College of Charleston
Graduate Program in Marine Biology

22nd ANNUAL
STUDENT RESEARCH COLLOQUIUM

Oct. 13, 2018
Fort Johnson Marine Resources Center
Marine Resources Research Institute Auditorium

PROGRAM & ABSTRACTS
PURPOSE AND HISTORY

The Student Research Colloquium of the Graduate Program in Marine Biology (GPMB) was established in 1998, to increase awareness of research activities by students and faculty affiliated with GPMB; to provide graduate students with experience in making scientific presentations; and to promote interactions among faculty and students conducting research in marine biology. The Colloquium Committee looks forward to your comments regarding ways to improve and enhance this annual event, and thanks all the sponsors for their support.

PREVIOUS KEYNOTE SPEAKERS

1999  Dr. Ken Tenore, Chesapeake Biological Laboratory, University of Maryland
2000  Dr. John Pearse, Institute of Marine Science, Univ. of California, Santa Cruz
2001  Dr. Lauren Mullineaux, Woods Hole Oceanographic Institute
2002  Dr. Larry Crowder, Duke Marine Laboratory, Duke University
2003  Dr. Walter Boynton, Chesapeake Biological Laboratory, Univ. of Maryland
2004  Dr. Malcolm Shick, School of Marine Sciences, University of Maine
2005  Dr. Margaret McFall-Ngai, University of Wisconsin-Madison Medical School
2006  Dr. Jeffrey Levinton, State University of New York at Stony Brook
2007  Dr. Peter Wainwright, University of California, Davis
2008  Dr. James T. Carlton, Williams College & Williams-Mystic Program
2009  Dr. Steve Palumbi, Hopkins Marine Station & Stanford University
2009  Dr. Erik Sotka, CofC & Dr. Geoff Scott, Hollings Marine Laboratory
2010  Dr. Win Watson, University of New Hampshire
2011  Dr. John Bruno, University of North Carolina
2012  Dr. Thomas Near, Yale University
2013  Dr. Felicia Coleman, Florida State University & Coastal Marine Laboratory
2014  Dr. Dean Grubbs, Florida State University & Coastal Marine Laboratory
2015  Dr. Daniel Huber, University of Tampa
2016  Dr. David Hastings, Eckerd College
2017  Dr. Billie Swalla, University of Washington

SPONSORS OF THE STUDENT RESEARCH COLLOQUIUM

Charleston Natural History Society
College of Charleston, Department of Biology
College of Charleston, Graduate Program in Marine Biology
College of Charleston, Graduate School
College of Charleston, Graduate Program in Environmental Studies
College of Charleston, School of Science and Mathematics
Grice Marine Laboratory
Marine Biology Fund
Sigma Xi: The Scientific Research Society – Charleston Chapter
SC Department of Natural Resources, Marine Resources Division
SC Sea Grant
STUDENT RESEARCH COLLOQUIUM

PROGRAM

Oral and poster presentations will be held at the Marine Resources Research Institute, at Fort Johnson and the Lowcountry Boil will be at the outdoor classroom (adjacent to the Marshlands House). Posters will be on display prior to the poster session in the Marine Resources Research Institute hallway, beginning Friday, 10/12 at noon. Poster presenters will attend their posters in two shifts, from 10:30 am – 12:15 pm (odd-numbered posters) and from 3:00 pm – 4:30 pm (even-numbered posters).

