this uncertainty may confound the ability to interpret the source and timing of environmental signals reflected in a coral’s growth history. Here, we analyzed 16 cores extracted from *Siderastrea siderea* colonies on the Florida Reef Tract to investigate how the timing of band deposition may be influenced by several factors that have previously been shown to play a role, including colony extension rate and size, tissue thickness, and gender. Growth records and the timing of density band deposition were obtained from the cores via computed tomography. Tissue thickness was measured at the top of the cores,
and gender was determined using histological techniques. Preliminary results suggest that the current understanding of banding timing and the factors influencing it may be insufficient to resolve the observed discrepancies in our *S. siderea* cores.

Presenting Author Contact: bebenson@live.unc.edu

Author name: Caitland Boggs
Missing abstract

Author name: George Boneillo
Missing abstract

Coral and associated symbiont physiologies are resilient to changes in $pCO_2$ but are negatively affected by temperature stress

Boulton J$^1$; Knowlton AC$^1$; Davies SW$^1$; Bove CB$^2$; Ries JB$^3$, Castillo KD$^{1,2}$

1 Department of Marine Sciences, University of North Carolina at Chapel Hill
2 Curriculum for the Environment and Ecology, University of North Carolina at Chapel Hill
3 Department of Marine and Environmental Sciences, Northeastern University

Corals and the dinoflagellate algae *Symbiodinium* exist in an obligate symbiosis where photosynthetically derived nutrients translocated to the host from intracellular *Symbiodinium* can provide up to 100% of the coral’s energy budget. Increases in sea surface temperature and decreases in oceanic pH reduce the competency of corals to maintain this symbiosis. As a result, increased coral bleaching events have been observed globally as climate change progresses. To quantify the immediate, transitional, and long-term physiological responses of coral hosts and algal symbionts to climate change stressors, we exposed the Caribbean corals *Siderastrea siderea* and *Pseudodiploria strigosa* to various temperature (28, 31 C) and $pCO_2$ (280, 400, 700, and 2800 ppm) treatments for 90 days. Temperature and $pCO_2$ were fully crossed and four fragments of each colony were maintained in each treatment. One colony fragment was removed at each time point (0, 30, 60, 90 days) and coral tissue protein and chlorophyll a concentrations were quantified as proxies for coral host and algal symbiont physiology. Preliminary results suggest that both host and symbiont physiology are negatively affected by temperature; however both partners appear resilient to changes in $pCO_2$. The results from this study shed light on how $pCO_2$ and temperature stress interact to affect the physiology of coral holobionts.

Presenting Author Contact: jboulton@live.unc.edu; aknowlto@live.unc.edu
Characterization of Red Mangrove Proproot Epibiont Communities of St. Johns USVI

Alan Buob*; Paul Bologna,
Marine Biology and Coastal Sciences Program Montclair State University

In May 1989, Hurricane Hugo impacted St. Johns USVI destroying the Red Mangrove (Rhzizophora mangle) Forest of Great Lameshur Bay. The impact restricted the tidal flow and caused mass death in the mangroves. Hurricane Marilyn (1995) hit St. John causing the storm wall formed by Hugo to be washed out and returned limited tidal flow to the dead forest. It was not until 2010 when another Hurricane broke down the sediment wall and natural flow returned. Up to that point, water quality restricted any fouling organisms to survive on prop roots. Using photo identification, we looked at a number of different bays of St. John to identify the local fouling community diversity and compared the new fouling community of Great Lameshur in march of 2015 and January of 2016. Settling plates were deployed in January 2016 to be collected in January 2017. Results showed active and growing recruitment of oysters, and sponges along with other fouling organisms. Given enough time, Great Lameshur Bay’s fouling community is suspected to increase in diversity and become similar to undisturbed sites. A total of 37 species were found across all sites with 3 species common to all sites.

Presenting Author contact info: buoba1@montclair.edu

Selection vs Selection in a hybrid zone: Directional selection among adults opposed by selection among larvae

Allison Burrell1*, Evgeniya Ermolaeva2*, Amaelia Zyck3 and Thomas J. Hilbish2
Chemistry and Biochemistry Program1
Department of Biological Sciences2
Marine Science Program3
University of South Carolina

Hybrid zones formed between two species involve complex interactions in which the stability of the zone is determined by the interplay of dispersal and natural selection. The mussels Mytilus
edulis and M. galloprovincialis hybridize at numerous locations in Europe, including Southwest England. In this region there is strong directional selection among adult mussels that favors alleles derived from M. galloprovincialis and hybrid populations are strongly isolated from neighboring populations of each parent species. Consequently this hybrid zone should be unstable, yet the zone has been stable for at least 30 years. We tested the hypothesis that there is selection in the larval stage that counteracts the directional selection for M. galloprovincialis alleles among adults. We sampled mussel larvae in different stages of development from plankton samples collected from Southwest England. There was strong directional selection favoring M. edulis alleles during larval development and that the majority of selection occurred shortly after the transition from trochophore to veliger. Opposing directional selection during different stages of the life-history contributes the stabilization of this hybrid zone.

**Missing author contact information:**

**Lasting Effect of Environmental Disturbance on Benthic Community Structure**

T. Caffray*1; Berke, S.K.1; Dorgan, K. M.2,3; Robertson, A.2,3; Bell, S.4; Weldin, E.1; Budai, S.1; Parker, R.2,3; Gadeken, K.2,3; Clemo, W.2,3

1 Siena College, 2 Dauphin Island Sea Lab, 3 University of South Alabama, 4 University of South Florida

Environmental disturbances have immediate as well as long-term effects on community structure and biodiversity. Marine benthic communities may be particularly vulnerable to disturbances, because the organisms have limited mobility and little protection from environmental stressors. For disturbances such as oil spills, which expose communities to toxic compounds that may remain in the habitat for years or decades, it is especially important to understand the lasting effects of disturbance. The Deepwater Horizon oil spill, which occurred in the Gulf of Mexico from April to August 2010, was the largest marine oil spill in history. Oil was widespread but patchy, and shallow benthic habitats in the northern gulf experienced varying levels of oiling. Sites that experienced oiling continue to have elevated sedimentary hydrocarbons, 7 years after the event. By comparing sites that experienced oiling to sites which did not, we can assess the lasting effects of the DWH event on benthic community structure. Here we evaluate patterns in biomass for major functional groups of invertebrates at oiled versus unoiled sites. These data will allow us to evaluate how functional biology influences responses to oil disturbance, and to assess how oiling influences secondary productivity over time.

Presenting author contact info: te15caff@siena.edu

**Bay scallops: the high-resolution canary in the highly-fertilized coal mine**

Jessica L. Carlton1; Lorie E. Williams1; John M. Carroll2; Steve Tettelbach3; Bradley Peterson4; Aswani K. Volety1; Elizabeth S. Darrow1

1Department of Biology and Marine Biology, University of North Carolina-Wilmington
As human populations increase in watersheds, the Peconic Bay estuary (NY) has experienced increased nitrogen (N) loads, resulting in eutrophication. Stable isotopes can be used as indicators of anthropogenic N sources such as wastewater and fertilizer, and potentially be used to track source-specific N inputs through time. We hypothesized that Peconic Bay scallops (Argopecten irradians) could be proxies for these environmental changes through assimilation of organic matter from surrounding water into their soft tissue and shells. We examined nitrogen stable isotopes (δ15N) from whole soft tissue and shell of scallops collected throughout the Peconic. A strong correlation was found between shell and soft tissue δ15N values, suggesting that scallop shells are reliable proxies for soft tissue. Scallop shores with higher percentages of N from wastewater had enriched δ15N values, whereas sites with higher percentages of fertilizer N inputs had depleted δ15N values in scallop shells and tissues. Thus, no significant relationship was found among sites between total watershed N yield and shell or soft tissue δ15N. This study is among the first to demonstrate fertilizer-derived N being incorporated into bivalve shell, which has implications for tracking long-term fertilizer inputs to watersheds on an annual time scale using archival shells.

Presenting author contact info: jlc7022@uncw.edu

Differential herbivory in native and introduced macroalgal seascapes in East Africa

Chacin, D.H.*1; Eggertsen, M.2; Åkerlund, C.2; Rojas, Y.2; Stallings, C.D.1; Halling, C.2; Berkström, C.2

1College of Marine Science, University of South Florida
2Department of Ecology, Environment, and Plant Sciences, Stockholm University

In temperate systems, algal beds can enhance productivity and provide habitat to numerous organisms. Although the presence of algae may play important roles within seascapes, anthropogenic activities may disrupt their natural functional roles. For example, seascapes could be altered due to introductions of non-native algae, which can become invasive, growing faster or being less palatable compared to native algae, resulting in changes in the rates of herbivory. While studies suggest both positive and negative effects of algal presence, it remains unclear how herbivory can vary between native and introduced algae within the tropical seascapes. To address this knowledge gap, we conducted a fully orthogonal field experiment in Mafia Island, Tanzania. Specifically, we tethered both native Sargassum spp and non-native Eucheuma denticulatum within each monoculture habitat (i.e., macroalgal beds of Sargassum spp., open-water macroalgal farms of E. denticulatum) at different distances from each habitat to quantify
herbivory and connectivity. Preliminary results indicate *Sargassum spp.* was grazed more than *E. denticulatum* in both native and farmed algal habitats. Furthermore, both species were consumed at higher rates in farmed habitats. Results highlight the importance of macroalgal identity in playing a role in ecological processes such as herbivory among habitats in East African seascapes.

Presenting author contact info: dchacin@mail.usf.edu

**Money on the Move: Managing Shifting Species Through Marine Protected Areas due to Climate Change**

Alicia Cheripka*; J. Wilson White

University of North Carolina - Wilmington

Marine Protected Areas (MPAs) are widely regarded as beneficial management tools across the oceans of the world. There are numerous questions about the most effective way to structure MPAs that is both beneficial to focal species and allows for economic gain. One major variable in this management problem is the effects climate change will have on economically important marine species, namely the idea that warming ocean temperatures will shift the ranges of many of these species poleward. This can lead to a) negative interactions with existing resident species, and b) new harvest pressures, both of which could inhibit poleward movement and lead to range contraction. We used a strategic, spatially explicit, age-structured model of hypothetical coastlines to investigate how alternative MPA designs would affect these dynamics. Our results suggest that under most conditions, MPA networks composed of many small MPAs would allow for a more successful “invasion” of the transitioning species than a network composed of few larger reserves. This is consistent with the theory that marine protected areas and reserves increase regional invasibility through increased heterogeneity of the region.

Presenting author contact info: amc4342@uncw.edu

**Sediment Effects on the Success of Free-Living Zooanthelle in the Re-inoculation of a Coral Host**

Ciarametaro, H.; Powers, C.C.*; Zeeman, S.I.*

1 Department of Marine Sciences, The University of New England
Coral reefs can take 10,000 years to create; however, earth has begun to lose some of the staple reef systems including the Great Barrier reef. With such diverse ecosystems at risk for complete loss, the unknown factors that contribute to the success of the rebrowning process are at the utmost importance for investigation. *Symbiodinium minutum* in its aposymbiotic state, is a benthic algae that most commonly resides in calcium carbonate sediment. Examining grain size can provide insight to the zooxanthellae’s ability to reinoculate coral systems which could be influenced by the characteristic of the medium. If grain size plays a role of the zooxanthelle’s ability to rebrown corals and anemones, this condition could be used to identify reefs with the specific sediment characteristic and therefore prioritized for restoration. Thus, qualifying reefs undergoing rebrowning may have protective measures put in place prior to the irreversible effects of bleaching on this ecosystem.

Presenting author contact info: hciarametaro@une.edu

**Author name: Patricia Cockett**

**Missing abstract**

---

**Oyster Infestation: Abundance of Mudblister Worms (*Polydora websteri*) in Mobile Bay, AL, Oyster Farms**

Sarah M. Cole*,1,2; Kelly M. Dorgan2,1, William Walton3,2

1University of South Alabama, 2 Dauphin Island Sea Lab, 3 Auburn University

Mudblister worms (*Polydora websteri*) infest oyster shells in off-bottom oyster farms across the gulf coast. Worms bore into oysters, which cover mud-filled boreholes with layers of shell, creating the mudblister. When shucked, infested oyster shells break easily and mudblisters can burst, releasing anoxic mud. The half shell market is growing along the coasts, and mudblister worms devalue oysters. This study quantified settlement of these worms over a full season of growth, with the aim of identifying preventative methods for oyster farmers. Diploid and triploid oysters at three different densities were set out at four Mobile Bay oyster farms, and collected at different seasons. *P. websteri* were extracted from oysters and condition index was quantified. These treatments showed minimal effects on infestation, although abundances varied among seasons and sites. Larval samples were taken during oyster collection adjacent and away from farms to determine whether larval abundance of *P. websteri* corresponded with adult infestations and potentially whether farms are re-infesting themselves. Ongoing experiments are characterizing larval growth rates and planktonic durations. Knowing when higher abundances of *P. websteri* occur and under what conditions could help oyster farmers prevent high infestation, and reduce mud blisters in oyster shells.
Habitat Selection and Demographics of Sharks in Winyah Bay, SC

Caroline Collatos*; Daniel Abel; Brooke Anderson; Sam Gary; & Kelsey Spencer

Coastal Carolina University

Winyah Bay (WB), on SC’s NE coast, is habitat for 12 migratory shark species (Abel et al. 2007, Gary 2009). Since these demographic studies were conducted, environmental changes and management efforts may have impacted local shark diversity and abundance, so we re-examined these from April-December, 2016. We caught 153 sharks comprising five species on 210 bottom longlines in middle and lower bay, including *Carcharhinus plumbeus* (n=117), *Rhizoprionodon terraenovae* (19), *C. isodon* (11), *C. limbatus* (5), and *Negaprion brevirostris* (1). Eighty-two % were immature, and young of years of the three most abundant species were caught during the summer. Overall abundance based on catch per unit effort (CPUE) was highest from May (CPUE=1.57) to June (1.08) and lowest from Nov (0.31) to Dec (0). Bottom water salinity and dissolved oxygen significant affected shark presence (binary logistic regression, p < 0.05). Although fewer individuals of less-common species were caught in 2016 than previously, diversity didn’t differ. WB thus represents migratory habitat for at least five shark species, and may represent a nursery for three species. Shark demographics appear to be little changed over the last decade based on this one-year survey.

Author name: Avonelle Combs

The lesser known Caribbean ascidians: molecular and morphological identification of Bahamian species

Bailey Counts¹,*; Xavier Turon²; Susanna López-Legentil¹

¹Department of Biology & Marine Biology and Center for Marine Science, University of North Carolina Wilmington
Ascidians or sea-squirts (Phylum: Chordata, Class: Asciidiacea) are sessile, filter-feeding organisms with numerous functions that render them crucial for a healthy ecosystem. The class Asciidiacea contains over 3,000 described species within three orders: Stolidobranchia, Aplousobranchia, and Phlebobranchia. Despite past and current sampling efforts to identify asciidians across the Caribbean Sea, the Bahamas region has been considerably under-sampled. Currently, only a handful of species has been described from the Bahamas. In particular, Van Name (1945) listed eight species: two Stolidobranchia (*Pyura vittata*, *Halocynthia microspinosa*), two Phlebobranchia (*Ascidia interrupta*, *Ecteinascidia turbinata*), and four Aplousobranchia (*Trididemnum soldium*, *Polyclinum constellatum*, *Eudistoma ovilaceum*, *Eudistoma capsulatum*). This study aimed to identify the main ascidian species from the Bahamas. Two sampling events took place in May 2008 and July 2010 at fourteen different localities within eight islands in the Bahamas (Little San Salvador, San Salvador, Great Stirrup, Sweetings Cay, West Plana Cay, East Plana Cay, Exumus, New Providence). Samples were fixed in 4% formaldehyde for morphological identification and 100% ethanol for DNA barcoding of a fragment of the mitochondrial gene Cytochrome Oxidase subunit I (COI). In total, 115 samples were collected and successfully barcoded. Preliminary analyses indicate up to 51 species may exist, including several new species.

Presenting author contact info: bkc7010@uncw.edu
prey than experienced individuals, even when trained to consume the similar native crab prey. Additional analyses will determine whether training diet and repeated exposure influenced handling time of the invasive Green Porcelain Crab.

Presenting author contact info: crosby.124@osu.edu

**Patterns of benthic secondary productivity along the estuarine gradient of Chesapeake Bay**

Dauer, D.M.*¹; Brauko, K.M. ²; Llansó, R.J. ³; Lane, M.F. ¹

¹ Department of Biological Sciences, Old Dominion University, ² Núcleo de Estudos do Mar, Universidade Federal de Santa Catarina, ³ VERSAR Inc

Along the estuarine gradient the highest biomass values were in the lower salinity zones (tidal freshwater and oligohaline) where infaunal bivalves dominated. The biomass values were 10X higher than in the higher salinity habitats (polyhaline). However, when secondary production was estimated the difference between low salinity and higher salinity habitats types was only 2X higher in the low salinity habitats. This discrepancy is driven by the high secondary productivity of polychaete species. In general other taxocenes (including, amphipods, cumaceans, isopods, gastropods, hemichordates and nemertines) were minor contributors. Regions with summer hypoxic/anoxic events had reduced levels of secondary production; however, regions with high levels of sediment PAHs, generally did not show reduced levels of secondary productivity. Both these stressed regions were highly dominated by polychaete production.

Presenting author contact info: ddauer@odu.edu

**Author name: Whitney Davis**

**Missing abstract**

**Sediment Controls on the Larval Recruitment of Aiptasia**

Day, M.; Powers, C.C.¹*; Zeeman, S.I.¹

¹ Department of Marine Sciences, The University of New England
Corals reefs have degraded due to anthropogenic global climate change in the past hundred years. Understanding the spawning of corals can identify areas of coral reefs that may be targeted for restoration. Previous studies show that coral larva can settle exclusively depending on the types of zooxanthellae present in the substrate. These studies support the idea that certain qualitative characteristics of sediments influence the success of spawning and growth of zooxanthellae. In order to determine the larval recruitment preferences of corals, we used Aiptasia as a model cnidarian. Artificial lunar cycles induce spawning in our model cnidarian, so by inducing a spawning event using this method, we can expose new anemone larva to substrates with variation in grain size and mineral composition. Flow cytometry may be used to assess abundance and determine sediment preferences. If sediment can impact larval settlement then determining whether or not we can profile coral reef for high priority in preservation efforts after bleaching events are reported by profiling the types of sediment on the reef.

Presenting author contact info: mday10@une.edu

Variation in fitness of recently established Avicennia germinans (Black Mangrove) populations along the Texas Gulf Coast
Devlin, D. J.1, Kennedy, J. P. 2 and Feller, I. C.3
1 Department of Life Sciences, Texas A&M University Corpus Christi
2 Smithsonian Station, Fort Pierce, Florida
3 Smithsonian Environmental Research Center, Edgewater, Maryland

With climate change, Avicennia germinans (Black Mangrove) is migrating up the Texas Gulf Coast. We compared the reproductive potential of six distinct populations (Rio Grande, Boca Chica, Laguna Atascosa, Corpus Christi, Galveston and Texas Point-Sabine River) of Avicennia along the coastal latitudinal gradient. Both the number and quality of propagules produced varies among populations (p=0.0001), but in contrast to what we predicted, do not vary with latitude. Propagules and their pericarp weights also vary among populations (p=0.0001) and vary marginally among maternal families (p=0.054) but do not increase/decrease with latitude. Instead local physical habitat and biological interactions seem to be more crucial in determining fitness. Propagule size was greater in comparison to all populations at the desert-like Rio Grande site where Avicennia grew among cactus and sage; and smaller in comparison to all sites at the Laguna Atascosa-NWR where Nilgai Antelopes grazed the trees. The ratio of pericarp/propagule weight varied both among sites and among maternal families (p=0.0001) but was constant at all sites except the grazed Laguna Atascosa site where the pericarp/propagule ratio was approximately >3X than at other sites. Our results indicate that for these populations local conditions and herbivory are more important indicators of fitness than latitude.

Missing contact info
Seasonal growth of the temperate coral *Astrangia poculata* from 1972 to 1981 using historical photographs

Gabriella M. DiPreta, Sean P. Grace

Department of Biology, Southern Connecticut State University, New Haven, CT 06515

At six sites in Narragansett Bay, the growth of the temperate, scleractinian coral *Astrangia poculata* was examined. Growth rate was examined through historical polyp photos from 1972 to 1981, which were taken on a time scale of months. Photos displayed polyp numbers for six different colonies. Results demonstrate that during the summer months, *Astrangia poculata* displayed a positive growth rate with an increase in polyp count. A negative growth rate or no change in polyp count was found when *Astrangia poculata* went dormant during the winter months. Competitive interactions between *Astrangia poculata* and the red boring sponge *Cliona celata*, as well as burial by sedimentation, displayed a negative growth or no change in polyp count. This study demonstrates an understanding of seasonal trends, which initiate a positive or negative growth of polyps in the temperate coral, and the ecological and environmental factors which influence coral growth.

Author contact: gmdipreta@gmail.com

Behavioral plasticity and the loss of social behaviors in juvenile spiny lobsters

Dubnicka, I*; Krachman, H.; Ehlert, A.; Childress, M.

Department of Biological Sciences, Clemson University

Caribbean spiny lobsters are one of the most important commercial fisheries but recent observations suggest there has been a decrease in their attraction to conspecifics. What is unknown is whether there has been a corresponding decrease in den sharing. Thirty-two juvenile lobsters were collected from Florida Bay, FL, sorted into size-matched pairs, and placed in aquaria with two identical shelters. The frequency of den sharing was recorded daily for 21 weeks. Half of these pairs were rewarded for sharing shelter (social) and the other half rewarded for not sharing shelter (asocial). Initial den sharing was equal for social and asocial lobster pairs but quickly diverged with more den sharing in the social pairs. However, after five weeks, den sharing for both treatment groups decreased until the end of the experiment. Furthermore, there were no correlations between attraction to conspecific odor cues and treatment group or observed den sharing frequency. These results clearly support the hypothesis that juvenile lobster social behaviors are uncorrelated plastic traits which are responsive to changes in local conditions. A field survey confirmed that observed den sharing is more correlated with habitat characteristics than with presence of conspecifics.
Characterization of the Chemical Defense System in the Marsh Grass, *Schoenoplectus americanus*, Using Bioassay-Guided Fractionation and HPLC Analysis

Sierra Duca¹; Cynthia Kicklighter¹

¹Goucher College

Tidal marsh habitats are typically located along coasts and estuaries and they provide many important ecological functions. These functions include filtering out contaminants, reducing runoff, and providing nursery habitats for marine organisms. For brackish tidal marshes, the trophic base consists of various marsh grasses and sedges. Both native and invasive marsh plants can be chemically defended against herbivory through the production of specific secondary metabolites. One such native grass is *Spartina alterniflora*, which has been found to have an induced chemical defense against the marsh periwinkle snail (*Littoraria irrorata*). The focus of this study is to understand and characterize the chemical defense systems in another marsh sedge, *Schoenoplectus americanus*, of which little is known. Using organic solvents, chemicals were extracted from *S. americanus* and fractions deterrent to *L. irrorata* were tracked down using the process of bioassay-guided fractionation. HPLC analysis will be performed to isolate the specific chemical(s) responsible for deterrence. We aim to characterize the chemical defense compound(s) in *S. americanus* in order to understand the ecological impact of its chemical defense on tidal marsh ecosystems.

Presenting author contact info: sierra.duca@mail.goucher.edu

Comments present

The role of environmental stressors and host immunocompetence in wasting disease prevalence and severity in the seagrass *Thalassia testudinum*

Duffin, P.*-¹; Ross, C.¹

¹ Department of Biology, University of North Florida

A growing body of evidence supports the observation that marine disease outbreaks, especially those caused by opportunistic pathogens, are increasing in frequency and severity. One genus of such pathogens, *Labyrinthula*, has been identified as the causative agent of seagrass wasting disease, an epidemic that has historically plagued seagrass beds around the world. It is suspected
that pathogenicity is intimately linked to the ability of the host to initiate defense responses, but a lack of compelling evidence prevents any meaningful application of preliminary observations. This study seeks to investigate the role of environmental stressors in dictating host immunocompetence, and, in turn, determine how this affects susceptibility to *Labyrinthula* infection. This was achieved through a series of controlled experiments which subjected *Thalassia testudinum* (turtlegrass) individuals to 1) abiotic stressors alone and 2) abiotic stressors followed by pathogen-challenge. Immunoassays were developed to quantify both constitutive and inducible (in response to pathogen exposure) host immune responses. The immune metric panel generated for each individual was then compared to quantified pathogen loading in the host tissue, using a novel q-PCR-based detection method. The results of this investigation provide valuable insight regarding the extent to which seagrasses possess the capacity for resilience against marine pathogens.

Presenting author contact info: paige.duffin@unf.edu

Author name: Kyley Dunmeyer

Missing abstract

Freshwater inflow needs of benthic macrofauna communities in the San Antonio and Matagorda Bay Systems, Texas

Hannah Ehrmann*; Paul Montagna; Terry Palmer; Evan Turner
Texas A&M University – Corpus Christ

Freshwater inflow is intimately related to estuary ecosystem health. This study aimed to quantify the effects of freshwater inflow on ecosystem health in Matagorda and San Antonio Bay systems, by using benthic macrofauna communities as biological indicators. Benthic and discrete water quality samples were collected monthly at five stations in the upper regions of San Antonio and Matagorda Bays for one year. Salinity and depth were the most important environmental drivers of macrofauna community dynamics (spearman rank correlation r=0.44). Two distinct salinity zones (0-10 psu and 11-25 psu) were identified based on macrofauna community characteristics. One month lag salinity was significantly correlated with macrofauna diversity at most sites (pearson correlation coefficients > 0.52, p<0.01). These findings indicate that freshwater inflow has an important influence on macrofauna community dynamics in the San Antonio and Matagorda Bay Systems.

Presenting author contact: hehrmann@islander.tamucc.edu
Application of environmental DNA (eDNA) techniques to detect the presence of *Diadema antillarum* on Caribbean coral reefs

Allyson Dahlen¹; Laura Eierman*²

¹Biology Department, St. Mary’s College of Maryland, ²Department of Biological Science, State University of New York Cortland

The catastrophic mass mortality of *Diadema antillarum* in 1983, and the limited recovery since, contributed to phase shifts from coral-dominated to algal-dominated communities throughout the Caribbean. Comparable census estimates from across the Caribbean are necessary for understanding the slow recovery, and are lacking due to inconsistent survey methods. Also, traditional visual transects may not be sufficiently effective at detecting low densities of nocturnal urchins that hide in rocky crevasses. Our objective was to develop the necessary molecular tools to assay water samples for the presence of *D. antillarum* using environmental DNA (eDNA) techniques. The ultimate goal is to develop a sensitive census method to estimate urchin densities in a consistent manner. We present 2 pairs of degenerate primers for use in both mesocosm experiments using the commercially available *Diadema setosum* and wild sampling for *D. antillarum*. Based on *in silico* comparisons to check primers against the NCBI database and mesocosm experiments using water from distinct aquaculture reef communities, the developed primers are species-specific to *D. antillarum* and *D. setosum*, without amplifying DNA from other Caribbean reef dwelling organisms. Future work will ensure specificity using wild water samples and generate models for estimating urchin densities based on eDNA quantity.

Presenting Author Contact Info: laura.eierman@cortland.edu

Author name: Garrett Elmo
Missing abstract

The effect of diet on growth, survival and condition in the bay scallop, *Argopecten irradians*

Enneking, K.*¹; Wilbur, A.E.¹.²

¹Department of Biology and Marine Biology, University of North Carolina Wilmington
²Shellfish Research Hatchery, CREST Research Park, University of North Carolina Wilmington

With the growth of shellfish restoration worldwide, there has been increasing interest in hatchery-based supplementation for species with inadequate local larval supply. Bay scallops
(Argopecten irradians) are one such species. As part of a larger project focused on developing efficient strategies for the hatchery production of bay scallops for aquaculture and restoration in North Carolina, we tested the effect of diet on the growth, survival and condition of juvenile bay scallops. (12.28±0.05mm shell height). Five diets (Isochrysis galbana, Chaetoceros muelleri, Thalassiosira weissflogii, Tetraselmis sp. and mix) were fed at equal cell density daily for the duration of the 4 week experiment. Growth (height, length width, wet weight) was assessed weekly. Preliminary observations after three weeks showed that the mixed diet is producing the greatest growth, exhibiting a 22.3±0.3% increase shell height and a 94.3±1.3% increase in weight. Identification of the best juvenile diets is an important step in the development of more efficient hatchery protocols for the production of seed for restoration and aquaculture.

Presenting author contact info: kme3142@uncw.edu

Effect of chemical cues on molting of fiddler crab megalopae in 20 ppt seawater

Farmer, M. A.¹³; Reinsel, K. A.²³; Welch, J. M. ²³; Forward, R. B. Jr.³

¹ Department of Biology, Randolph-Macon College, ² Department of Biology, Wittenberg University, ³ Nicholas School of the Environment, Duke University Marine Laboratory

Three species of fiddler crabs (Uca pugilator, U. pugnax, and U. minax) inhabit estuaries along the east coast of the United States, segregated by salinity and sediment grain size. Prior research concluded that odors from conspecific adult fiddler crabs stimulate molting by field-caught megalopae in full-strength seawater. However, in that experiment few U. minax molted. In the present study, 576 field-caught megalopae were used to test whether: 1) lower salinity water or 2) lower salinity water in addition to conspecific chemical cues would stimulate metamorphosis. In five 10-day experiments, individual fiddler crab megalopae were placed into vials of 20 ppt seawater with and without odors from each of the three species, and monitored for molting every six hours. In these experiments, many more U. minax molted than in the full-salinity experiments (57% vs. 10%) but they did so regardless of chemical cues. U. pugnax molted most often in conspecific water but there was no effect of salinity or odor on time to molt. U. pugilator molted most often in water with odor of U. pugnax; molting was accelerated in conspecific water. This suggests that both salinity and adult chemical cues are important in settlement site selection by fiddler crab megalopae.

Presenting author contact info: MadelineFarmer@go.rmc.edu

On the diversity and distribution of the bioengineer Sabellaria alveolata in Ireland: past and present

Firth L. B.⁶¹²; Bordeyne F.³; Bush L. E.⁴; Davies A. J.⁴; Dubois S.⁵; Foggo A.⁶; Harris D.⁷; Mieszkowska N.⁸; O’Connor N.⁹; O’Riordan R.¹⁰; Patterson A.²; Power A.-M.²; Simkanin C.¹¹; Hawkins S. J.⁸¹².
Biogenic reefs are important for habitat provision and coastal protection. Long-term datasets on the distribution and abundance of the reef-forming polychaete *Sabellaria alveolata* (L.) are available from Ireland. The aim of this study was to combine historical records and contemporary data to (1) describe spatio-temporal variation in temperatures, (2) document changes in the distribution and abundance of *S. alveolata* and discuss these changes in relation to extreme weather events and recent warming, and (3) identify *S. alveolata* ‘hotspots’ and (4) assess the potential for this species to provide habitat for infauna and a refuge from grazing activity for epibiotic algae. A semi-quantitative abundance scale was used to compare broadscale, long-term and interannual abundance of *S. alveolata* at >100 sites around the Island of Ireland. *S. alveolata* was only found at 25 out of 133 sites. We present preliminary results on the role of *S. alveolata* in providing habitat and refuge for infauna and epibiotic algae respectively.

Presenting author contact info: louise.firth@plymouth.ac.uk

Author name: Kinsey Fisher

Missing abstract

An arduino-based datalogging system adapted as an underwater flow-meter

Fox, Emily E.*; Fox, Gary. J.; Pawlik, Joseph R.

Department of Biology and Marine Biology, Center for Marine Science, UNC Wilmington

Suspension feeders such as sponges, ascidians, and bivalves play a significant role in the trophic ecology of benthic ecosystems. Ecosystem services such as nutrient cycling and water quality regulation are performed by small, cryptic members of these taxa, yet the impact of these processes on their local environment is largely unknown. Accurate measurements of flow generated by these organisms are vital for understanding their metabolism and physiology, as well as carbon and nutrient flux. Flow estimations of currents generated by small suspension feeding organisms are limited by the cost and precision of the measuring instrument, not to mention data logging capacities. The increasing accessibility of inexpensive single-board microcontrollers and computers such as the Arduino Uno and Raspberry Pi permit a datalogger
platform that is easily adapted to a variety of probes for \emph{in situ} underwater use. When connected
to a FS5 thermal mass flow sensor, the system can detect flow within the range of 0 to 100 ms\(^{-1}\)
with a sensitivity of 0.01 ms\(^{-1}\). The system includes an upgradeable Micro SD card for storage,
and generates .csv files that can be directly uploaded to a remote processor for analysis.

Presenting author contact info: eef3807@uncw.edu

\textbf{Long-term Dissolved Oxygen Trends in Long Bay, SC}

Authors: D.B. Fribance\textsuperscript{*1}; R. Gurka\textsuperscript{2}; E.E. Hackett\textsuperscript{2}, M.L. Troup\textsuperscript{3}

\textsuperscript{1}Coastal Carolina University, Department of Marine Science
\textsuperscript{2}Coastal Carolina University, School of Coastal and Marine Systems Science
\textsuperscript{3}Dalhousie University, Department of Oceanography

The first evidence of hypoxia in Long Bay, SC was documented in 2004, and yet the
mechanisms explaining the development of this seasonal decline in dissolved oxygen are still not
definitively known. Prior studies have primarily focused on individual low dissolved oxygen
(LDO) events and the related physical, biological and chemical factors. Here we present results
from a longer-term study using pier data made available by the Long Bay Hypoxia Monitoring
Consortium (LBHMC), with a focus on physical factors associated with LDO events. In addition,
we present analysis of the first concurrent measurements of water velocities during LDO events,
collected in summer 2016. Together these long-term measurements along the coastline and
circulation patterns reveal which physical factors show strong correlations with dissolved
oxygen, and which factors are more variable in relation to LDO events. Understanding the scope,
severity and setup of these reductions in dissolved oxygen has implications for management and
long-term ecosystem resiliency.

Contact info: dfribance@coastal.edu

\textbf{Rates of benthic metabolism in an intertidal marsh throughout a diurnal oxygen cycle}

Gadeken, K.J.*\textsuperscript{1,2}; Dorgan, K.M.\textsuperscript{1,2}

\textsuperscript{1}Dauphin Island Sea Lab
\textsuperscript{2}University of South Alabama

Oxygen availability is a critical factor affecting metabolic processes and organic matter
remineralization in marine sediments. Hypoxia (dissolved oxygen concentrations below 2 mg L\(^{-1}\)
decreases macrofaunal bioturbation and bioirrigation activity and lowers sediment metabolism
rates. Shallow water oxygen patterns often follow a diurnal cycle as dissolved oxygen drops to
hypoxic levels at night due to respiration and then increases during the day with photosynthesis, creating a recurring, potentially stressful suboxic benthic environment. Sediment metabolism is known to depend on ambient dissolved oxygen concentration, but responses of organisms to hypoxia are more complex and likely contribute to variability in sediment metabolism. In this study, sediment oxygen consumption rates were measured in a salt marsh via metabolism chambers throughout a diurnal cycle in natural and artificially oxygenated sediments. We hypothesize that varying responses of macrofauna to hypoxia result in a time lag between the diurnal oxygen cycle and the corresponding diurnal cycle in sediment oxygen consumption that prevents sediment metabolism from attaining fully oxic rates, even at peak daily ambient dissolved oxygen concentrations. The multiple potential responses of macrofauna to short-term oxygen variability may be an important factor driving shallow sediment metabolism rates and macrofaunal behavior.

Presenting author contact info: kgadeken@disl.org

Results of a multi-year benthic meiofauna community survey of the northern Gulf of Mexico

Ghazal, J.*; Romano III, F.; Carter, R.; Tolley-Jordan, L.; Cline, G.

Department of Biology, Jacksonville State University

A multi-year (2007-10) study was undertaken to determine meiofauna distribution patterns in the northern Gulf of Mexico, from 26 to 30°N latitude and -97 to -83°W longitude. Benthic sediment samples were taken using a Shipek® grab sampler and meiofauna sorted, identified (phylum or class) and enumerated. Temperature, salinity, dissolved oxygen concentration, latitude, longitude and depth were measured at each sample site. Sediment composition was also determined. A total of 1.3×10^7 (indiv/m³) organisms were collected from 137 samples taken from 2007-2010. Individuals identified were Nematoda, Copepoda, Polychaeta, Kinorhyncha, Priapulida, Acari (mites), Tardigrada and Loricifera. Meiofauna distribution was influenced by sediment composition. Sand-rich samples contained slightly more meiofauna than samples with higher clay and silt, with sediment characteristics exhibiting longitudinal differences in the northern Gulf. Overall, meiofauna abundance was not affected by location, with only a slight increase of meiofauna collected in the sandy eastern stations. Thus, these results suggest that meiofauna and taxonomic composition are patchily distributed, evidenced by some areas of the northern Gulf being occupied by various taxa at higher densities, some at lower densities and some unoccupied.

Presenting Author Contact Info: jjg0016@tigermail.auburn.edu.
First occurrence of the invasive hydrozoan Gonionemus vertens A. Agassiz, 1862 (Cnidaria: Hydrozoa) in New Jersey, USA

Jordan F. Gilruth*1; John J. Gaynor1; Paul A. X. Bologna1; Dena J. Restaino2; Christie L. Barry2
1Department of Biology, Montclair State University
2Earth and Environmental Studies, Montclair State University

Gonionemus vertens A. Agassiz, 1862 is a small hydrozoan native to the Pacific Ocean. This species is a known invasive that has become established in the northern and southern Atlantic Ocean, as well as, the Mediterranean Sea. In June 2016 hydrozoans believe to be G. vertens were collected from two different estuary systems in New Jersey Shrewsbury/Navesink (Monmouth County) and the Manasquan River/Barnegat Bay (Ocean County, NJ). More than 60 specimens were collected and identified both morphologically and through molecular analyses. This is the first reported occurrence of this species in New Jersey estuaries. Given the large number of individuals collected, we contend that this is a successful invasion into this region. Additionally, this is supported by the collection and molecular identification of a polyp from the Shrewsbury River, further confirming establishment of the species in this region. While the invasion of this species is confirmed the vector and source of this New Jersey population is still unknown.

Presenting author contact info: Gilruthj1@montclair.edu

Faunal Associates of the Coral, Oculina arbuscula, on Temperate Reefs of the Georgia Bight

Gleason, Daniel F.1; Henkel, Timothy P.2; Munoz, Roldan C.3
1Institute for Coastal Plain Science, Georgia Southern University, 2Department of Biology, Valdosta State University, 3NOAA Southeast Fisheries Center, Beaufort Lab

Rocky outcrops encrusted with algae and sessile benthic invertebrates cover ~20% of the bottom in the Georgia Bight. These outcrops are foci for fish diversity and biomass, but the resources provided to fish by these habitats are unclear. In July 2015, we began investigating associations between fish and sessile invertebrates at Gray’s Reef National Marine Sanctuary. The focal invertebrate was Oculina arbuscula, the only branching coral on Georgia reefs. Organisms living among coral branches were sampled by tenting colonies with nylon bags and injecting 150ml of quinaldine solution. A total of 17 taxa (10 fish, 7 invertebrates) were associated with the 31 colonies sampled. For fish, the Crested Blenny was most common, followed by Belted Sandfish and the Seaweed Blenny. Invertebrate representatives were mostly crustaceans, primarily the Coral Crab (Mithrax hispidus) and Arrow Crab (Stenoryynchus seticornis). Fish and crustacean
numbers per coral were similar, overall mean =4.3 (±2.4 S.D.) organisms/colony. There was also a positive relationship between coral size and faunal abundance, but fish primarily drove this relationship. While preliminary, this study yielded surprisingly consistent patterns of association between *Oculina* and several species of fish and macroinvertebrates and indicated that structurally complex invertebrates on these reefs are valuable biogenic habitat.