SATURDAY, 13 OCTOBER

8:45  Introduction and Opening Remarks
Dr. Louis Burnett, Chair of the Colloquium Committee
College of Charleston

SESSION 1 – ORAL PRESENTATIONS

9:00  1.1 ASSESSING THE RELATIONSHIP BETWEEN GEOMORPHOLOGY AND DEEP-SEA MEGAFANAUL COMMUNITIES ON THE WEST FLORIDA ESCARPMENT. Proux, Z (GPMB, University of Charleston, SC)

9:15  1.2 A LIFE HISTORY STUDY OF THE GOBIID FISH GOBIOSOMA BOSC IN SOUTH CAROLINA ESTUARIES. Taylor, MA (GPMB, University of Charleston, SC)

9:30  1.3 METABOLIC RESPONSE TO HIGH WATER TEMPERATURES IN CULTURED JUVENILE RED DRUM, SCIAENOPS OCELLATUS. Welling, E (GPMB, University of Charleston, SC)

9:45  1.4 LARVAL SURVIVAL AND SETTLEMENT IN THE COMMENSAL BARNACLE CHELONIBIA TESTUDINARIA UNDER DIFFERING SALINITY CONDITIONS. Reilly, M (GPMB, University of Charleston, SC)

10:00 1.5 RELATIONSHIP BETWEEN TEMPERATURE TRENDS AND THE TEMPORAL CHANGES IN THE LARVAL RECRUITMENT OF A NON-NATIVE CRUSTACEAN ALONG THE LEADING EDGE OF ITS RANGE. Popp, T (GPMB, University of Charleston, SC)

10:15 1.6 DETERMINING POTENTIAL WATER QUALITY THREATS TO ACROPORA PALMATA REPRODUCTION AT SALT RIVER BAY NATIONAL HISTORIC PARK AND ECOLOGICAL PRESERVE IN ST. CROIX, USVI. Bayless, A (GPMB, University of Charleston, SC)

10:30 – 12:15  POSTER PRESENTATIONS. Presenters at odd-numbered posters.

12:15 – 1:15  LUNCH
SESSION 2 – ORAL PRESENTATIONS

1:30  2.1 IMPROVING DIET RESOLUTION FOR LARGE REEF-ASSOCIATED PISCIVORES IN THE U.S. SOUTHEAST ATLANTIC USING MOLECULAR TOOLS. Spanik, K (GPMB, The University of Charleston, SC)

1:45  2.2 DETECTION OF MULTIPLE PATERNITY IN DIAMONDBACK TERRAPIN (*MALACLEMYS TERRAPIN*) EGG CLUTCHES FROM CHARLESTON, SC THROUGH THE USE OF NOVEL MOLECULAR TECHNIQUES. Sporre, M (GPMB, The University of Charleston, SC)

2:00  2.3 RELATING SHRIMP BLACK GILL AND PARASITE INFECTIONS TO POPULATION ENERGETICS OF WHITE SHRIMP (*LITOPENAEUS SETIFERUS*). Kell, S (GPMB, The University of Charleston, SC)

2:15  2.4 AGE, GROWTH, AND REPRODUCTIVE LIFE HISTORY OF TWO DATA-DEFICIENT PARROTFISH SPECIES IN THE CARIBBEAN. Wagner, G (GPMB, The University of Charleston, SC)

2:30  2.5 A LIPIDOMIC APPROACH TO IDENTIFYING IMMUNE RESPONSE IN CETACEAN SKIN TO THE ATTACHMENT OF THE TASSEL BARNACLE, *XENOBALANUS GLOBICHTIS*. Hall, A (GPMB, The University of Charleston, SC)

2:45  2.6 STRESS RESPONSE AND POST-RELEASE SURVIVAL OF BLACKTIP SHARKS (*CARCHARHINUS LIMBATUS*) CAPTURED IN SHORE-BASED AND CHARTER RECREATIONAL FISHERIES. Weber, N (GPMB, The University of Charleston, SC)

3:00 – 4:30  POSTER PRESENTATIONS. Presenters at even-numbered posters.