Presenting author contact info.: dgleason@georgiasouthern.edu

**Author name:** Cameron Good

**Missing abstract**

**A Functional Ecological Comparison of Three Sponge Species from the Lower Florida Keys**

Tyler W. Griffin*1, Clara L. Prentiss1, Malcolm S. Hill2, Jeremy B. Weisz1

1Department of Biology, Linfield College, McMinnville, OR
2Department of Biology, University of Richmond, Richmond, VA

The shallow, tidal flats off the islands of the lower Florida Keys represent a harsh environment for sessile marine invertebrates. This habitat is home to three taxonomically distinct sponge species that share similar rope morphologies: *Cliona varians forma varians*, *Ircinia variabilis*, and *Neopetrosia subtriangularis*. Despite sharing a habitat, these three species differ in their symbiont regime, with *C. varians* hosting dinoflagellate photosymbionts, and *I. variabilis* and *N. subtriangularis* hosting cyanobacterial photosymbionts. We conducted experiments to measure other ecological differences between these species. The sponges were all assayed for pumping rates using dye-video analysis and tissue samples were taken to compare the composition and functional genes of their microbiomes. The results indicated that *N. subtriangularis* had a significantly higher pumping rate than the other species. The microbiomes of the species varied, and the microbiome functional gene screening provided evidence that *C. varians forma varians* hosts nitrogen fixing bacteria, that *I. variabilis* hosts methane metabolizing bacteria, and that *N. subtriangularis* hosts nitric oxide reducing bacteria. More work is currently underway to examine the metabolism of these sponges, giving us insight into the unique ecology of this harsh habitat.

Presenting author contact info: tgriffin@linfield.edu
Influence of intertidal elevation origin on *Avicennia germinans* dispersal distance and direction

Grogan, S.V.*; Bell, S.S.

Department of Integrative Biology, The University of South Florida

Expansion of *Avicennia germinans* populations into higher tidal elevations, a predicted response to modern sea-level rise, requires successful dispersal of propagules in a landward direction. Multiple studies agree that, regardless of species and intertidal position, propagules disperse seaward most frequently. Historical imagery of a mixed mangrove/saltpan habitat on Honeymoon Island, FL revealed the inland expansion of *A. germinans* (~107 m in 18 years), indicating a high likelihood of successful landward dispersal. An experimental study was conducted to examine: 1) frequency of *A. germinans* dispersal direction 2) whether the tidal elevation origin of trees from which propagules abscise influences propagule dispersal direction and distance. Sixty propagules were released, underneath their parent tree canopy, during a high spring tide at three tidal elevations across the distribution of the population. We observed >75% of propagules, recovered outside of their parent tree canopy, dispersed landward at the upper and middle tidal elevations after 24h and 48h. Mean landward dispersal distance (48h) was greatest for propagules originating from the middle elevation treatment which also had the highest proportion of landward dispersed propagules (>88%). Findings emphasize that the proportion of *Avicennia germinans*’ propagules dispersing landward varies with tidal elevation origin.

Presenting author’s contact info: sgrogan1@mail.usf.edu

Author name: Jane Guentzel

Missing abstract

An ecological indicator, *Ocypode quadrata*, of natural and anthropogenic impacts on sandy beaches

Gül, M. R.*; Griffen, B. D.1,2

1Marine Science Program, University of South Carolina
2Department of Biological Sciences, University of South Carolina

Anthropogenic pressure has been dramatically increasing on sandy beaches all around the world for the last century. Human impacts, such as global climate change, have also been linked to more frequent and severe storms which may further impact beaches. Despite anthropogenic activities such as tourism bringing economic and social input, they together with natural impacts cause ecological issues on sandy beaches (e.g. population declines). Management attempts to minimize these ecological issues are based on reliable biological data collected using viable species. To understand if ghost crabs, *Ocypode quadrata*, are a viable ecological indicator of
natural and anthropogenic impacts on sandy beaches, we conducted twenty beach surveys. Here we used an indirect burrow counting technique on twenty sandy beaches that have been under different levels of anthropogenic impact. Those beaches were sampled before and after Hurricane Matthew. Both recreational activities and Hurricane Matthew caused a significant decline in burrow density and width among sites. Additionally, the zonation of ghost crab populations on beaches depended heavily upon human use and were altered by the storm. We think that a sandy beach management strategy that provides a sustainable usage of sandy beaches for recreation and meets ecological conservation targets should be applied.

Presenting author contact info: mgul@email.sc.edu

**Perception of sounds by American lobsters**

Gutzler, Benjamin C.*; Watson, Winsor H

Department of Biological Sciences, University of New Hampshire

American lobsters (*Homarus americanus*) can vibrate their carapaces to produce brief low frequency (180 Hz) sounds, which can deter the approach of predatory fish. However, little is known about whether the lobsters themselves are capable of detecting, and responding to, auditory stimuli, or whether they are able to recognize the sounds produced by other lobsters. In laboratory trials, a cardiac assay was used to determine that lobsters can perceive sounds over a frequencies range of 200-2000 Hz. However, individual lobsters varied in their sensitivity to sounds, for reasons that are not yet known. We are currently working to determine whether lobsters are more sensitive to the pressure or particle motion component of underwater sound, and which body parts are involved in perception of these stimuli. The addition of sound to the sensory repertoire of lobsters will give a fuller understanding of the behavior of this important and iconic species.

Presenting author contact info: bg1067@wildcats.unh.edu

**Location, Location, Location: Do differing enrichment methodologies affect the above and belowground productivity of *Spartina alterniflora***?

Nathan Hammond*; Jennifer M. Hill

Department of Biological Sciences, Louisiana Tech University
In coastal Louisiana, roughly 18,500 acres of economically and ecologically vital wetlands are lost each year. Their conservation and restoration requires knowledge of how various processes, including enrichment, sea level rise, and subsidence, affect plant growth patterns and production.

While many studies agree that nutrient enrichment stimulates aboveground *Spartina* production, they disagree on whether enrichment stimulates or reduces production of belowground biomass. The disagreement of these studies may be from local marsh processes or from different enrichment methodologies, where some studies enrich surrounding water and others enrich sediments. To examine if enrichment location affects *Spartina* production patterns, we performed a pilot study (N=7) where small plots (0.25 m²) of *Spartina alterniflora* were enriched aboveground, belowground, and a combination of both. We collected metrics of shoot abundance, shoot height, aboveground biomass, new root production, and belowground biomass to measure aboveground and belowground production. Different enrichment methodologies showed no significant effects on shoot abundance or on new root production. Data from shoot biomass and belowground samples may provide further insight into plant production patterns. Further examination of both above and belowground enrichment in response to enrichment location could enhance restoration efforts.

Presenting author contact info: nch019@latech.edu

**Author name: Ivy Hancock**

**Missing abstract**

---

**Balancing production and fisher attraction on artificial reefs: model analysis**

Hann, A.M. *¹; Stallings, C.D. ²; White, J. W.¹

¹University of North Carolina Wilmington

²University of South Florida

Anthropogenic influence has led to the degradation of marine ecosystems and exploitation of their fish populations via active fishing and decrease in habitat. Artificial reefs are a popular technique in fisheries management as they are thought to replenish fish populations in an environmentally conscious manner that still permits fishing. The effectiveness of such reefs as a fishery management tool is debatable. Recent studies have noted that artificial reefs may attract higher fishing pressure, possibly resulting in adverse effects on the resident fish populations includes increased catch rates that further exploit the populations. As a result, increased presence of artificial reefs was predicted to influence fisher attraction thus influencing fishery yield and survival on reefs. We assessed the balance between artificial reef number and total fishery yield...
in respect to production on the reefs and fishing effort using an age-structured, spatially explicit model. Parameters such as fishing pressure, number of natural versus artificial reefs, and attraction were varied to simulate potential fishery outcomes. Preliminary results, suggest that if fishing efforts shift towards artificial reefs, no change in fishery yield will be observed as the proportion of artificial reefs increases, unless mortality becomes higher on artificial reefs. Alternately, if fishing is constant across artificial and natural reefs fishery yield will increase.

Presenting author contact info: amh1552@uncw.edu

Testing a molecular identification assay for glochidia parasitic on fish from Lake Waccamaw, North Carolina

Harrison, Brion E. 1*; Burge, Erin J. 1; Sporre, Megan A. 2

1Department of Marine Science, Coastal Carolina University, Conway, South Carolina USA
2Graduate Program in Marine Biology, College of Charleston, Charleston, South Carolina USA

Understanding the ecology of North American unionids (freshwater mussels) is important because many species are imperiled. In Lake Waccamaw, *Elliptio waccamawensis*, *Lampsilis fullerkati*, and *Leptodea ochracea* are essential components of the lake ecology. Morphological identification of adult mussels can be conducted by specialists, however identification of their glochidia, unionid larvae typically parasitic on fishes, based on morphology has not been reported. To establish a method for identifying both the adult and larval stages of three common Lake Waccamaw unionids, virtual restriction endonuclease digestions with 303 potential enzymes were conducted on three loci for which sequence data was available (16S ribosomal subunit, ND1, coxI). Results of these virtual digests suggest that for the 16S region AvaII and HindIII digestions will result in discriminatory bands for *Le. ochracea* only, however EcoRV may provide diagnostic banding for *E. waccamawensis*, *La. fullerkati*, and *Le. ochracea*. Initial testing of the assay on adult mussel tissues has confirmed that for the 16S region AvaII and HindIII did not differentiate between *E. waccamawensis* and *La. fullerkati*. Preliminary results suggest that a molecular key can be established to identify glochidia to species before adult morphological characteristics develop. Such an identification method could contribute to conservation studies on rare unionids.

Presenting author contact info: beharriso@g.coastal.edu

Author name: Heather Harwell
Algal endosymbiont diversity in the common reef-building coral *Goniastrea retiformis* ten years after experimental bleaching

1Caroline Haymaker*; Dan Barshis1; Courtney Klepac1; Andrew Baker2

1Department of Biological Sciences, Old Dominion University

Ofu Island, in American Samoa, hosts a diverse assemblage of corals in contrasting thermal regimes. In March 2006, ten colonies of *Goniastrea retiformis* from a shallow, thermally variable back reef, and ten from a deeper, more stable forereef were experimentally bleached and reciprocally transplanted to determine how the diversity of coral algal endosymbionts (*Symbiodinium*) recovered with time post-bleaching. These populations of *G. retiformis* host contrasting clades of *Symbiodinium*, with the forereef and back reef populations largely comprised of clade D and clade C phylotypes respectively. Over a decade later, in July of 2016, 95% of transplants were still surviving at the back reef site and 65% survival at the forereef site. Colonies were re-sampled, DNA was extracted, and PCR used to investigate the clade of *Symbiodinium* within each coral sample at the internal transcribed spacer (ITS2) region of nuclear ribosomal DNA. Sequence data and analysis will be presented.

Presenting author contact info: chaym002@odu.edu

Spatial distribution of barnacles on *Spartina alterniflora* stems and leaves

Hines, R.*; Guidone, M.; Lane, J.; Ashe, E.; Joesting H.

Department of Biology, Armstrong State University

*Spartina alterniflora* is a foundation species in western Atlantic salt marshes. As such, salt marsh conservation efforts focus on preserving and supporting *S. alterniflora* development. In prior studies, barnacle colonization has been noted on stems and leaves of *S. alterniflora*, however there have been few examinations of the spatial distributions of barnacles during the growing season. The purpose of our study was to determine the relationship between barnacle location on the plant and: 1) barnacle size, 2) the distance between nearest barnacle neighbors, and 3) the percentage of the stem or leaf covered by barnacles. Five *S. alterniflora* plants were collected in July and August from a tidally impacted site along the Savannah River, Savannah, GA. Plants were photographed in the laboratory; measurements of all visible barnacles were subsequently estimated using ImageJ. Barnacles were significantly larger in August than in July. We did not observe a significant relationship between barnacle height on the plant or sampling month on the
distance between nearest barnacle neighbors. However, height on the plant significantly impacted the percentage of the stem covered by barnacles, with the greatest percent cover occurring between 40 and 80 cm stem height.

Presenting author email: rh4955@stu.armstrong.edu

Chlorophyll a levels at low tide mark over depth in intertidal sands of South Carolina

Hitt, A., Hannides, A.K.

Intertidal sands are a location of intense mixing and potentially high rates of biogeochemical processes. We tested for patterns in Chlorophyll a distribution in intertidal sands at Waites Island, South Carolina, utilizing a piston core along with syringe cores at low tide and runnel formations during a monthly time-series monitoring project. Based upon the data collected chlorophyll a in these siliceous sands can be found in substantial concentrations (50% of surface concentrations or greater than 0.25 μg cm⁻³) down to depths in excess of 75 cm. In contrast, profiles at runnel formations showed a more typical structure with surface maxima when associated with ripples and reaching <5% of surface concentrations by a depth of 5 cm, suggesting different physical mixing rates and biogeochemical rates between these two common formations in the intertidal zone of high-energy beaches.

Presenting author contact info: ajhitt@g.coastal.edu

Tracking Nuclear Inclusion X (NIX), a Potential Pathogen of Pacific Razor Clams

Carmen Hoffbeck*¹; Tyler W. Griffin¹; Steve Fradkin¹; Jeremy Weisz²

¹Department of Biology, Linfield College, McMinnville, OR
²Olympic National Park, Port Angeles, WA

The Pacific razor clam, *Siliqua patula*, is an important recreational fishery species that lives in the intertidal zone of sandy beaches from Alaska to central California. Populations have had periodic, but significant, declines over the past 30-40 years. These declines have correlated with an increase in the presences of an intranuclear bacterial parasite known as Nuclear Inclusion X (NIX). We have developed a quick and easy PCR-based screening protocol that streamlines the diagnosis of NIX infection. Razor clam screening along the Oregon and Washington coasts in 2015 revealed a high infection rate, averaging 97%. Screening completed in 2016 indicated the infection rate has declined significantly to an average of 74%, though all sampled locations still had infected clams. Furthermore, PCR screening conducted on sand samples from multiple
locations along the Oregon and Washington coasts have identified NIX DNA present in the sand, indicating that NIX may be transmitted environmentally. Interestingly, NIX was found in sand samples both on beaches with and without clam populations, suggesting a longer planktonic period for the NIX bacterium. These clam populations will continue to be monitored in the future to better understand the spread of this potential pathogen.

Presenting author contact info: cstoffbec@linfield.edu

**The Ecology of Fear: Effect of Predators on the Foraging Behavior of Guppies (Poecilia reticulata)**

Hoffman, K.*; White, J. W.

Department of Biology and Marine Biology, University of North Carolina Wilmington

Optimal Foraging Theory (OFT) holds that organisms searching for prey focus their effort on areas of high prey density, depending on the risk of predation. However, estimating prey density requires cognitive effort. Based on the general expectation that predation risk leads to sub-optimal foraging decisions and that stress associated with risk can influence cognition, we hypothesized that the risk of predation will affect a forager’s ability to effectively discriminate between prey patches with different densities. We used guppies, *P. reticulata*, a model species for visual fish predators, and an experimental design in which guppies choose between two arrays of simulated prey in an aquarium arena; a cichlid predator was separated by a mesh screen. Previous work in this system showed that guppies can detect fine-scale variation in prey density. Our preliminary results indicate that the guppies consumed more prey items in the higher-density patch in the absence of a predator, but not in the presence of a predator, supporting the hypothesis that the predation risk impairs the forager’s ability to estimate patch density, and thus reduced their overall foraging effectiveness. This simple experiment is the first test of the effect of risk on spatial decision making in a fish.

Presenting author contact info: kmh8153@uncw.edu

**Multiple paternity in egg capsules of the crown conch (Melongena corona)**

Alexandra Hooks*; Scott Burgess

Department of Biological Sciences, Florida State University
Multiple paternity in egg capsules can influence sibling interactions resulting from different levels of relatedness. We quantified the level of polyandry in a marine gastropod (the crown conch, *Melongena corona*) to estimate the potential for conflict between siblings. The crown conch has direct development and lays strings of egg capsules attached to intertidal substrates. We collected three egg strings from different mothers in the field, and genotyped mothers, their offspring, and putative fathers at eight microsatellite loci. We performed parentage analysis and sibship reconstruction in the program COLONY on 290 offspring, 10 offspring per egg capsule, 8-10 egg capsules per mother. We found that egg capsules ranged from having 1-4 fathers. Paternity was consistent in egg capsules along the egg string for each mother. None of the putative fathers that were copulating with the focal mother at the time of laying eggs contributed to the offspring produced. These preliminary data show that there is variation in the level of polyandry among mothers and that there is potential for differential sibling conflict between offspring based on relatedness. Future work will investigate the patterns and causes of sibling conflict within an egg capsule and how mothers offset conflict across an egg string.

Presenting author contact info: ahooks@bio.fsu.edu

**Author name: Trinity Hopkins**

**Missing abstract**

**Alternate methods for observing stratification dynamics using remote sensing technologies on discrete and continuous time scales**

Hudson, K. L.*.1; Patterson, M. R.1,2,3

1Department of Marine and Environmental Sciences, Northeastern University  
2Department of Civil and Environmental Engineering, Northeastern University  
3Global Resilience Institute, Northeastern University

Stratification is an important driver for many biological and ecological processes across benthic and pelagic habitats in the world ocean. However, stratification dynamics are still undersampled because of limitations of current methods. Current methodologies rely primarily on CTD and Niskin bottle data to develop stratification profiles that are then compared over time. Here we describe two new methodologies which utilize *in situ* remote sensing technologies for examining stratification dynamics on discrete and continuous time scales. The first, focusing on thin layers and zooplankton distributions in the water column, utilizes a Remotely Operated Vehicle (OpenROV v. 2.8) to record vertical transects in discrete time using a low-power lens placed periodically over an HD imager. The second utilizes a customizable mooring system and thermistor strings to continuously observe stratification as well as dynamic phenomena like
internal waves. These methodologies allow for the observation of stratification dynamics on a variety of time and spatial scales. Understanding stratification dynamics and its impacts on water column biota across temporal and spatial scales will become increasingly important as climate change impacts the dynamics of the surface layer of the world ocean.

Missing author contact info

**Condition and Temporal Dynamics of Newly Identified Staghorn Coral, Acropora cervicornis, Patches in Southeast Florida**

Hoyt, R.*1; Walker, B. K.1

1Halmos College of Natural Sciences and Oceanography, Nova Southeastern University

Historically the Caribbean staghorn coral, Acropora cervicornis, extended to higher latitudes in a warmer climate. Present-day rising ocean temperatures may facilitate a similar range shift. In the mid 1990’s, seven large dense patches were reported at the northern extent of the range. Recently, thirty-five patches were discovered during coastal mapping of the same region. Multivariate analyses of percent live, dead, rubble, and disease indicated three main patch conditions: Good (2) – high amount of live tissue; Moderate (19) – similar levels of live tissue and dead framework; and Poor (14) – high levels of dead framework and rubble. In many cases, patches spread from concentrated areas of dense coral and overlap adjacent patches covering 82.7 ha of the Nearshore Ridge Complex habitat. Patch temporal dynamics (inception, growth, and persistence) were investigated by a satellite imagery time series. There is no evidence of the range of dense patches increasing over the past 20 years. Preliminarily, the number of patches and their coverage has increased regionally. In 2010, there were 17 patches visible in satellite imagery. Those patches have expanded and are accompanied by 18 more that were not visible. A present hurricane drought (since 2005) also coincides with the expansion in cover and patches.

Presenting author contact info: rh1203@nova.edu

**Proximity matters: effects of ocean acidification and warming on coral-algal interactions**

Nicole K. Johnston*1; Justin E. Campbell2; Valerie J. Paul2; Mark E. Hay1

1School of Biological Sciences, Georgia Institute of Technology

2Smithsonian Marine Station

Increased ocean acidification (OA) and warming are predicted to harm coral reefs by altering both organism physiology and species interactions – likely producing cascades throughout reef ecosystems. Here, we show that OA and warming alter key coral-algal competitive interactions. When algae were secured in close proximity to coral using rope tethers, Halimeda tuna, Stypopodium zonale, and a plastic mimic all lessened bleaching of Montastrea cavernosa due to elevated OA and temperature relative to a no-contact control. In contrast, when ziptied to the coral for greater contact, S. zonale increased coral bleaching by 40% under elevated OA and temperature; bleaching in other treatments increased only 4-9%. These results suggest OA and warming will increase the competitive advantage of certain algal species over
coral, but this competitive advantage will be dependent on level of coral-algal contact. Given that macroalgal abundance and interactions with corals have increased in recent decades, greater effort should be devoted to conservation measures that minimize coral-algal contact, such as reducing overfishing, to mitigate the effects of increased algal competitive ability over coral.

Presenting author contact info: njohnston7@gatech.edu

Quantitative Analysis of Spatial and Temporal Variance in Benthic Cover of a High Latitude Reef System Offshore Southeast Florida, USA

Jones, N. P.1*; Walton, C. J.1; Brinkuis, V.2; Ruzicka, R.2; Gilliam, D. S.1

1NOVA Southeastern University, Halmos College of Natural Sciences and Oceanography
2Florida Fish and Wildlife Conservation Commission, Fish and Wildlife Research Institute

The southeast Florida Reef Tract (SEFL RT) is a high latitude (>25°N), marginal system offshore southeast Florida (SEFL), USA. This system exists as continuous linear reefs adjacent to a highly urbanized shoreline exposing it to multiple anthropogenic stressors. Records from in situ temperature loggers also indicate that the SEFL RT is commonly exposed to variable seawater temperatures. In 2003, the Southeast Florida Coral Reef Evaluation and Monitoring Project (SECREMP) was established as a northern extension of the existing Florida Keys program (CREMP). SECREMP provides long-term benthic cover data via annual image analysis of permanent sites on the upper Florida Reef Tract (FRT). This analysis focuses on the spatial and temporal variance in benthic cover in SEFL throughout the duration of the project. Trends indicate that stony coral cover has remained spatially stable up to 2014, however subsequent, widespread bleaching events in 2014, 2015 and 2016 and regional disease events in 2015 and 2016, are predicted to cause a statistical decrease in cover. Community wide extreme fluctuations have not previously been found in major benthic taxa (sponges, octocorals and macroalgae), but the predicted decrease in stony coral cover may result in variance of benthic composition.

Presenting author contact info: nj350@nova.edu

Caribbean scleractinian coral spawning trends

Anna C. Jordan*; Nicole D. Fogarty

Department of Marine and Environmental Sciences, Nova Southeastern University

Most corals worldwide are broadcast spawners that rely on synchronous gamete release for successful fertilization. Spawning synchrony may also decrease the probability of heterospecific fertilization that may produce maladaptive hybrids. Despite the importance of reproductive timing, researchers have only recently begun to collect spawning data across coral species in the
Caribbean, and no one has synthesized these data. Here, we investigate interannual, seasonal, regional, local, and environmental patterns that may influence Caribbean scleractinian coral spawning times. The number of spawning observations varies widely among location and species. Most spawning observations were collected in Florida, Belize, Curaçao, and Flower Garden Banks National Marine Sanctuary. *Acropora palmata*, *A. cervicornis*, and *Orricella* species spawning were the most documented. *Orricella* spp. are known for their spawning precision, while the acroporids are known for their unreliability but show more timing consistency between years. Robust latitudinal, seasonal, and lunar patterns were obvious in these data, but a strong correlation to wind and tide was absent. This study also highlights the greatest data gaps exists for *Pseudodiploria clivosa*, *A. prolifera* and *Siderastrea siderea*. Studies such as this are crucial to document trends before environmental and anthropogenic changes further put imperiled Caribbean corals at risk from reproductive failure.

Presenting author contact info: aj970@nova.edu

---

**A novel approach to recording temperature data of *Mytilus edulis* mussel beds using biomimetic logger arrays**

Richard Judge*; Francis Choi, Brian Helmuth

Affiliation: Northeastern University

Blue mussels (*Mytilus edulis*) are a dominant species in the Gulf of Maine. Over the last few decades, widespread losses of blue mussel beds have occurred in this region, potentially due to: thermal stress (both heat and cold), predation by invasive species, diseases, wave disturbance, and loss of substrate. Understanding the potential role of aerial temperature at low tide on this species is difficult as, like other intertidal organisms, the body temperatures of mussels can be substantially different from air temperature. The use of in-situ thermal biomimetic devices allows a better understanding of how thermal stressors might affect *M. edulis* at the scale of the individual organism. However, existing methods require that biomimics (“robomussels”) must be placed within an existing mussel bed to obtain accurate measurements. This presents difficulties in predicting potential body temperatures in areas where beds are no longer common. I will describe the construction and testing process of a “robomussel bed” prototype- a device that can be deployed anywhere in the intertidal zone to accurately measure thermal stress of an intertidal mussel within a bed during low tide. These loggers can be deployed where local declines or extinctions of mussels have already occurred, enabling studies of how thermal stress may have contributed to population decline.

Author contact: judge.r@husky.neu.edu

---

**Comparative Ecophysiological Response of *Gracilaria tikvahiae* to Fertilizer and Septic Tank Effluent**
In southeast Florida, anthropogenic activities have led to an overall increase in nitrogen and phosphorous availability in the Indian River Lagoon (IRL). This study compares the effects of two major sources of nutrient pollution occurring in the IRL, residential fertilizer and septic tank effluent, on macroalgal response in a laboratory exposure. Thalli of *Gracilaria tikvahiae* were held in a nutrient deplete starvation tank for 2 weeks. During pretreatment, a color change was observed from bright red to a pale yellow. The pretreated algae were randomly assigned to a nutrient treatment and placed in Percival incubators at either 20° with 10 hours light/14 hours dark or 30° with 14 hours light/10 hours dark. Treatments included dilutions of fertilizer or septic tank effluent in weeklong experiments to observe nutrient assimilation. Change from initial to final in aqueous concentrations of phosphorus, nitrate, and ammonia ($\Delta P$, $\Delta$NO$_3^-$, and $\Delta$NH$_4^+$) were calculated as a proxy for relative nutrient uptake and compared among treatments with ANOVA. Final weight, color, and condition were also compared among treatments. The findings of this research will help explain more complicated field observations and will be useful to resource managers and policy makers interested in reducing nutrient loading to the IRL.

Presenting author contact info: kkane2016@fau.edu

**Are sediment characteristics on saltmarsh mounds versus mudflats driving juvenile fiddler crab abundance?**

Kight, H.*; George, S. B.

Department of Biological Sciences, Georgia Southern University

Facilitation among species is important in establishing salt marsh communities. The mussel *Geukensia demissa* and fiddler crab (*Uca* spp.) facilitate the growth of the marsh grass *Spartina alterniflora* by increasing the organic content of the sediment. At a Georgia salt marsh, mussels are only found on mounds and never on the mudflat. Mounds are raised portions of the substrate found in a narrow region between the lower high marsh and the upper mid marsh. These mounds attract a large number of juvenile fiddler crabs. This study investigated whether higher organic content of the sediment on mounds lead to greater abundance and higher protein content of juveniles. Four mound and 4 off-mound sites were flagged and the number of juvenile burrows, adult burrows and tunnels counted; and the heights of 10 *Spartina* stems recorded, Fall 2016. Three sediment cores were extracted for organic content analysis, and 10 juvenile fiddler crabs collected from each site for protein determination. Juvenile abundance and the protein content of juveniles were significantly greater on mounds than off mounds. We believe that the high juvenile abundance and protein content observed on mounds is associated with a higher organic content of the sediment on mounds than off mounds.
Does biotic resistance from predation limit the northward expansion of the non-native, invasive green porcelain crab, *Petrolisthes armatus*?

Kinney, K.*; Pintor, L.; Byers, J.

1School of Environment and Natural Resources, The Ohio State University
2Odum School of Ecology, University of Georgia

Biotic resistance via predation is expected to limit the invasion success of non-native species. Here we test the hypothesis that the northward expansion of a non-native, invasive crab (*Petrolisthes armatus*) along the southeastern US, is limited by biotic resistance exerted by native predators. Specifically, we conducted a field tethering experiment to quantify rates of predation on *P. armatus* along this invasion gradient. We hypothesized that if biotic resistance was preventing spread than the northern sites would show higher rates of predation compared to southern sites. Tethered *P. armatus* (n=371) were deployed for 12 hrs during the night tidal cycle at 8 different estuaries. We also quantified habitat quality, abiotic, predator community and prey base factors at each estuary to explore their potential influence on predation rates. Results indicate that predation rates were high across sites (>60%) with no clear latitudinal pattern. Preliminary investigations suggest that variables such as total predator abundance and habitat quality factors were significant predictors of predation rates on *P. armatus*. Together these results suggest that the northward expansion of *P. armatus* is not currently limited by predation, but by some other factor.

Presenting author contact info: kinney.202@osu.edu

Restoration by Transplantation: using a filter-feeding gastropod, *Crepidula fornicata*, to rehabilitate Great South Bay, New York: Preliminary surveys

*Nicole L. Kleinas*¹, Bradley J. Peterson², Stephen T. Tettelbach³, John M. Carroll¹

¹Department of Biology, Georgia Southern University
²School of Marine and Atmospheric Sciences, Stony Brook University
³Department of Biology, CW Post of Long Island University
Coastal biogenic habitats provide a plethora of ecosystem services that enhance the commercial and recreational value of the system. Specifically, shellfish beds play a critical role in improving water quality, creating complex habitat for other commercial species, and serving as a trophic resource for surrounding nutrient-poor habitats. Great South Bay, New York, was historically one of the most productive estuaries in the nation, yet commercial shellfisheries have collapsed here due to overharvest. These filter-feeding shellfish species, in particular hard clams *Mercenaria mercenaria*, once provided important ecosystem services, including top-down control of phytoplankton blooms. Overharvest of clams has led to a marked decrease in water quality of Great South Bay. Restocking efforts have been unsuccessful due to the prevalence of brown tide, *Aureococcus anophagefferens*, blooms and decrease in overall water quality. We have proposed that the filter-feeding gastropod, *Crepidula fornicata*, may provide the necessary filtration capacity for successful hard clam ecosystem restoration. Further, the addition of *Crepidula fornicata* to Great South Bay has the potential to increase habitat, and as a result, secondary productivity. Here we present preliminary endobenthic biodiversity data from sites upon which experimental *Crepidula* beds will be constructed.

Presenting author contact: nk01063@georgiasouthern.edu

**Undoing the undaria: an assessment of management strategies for the invasive species *undaria pinnatifida* in monterey bay harbor**

Angela Korabik

University of South Carolina, Columbia

Monterey Bay National Marine Sanctuary, National Oceanic and Atmospheric Administration (NOAA)

*Undaria pinnatifida* (Harvey) Suringar (Laminariales, Phaeophyceae), a brown algae native to Northeast Asia, has been present in Monterey Harbor since 2001, when it was first found on the floating docks of A Tier. *Undaria* has become a problem across the world since the 1980s, having established colonies in multiple locations, including the Mediterranean Region, Australia, New Zealand, Tasmania, and Argentina. In this project, we seek to examine improved methods of removal that may reduce the time and effort required to manage the *Undaria* population of Monterey Harbor. We conducted an experiment in Monterey Harbor during the months of June and July to measure growth rates of *Undaria* individuals under two different treatments. Five sets of individuals from three age classes (young, juvenile, and mature) were cut in half either above or below the meristem, and were consequently measured twice a week for the duration of the experiment. Results show that *Undaria* growth is arrested in portions separated from the meristem, while portions with the meristem still intact are able to proceed to reproductive maturity.

Presenting author contact info: akorabik@email.sc.edu
Colonization Patterns of Natural versus Restored Oyster Reefs by Decapod Crustaceans in Apalachicola Bay, Florida

Lamb, M.S.*; Behringer, D. C.1,2

1School of Forest Resources and Conservation, Program in Fisheries and Aquatic Sciences, University of Florida, Gainesville, FL 32653
2Emerging Pathogens Institute, University of Florida, Gainesville, FL 32608

Oysters are a foundational species and important to estuarine systems around the globe. In addition to supporting fisheries, oyster bars provide many important ecosystem services such as shoreline protection, water filtration, and food and essential habitat for many species including fishes, crabs, and shrimps. However, oyster habitats have become degraded in many areas and there is great interest in understanding the efficacy of restoration techniques. Understanding how associated organisms use restored reef habitats is critical to understanding how those sites function relative to a natural, unrestored ecosystem. We compared the decapod crustacean communities between historic and newly planted subtidal reefs of the American Oyster Crassostrea virginica in Apalachicola Bay, Florida. We used coated-wire ‘collector’ boxes filled with oyster shell to examine biological diversity, community succession, and recruitment/colonization to natural oyster bars compared to those restored with fresh or fossilized oyster shell substrates over a one year period, beginning six months after reef restoration. Initial results indicate that the collectors from natural and restored sites differed in their decapod crustacean total abundance, community composition, and number of recruits. These results have implications for type of material used for oyster reef restoration and time required for the full return of ecological function.

Presenting author contact info: megan.lamb@ufl.edu

Does the biocomplexity of restored sponge communities affect the abundance and diversity of new recruits to hard-bottom habitat in the Florida Keys?

Alison Lamberski, Haley Johnson, Mark Butler IV, and Donald Behringer

Few will deny that coastal ecosystems have been degraded by human activity, but debate still swirls regarding the best course of action going forward. Over recent decades there has been increasing interest from the public and research communities in restoration of these ecosystems.
Prior studies have shown that barring addition perturbation natural recovery of a system may be effective, in the long-term. However, this is often not practical and risks degradation beyond the threshold for recovery. Sponge communities in the Florida Keys have been devastated by periodic harmful algal blooms (HAB) that have occurred over the past 25+ years. Given the importance of sponge communities and their foundational role in tropical hard-bottom habitat, their loss has clear negative effects. We have been studying the ecology of restoring these sponge communities for the past decade and focus here on the effect of sponge community biocomplexity on recruitment of organisms to hard-bottom. We established sites with either high or low sponge biomass and with either high or low sponge species diversity in an orthogonal design. Degraded but not restored sites serve as negative controls and sites not impacted by the HABs serve as positive controls. Recruitment is measured by monthly monitoring of mid-water ‘shag’ collectors deployed at each site. We used several metrics of community composition including total abundance, species evenness, species richness, number of rare species, and diversity to determine if biocomplexity of the sponge community effects recruitment. This is an on-going project and we will again measure recruitment in 2017, as the treatment sites continue to recover.

**Missing author contact**

**Do HAB’s affect barnacles? Assessing brevitoxicosis in turtles from the barnacles they host**

Lane, Z.*1; and Zardus, J.D.2

1GPMB, The Graduate School at the University of Charleston, Charleston, SC
2The Citadel, Charleston, SC

The epibiotic barnacle, *Chelonibia testudinaria*, is a commensal species that has been reported living on all species of sea turtles. In areas where the hosts for *C. testudinaria*, (e.g., loggerhead and Kemp’s ridley sea turtles) are native, harmful algal blooms (HAB’s) can be a common stressor. An alga linked to HAB production in these regions is the dinoflagellate, *Karenia brevis*, which releases a suite of neurotoxins known as brevetoxins. Brevetoxins have been implicated in many marine mammal and turtle strandings as well as fish kills. This study aims to connect brevetoxin concentrations in *C. testudinaria* tissues with environmental brevetoxin concentrations to determine if this commensal barnacle could act as an indicator for host exposure. *Chelonibia testudinaria* raised in a laboratory setting will be exposed to biologically relevant concentrations of *K. brevis* in order to test if the barnacle is capable of directly ingesting the dinoflagellate and if environmental brevetoxin concentration is positively correlated with brevetoxin concentration in *C. testudinaria* tissue after feeding. Along with laboratory trials, *C. testudinaria* and host blood samples will be taken from stranded loggerhead, Kemp’s ridley, and green sea turtles to examine the potential correlation between host exposure to brevetoxins and *C. testudinaria* tissue brevetoxin levels.

Presenting author contact info: Lanezm@g.cofc.edu
Fish Nursery Function of Ocean Surf-Zone Habitat:
Response to Human Disturbance Gradients
Lankford, T.¹

¹Department of Biology and Marine Biology, University of North Carolina Wilmington

Ocean surf-zones provide essential habitat for a variety of coastal marine fishes. The nursery function of surf-zone habitat may be sensitive to human disturbances associated with shoreline development and protection. We are investigating the response of fish nursery function to beach disturbance by comparing the assemblage structure, density and nutritional condition of juvenile fishes from beaches varying in their degree of human disturbance. Sampling sites include undisturbed (undeveloped and unnourished, n=3), moderately disturbed (developed but unnourished, n=2) and highly disturbed (developed and nourished, n=3) beaches in southeastern North Carolina. Nursery function is indexed based upon the compositional analysis (tissue lipid content, ash content, somatic condition) of two surf-dependent indicator species: Florida pompano (*Trachinotus carolinus*) and Gulf kingfish (*Menticirrhus littoralis*). Preliminary results indicate that the nursery function of undisturbed beaches was superior to that of both developed and nourished beaches.

Presenting author contact info: lankfordt@uncw.edu

Are bacterial and fungal pathogens responsible for high sea turtle embryo mortality in Ostional, Costa Rica?

Morgan P. Larimer*¹; Kristina M. Hill-Spanik¹; Vanessa S. Bézy²; Craig J. Plante¹

1. Grice Marine Laboratory, College of Charleston
2. Department of Biology, University of North Carolina at Chapel Hill

The olive ridley sea turtle (*Lepidochelys olivacea*) is characterized by a unique mass-nesting behavior; some females nest *en masse* while most nest solitarily. Hatching success is markedly lower at mass-nesting beaches, although the reason remains unclear. One theory is that specific pathogens, particularly fungal pathogens within the *Fusarium solani* species complex (FSSC), are present and causing high embryo mortality. We collected sediment samples from Ostional, Costa Rica, and employed high-throughput DNA sequencing to assess microbial diversity and community composition. We compared two nesting areas with disparate embryo survivorship (low-density, low mortality vs. high-density, high mortality). Analyses revealed that both fungal and bacterial communities varied by nesting area (p<0.05). Bacterial diversity was greater in the low-density area compared to the high (p=0.022). Fungal evenness varied with respect to area as
well (p=0.039), with the high-density area being more even than the low. While FSSC were present in all nesting sites (high-density abundance=0.01%, low=0.05%), they contributed less than 1% to the average dissimilarity. For bacteria, Moraxellaceae, which contains pathogenic species, was the highest contributor to area dissimilarity (1.38%). Overall, these results suggest that a pathogen may be a cause of low survivorship observed, but it is not likely a result of FSSC.

Presenting author contact info: larimermp@g.cofc.edu

Author name: Laina Latzsch
Missing abstract

Characterization of Proteobacteria in the Satilla River Estuary in regard to Bioremediation, Nutrient Cycling, and Pathogenicity.

Alexander Leach*; Adrienne Kambouris; Jessica M. Reichmuth; and Chris Bates.

All affiliations are Department of Biological Sciences and Augusta University.

The Satilla River Estuary is an example of how industrial processes can alter an ecosystem. In 1910, the Noyes Cut was dug by hand to transport lumber. Shortly thereafter, two other cuts, Dover and Baileys were also made. All three have not been maintained, but appear to be disrupting water flow in Umbrella and Dover Creeks. However, a 1983 US Army Corps of Engineers report indicated that Noyes Cut was the main culprit in the observed changes of water flow and sediment deposition. The topsoil from four sites in the Satilla River Estuary was collected, microbial DNA was extracted, and 16s rRNA genes were sequenced. The gene sequences were used to identify genera present as well as to determine the community diversity. The four sites demonstrated different similarity and diversity indices, across the sampling sites indicating that Noyes Cut may be influencing the environments adjacent to and downstream. The most abundant phylum present was Proteobacteria. The goal of this study was to further characterize the genera of Proteobacteria with particular focus on remediation, nutrient cycling, and pathogenicity.