KEYNOTE PRESENTATION

4:30  Introduction of Keynote Speaker
Dr. Christine Byrum, College of Charleston

4:45  Keynote Address
Dr. Sandra Brooke, Florida State University

5:45  Closing remarks and award presentation

6:15  Lowcountry Boil and introduction of new students, Outdoor Classroom
<table>
<thead>
<tr>
<th>Poster #</th>
<th>Title</th>
<th>Author(s)</th>
<th>Institution</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>EXAMINING THE IMPACTS OF ULTRAVIOLET (UV) LIGHT-ENHANCED TOXICITY OF SURFACE OIL SHEENS ON THE SURVIVAL, GROWTH, AND DEVELOPMENT OF LARVAL AND JUVENILE RED DRUM (SCIANEOPS OCELLATUS).</td>
<td>Beers, D (GPMB, The University of Charleston, SC)</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>CHARACTERIZATION OF THE CORAL METABOLOME UNDER DIFFERENT PH AND TEMPERATURE REGIMES, VIA $^1$H NMR.</td>
<td>Loewenstein, J (GPMB, The University of Charleston, SC)</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>CAPTIVE POPULATIONS AS A TOOL FOR WILDLIFE RESEARCH: NON-INVASIVE METHODS ASSESS THE STRESS HORMONES AND CONDITION OF GENTOO PENGUINS IN VASTLY DIFFERENT ENVIRONMENTS.</td>
<td>Karan, J (GPMB, The University of Charleston, SC)</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>LINKING LAND USE TO PHYSICAL CHANGES IN CHARLESTON’S ESTUARIES AND TIDAL CREEKS.</td>
<td>Hanson, B (GPMB, The University of Charleston, SC)</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>LONG-TERM PASSIVE ACOUSTICS AS A MEANS TO UNDERSTAND SPATIAL AND TEMPORAL PATTERNS OF ATLANTIC BOTTLENOSE DOLPHINS (TURSIOPS TRUNCATUS).</td>
<td>Marian, A (GPMB, The University of Charleston, SC)</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>A BOTTLENOSE DOLPHIN (TURSIOPS TRUNCATUS) POPULATION CHARACTERIZATION STUDY IN CAPTAIN SAM’S INLET, SC.</td>
<td>Bayles, C (GPMB, The University of Charleston, SC)</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>PREDATOR AVOIDANCE COSTS OF EGG-CARRYING IN SNAPPING SHRIMP (DECAPODA: ALPHEIDAE).</td>
<td>Bergeson, P (GPMB, The University of Charleston, SC)</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>ADDRESSING LIFE HISTORY INFORMATION GAPS IN TWO CARIBBEAN PARROTFISHES, SCARUS TAEINOPTERUS AND SCARUS VETULA.</td>
<td>Jones, D (GPMB, The University of Charleston, SC)</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>CHARACTERIZING MICROPLASTICS IN THE GASTROINTESTINAL TRACTS OF BOTTLENOSE DOLPHINS (TURSIOPS TRUNCATUS) AND OTHER SMALL DELPHINIDS.</td>
<td>Pfeifer, T (GPMB, The University of Charleston, SC)</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>RELATING SHRIMP BLACK GILL AND PARASITE INFECTIONS TO POPULATION ENERGETICS OF WHITE SHRIMP LITOPENAEUS SETIFERUS.</td>
<td>Zuidema, S (GPMB, The University of Charleston, SC)</td>
<td></td>
</tr>
</tbody>
</table>
REEXAMINING THE TAXONOMIC PLACEMENT OF *HYPNOGORGIA PENDULA* USING MITOCHONDRIAL DNA AND MORPHOMETRICS. Vill, C (GPMB, The University of Charleston, SC)

TURTLE TRACKING TROUBLE: DO CARAPACE MORPHOLOGY AND COMPOSITION DICTATE SATELLITE TRACK DURATIONS FOR HARD-SHELLED SEA TURTLES? Hoffman, K (GPMB, The University of Charleston, SC)

IMPOSEX INDUCTION BY ENDOCRINE DISRUPTING CHEMICALS: EFFECTS OF TBT AND WASTEWATER EFFLUENT ON THE EASTERN MUD SNAIL. Mathis, E (GPMB, The University of Charleston, SC)