Presenting author contact info: aleach2@augusta.edu
Diploid thalli of the ecosystem engineer *Gracilaria vermiculopylla* are stronger and less nutritious than haploid thalli

Lees, L.E12#; S.A. Krueger-Hadfield3#; A.J. Clark2; E.A. Duermitt12; E.E. Sotka12; C.J. Murren2,

1 Grice Marine Laboratory, College of Charleston, 2 Department of Biology, College of Charleston, 3 Department of Biology, University of Alabama at Birmingham. # Authors contributed equally to this work

Native to the northwest Pacific, the haplo-diplontic red seaweed *Gracilaria vermiculophylla* has invaded every temperate estuary in the Northern Hemisphere and profoundly alters local trophic and detrital pathways. During the invasion, there was an ecological shift from hard to soft-substratum that resulted in diploid dominance and the loss of the haploid stage. One explanation may be that diploids have greater fitness than haploids in the non-native range. To test for differences in phenotype that may contribute to differential fitness, we sampled male haploids, female haploids and diploids from an introduced population in Charleston Harbor, SC across two years and analyzed their thallus morphology, protein and organic concentrations, and thallus material properties. We found differences in thallus length and surface-area to volume ratios between years, but not between ploidies or sexes. Diploids had lower protein concentrations than did haploids and the peak force required to pull apart diploid thalli was greater than for haploids. Differences in nutritional content suggest that haploids may be more attractive to herbivores, while differences in breakage force may favor the integrity of diploids and facilitate clonal propagation in free-floating mats that drift on non-native soft-bottomed habitats.

Contact info: leesle@g.cofc.edu

How Much Seawater is Filtered Through

Long Bay, SC

Legut, N.1; Hannides A.K.1

1 Department of Marine Science, Coastal Carolina University

Sediment in Long Bay, South Carolina from the intertidal zone to the innershelf is primarily characterized by permeable sands which underlie a dynamic water column, therefore exchanging particles and water at rapid rates. Grain size data collected throughout the innershelf of Long Bay indicates that 99% of Long Bay sediment is highly permeable and it may be apt to view this bay as a sponge that filters water throughout the tidal cycles. The amount of water filtered is determined by replicating an experiment performed by Rupert Reidle, in situ at Waites Island, South Carolina. Using conservative volume approximations for the Waites Island intertidal zone and the on site determination of the saturation limit it is concluded that approximately 43,378 m³/day of seawater is filtered through Waites Island intertidal zone. Using the relationship between the filtering rate and the volume of the intertidal zone on Waites Island it is determined
that this volume is filtered approximately 50 times per year. Further research will continue into the implications on biogeochemical processes in the nearshore environment and the role in Long Bay’s biogeochemical episodic hypoxia.

Presenting author contact info: Nalegut@g.coastal.edu

Oyster Growth, Survival, and Associated Fauna from Baltimore’s Inner Harbor
Liberto, B.*; Moody, M.; Johnson, K. D.
Stevenson University

There are a large number of ongoing and prospective restoration projects occurring currently around the Chesapeake Bay, which benefit numerous organisms in the area. In one of these projects, the National Aquarium and Baltimore City have collaborated in order to create the “Harbor 2.0” project, which strives to make the polluted waters swimmable and fishable by the year 2020. Water quality analysis was conducted and growth and survival rates of *Crassostrea virginica* spat were examined in order to determine their ability to survive in this kind of environment. The data we collect is then used to determine if oysters could be used in the project as a natural water filtration system. Through our monitoring of this restoration project, we hope to help determine the future course of restoration in urban settings. The initial data suggests that the conditions at the Inner Harbor are sufficient to support oyster growth and development.

Presenting author contact info: bliberto@stevenson.edu

Belizean coral community phase shifts in response to environmental stressors
Locklear, Z. D.*1; Alves, C. A.*1; Bruno, J. F.2; McField, M.3

1 Curriculum for the Environment and Ecology, University of North Carolina at Chapel Hill
2 Department of Biology, University of North Carolina at Chapel Hill
3 Smithsonian Marine Station, Fort Pierce, Florida

- Habitat degradation leads to changes in species composition
- Acropora and Orbicella are listed under Endangered Species Act
- Add a more conceptual framework
- Change in functional groups leads to lower rugosity and fish effects etc

Coral reef ecosystems worldwide have been subjected to an increasing number of stressors, ranging from excess nutrient runoff and overfishing locally to rising sea surface temperatures and ocean acidity globally. These stressors have been linked to phase shifts from coral-dominated to macroalgal-dominated reef ecosystems, particularly in Caribbean reefs. However,
comparing the stressors to coral community phase shifts over space and time has yet to occur along the Belizean Barrier Reef. The goal of this study was to test if there has been a shift in Belizean coral functional groups from a more diverse species assemblage with stress intolerant and tolerant species to a less diverse, stress tolerant dominant species assemblage. By comparing benthic video transects taken at 14 sites along the reef from 1997, 1999, 2009, and 2016 with environmental stressors such as sea surface anomalies and overfishing risk, we found … [Insert results here] … These data can help inform management goals of what species or sites need greater protection and which stressors are the strongest.

Presenting Author Contact: zaclocklear@gmail.com

Incomplete

Spatial and Temporal Variation in Mussel Recruitment within the Gulf of Maine

Longman, E.K.*; Matassa, C.M.; Trussell G.C.

Department of Marine and Environmental Sciences and the Marine Science Center, Northeastern University

Local scale studies can yield valuable insight about the structure and processes underlying ecological communities. However, greater knowledge often emerges when highly dynamic communities are observed over larger spatial scales. Rocky intertidal communities along the Gulf of Maine (GoM) are a model system to study the degree and causes of variation in community dynamics since they are composed of similar species, but span large abiotic gradients. Blue mussels (*Mytilus edulis*) are a foundation species in rocky intertidal communities, and variation in the timing or intensity of mussel recruitment to rocky shores may contribute to variation in community structure within the GoM. We analyzed mussel recruitment at 10 pairs of exposed and protected shores in across the GoM from June to October in 2015 and 2016. Mussel recruitment was significantly higher on wave exposed versus protected shores. Furthermore, recruitment intensity was considerably larger in the southern GoM, peaking at field sites in northern Massachusetts and southern Maine. Although recruitment spanned a long time period, the timing of peak recruitment varied along the coast, with southern sites recruiting earlier than northern sites. Understanding the dynamics of mussel recruitment along the GoM is the first step to comprehending the drivers behind the striking variation in rocky intertidal community structure within the ecosystem.

Presenting author contact info: eklongman@gmail.com

Evidence and Effects of Climate Change in Florida’s Nature Coast
Florida’s Nature Coast, spanning from Hernando to Wakulla County in the northeast Gulf of Mexico, is one of the most undeveloped estuarine ecosystems in the Southeastern United States. The region contains an abundance of diverse habitats, including tidal creeks, salt marshes, oyster reefs, seagrass meadows, and mangroves, as well as an economy driven by natural resources (farming, fishing, forestry, ecotourism, and aquaculture, among other industries). Despite the presence of numerous wildlife refuges and protected lands, the area is still under threat from a number of disturbances, including global climate change. The gradual elevation gradient makes the Nature Coast extremely susceptible to climate change, as even small changes to sea level or the timing and magnitude of freshwater discharge become exacerbated. Here, we synthesize the available evidence for the existence of climate change along the Nature Coast, including changes to temperature, sea level, and large scale weather patterns that may influence freshwater discharge from the Suwannee River, one of the largest and most pristine rivers in the Southeast. In addition, we provide examples of tropical and subtropically-associated fauna (groupers, snappers, snook, parrotfish) and flora (black, red, and white mangroves) that exhibit expanding distributions into the northern Gulf of Mexico. The objective of collating this information is to develop a more comprehensive understanding of the risk of climate change to this estuary and highlight critical knowledge gaps that should be prioritized in future efforts.

Presenting author contact info: charles.martin@ufl.edu

Oyster recruitment and growth in areas of high and low groundwater discharge in Oyster Creek, Georgia

McKenna, AL*¹; Carroll, JM¹; Kelly, JL²

¹Department of Biology, Georgia Southern University
²Department of Geology and Geography, Georgia Southern University

Reef building oyster populations found in coastal Georgia have been declining as a result of disease, parasites, and overharvest, among other factors. These oysters both provide important services to ecosystems and support to the shoreline and have a large commercial value. While many restoration efforts have been attempted, success or failure is dependent upon a suite of biological and physical factors. One factor that has not received much attention is the presence of high groundwater discharge on oyster populations. For this study, we worked to determine the relationship between oysters and the groundwater gradient within Oyster Creek, Georgia; we
also surveyed recruitment of new individuals and recruitment growth. Groundwater surveys were conducted along each bank of the creek using radon sampling. Oysters and discrete water samples were collected at 23 survey sites within the creek. Additionally, oyster recruitment was monitored at 13 of the sites on each of the banks and oyster growth was studied at the 5 sites closest to the area of greatest groundwater discharge. The condition index of each oyster was compared to the nutrient availability, turbidity, and pH levels in the water. We will present our preliminary findings.

Presenting author contact info: am11022@georgiasouthern.edu

Author name: Jacob McKittrick
Missing abstract

Author name: Kelsey McLeod
Missing abstract

Does abundance of the invasive porcelain crab *Petrolisthes armatus* affect body size of the native mud crab *Panopeus herbstii*?

Miller, C.*:1; Podolsky, R. 1 and Wilber, D.1

1Graduate Program in Marine Biology, University of Charleston, South Carolina

Over the past two decades the range of the invasive green porcelain crab, *Petrolisthes armatus*, has extended northward along the South Atlantic Bight. Although *P. armatus* densities can reach up to several thousand m$^{-2}$ on intertidal oyster reefs, little research has examined its impact on native communities. We tested for a set of associations between the invasive crab and a native mud crab, *Panopeus herbstii*, using collecting trays filled with live oysters or oyster shells at 2 sites near Charleston, SC. Collected crabs of the two species were counted, sexed, and measured (carapace width). Within each site, abundances of the invasive and native were positively correlated. Mud crab body size was largest and porcelain crab abundance highest in the high rugosity treatment. Similarly, within the high rugosity treatment, mud crabs were larger at the site with higher porcelain crab densities (19.12 ± 0.99 vs. 16.03 ± 0.44 mm CW, mean ± SEM), suggesting a possible effect of prey density on predator growth. These relationships are consistent with an interaction between species but could also reflect a common response to another variable. Understanding these interactions may provide insight into other aspects of how *P. armatus* is altering oyster reef communities.
**Effect of Harmful Algal Blooms on Growth and Survivorship of Oysters in the Baltimore Harbor**

Moody, M.; Prettyman J.; Johnson, K. D.
Stevenson University

Harmful algal blooms (HABs) in the Chesapeake Bay are a growing threat to marine life. The increased anthropogenic adding of nutrients from and agriculture and industrial runoff provide the necessary nutrients for large algal blooms to occur. HABs create “dead zones” with low oxygen making life for oysters, crabs, fish and other marine life difficult. HABs are quite frequent in the Baltimore Harbor which connects to the Chesapeake Bay by the Patapsco River. In attempts to restore the ecology of the harbor by 2020, floating grass beds and bio-huts are currently in place along piers in the harbor to better understand the ecology of the area. Oysters are essential to the ecology of the bay because they provide food and habitat for a multitude of aquatic species. Oysters were placed in various locations in the harbor and grown over the summer and early fall. The growth and survival of the oysters were monitored to better understand how HABs will affect oyster growth and survival in the Baltimore Harbor.

Presenting author contact info: mmoody2@stevenson.edu

---

**Invasion of the Body-Snatchers: Salinity Limits the Spread of an Invasive Castrating Parasite in Populations of North Carolina Mud Crabs**

Moore, C.*; Barnard, R; Blakeslee, A.
Biology Department, East Carolina University

Invasive species are a threat to community stability and the persistence of trophic relationships, especially in estuarine environments in North Carolina that are heavily impacted by human activity. The threat posed by biological invasion is not well characterized in major estuaries like the Pamlico and Neuse Rivers, which merge to form Pamlico Sound: the largest lagoonal estuary in the United States. This is especially true for non-native parasites, organisms which can disrupt trophic networks because of the functional links they form with one or more hosts. We tested the hypothesis that the prevalence of Panopeid mud crabs (primarily the white-fingered mud crab *Rhithropanopeus harrisii*) infected with an invasive castrating parasite (*Loxothylacus panopei*, a rhizocephalan parasitic barnacle) increased with increasing salinity in the Pamlico and Neuse rivers. This is the first study to explicitly test the prevalence of *L. panopei* infection along a salinity gradient. Preliminary data indicate that infection prevalence is greater in moderate to high salinity (> 8-10 ppt) areas, which is consistent with findings from monitoring work done in
the Chesapeake Bay. Because mud crabs are an important component of estuarine food webs, heavily infected populations may result in altered predator-prey dynamics.

Presenting author contact info: moorech16@students.ecu.edu

A Bayesian Hierarchical Model for Improved Genetic Stock Identification

Benjamin Moran*,1; Eric C. Anderson2

1Department of Marine and Environmental Sciences, Northeastern University
2Southwest Fisheries Science Center, National Marine Fisheries Service, National Oceanic and Atmospheric Administration

Genetic stock identification (GSI) assigns individuals to populations through comparison of genetic markers to population references, and is utilized in anadromous fisheries to estimate the impact of oceanic harvest on threatened riverine populations. Individual rivers are realistically managed as collections known as reporting units, whose GSI proportions are typically calculated by summing those of their constituent river populations. However, this method is afflicted by a known bias, recently observed in Hasselman et al. (2015), which may have considerable effects on estimated proportions. We hypothesized that a hierarchical GSI model would eliminate this error, and have implemented such a model in the R package "rubias". This package includes a GSI framework explicitly accounting for the inclusion of both populations and overlying reporting units, a suite of tools for assessing the accuracy of GSI in any population genetic dataset, and a parametric bootstrapping correction which consistently reduces biases in reporting unit estimates, if present, by >50%. By implementing these methods with the RCpp package for R, we obtain speeds comparable to previous methods in C. Fisheries managers may use this new toolset to more accurately estimate the reporting unit proportions within mixed-stock samples, better tracking the impacts of fisheries on riverine populations.

Presenting author contact info: moran.ben@husky.neu.edu

Author name: Claire Mueller

Missing abstract

The Role of Habitat Connectivity in a Restored Marsh System: Influences on Nekton Populations
This study examines the effect of increased habitat connectivity on the nekton occupying a restored marsh system in Poplar Island, Chesapeake Bay. The Poplar Island Environmental Restoration Project (PIERP) is a large scale (1,715 acres) marsh restoration project designed in stages. Each marsh (identified as cells) was isolated and developed independent of previously established cells, so that each cell incorporated lessons learned from creating the previous cell. This project focuses on nekton utilization among established marshes connected in 2012. Comparison of pre (2010-2012) and post (2013-2016) connection data focuses on changes in abundance, size demography, body depth, and individual weight measurements among critical marsh species, including marsh residents, *Fundulus heteroclitus*, *Fundulus majalis*, and *Cyprinodon variegatus*; and transient marsh species, *Menidia menidia*. If connectivity influences nekton utilization of marsh habitat these species are most likely to respond through changes in condition, distribution, and/or abundance. Data collected from within the cells, at the connections, and in the inlets were analyzed to gain an understanding of the role that habitat connectivity plays in a salt marsh system. *M. menidia* provides a clear example in distribution with greater abundance at the inlets compared the connecting channels.

Presenting Author Contact Info: Cjm3354@uncw.edu

---

**Similar trends in cover of sponges and macroalgae with depth on deep Caribbean reefs**

Noren, L*; Scott, A; Pawlik, J

Department of Biology and Marine Biology, Center for Marine Science, UNC Wilmington

Benthic community composition on coral reefs changes as a function of depth through the mesophotic zone. Some researchers have proposed that sponges show a repeatable pattern of increasing biomass to 150 m on Caribbean reefs, while others have documented alternative patterns. We used photographs from remote operated vehicle (ROV) transects in Puerto Rico and St. Thomas (USVI) to examine patterns in the abundance of benthic organisms with depth. A standardized sampling protocol revealed that the percentage cover of macroalgae (encrusting and upright taxa) had a similar distribution to the cover of sponges. To further investigate this relationship, we examined the correlation between the cover of these two taxonomic groups at increasing sampling scales. Cover of sponges and macroalgae were not related at the quadrat scale, but were positively correlated at greater sampling scales. In addition, cover of both macroalgae and sponges declined consistently from approximately 20% at 110 m to zero at 170 m and deeper. These data appear to support the “vicious circle” hypothesis, which proposes that...
sponges and algae cycle dissolved organic carbon (DOC) and dissolved inorganic nitrogen (DIN), creating a positive feedback loop that supports both benthic taxa.

Presenting Author contact info: Lnn6296@uncw.edu

---

Blue Carbon Storage In Migrating Barrier Island Systems
Norman, K.¹* and K. Gedan¹

¹Department of Biology, George Washington University

Despite the potential value of blue carbon in carbon accounting schemes, controls on blue carbon density are not well understood. Mechanistic understanding of blue carbon storage is crucial to understanding its response to changing environmental conditions, such as barrier island migration and marine transgression. In a comparison of two barrier islands along the Virginia Coast, we observed higher marsh elevations and lower mean *Spartina alterniflora* heights behind rapidly migrating Cedar Island and lower marsh elevations and relatively higher mean *S. alterniflora* heights behind relatively stable Parramore. If these differences in elevation are due to additional sediment inputs from Cedar’s rapid migration, we expect this sediment input is also impacting blue carbon density. Using randomly distributed soil samples collected from backbarrier Parramore and Cedar Island, we measured the percent carbon of soil composition using loss on ignition. We hypothesize that blue carbon density will be lower, indicating larger inputs of sand, behind Cedar Island. Carbon density data will be analyzed using ANCOVA to test for the effects of island identity, dominant vegetation, and elevation on blue carbon density. Our results will fill important knowledge gaps in our understanding of barrier island dynamics and blue carbon variability across spatial gradients.

Presenting author contact info: ke_norman@gwu.edu

---

Author name: Dana Orr
Missing abstract

---

Ecosystem restoration along the Grand Strand, South Carolina: the Coastal Oyster Recycling and Restoration Initiative (CORRI)

O'Shaughnessy, K. A.*¹; Walters, K.²; Funk, T.²; Martin, C.W.³

¹School of Biological and Marine Sciences, Plymouth University
²Department of Marine Science, Coastal Carolina University
In northern South Carolina, tidal swash systems have experienced an almost total loss of one intertidal habitat: oyster reefs. Swashes – estuarine tidal creeks that empty into the ocean over barrier island beaches – historically drained inland swamps. Currently all tidal swashes are part of the local stormwater infrastructure that accommodates both a vibrant tourist industry and growing residential communities along a 100 km stretch of coastline. The Coastal Oyster Recycling and Restoration Initiative (CORRI) was established to involve local communities and businesses in oyster shell recycling and restore shell reefs along >600 m of tidal creek shoreline, and assess the efficacy of reef restoration on reef-dependent fauna. To date over 200 tons of shell have been recycled to construct 20+ reefs within 10+ tidal creeks. Oyster population growth rate was similar for natural and constructed reefs within 2 years of deployment, and experiments and sampling conducted indicate that constructed reefs quickly provide a range of ecosystem services associated with natural oyster reefs. CORRI’s continued efforts to increase the prevalence of oyster reefs within tidal swash systems have the potential to reverse recent oyster reef declines and significantly improve the regional quality of coastal estuarine systems.

Presenting author contact information: kathryn.iosaughnessy@plymouth.ac.uk

---

Development of a bio-optical model to optimize seagrass restoration within Long Island estuaries

O’Toole, K.*1 Peterson, B.J.1

1School of Marine and Atmospheric Science, Stony Brook University

As global ocean temperatures rise, concern grows over economical and environmental ramifications. Seagrasses are integral to coastal ecosystems, providing nurseries for shellfish and juvenile fish, reducing currents, and improving water quality. Seagrasses are sensitive to temperature and each species have certain parameters that must be met for their survival. Optimal temperatures for Zostera marina, a northern species, are < 25°C. Warming ocean temperatures will be problematic for local eelgrass populations, mortality occurs during extended temperatures over 30°C. Z. marina populations have been in decline since the 1930s in Peconic Bay and Great South Bay estuary systems (NY, USA). Implementation of wastewater management policies have diminished historically disastrous brown tide blooms, which shade seagrass, especially in Peconic Bay. During Hurricane Sandy, a breach formed and water quality in Great South Bay since has dramatically improved. With improvements in water quality of these areas, restoration is deemed feasible. A bio-optical model will be developed via water quality monitoring, epiphyte and sediment analysis, and deep edge seagrass bed observations to determine light requirements of resident eelgrass populations. This model will assign a habitat suitability model to both estuary systems to highlight areas of ideal restoration potential.

Presenting author contact info: kaitlyn.otoole@stonybrook.edu
Underwater video observations of a marine fish assemblage associated with hard-bottom habitat of North Carolina

Otstott, Emily E.*; Burge, Erin J.

Department of Marine Science, Coastal Carolina University

Coastal regions support diverse and productive ecosystems. Hard structure, either natural or artificial, increases productivity by providing substrate and protection for marine organisms. Underwater video is a useful tool for monitoring marine communities and provides a nonextractive sampling method with little selectivity. The fish assemblage of Frying Pan Tower, North Carolina was consistently monitored during a 3-month period using SharkCam video recordings. Species composition (total richness = 66) within the assemblage was assessed as a whole, by month, and within days. Relative abundance, measured for some species (n = 34) by MaxN, and species richness was compared among monthly and daily intervals. Biodiversity was analyzed by phyletic diversity using the Shannon-Wiener Diversity index and functional diversity using the Functional Attribute Diversity index. Functional attributes of interest were body length, eye diameter, trophic level, longevity, and habitat use. Local guilds were formulated based on ecological similarities. These findings help characterize the fish assemblage of Frying Pan Tower and contribute to the existing knowledge of connectivity between metrics of diversity.

Presenting author contact info: eeotstott@coastal.edu

Sublethal Impacts of Oil Exposure on Bioturbation

Parker, R.*1,2; Dorgan, K. M.1,2; Robertson, A.1,2; Berke, S. K.3; Bell, S.4; Weldin, E.3; Caffray, T.3; Budai, S.3; Gadeken, K.1,2; Ballentine, W.1; Kiskaddon, E.1

1Dauphin Island Sea Lab, 2University of South Alabama, 3Siena College, 4University of South Florida

The Deepwater Horizon Oil Spill released nearly five million barrels of oil into the northern Gulf of Mexico, introducing toxic hydrocarbons into many marine ecosystems. The impacts of oil contamination on soft-bottom benthic ecosystems are particularly important because of their potential to alter nutrient cycling, bioturbation, and bioirrigation, and primary and secondary productivity. Many heavy hydrophobic hydrocarbons associated with oil contamination are highly persistent in marine sediments, and infauna are particularly susceptible to oil exposure due to their limited mobility. To evaluate the sublethal effects of petrochemical exposure on select infauna, we established replicate sediment mesocosms representing an oiled treatment and an unoiled control. Individual species and diverse assemblages of three common infaunal taxa, Owenia fusiformis, Hemipholis elongata, and Telina versicolor were exposed to sublethal
concentrations of water-accommodated fractions (WAF) of crude oil over four weeks. Surfacial evidence of bioturbation was monitored with photos of fluorescent luminophores spread on the surface at the beginning of the exposure. After four weeks, sediment cores were sliced at 1-cm increments and luminophore distribution and porosity profiles were characterized. These results highlight differences among taxa in responses to oil exposure and provide insight into potential long-term impacts of oil spills on benthic ecosystem functions.

Presenting author contact info: rparker@disl.org

Determining the impacts of ocean acidification on shell mechanics and structure in the barnacle *Amphibalanus amphitrite*

Patel, S.*1; Nardone, J.A.1; Tedesco, D.1; Siegel, K.R.1; Orihuela, B.2; Rittschof, D.2; Dickinson, G.H.1

1Department of Biology, The College of New Jersey
2Duke University Marine Laboratory, Marine Science and Conservation

Ocean acidification is a decrease in seawater pH, resulting from increased atmospheric CO$_2$. We assessed the impact of pH on shell structure, mechanics and composition in the barnacle, *Amphibalanus (=Balanus) amphitrite*. Juvenile barnacles, settled on T2 silicone, were exposed to pH$_T$, 7.5, 7.8, or 8.1 for 12 weeks at 25°C and 35psu. Shell growth was significantly influenced by pH; barnacles at pH 7.8 and 7.5 were larger and shell mass was greater than those at 8.1. Despite increased growth, the base plate of pH 7.5 barnacles tended to break more frequently than those at 7.8 or 8.1. Shell mechanical properties were quantified through microhardness testing. Although hardness (resistance to deformation) did not differ among pH treatments, crack propagation was greater in pH 7.5 barnacles as compared to those at 7.8 and 8.1, suggesting a reduction in shell toughness. All shells were found to be composed of calcite, however, magnesium content in base plates of pH 7.5 barnacles was lower than that at 7.8 or 8.1. Size of the calcite crystals that comprise the base plate was found to be significantly larger in 7.5 and 7.8 barnacles as compared to those at 8.1. Authors acknowledge support from ONR.

Presenting author contact info: patels111@tcnj.edu

Tide gates and coastal wetlands: creating better decision support tools

Patterson, M. R.*1,2,3; Helmuth, B. S.1,4
Tide gates are valves in wetlands designed to protect life and property but often have negative effects on the ecosystem. Our research aims to develop best practices for tide gate operation to maximize protection of people and ecosystem health. In the US, thousands of tide gates are maintained and operated by municipalities, conservation boards, and government agencies. Gate operation affects risks of flooding, fire, and wetlands health, in competing, non-linear ways. For example, if too little seawater passes through the gate per tidal cycle to keep flood risk low, the ecosystem can freshen too much. *Phragmites australis*, a flammable grass then invades, posing a severe seasonal fire risk. Tide gates affect the transport of pollutants in sediment and water and the movement of fishes and other aquatic life. We instrumented and monitored a tide gate in the Rumney Marsh, an urbanized wetland near Boston, MA. Our preliminary work demonstrated strong effects of tide gate presence on water quality (nitrate, DO, salinity, temperature, and pH), and wetland flora and fauna. During our study, this gate failed; post-hoc analysis showed interesting hallmarks of impending failure. We are developing decision support tools to help tide gate operators maximize ecosystem services while minimizing risk.

Presenting author contact info:  m.patterson@northeastern.edu
evolutionary lineages. Thus, characteristics of Halimeda utricle morphology may control long-term adaptive responses to OA, an idea articulated in the broader literature.

Presenting author contact info: peach.kate@comcast.net

The interactive effects of the canopy-forming macroalga Sargassum pacificum and ocean acidification on Lithophyllum kotschyanum

Perng, L.Y.*; Carpenter, R.C.

California State University, Northridge

Ocean acidification decreases calcification in reef builders such as crustose coralline algae (CCA). Scenarios of global climate change also predict shifts to macroalgal dominance in reef systems, which is predicted to negatively impact CCA. However, non-calcified algae can mitigate the effects of ocean acidification through local metabolic CO$_2$ drawdown by photosynthesis. This interaction was explored in a mesocosm study conducted in Moorea, French Polynesia using the common canopy-forming alga Sargassum pacificum and the CCA Lithophyllum kotschyanum. In a two-factor experiment, samples of L. kotschyanum were placed in mesocosms with crossed factors of Sargassum canopy present/absent and ambient/elevated pCO$_2$. Treatments had no effect on photosynthesis of L. kotschyanum but canopy presence significantly increased respiration rates, indicating potential metabolic compensation in response to shading by macroalgae. There also was a trend toward slower respiration in elevated pCO$_2$ treatments. Elevated pCO$_2$ increased long-term calcification, but decreased short-term calcification, suggesting a delayed reaction to acidification. The canopy treatment significantly reduced short-term calcification, revealing a stronger effect of light limitation than CO$_2$ drawdown. Results suggest that fleshy macroalgae negatively impacts CCA, but future research may explore the CO$_2$ drawdown effect on calcification in an experiment where light obstruction by macroalgae is eliminated.

Presenting author contact info: lansing.perng.886@my.csun.edu

The effects of hard-bottom habitat degradation on the ecology and biology of the Florida stone crab Menippe mercenaria from the Florida Keys

Pharo, D. *; Behringer, D.

1Department of Fisheries and Aquatic Sciences, University of Florida
The stone crab *Menippe mercenaria* supports one of the most economically important fisheries in the southeastern United States, with Florida leading overall landings. Hard-bottom in the Florida Keys is an important habitat for Florida stone crabs and is characterized by a porous limestone substrate covered by sponges, octocorals, macroalgae and a thin layer of sediment. Over the past three decades cyanobacteria blooms have periodically occurred in Florida Bay, resulting in mass sponge mortalities. Mostly juvenile and young adult *M. mercenaria* are predominantly found residing in hard-bottom under loggerhead sponges, *Spheciospongia vesparium*. Blooms have decimated populations of this sponge and the loss of habitat appears to affect the population structure and condition of the stone crabs that reside in impacted areas. Our research is examining the effects of hard-bottom degradation on stone crab nutritional condition, population size structure, size at sexual maturity, and whether *M. mercenaria* use chemical cues from sponges or macroalgae to navigate their home range. Here we focus on the nutritional condition of *M. mercenaria*. The results of this study will increase our understanding of the effects of habitat degradation on an important member of the benthic community in the Florida Keys.

Presenting author contact info:  dpharo@ufl.edu

**Fall male-biased sex ratios of *Petrolisthes armatus* in its invaded range**

1Popp, T.E.*; 1Wilber, D.H.

1 Grice Marine Biology Program, College of Charleston

The green porcelain crab, *Petrolisthes armatus*, is an invasive species that now inhabits the southeastern coast of the United States. These non-native crabs occur on intertidal oyster reefs, where their potential ecological impact is unclear. We examined colonization by *P. armatus* of constructed intertidal oyster habitat at two sites in Charleston, SC. After three months of deployment, habitat trays of varying vertical complexity were retrieved in the fall of 2014 and processed for resident crab identity, sex, and abundance. *P. armatus* sex ratios were male-biased at both sites (2.38 and 1.95 M:F) and across all size classes, becoming more male-biased in the larger crab sizes due to the species’ sexual dimorphism. Sex ratio was also related to habitat complexity. Male-biased sex ratios were highest in the treatment with the greatest vertical complexity, with 2-3 more males per female. Treatments with low vertical complexity had the lowest mal-biased sex ratios, but males still outnumbered females 1.7:1. Future studies will address possible causative mechanisms underlying these male-biased sex ratios, such as sex-specific habitat preference, potential female mortality in the fall after spawning, and sex-specific seasonal migration to and from the intertidal oyster habitat.
The Effects of Water Quality on the Growth and Survival of the Chesapeake Bay Oyster

Prettyman, J.*; Moody, M; Johnson, K. D.
Stevenson University

The oyster populations of the Chesapeake have slowly dwindled over the past hundreds of years. There are many issues that lead to possible threats to the overall health and growth of the oysters. Overharvesting, disease, and pollution are all dangerous to the oysters and the overall health of the bay. Some results of this are low oxygen levels, increased metal abundance in oyster tissue, and stress on the oyster spat in development. In an attempt to monitor and restore the oyster populations in the bay, Eyes on the Bay and oyster gardens have been placed in several locations around the bay to check the water quality and monitor the growth of the oysters attached to the marker. The oysters growth and survival were all measured as a means to understand the health of the oyster in that location of the bay and compare the health of different areas of the bay.

Presenting author contact info: Jprettyman@stevenson.edu

Cannibalism in the mud crab Dyspanopeus sayi

A.E. Profetto*; N.J. O’Connor
Department of Biology, University of Massachusetts Dartmouth

Cannibalism plays a role in population regulation for many animal species. The mud crab Dyspanopeus sayi is endemic along the U.S. Atlantic coast, from Florida to Canada, and is a known predator of molluscs. By examining the tendency of adult crabs to cannibalize settling larvae (megalopae) and newly metamorphosed crabs, the potential for cannibalism to affect recruitment and therefore population dynamics of D. sayi can be better understood. Laboratory experiments were conducted in order determine under what conditions cannibalism occurs. One predator and ten prey (megalopae or first stage crabs, C1) were put into bowls with different treatment types: no sediment; sand; sand and rocks; sand and food; and sand, rocks and food. After 24 hours, the contents of the bowl were sifted and remaining animals counted to determine how many were eaten, left dead or were alive. Megalopae were highly cannibalized in all treatments. Cannibalism of C1s was variable but occurred in all treatments, although was less in the treatment with sand, rocks and food. Cannibalism of settling larvae by adult D. sayi could affect recruitment and potentially the population dynamics of this species of mud crab.

Presenting author contact info: aprofetto@umassd.edu
Effects of conflicting chemical cues on the recruitment of the eastern oyster, *Crassostrea virginica*

Pruett, J. ¹*; Weissburg, M. J.¹

¹School of Biological Sciences, Georgia Institute of Technology, Atlanta, Georgia 30332

Recruitment is a critical process that is necessary to sustain populations. For instance, adult distributions in sessile marine organisms are affected strongly by habitat choices made by pelagic larvae. Larvae are able to use sensory cues to locate and assess habitats. Chemical cues can either attract or deter larvae. Conspecific cues attract and induce settlement in a variety of benthic taxa. Whereas, the influence of predators on settlement has been less studied but demonstrated to deter settlement. Prey modify behavior in response to cues from injured conspecifics, which presents a conflicting cue to larvae that use conspecifics as a positive cue. Preliminary laboratory choice assays suggest oyster (*Crassostrea virginica*) larvae may be attracted to chemical cues from crushed adults. In the field, oyster recruitment was higher on tiles in antipredator cages surrounded by crushed adult oysters compared to crushed sun-bleached oyster shells. Whereas, recruitment levels were similar on caged tiles surrounded by crushed shells or mud crabs (no physical contact with tile) fed crushed adult oysters. Thus, injured adult conspecifics attracted settling oyster larvae, but this positive effect was neutralized by the presence of potential future predators.

Presenting author contact: jpruett7@gatech.edu

Behavioral and physiological responses of the coral *Porites astreoides* to high bloom densities of *Karenia brevis* and associated brevetoxins

David Reynolds¹*; Danielle Dixson²; Kate Semon Lunz³ and Cliff Ross¹

¹ Dept. of Biology, University of North Florida
² School of Marine Science and Policy, University of Delaware
³ Fish and Wildlife Conservation Commission

Gulf of Mexico seasonal red tide events occur from blooms of the neurotoxic dinoflagellate, *Karenia brevis*. This study provides evidence that short term exposure of the scleractinian coral, *Porites astreoides* to naturally occurring high concentrations of *K. brevis*, or brevetoxins, results in sub-lethal stress and affects larval behavior. Larva and adult fragments of *P. astreoides* were exposed to either *K. brevis* (2.5 X 10⁶cells L⁻¹) or purified brevetoxins ([0.018 ug PbTx 2, 0.0018 ug PbTx 3]ml⁻¹) for 24 or 48 hours and where subsequently analyzed for oxygen consumption, photosynthetic efficiency, larvae settlement and larval survival. Larvae were also placed in an Atema flume designed for pairwise choice between flowing sea water or seawater treated with *K. brevis* (range: 7.6x10⁶ cells L⁻¹ - 5x10⁵cells L⁻¹) or brevetoxins ([ 5.5ug PbTx2 and .55ug PbTx3] L⁻¹). *K. brevis* and brevetoxins had little impact on oxygen consumption rates or settlement and survival; however, photosynthetic efficiency was reduced at both time frames for larvae and 48 hours for adults. In pairwise choice of treated and untreated seawater, larvae showed a preference for untreated seawater, in a gradient response. These results highlight the importance of how naturally occurring toxins can potentially influence reef community health.

Presenting author contact info: d.reynolds@unf.edu
Effects of intra-clutch egg size variation and larval food supply on sea star development

Richardson, Emily L.*; Jonathan D. Allen

College of William and Mary

A fundamental tradeoff exists between the number and size of offspring that a female produces. Traditional life history models assume an optimal egg size within a clutch and largely ignore intra-clutch variation. However, the sea star, Asterias forbesi, produces eggs that vary two-fold in volume within a single clutch. We tested how intra-clutch variation in maternal investment in A. forbesi affects development to metamorphosis by rearing sibling larvae from small eggs (mean = 119 µm) and large eggs (mean = 142 µm). Simultaneously, we manipulated food availability (high = 22,500 cells ml\(^{-1}\) and low = 3,000 cells ml\(^{-1}\)) during larval rearing to assess the relative importance of larval food environment to development. Our response variables were time to metamorphosis, percent survival, juvenile disk diameter, and spine number. We found no significant effects of egg size on larval or juvenile traits. However, higher larval food levels resulted in significantly shorter time to metamorphosis, higher survival, and larger juveniles with more spines. These results indicate that food level is more important than levels of maternal investment in determining the success of A. forbesi larval development and suggest egg size may be decoupled from larval success under high food conditions.

Author contact: elrichardson01@email.wm.edu

Low salinity exposure affects reproduction of the Eastern oyster (Crassostrea virginica)

Madison Robison*; Myrina Boulais; Kyle John Chenevert; John Park Roberts; Aswani Volety

University of North Carolina Wilmington

Estuarine ecosystems experience regularly fluctuating salinity. Salinity can reach near-freshwater, and prolonged low salinity events will increase in frequency as a result of changing weather patterns over the next century. Furthermore, watershed development and disruption of sheet flow also contribute to episodic events of freshwater input into estuaries. Crassostrea virginica is an environmentally and economically important species that inhabits estuaries. Population maintenance relies on reproductive success, and therefore, the ability of individuals to successfully undergo gametogenesis, spawning, and fertilization. Oysters were exposed to salinities 5, 10, 15, 20, 25, and 30 over a period of 3 weeks during gametogenesis (n=230).
Exposures of 5 and 10 PSU delayed gametogenesis \((P<0.0001)\), and oogenesis appeared to be more sensitive to low salinity compared to spermatogenesis \((P=0.006)\). Similarly, gametes collected from oysters conditioned in 5 and 10 PSU did not develop into trophophore-larvae (24h after fertilization) as compared to 30PSU \((71\pm 17\% \text{ of trophophore-larval yield})\). These results support field observations, indicating low salinity exposure during gametogenesis negatively impacts oyster reproduction. This may reduce recruitment, which will have a negative effect on Eastern oyster population and may have important consequences for estuarine ecosystems.

Author contact: *Mrr9985@uncw.edu

---

**First report and establishment of Hermundura americana (Polychaeta:Pilargidae) in the Chesapeake Bay**

Rodi,A.J.*; Dauer,D.M.

Department of Biological Sciences, Old Dominion University

The genus *Hermundura* is considered limited to the tropics and subtropics (Glasby and Hocknull, 2010). Prior to 2009 the pilargid polychaete, *Hermundura americana*, was not reported in the Chesapeake Bay. In 2009 it was first recorded at a single location in the Southern Branch of the Elizabeth River. Over the next two years it became well established throughout the Southern Branch. In 2012 *H. americana* was found at a single location in the James River. By 2015 it was found in much of the James River from the polyhaline to oligohaline salinity zones. *Hermundura americana* has yet to be found in any locations beyond the James River in the Chesapeake Bay. The mechanisms restricting its movement into the rest of the Bay are uncertain; but, given its establishment over a wide range of salinities, it could become established throughout the Chesapeake Bay.

Presenting author contact info: arodi@odu.edu

---

**Damsels in Distress:**

**Influence of reef composition on abundance and behavior of damselfishes**

Rolfe, S.*; Stroud, C.; Towe, A.; Sims, R.; Smith, K.

Department of Biological Sciences, Clemson University

Damselfish are territorial, herbivorous reef fishes that potentially influence the abundance of macroalgae on coral reefs. Previous studies have suggested that some damselfish (farmers) actually harm corals by removing live tissue to stimulate more macroalgal growth. However, this behavior has not been observed for other damselfish species (non-farmers). In this study, we
compared the differences in aggression between farmer (dusky and cocoa) and non-farmer (bicolor) damselfishes and their impact on other reef herbivores. We surveyed the abundance and diversity of damselfishes on both nearshore (high coral cover) and offshore (low coral cover) reefs in the middle Florida Keys. We also conducted diver-recorded observations of damselfish behaviors. Both farmer and non-farmer damselfish showed similarly high levels of aggression toward intruding fishes, but differed in their responses toward damselfishes and parrotfishes. Cocoa damselfish were more responsive to damselfishes whereas dusky damselfish were more responsive to parrotfishes. Damselfish diversity was highest inshore (high coral) with all seven species in nearly equal abundance. However, offshore (low coral) bicolor damselfish abundance increased threefold leading to a relatively lower species richness and diversity. These results suggest that with the loss of live coral there may be a shift toward higher densities of non-farmer bicolor damselfishes.