EVALUATING THE EFFICACY OF MARINE PROTECTED AREAS FOR SNAPPER-GROUPER SPECIES IN THE US SOUTH ATLANTIC. Pickens, C (GPMB, The University of Charleston, SC)

FROM THE SEAFLOOR TO ESTUARINE SHORES: ZETAPROTEOBACTERIA IN CHARLESTON, SC. Enriquez, A (GPMB, The University of Charleston, SC)
Keynote Speaker

Sandra Brooke, Ph.D.
Coastal and Marine Laboratory
Florida State University

Biography

Dr. Sandra Brooke is an associate researcher at the Coastal and Marine Laboratory at Florida State University. She is an expert on both shallow and deep sea corals, but has focused mainly on understanding the distribution, abundance, and physiology of deep sea corals. Dr. Brooke discovered her love of marine ecology while working in mosquito control in the Cayman Islands. Fascinated by the marine world, she continued her education and received her M.A. in Marine Biology from the Virginia Institute of Marine Science and Ph. D from the Southampton Oceanography Center in the UK, where her research focused on the reproductive ecology of the deep water coral *Oculina varicosa*. Since then, Dr. Brooke has worked with deep water corals all around the world, from the Aleutian Islands in Alaska to the Norwegian Fjords to our own backyard in the South Atlantic Bight and Gulf of Mexico! Her most recent research concentrates on characterizing deep reef ecosystems and learning about the biology and ecology of the corals living there to identify sensitive hard bottom habitats that are ecologically valuable.

Keynote Address

ATLANTIC DEEPWATER CANYONS: EXPLORATION AND RESEARCH OF SUBMARINE CANYONS OF THE WESTERN ATLANTIC MARGIN

Submarine canyons are massive geological features that funnel currents and nutrients between the continental shelf and abyssal plane. Deep-sea canyons are dark, turbid and cold with strong currents that scour sediments to expose the underlying rocks, which are colonized by extensive communities of deep sea corals and their associates. There are many submarine canyons along the US east coast, and few have been explored. The Atlantic Deepwater Canyons project was a multidisciplinary study of two canyons in the US Mid-Atlantic region. Remotely Operated Vehicles revealed complex and diverse benthic communities on the canyon walls, including new species and several range extensions. This presentation will show the results of exploration and research in these remarkable features, including the first descriptions of methane seep communities in the region, and discuss conservation measures for deep sea ecosystems.
PRESENTATION AWARDS

Awards are given to two graduate students for the best oral presentation and the best poster presentation. Presentations will be judged on 1) scientific content based on the articulation of the problem, soundness of hypothesis testing, methodologies, and analyses; 2) oral and visual quality of the delivery; and 3) demonstration of confidence and depth of understanding of the material.

A panel of judges will evaluate oral presentations and provide feedback to those participating after the colloquium. A second panel will judge poster presentations and also provide feedback after the colloquium. Audience members will be invited to provide feedback as well.

Following the colloquium, the award for best oral presentation will be presented and the winner will receive a personalized certificate of recognition and a cash award sponsored by Sigma Xi, The Scientific Research Society. The award for best poster presentation will be presented next and the winner will receive a personalized certificate of recognition and a cash award sponsored by The Charleston Natural History Society.

Past Oral Presentation Award Winners
2017 Elizabeth Underwood
2016 Kevin Mack
2015 Robin Frede
2014 Alyssa Demko
2013 David Coles
2012 Tim O’Donnell
2011 Kristin Stover
2010 David Shiffmann
2009 (Sept.) Melanie Hedgespeth
2009 (Feb.) Megan Kent
2008 Tom Baird
2007 Courtney Arthur
2006 Deb Zdankiewicz
2005 Eric Pante
2004 Stephanie Brunelle
2003 David Couillard
2002 Bob Grant