Presenting author contact info: rolfe@g.clemson.edu

**Determining the Heritability of Thermal Tolerance in the Threatened Coral, Acropora cervicornis**

Ross, M*; Yetsko, K.; Gilg, M.

University of North Florida

*Acropora cervicornis*, a threatened species of coral, has been heavily affected by massive bleaching events caused by elevated oceanic temperatures. It is an important fore-reef coral, providing many unique ecosystem services. Global climate change poses a risk to coral populations; it is unknown whether many species of coral will be capable of adapting to the future temperature regimes. To determine heritability, we obtained six fragments from 20 genetically distinct colonies and placed them into two different temperature treatments, a control at ambient temperature (~27°C) and an elevated temperature treatment of 33°C. Fragments were monitored twice daily until death for a maximum of 30 days. Death was determined using pulse amplitude modulated (PAM) fluorometry measurements and visually scanning for live tissue. Heritability was estimated using both a clonal method and a genetic marker based method. Broad sense heritability was estimated as 0.3833 suggesting thermal tolerance varies among coral genotypes, but narrow sense heritability was ~0.0 suggesting the differences were not due to additive genetic variation. It appears unlikely natural selection would be able to significantly affect the thermal tolerance of *A. cervicornis*.

Presenting author contact info: mross14@hastings.edu

**Distinct personality types in Littoraria irrorata and the implications for predator escape behavior**

*Christina Salerno¹
This study was conducted to determine if periwinkle snails, *Littoraria irrorata*, exhibit individual personality types, and whether these behaviors vary when in the presence of a predator. Baseline personality types of 25 snails were determined using outdoor mesocosms in their natural habitat. To do so, 3 randomly selected snails were placed in the center of a bucket containing 3 cm of seawater. Every 5 minutes for a total 15 minutes the height of each snail was recorded. To test whether individuals exhibited consistent behaviors (in this case, maximal height climbed) across multiple trials, each trial was repeated 5 times for each snail. To test predator escape behavior, experimental trials were run as described above, with the inclusion of the common marsh predator, the blue crab, *Callinectes sapidus*. It was found that periwinkle snails do in fact have distinct personalities which significantly influence their predator escape response.

Email: cms8486@uncw.edu

---

**Reducing Bycatch Mortality of Blue Crab in a Dredge Fishery by Spatial Sediment Mapping**

Saluta, G.G.*; McCulloch D.N. 2; Seebo, M.S1; Knick, K.E. 3; Ralph, G.M. 4; Mamoozadeh, N.R. 1; Karp, M.A.3; Seitz, R.D. 3; Lipcius, R.N. 1

1 Department of Fisheries Science, Virginia Institute of Marine Science
2 Department of Life Science, Virginia Commonwealth University
3 Department of Biological Science, Virginia Institute of Marine Science
4 Department of Biological Science, Old Dominion University

The unobserved mortality of individuals that escape fishing gears and unquantified discard mortality, collectively termed bycatch mortality herein, reduce the accuracy of stock assessment models. One potential cause of the Chesapeake Bay blue crab decline beginning in the 1990s was bycatch mortality from the winter dredge fishery. This fishery was closed in 2008, and remained closed, but calls to reopen it continue. Thus, we explored the effects of sediment on bycatch crab mortality to determine if spatial sediment mapping could be used to optimize the dredge fishery. Four commercial watermen dredged forty sites of mud and sand bottom with high blue crab densities; pre- and post-dredging samples were taken with observers on board. The number of crabs rendered unmarketable (discard mortality) during dredging was negligible in mud and highest in sand. If the dredge fishery were to be reopened, a Virginia main-stem sediment-mapping program should be implemented and dredging should be restricted to muddy bottoms without divers.

Presenting author contact info:gsaluta@vims.edu
Assessing the effects of ocean acidification on the exoskeleton properties in adult Tanner crabs (*Chionoecetes bairdi*)

Salvador, T.*¹; Bejerano, S. ¹; Makdisi, C. ¹; Long, W. C. ²; Swiney, K. M. ²; Foy, R. J. ²; Dickinson, G. H. ¹

¹ Department of Biology, The College of New Jersey
² NOAA, National Marine Fisheries Service, Alaska Fisheries Science Center, Resource Assessment and Conservation Engineering Division, Kodiak Laboratory

Ocean acidification affects the ability of many calcifying marine organisms to build and maintain mineralized tissue. This biological response can be due to the reduction of seawater pH itself and/or decreased carbonate availability. We investigated the effects of ocean acidification on exoskeleton mechanical and structural properties in mature female southern Tanner crabs (*Chionoecetes bairdi*) that were exposed to one of three pH levels (8.1 (ambient), 7.8, and 7.5) for two years. Thickness, microhardness, and the polymorph of calcium carbonate present were assessed in the carapace and right claw. Endocuticle thickness tended to decrease with decreasing pH in both body regions, and the interior of the carapace was visibly eroded at pH 7.5. A slight trend toward decreased hardness with decreasing pH was observed for the endocuticle of the carapace and for the exocuticle of claw. Fourier transformed infrared spectroscopy (FTIR) showed that the carapace was composed primarily of amorphous calcium carbonate (ACC), whereas a mix of ACC and calcite was found in the claw. The fraction of ACC versus calcite did not vary significantly among pH treatments. It is noteworthy that altered cuticle properties were observed even in mature adult crabs. Such changes could affect cuticle functionality.

Presenting author contact info: salvadt2@tcnj.edu

Hemichordates as a model system for investigating intertidal zonation in soft sediments

Kharis R. Schrage*; Jonathan D. Allen

College of William and Mary

Intertidal zonation of organisms is well studied on rocky shores but less so in soft sediment communities. On rocky shores, biological factors such as predation often set the lower bound of a zone, while abiotic factors set the upper bound. Here we describe the zonation of hemichordate worms at two field sites. In Virginia, *Saccoglossus kowalevskii* occurs in the mid-intertidal at densities up to 500 m⁻². In Maine, two hemichordate species, *Saccoglossus bromophenolosus* and *Protoglossus graveolens*, co-occur at densities approaching 100 m⁻². Their zonation was described by transecting at both sites. The role of predation in setting zonation limits was then
examined. Hemichordates have chemical defenses that appear to deter fish, but not crustacean, predators. Six species of crustaceans and two species of predatory polychaetes were fed all three species of hemichordate. Crustaceans readily consumed hemichordates, while the polychaetes did not. In predator choice experiments, hermit crabs preferred hemichordates over the tissue of blue mussels, while green crabs preferred mussel tissue. Our results suggest that even though they are unpalatable to fish and some invertebrates, the lower bound of the hemichordate zone could be set by crustacean predators, some of which appear to prefer hemichordates over palatable alternatives.

Author contact: krschrage@email.wm.edu

Estuarine Runoff and Thermal Stress Impact Montastraea cavernosa corals in Southeast Florida

Shatters, Alycia¹; Beal, Jeff²; Voss, Joshua¹*

¹ Harbor Branch Oceanographic Institute; Florida Atlantic University
² Florida Fish and Wildlife Conservation Commission

In numerous regions, coral reef declines have been linked to thermal stress and anthropogenic impacts. St. Lucie Reef near Stuart, Florida receives increased estuarine efflux as a result of watershed manipulations that have substantially altered historic, natural flows. We investigated the individual and interactive effects of thermal stress and St. Lucie Estuarine discharge water on Montastraea cavernosa, a dominant scleractinian coral species at St. Lucie Reef. Zooxanthellae populations within host corals were significantly affected by thermal stress. Significant interactions among temperature and water treatment were observed, suggesting that the impacts of discharge water may be supplanted when corals are exposed to thermal stress. A TagSeq protocol was employed to elucidate coral transcriptomic responses among treatments. In a supplement to the experiment, M. cavernosa colonies transplanted from Palm Beach, a less impacted site, to St. Lucie Reef have demonstrated consistent resilience despite exposure to more variable and extreme environmental conditions. The overarching goal of this collaborative research is to provide data and recommendations for enhanced adaptive management in ongoing and proposed restoration and conservation efforts. To this end the project design, implementation, data sharing, and outreach were accomplished by a collaborative team including multiple state agencies and local government offices.

Presenting author contact info: jvoss2@fau.edu

Blue Carbon Storage Across Habitat Types in Extensive Eelgrass Meadows (Padilla Bay, WA)

Siegert, D.M.*¹; Apple, J. K.²
Globally, eelgrass meadows are being lost to habitat degradation and decreased water quality. With almost 4000 hectares of eelgrass, Padilla Bay provides an exceptional place to study carbon stocks; these meadows capture ‘blue carbon’ annually in the form of biomass, but how much of this carbon is sequestered in the sediment is not well defined. To investigate this question, sediment cores were collected from three different habitats (i.e. *Zostera marina*, *Zostera japonica*, bare mudflats) and at a range of elevations (-0.4 to 0.8 meters). Cores were sectioned and analyzed for bulk density, organic matter, and grain size. In general, mudflats have the highest bulk density and organic matter content, followed by *Z. japonica* and *Z. marina*. The most variability between sites in organic matter content is found in the top ten centimeters of sediment. Because this subsection is closest to the sediment-water interface, it is most susceptible to human influence. Continued assessment of carbon stocks could allow an economic value to be associated with carbon stored in eelgrass meadows (i.e. carbon finance) and justify their inclusion in ecosystem-scale carbon mitigation strategies.

Presenting author contact info: dms7190@uncw.edu

Using metabolic theory and physiological traits to evaluate the effects of ocean acidification and warming on crustose coralline algae

Siravo, A. A.*; Carpenter, R. C.

California State University, Northridge

Using metabolic theory, which includes allometry and temperature kinetics, it is possible to extrapolate the effects of climate change to more complex ecological levels. In this application, we measure the metabolic responses of calcifying, coral reef organisms to ocean acidification and warming, and use the additive properties of metabolic theory to scale. In this study, *Lithophyllum kotschyanum*, a species of crustose coralline algae (CCA) found in Moorea, French Polynesia, was used to test for metabolic theory congruence and determine metabolic responses to climate change factors. Different size classes of *L. kotschyanum* were collected to achieve a range of organismal biomass over two orders of magnitude. Samples were placed in fully-crossed treatments with ambient (27 °C) and high temperature (31 °C), and ambient (400 µatm) and high pCO₂ (1000 µatm) conditions. Photosynthetic, respiratory, and calcification rates were measured for each individual and the overall response for each variable was defined as a trait. This suite of traits, estimated by the measured metabolic responses, will be used to create functional groups and then combined using MTE to generate predictions of how CCA communities varying in morphology and species composition will respond to ocean acidification and warming.
Soft coral bleaching is enhanced by multiple stressors

Slattery, M.*.1,2; Gochfeld, D.J.1,2; Pankey, M.S.3; Lesser, M.P.3

1 Department of BioMolecular Sciences, University of Mississippi
2 National Center for Natural Products Research, University of Mississippi
3 School of Marine Science and Ocean Engineering, University of New Hampshire

Soft corals are critical structural components of Indo-Pacific reefs; they provide food, habitat, and the adhesive that holds the reef matrix intact. Like scleractinian corals, soft corals contain symbiotic zooxanthellae that provide energy for growth and defense of the host. However, recent extreme thermal events have resulted in an annual incidence of soft coral bleaching on Guam, where soft coral cover once exceeded 70% in back-reef communities. Soft coral bleaching susceptibility was examined in two species, Sinularia maxima and S. polydactyla and their hybrid, and a comparison of symbiotic zooxanthellate indicated that the hybrid shares greater Symbiodinium diversity with S. maxima than with S. polydactyla. Results from field surveys demonstrated interspecific differences in bleaching susceptibility; S. maxima and the hybrid were more susceptible to bleaching than S. polydactyla, and stressed individuals were particularly susceptible. We validated these results with experimental manipulations of the three soft corals by exposing them to predation, disease, and sedimentation. Treated clones exhibited significantly more mortality relative to paired control clones during the bleaching event in 2016, and these effects were compounded under multi-stress conditions. These data indicate that reefs already exposed to anthropogenic stresses may be more susceptible to climate change effects.

Presenting author contact info: slattery@olemiss.edu

Coastal shark movements near fishing structures along the NE coast of South Carolina: Early Results

Spencer, K. L.*.1; Abel, D. C.1; Crane, D.1

1Department of Marine Science, Coastal Carolina University

The spate of shark attacks/bites in the summer of 2015 focused attention to shark movements along beaches of the region and, more specifically, around fishing piers. We used acoustic
telemetry and pier surveys to assess composition and site fidelity of sharks around fishing piers in the Grand Strand of South Carolina. Vemco V9-69 kHz transmitters were surgically implanted in 12 sharks [Blacktip (Caracharinus limbatus, n = 4), Finetooth (Cararcharinus isodon, n = 2), Blacknose (Cararcharinus acronotus, n = 4), Tiger (Galeocerdo cuvier, n = 1), and Sandbar (Cararcharinus plumbeus, n = 1)] from July 14th through November 3rd, 2016. From July 25th, 2016 to January 5th, 2017, 5,589 detections were recorded from three piers and two nearshore locations. Three sharks, each a different species (Finetooth, Blacknose, and Blacktip), encompassed 96.3% of all detections. A fast fourier transform with hamming window smoothing revealed tidally influenced movement patterns for each of the three most detected sharks. Preliminary results suggest residential sharks display a small degree of site fidelity to piers. Tidally influenced behavior are a result of the shallow nearshore environment, where low tide can reduce depths to as little as 3 m (www.sutronwin.com).

Presenting author contact info: klspace@coastal.edu

Author name: Jacob Sprague

Missing abstract

Multiple-mode and -scale sampling to characterize Sabellaria vulgaris reefs in Delaware Bay

Stockwell, C.*; Dohner, S.; Gallagher, K.; Miller, D.

School of Marine Science and Policy, University of Delaware

Worm reefs represent a shoreline habitat unique to Delaware Bay and the subject of study since the 1960’s. Here we report on a multi-modal survey approach using direct sampling for species assemblages, quadrat photographs for worm density, and drone imagery for spatial mapping and determination of settlement, reef regeneration, growth, interpretation and surrounding physical characteristics. We compared two reefs differing in substrate (rip rap rock and sand) and growth form (encrusting and pillow mounds). Preliminary results suggest there is greater diversity in pre-settlement reef species on rip rap rock as opposed to the pillow mounds. During settlement months, the density of S. vulgaris increased while other species’ population densities decreased within the reef. Other species commonly found within the reef include Haliplanella luciae, Anachis avara, and Hydroides dianthus. Increased S. vulgaris populations is expected during the traditional settlement period beginning in late September and population reduction in remaining species during winter months (Oct-Jan). Combining conventional on-site sampling, close-up photography and aerial imagery provided more detail and greater context useful in testing published hypotheses concerning reef location and stability.

Presenting Author contact info: caitlins@udel.edu
Is there differential mortality in caged vs. uncaged spat of the Eastern oyster, *Crassostrea virginica*?

Jenifer Sugarman*; Jordan Gossett; Stephanie J. Kamel

Department of Biology & Marine Biology, University of North Carolina Wilmington

Oysters, like many marine invertebrates, have a relatively long pelagic larval stage. It is often assumed that oyster larvae are dispersed long distances by currents, facilitating large-scale connectivity among habitat patches but limiting the degree to which a single patch replenishes itself with locally produced larvae. Previous work in this species has shown, however, that localized aggregations of kin are found at the scale of individual reef patches. To elucidate the processes involved in generating aggregations, we investigate patterns of genetic diversity and kinship within recent larval settlers over the course of the reproductive season. Specifically, we compare patterns of genetic diversity between spat settling on caged vs. uncaged tiles to determine whether changes in the genetic composition of recruits might be predation-dependent. There is increasing evidence that post-settlement mortality is non-random, with larvae from some populations surviving better than others, either due to environmental conditions encountered during dispersal or local adaptation. Only larvae that survive contribute to replenishment, so such selective mortality may shift the realized population connectivity among populations.

Presenting author contact info: jes7298@uncw.edu

---

*In Situ* Measurements of Reef Coral Respiration, Photosynthesis and Calcification Using A Diver-Deployed Respirometer: *CISME (Coral In Situ MEtabolism)*

Szmant, A.M.*; Whitehead, R.F.

Center for Marine Science, University of North Carolina Wilmington,

A diver-portable respirometer, named CISME, was developed to measure metabolic rates of corals and other low-relief benthic substrates *in situ* under ambient conditions. CISME measures oxygen fluxes and delta pH during short incubations in which water flow and light levels are user controlled. Respiration (R) and photosynthesis (P) are calculated from these concentration changes. Sample loops provide water samples that can be titrated for total alkalinity (TA) to measure calcification rate (CA). R and P can be calculated both based on O$_2$ and CO$_2$ fluxes, from which RQs and PQs can be calculated. The sample loop can also be used to experimentally introduce substances that might affect coral metabolism (e.g. acidified seawater for OA studies). CISME was used to measure seasonal changes in the metabolic rates of 40 tagged colonies of the
Caribbean coral *Orbicella faveolata* on two coral reefs in La Parguera, PR. Measurements were repeated 4 times over an annual cycle. Results show elevated R during late summer, but no change in P, and thus lower P/R ratios during the late summer. P, CA and P/R ratios were ≥ than published laboratory measured rates, suggesting that *in situ* conditions were better than those provided in land-based seawater systems.

Presenting author contact info: szmanta@uncw.edu

**Author name: Amanda Tinoco**

**Missing abstract**

The Effect of Positioning on the Growth Rates of *Crassostrea virginica* Among Floating Bag Culture

Torok, J.S.*1; Posey, M.H.2; Alphin, T.D.3

1Center of Marine Science, University of North Carolina Wilmington
2Director of the Center for Marine Science, University of North Carolina Wilmington
3Department of Biology & Marine Biology, University of North Carolina Wilmington

Oyster (*Crassostrea virginica*) aquaculture has increased many fold over the last decade prompting the need to investigate the influence of cultivated oysters on adjacent ecosystems. While it is clear that natural oyster reefs provide ecosystem services, the role cultivated oysters play is still in question. Regardless, few studies have focused on site-specific spatial impacts to the cultured oysters compared to natural reference reefs. This study seeks to address critical landscape issues by evaluating the role position plays on the performance of oysters on natural reference reefs and in an aquaculture setting. Among dense assemblages of oysters, edge vs interior may play a critical role in the overall health and long-term stability of a reef. The question remains: does this issue hold true for oyster cultivation operations? Aquaculture operations use cages and bags placed in a relatively dense spatial matrix. As water flows through and around the matrix, the structures create turbulent flow, deflecting the current. If phytoplankton concentrations become limiting, then the growth rates and condition of oysters would be impaired to some degree. This study will use three aquaculture sites and natural oyster reef reference sites to investigate the role of position on oyster performance.

Presenting author contact info: jst1596@uncw.edu

Density-dependent post settlement mortality in *Semibalanus balanoides*: are settlement and recruitment uncoupled at regional spatial scales?

Jesse Turner*; Maeve Snyder; Thomas J. Hilbish
Most marine invertebrates have complex life histories in which a sedentary adult life stage alternates with a free-swimming larval stage potentially capable of long-distance dispersal. Consequently recruitment into the adult population is also complex and it is possible that success at any given stage may be so variable as to obscure success at previous stages. We examined settlement of the barnacle *Semibalanus balanoides* across the United Kingdom (~50-58.5°N latitude). Settlement was much greater at northern latitudes, which was consistent with patterns of winter temperature and a known response of *S. balanoides* to increase larval output at lower temperatures. We then re-sampled each site a few weeks later to test the hypothesis that mortality following settlement substantially altered apparent patterns of recruitment. We found a strong pattern of density-dependent mortality. Early post-settlement mortality was low at southern sites that initially had low settlement and high at northern sites that initially had high recruitment. Post-settlement mortality only obscured the initial pattern of settlement at sites with initially high recruitment but regional patterns of settlement remained evident. We speculate that the capacity for post-settlement mortality to uncouple settlement from recruitment depends upon settlement density and the growth rate of newly settled barnacles.

**Effects of introduced prey species on the growth and reproduction of the blood star, *Henricia sanguinolenta***.

Kaitlin Van Volkom*; Larry Harris

Department of Biological Sciences, University of New Hampshire

*Henricia sanguinolenta* is a native generalist predator that consumes sponges during the fall and spring months. Historically, in the summer and the fall months, these animals feed on detritus and filter particles from the water column. However, after the invasion of several tunicate species, these animals had the opportunity to feed on another prey species during the warmer months when food is less abundant. The goals of this study were to 1) monitor the percent cover of prey species throughout the year 2) determine sea star feeding patterns, and 3) evaluate the effect of diet on growth and reproduction. A field site was surveyed monthly to evaluate the percent cover of tunicate species, and instances of feeding were recorded. In a lab setting, sea stars were fed four different diets for six months. They were fed a combination of sponge and tunicate species that represented the historical and proposed current diet. They were weighed every two weeks, and at the end of the experiment the gonads and pyloric caeca were weighed. This study is currently ongoing, and results are not known.

Presenting author contact info: missing

**Comparison of genetic variation among wild and hatchery-reared broodstock *Crassostrea virginica***

Varney, R. L.*; Wilbur, A. E.
The eastern oyster, *Crassostrea virginica*, is an ecologically and economically important marine bivalve along the east coast of North America. Severe declines in natural populations of *C. virginica* due to overfishing, habitat loss and disease have led to increased restoration efforts. Expansion of the oyster aquaculture industry has enhanced efforts to restore natural populations, as well as produced genetically improved oyster lines through hatchery production. Loss of genetic diversity and inbreeding depression are potential negative effects of using hatchery-reared lines as broodstock in oyster aquaculture. This study assessed the genetic effects of breeding practices on one line of hatchery-reared *C. virginica*. Utilizing 22 microsatellite loci, the genetic properties of one wild population and five breeding populations (three generations of broodstock) were estimated and compared. Additionally, parentage assignment was performed on each population of hatchery-reared progeny to evaluate reproductive success of mating pairs and inbreeding between siblings.

Presenting author contact info: varneyr@uncw.edu

**Author name:** Alexander Villafana

**Missing abstract**

**How does colony size and density influence paternity in a brooding coral?**

Vollmer, Alicia A.*; Fogarty, Nicole D.

Department of Marine and Environmental Sciences, Nova Southeastern University

Multiple natural and anthropogenic stressors have caused a decline in coral populations. Broadcast spawning corals once dominated the Florida Reef Tract (FRT), but since their decline, smaller brooding corals, soft corals, and macroalgae are replacing them. Brooding corals are more resilient to current threats in part because they are reproductive throughout much of the year and their larvae are competent to settle after release. Despite the ubiquity of brooders on Florida reefs, much of their reproductive strategy remains unknown. This study examines paternity as a function of colony size and density in *Porites astreoides*, a common brooding coral in the FRT. A focal colony of *P. astreoides* was surrounded by six other colonies, separated from the focal colony at different distances (1m, 7m, and 15m) representing high, moderate, and low population densities, respectively. Each array was replicated three times. Colonies were transported to the laboratory for larval collection and the resulting larvae were genotyped using eight microsatellite markers. Over a four day period, a total of 3,184 larvae were collected from 22 colonies, 13 of which released larvae over consecutive days. Understanding the paternity in common brooding corals is important to effectively assess and conserve Florida's shifting coral reef communities.
Estuarine Runoff and Thermal Stress Impact Montastraea cavernosa corals in Southeast Florida

Shatters, Alycia¹; Beal, Jeff²; Voss, Joshua¹*

¹ Harbor Branch Oceanographic Institute; Florida Atlantic University
² Florida Fish and Wildlife Conservation Commission

In numerous regions, coral reef declines have been linked to thermal stress and anthropogenic impacts. St. Lucie Reef near Stuart, Florida receives increased estuarine efflux as a result of watershed manipulations that have substantially altered historic, natural flows. We investigated the individual and interactive effects of thermal stress and St. Lucie Estuarine discharge water on Montastraea cavernosa, a dominant scleractinian coral species at St. Lucie Reef. Zooxanthellae populations within host corals were significantly affected by thermal stress. Significant interactions among temperature and water treatment were observed, suggesting that the impacts of discharge water may be supplanted when corals are exposed to thermal stress. A TagSeq protocol was employed to elucidate coral transcriptomic responses among treatments. In a supplement to the experiment, M. cavernosa colonies transplanted from Palm Beach, a less impacted site, to St. Lucie Reef have demonstrated consistent resilience despite exposure to more variable and extreme environmental conditions. The overarching goal of this collaborative research is to provide data and recommendations for enhanced adaptive management in ongoing and proposed restoration and conservation efforts. To this end the project design, implementation, data sharing, and outreach were accomplished by a collaborative team including multiple state agencies and local government offices.

Presenting author contact info: jvoss2@fau.edu

The role of adult fiddler crab environmental acoustic cues and chemical cues in stimulating molting of field-caught megalopae

Emily E. Waddell*¹,³; Wendy D. Piniak¹,³; Kathleen A. Reinsel²,³; James M. Welch²,³

¹ Department of Environmental Studies, Gettysburg College
² Department of Biology, Wittenberg University
³ Duke University Marine Laboratory
In mid-Atlantic estuaries, three fiddler crab species, *Uca pugilator*, *Uca pugnax* and *Uca minax* co-occur, with their adults occupying different habitat types distinguished by salinity and sediment size. Some evidence exists that selective settlement is responsible for this separation but the mechanism is largely unknown. We tested the hypothesis that field-caught megalopae would accelerate metamorphosis in the presence of adult species-specific environmental acoustic cues and conspecific chemical cues. We placed megalopae in seawater with and without adult chemical cues, exposed them to one of three sound treatments for 8 days, and recorded the time each megalopa took to metamorphose. In the absence of adult chemical cues, very few megalopae molted regardless of sound treatment. Molting in the presence of habitat sound and chemical cues varied by species. Many *U. pugilator* molted in all sound and odor combinations, including no odor/sound. *U. pugnax* was stimulated to molt by chemical cues from either *U. pugilator* or *U. pugnax*, but molting was similar across sound treatments. Our results do not support the hypothesis that sound stimulates molting by fiddler crab megalopae, but support the role of chemical odors from adults as molting cues.

Presenting author’s contact information: waddem01@gettysburg.edu

**Five years on Southeast Florida Reefs: Density results of the giant barrel sponge from a long-term monitoring program**

Waldman, Alanna D.¹; Walton, Charles J.¹; Brinkhuis, Vanessa²; Ruzicka, Rob²; Gilliam, David S.¹

¹ Nova Southeastern University Halmos College of Natural Sciences and Oceanography
² Florida Fish and Wildlife Conservation Commission, Fish and Wildlife Research Institute

Beginning in 2003, The Southeast Florida Coral Reef Evaluation and Monitoring Project (SECREMP) has allowed for annual data collection on the status of the Florida Reef Tract (FRT) from Martin County to Miami-Dade County providing information on long term benthic cover trends. Annual visits to permanent sites show changes in stony coral, octocoral, and barrel sponge demographics. The objective of this study is to focus on the giant barrel sponge, *Xestospongia muta*, to observe whether trends in barrel sponge density are comparable to the benthic cover trends of stony corals and octocorals observed in the same areas from the years 2012 to 2016. Data were collected at 22 permanent sites on the Southeast Florida portion of the FRT. At each site, barrel sponge data were collected on four, 22x1 meter transects. Results indicate an increasing trend of barrel sponge density region wide in comparison to decreasing stony coral cover. Further analysis of this data will be useful to show trends in benthic cover densities and potential shifts in functional groups from coral dominated reefs to that of sponge and octocoral dominated reef communities on the FRT.
Testing desiccation stresses and visual predation as mechanisms for maintaining a color polymorphism cline at wave protected sites

Walkes, S.*; Carlon, D.B.; Kingston, S.E.

Color polymorphism in gastropods impacts the organisms’ ability to moderate heat flux in tissues and shells, and is common phenomenon in temperate intertidal snails, including *Littorina obtusata*. This study tests for a phenotypic cline in *L. obtusata* color morph frequencies as a result of opposing high-low gradients of desiccation stress and visual predation intensity. Surveys of wave-protected sites reveal a significantly lower yellow color morph frequency at low tidal elevations than at high (p < 0.05) and mid elevations (p <0.05). Yellow color morph frequency did not differ across wave-exposed elevations. Additionally, we find a positive correlation between light-colored macroalgae coverage and yellow color morph frequency (p = 0.02, $R^2 = 0.26$). *Ex situ* feeding trials using *Carcinus maenas* as a potential visual predator were performed to test for a bias to a particular color morph, but found no difference in mortality rates across all phenotypes (p = 0.33). This study provides evidence of a within site cline, and classic ecological models suggest that visual predation and thermal stress gradients drive the color morph frequency changes across discrete tidal elevations. However, further feeding trials with alternative predators are required to more definitively link the cline with predation patterns.

Presenting author contact info: swalkes@bowdoin.edu

The effect of stocking density and net shape on the growth and survival of juvenile bay scallops, *Argopecten irradians*

Watts, J.C.*; Wilbur, A.E.

The bay scallop, *Argopecten irradians*, is a commercially important Atlantic species and low population abundance in North Carolina has led to increasing interest in aquaculture and restoration. As part of a larger project focusing on the development of efficient strategies for hatchery production of bay scallops, we investigated the effect of stocking density (high, low) and net shape (square, round) on growth and survival of juvenile scallops. Preliminary observations at 1 month post deployment suggest that survival was enhanced in the square nets (35% in square, 26% in round) but growth was reduced (25% increase in square, 33% increase in round). Growth was higher in the higher density for both net types (28.8±2.3%
Effects of oil exposure and diversity on the behavior of *Owenia fusiformis*

Weldin, E.* 1; Berke, S.K. 1; Dorgan, K. M. 2,3; Robertson, A. 2,3; Bell, S. 4; Parker, R. 2,3; Caffray, T. 1; Budai, S. 1; Gadeken, K. 2,3; Ballentine, W. 2; Kiskaddon, E. 2

Siena College 1, Dauphin Island Sea Lab 2, University of South Alabama 3, University of South Florida 4

Understanding how organisms respond to disturbances is becoming increasingly important as the pace of anthropogenic environmental change accelerates. The Deepwater Horizon Oil spill (2010) introduced toxic hydrocarbons into marine sediments throughout the Northern Gulf of Mexico, where oiled sites remain contaminated 7 years after the event. Benthic invertebrates may be especially sensitive to such events, given their limited mobility and intimate contact with contaminated sediment and water. We are conducting laboratory mesocosm experiments in which common benthic taxa are exposed, either in monoculture or in mixed assemblages, to realistic concentrations of the water-accommodated fraction (WAF) of crude oil. Here we present behavioral data for *Owenia fusiformis*, a tubicolous surface deposit feeding polychaete. To characterize the interaction of diversity and WAF exposure, mesocosms contained either six *Owenia* or a mixed community. By photographing the mesocosms daily, we were able to quantify changes in tube angle, head position, and the area of feeding on the sediment surface. Comparing *Owenia* behaviors in monoculture vs. mixed assemblages, and in the presence vs. absence of WAF provides insight as to how benthic organisms respond to sublethal oil exposure with implications for other stressors.

Contact Info: el23weld@siena.edu

Greener Futures: Substrate preferences explain variation in social structure in two species of parrotfishes

Whittaker, S.*; Ehlers, A.; Smith, K.

Department of Biological Sciences, Clemson University

Coral reef communities are changing rapidly with a shift from hard corals to soft corals and sponges. What is unknown is how these changes in reef substrate will influence the abundance and structure of reef fish communities. In this study, we compared the abundance, territory size,
and social structure of two common herbivores, redband and stoplight parrotfishes, on inshore (high hard coral) versus offshore (low hard coral) reefs in the middle Florida Keys. Inshore, redband and stoplight parrotfishes are equal in abundance, territory size, harem size, and social structure. But in offshore reefs, redband parrotfish are three times as abundant as stoplight parrotfish, and have increased territory size, harem size, and initial phase to terminal phase ratios. To explore this further, we examined the differences in substrate composition inside and outside of redband and stoplight territories for both inshore and offshore reefs. Again, region was the most important factor but the strongest differences among the species were preferences by stoplight parrotfish for higher coral and higher turf algae substrates. These differences in species-level substrate preferences help explain why stoplight parrotfish are less abundant on offshore reefs and may help us to predict future reef fish community structure.

Presenting author contact info: srwhita@clemson.edu

Author name: Jennie Wiggins

Assessing Health of the Eastern Oyster Crassostrea virginica in Tidal Creek Systems

Wileman, A.N.1*; Thurlow, H.R.1*; Alphin, T.D.1; Cahoon, L.B.1; Posey, M.H.2

1Department of Biology and Marine Biology, University of North Carolina Wilmington
2Center for Marine Science, University of North Carolina Wilmington

Tidal creeks systems are important estuarine nursery areas for a number of ecologically and economically important species including the Crassostrea virginica. These systems tend to be areas of high coastal development, receiving runoff from adjacent uplands. As suspension feeders, the eastern oyster removes suspended organic and inorganic particles from the water column, with demonstrated impacts on water quality. But the more important question for the long-term health of these systems is how this exposure and removal affects the oysters’ health and condition. This undergraduate based project focuses on the health of oysters through evaluation of lipid content and condition index. Amino-propyl solid phase extraction was used to separate 9 lipid levels (hydrocarbons, sterol/wax esters, ketones, triglycerides, free fatty acids, free fatty alcohol, free sterols, acetone mobile polar lipids, and phospholipids). Comparisons were made, using 50-70mm shell height oysters among creeks of varying levels of background development, and between oysters in the headwaters and mouth regions of the creeks. Relative compositions of lipid classes are compared to measures of body mass condition from among the same locations to determine health of the oyster within these creek systems.

Presenting author contact info: anw3485@uncw.edu, hrt2805@uncw.edu
**Are the observed changes in protein profiles in *Uca Spp.* due to a major storm?**

Williams, S.*; S. B. George  
Department of Biological Science, Georgia Southern University

By the year 2050 more than 30% of species will be extinct due to climate change. For instance, the increase in storm frequency in the SE United States may have a devastating effect on the juvenile stages of many invertebrates. This study examined the effects of a storm on the protein content and profiles of juvenile fiddler crabs in a Georgia salt marsh. Four trips were made to Tybee Island in September before Hurricane Matthew and in October after the storm. Six quadrats were placed randomly in the high marsh and in each, salinity, pH, *Spartina alterniflora* density and height were measured. Juvenile fiddler crabs (*Uca spp.* ) were collected for protein determination. We observed no significant difference in *Spartina* height, density, salinity, or pH. The protein content of the juveniles was significantly higher for those collected before than after the storm. Several factors might contribute to the above results. Either, Hurricane Matthew had a significant effect on the time juveniles spent feeding or large amounts of water from the hurricane washed away the surface sediment reducing the nutrient content of their food source. Future studies will examine the nutrient content of the sediment before and after major storms.

Presenting author contact info: sw05785@georgiasouthern.edu

---

**El Niño drives environmental filtering and widespread disease in a tropical marine fish assemblage**

Robert W. Lamb¹; Franz Smith¹; Anaide W. Aued²; Pelayo Salinas de León³; Jenifer Suarez⁴; Jon D. Witman¹*

¹Brown University, ²Universidade Federal de Santa Catarina, ³Charles Darwin Research Station, ⁴Parque Nacional Galápagos

Extreme El Niños decrease marine productivity and increase temperature, but the impact this has on entire fish communities is unclear. We documented changes in the diversity and abundance of Galapagos reef fishes during the 2015-2016 El Niño. Visual censuses and video were taken every six months between July 2013 and January 2017. The effects of a +3°C temperature anomaly were tested among species and sites. Filtering occurred based on trophic category and
biogeographic province of origin. Significant negative abundance anomalies were observed for planktivorous species and those originating from the cold Peruvian region, whereas species from the warm Indo-Pacific region increased in abundance. Sites with sustained upwelling of cold water were more stable, and many species shifted below 30m thermoclines, lending support to thermal refugia. A novel disease was discovered concurrent with the warming event in at least 16 different confirmed species. The bacterium *Pantoea* was isolated from infected fish, which also had hemorrhagic discoloration of the skin, loss of scales, and aggressive solicitation of cleaner fish. Tropicalization of the fish community and the presence of disintegrating skin disease in several taxa represent an alarming situation for this diverse and productive fish assemblage with high endemism.

Presenting author contact: *jon_witman@brown.edu*

Aquatic insect emergence across an estuarine salinity gradient

Zapata, M. J.*, Sullivan, S. M. P.

School of Environment and Natural Resources, The Ohio State University

The ecological role of aquatic insects in estuaries is currently limited. In freshwater systems, emergence of aquatic insects (i.e., as winged adults) is recognized as an important mechanism linking aquatic and terrestrial food webs. Nutritional reliance on emerging insects by terrestrial estuarine consumers such as birds, bats, lizards, spiders is expected to vary with seasonal inputs of freshwater and nutrients. We monitored salinity and other water-chemistry parameters and aquatic insect emergence at nine sites representing freshwater cypress swamp, and meso- and polyhaline mangrove habitats in the Fakahatchee Strand estuary of southwest Florida during the early wet (June/July) and dry (Dec/Jan) seasons of 2015 and 2016. Salinity was a strong predictor of aquatic insect emergence (no. m⁻² day⁻¹), which varied seasonally at freshwater and mesohaline sites. Our findings contribute to our understanding of the role of aquatic insects and cross-ecosystem connectivity among estuarine habitats. Subsequent analysis will estimate reliance of riparian orb-weaving spiders on emerging insects using stable-isotope analysis.

Presenting author contact info: zapata.22@osu.edu

Initial Response of Epifauna and Vegetation to Salt Marsh Restoration using Dredged Material

*Adrianna Zito-Livingston; Metthea Yepsen; and Jessie Buckner*

The Nature Conservancy New Jersey Chapter
Coastal landscapes face new and dynamic challenges and as these change, coastal restoration techniques must adapt as well. The Nature Conservancy partnered with the New Jersey Department of Environmental Protection, and several other partners to explore beneficial reuse of dredged material to restore salt marshes in Southern New Jersey. Sediment was applied to carefully selected areas of marsh to raise the elevation allowing the marshes to remain intact and better able to keep pace with sea level rise. We sampled vegetation and epifaunal macroinvertebrates to characterize habitat and assess functionality of the marsh on placement and control sites before and after the placement of dredged material. Expectations included initial impact to vegetation and epifauna with shifts in macroinvertebrate and vegetation species as vegetation recovered and sediment stabilized. These metrics can lend an understanding of marsh condition, and provide a strong signal of whether using dredged sediment to raise elevation has led to restoration and resiliency of both marsh structure and ecological function. Early results show some initial recovery of vegetation one-year post placement, but the results of longer-term monitoring of these metrics, and others, are still necessary before the final outcome of this experimental technique can be determined.

Presenting author contact info: azito-livingston@tnc.org

Spatial and Temporal Variation in Larval Availability: Success in the Plankton and Maintenance of Connectivity among Adult Mussel Populations

Amaelia Zyck¹*; Krista Harmon²; Allison Burrell³; Evgeniya Ermolaeva²; Thomas J. Hilbish²

Marine Science Program¹, Department of Biological Sciences², Chemistry and Biochemistry Program³, University of South Carolina

We determined the abundance and size structure of mussel larval populations across ~30 km of coast-line in Southwest England. The spatial scale of the study approximates estimated larval dispersal in this region. We compared the growth and abundance of mussel larvae to the concentration of nanoplankton that comprise potential food sources for larvae to test the hypothesis that larvae may starve during time they are transported. We specifically tested the hypothesis that larval populations are well mixed both with respect to distance from shore and cross-shore. Larvae abundance varied significantly over the course of the spring and summer but was generally well mixed at local spatial scales. There was, however, evidence that larval abundance very close to shore (<500m) is uncoupled from the abundance of larvae at sites 1-5 km from shore. Using samples collected at varying spatial scales we assessed the spatial scale of mussel larval patches and compared the local and regional availability of larvae to patterns of larval settlement that occurred on-shore.

Contact info *Presenter azyck@email.sc.edu