Past Poster Presentation Award Winners
2017 Teresa Popp
2016 Francesca Battaglia
2015 Victoria Ruddle
2014 Mark Lehtonen
2013 Liz Duermitt
2012 Amanda Kelly
2011 Tim O’Donnell
2010 Cameron Doll
2009 Ryan Joyce & Tessa Bricker
2008 Lindsey Parent & Joy Gerhard
ABSTRACTS

POSTER PRESENTATIONS

1  EXAMINING THE IMPACTS OF ULTRAVIOLET (UV) LIGHT-ENHANCED TOXICITY OF SURFACE OIL SHEENS ON THE SURVIVAL, GROWTH, AND DEVELOPMENT OF LARVAL AND JUVENILE RED DRUM (*SCIANEOPS OCELLATUS*). Beers, D (GPMB, The University of Charleston, SC)

The 2010 Deepwater Horizon oil spill released approximately 5 million barrels of oil into the Gulf of Mexico. Following the spill, 2100 km of shoreline were affected, including beaches, estuaries, and wetlands. Petroleum, which is a naturally occurring substance, contains toxic chemicals called polycyclic aromatic hydrocarbons or PAHs. In the presence of UV light, PAHs can be photomodified into more toxic compounds, leading to increased toxicity in aquatic organisms. PAHs cause a suite of physiological consequences particularly in the early stages of development due to increased vulnerability and less adapted methods of dealing with pollutants. Red drum, otherwise known as redfish, is a recreationally and commercially important fish found along the South Atlantic and Gulf of Mexico coastlines. Adults spawn offshore and larval fish travel inland to estuaries to develop until reproductive maturity. Therefore, the aim of this study is to understand the potential impacts of the increased potency of oil slicks due to UV light on the larval and juvenile stages of red drum. It is hypothesized that with exposure to UV light and oil there will be significant decreases in survival, growth, and development of a larval fish exposed after hatching. A 24-hour experimental test will be conducted followed by a 30 day grow-out phase in which multiple sublethal endpoints will be examined. Findings will be used to fill in data gaps for NOAA’s Office of Response and Restoration to create more useful mitigation and restoration plans in the event of future oil spills.

2  CHARACTERIZATION OF THE CORAL METABOLOME UNDER DIFFERENT PH AND TEMPERATURE REGIMES, VIA $^1$H NMR. Loewenstein, J (GPMB, The University of Charleston, SC)

The increase in sea surface temperature and decline in pH due to anthropogenic activities during the last two centuries are rapidly changing the ocean environment. This is problematic for reef corals, which are extremely sensitive to environmental changes and exhibit decreased calcification, reproduction, and compromised competitive and immune abilities as a response to stress. To this end, metabolomic measurements using $^1$H NMR provide an opportunity to determine the chemical response to a number of stress factors relevant to global climate change, such as elevated temperature and reduced pH. The present study has several goals: (1) To assess the change in the coral metabolome over a natural pH gradient and (2) To compare the coral metabolome of colonies exposed to different treatments of pH and temperature as well as the combined effect of these two treatments, and examine inter- and intra-species variation of two major reef building species. Metabolites from coral tissue powder will be extracted using methods modified from Bligh and Dyer (1959) and Wu *et al.* (2008) and
analyzed on a 700 MHz $^1$H NMR. Previous studies have demonstrated $^1$H NMR as a powerful tool for profiling the coral metabolome however this will be the first study to examine the coral metabolome as it is affected by climate change related issues, using NMR. This work will lay the foundation for future research exploring different species responses and answering fundamental questions about how reef systems will change as global climate change continues to alter their physical and chemical environment.

3 CAPTIVE POPULATIONS AS A TOOL FOR WILDLIFE RESEARCH: NON-INVASIVE METHODS ASSESS THE STRESS HORMONES AND CONDITION OF GENTOO PENGUINS IN VASTLY DIFFERENT ENVIRONMENTS. Karan, J (GPMB, The University of Charleston, SC)

Although gentoo penguins, *Pygoscelis papua*, can be found by the hundreds of thousands in the wild, and in zoos and aquariums across the globe, little is known about their basic physiology. Significant differences in stress levels and health have been documented between several Antarctic gentoo colonies, but the source(s) of these differences remains unknown. Correlates with gentoo penguin condition have not yet been established, as parameters such as age, sex, and diet are often impossible to obtain in wild populations. Captive populations therefore provide an invaluable tool for discovering more about animal biology, as they are easily accessible and detailed long-term records are maintained for each individual. By assessing captive gentoo populations, I seek to determine biological and environmental variables that have a significant effect on gentoo penguin condition. The health of eight wild gentoo colonies will also be investigated through comparisons to the captive penguins. The stress hormones and immunocompetence of penguins across various environments will be measured through novel non-invasive methods, allowing each type of population (captive vs. wild) to inform the care and protection of the other. Partnering with several zoos and aquariums across the country will allow findings of the proposed study to reach a wide audience, and results will give institutions the opportunity to better understand their animals, tailor care to individual penguins, and possibly improve overall husbandry practices. Ultimately, I hope to introduce improved monitoring methods for wild penguin populations and better inform research and conservation decisions for the rapidly changing Southern Ocean ecosystem.

4 LINKING LAND USE TO PHYSICAL CHANGES IN CHARLESTON’S ESTUARIES AND TIDAL CREEKS. Hanson, B (GPMB, The University of Charleston, SC)

As one of the ten fastest growing cities in the United States, Charleston, South Carolina is experiencing rapid rates of development along its coasts and waterways. Large-scale changes in land use lead to proportionate increases in impervious ground cover. Impervious surfaces increase stormwater input, which can alter salinity regimes. Stormwater runoff is associated with increased fecal coliform and contaminant loads and threatens the integrity of ecologically and economically valuable estuarine ecosystems. In collaboration with an advisory committee of vested stakeholders, including Charleston County and local municipalities, the present study intends to quantify watershed characteristics associated with stormwater impacts, the spatial extent of such impacts, and how they may respond to predicted changes in climate and weather patterns. Stormwater input and its effect on salinity regimes may additionally impact
local ichthyoplankton. As a focus study a mesocosm experiment will examine how variable salinity regimes affect growth, development and survival of larval Sheepshead minnows, *Cyprinodon variegatus* (Lacepede, 1803). Additionally, MSS multiparameter water quality sondes will be deployed in select Charleston area tidal creeks to quantify hydrological responses to rain events along a gradient of coastal development. With data collected from the sondes, predictive models will identify areas of tidal creeks that are most sensitive to stormwater input using salinity as a proxy for stormwater input. Results of the current study will inform and improve best management practices by focusing policy and regulation on the most hydrologically sensitive creeks in the Charleston region.

5 LONG-TERM PASSIVE ACOUSTICS AS A MEANS TO UNDERSTAND SPATIAL AND TEMPORAL PATTERNS OF ATLANTIC BOTTLENOSE DOLPHINS (*TURSIOPS TRUNCATUS*). Marian, A (GPMB, The University of Charleston, SC)

The Atlantic bottlenose dolphin has a very complex stock structure along the Southeast coast with waters off the coast of South Carolina being home to permanent, local resident dolphins, as well as those that make large-scale seasonal migrations. Most current population and distribution estimates for bottlenose dolphins are based on aerial or boat-based visual surveys, which have many disadvantages including minimal temporal coverage, high variability due to weather and daylight limitation. Passive acoustic monitoring can be more useful than visual surveys because it can enhance temporal coverage. This method can be applied year round at relatively low costs and allows long-term sampling at precise time scales (e.g. duty cycles of 2 min every 20 min throughout the day and night). The goal of the current project is to combine both visuals surveys and passive acoustics to assess seasonal patterns in the distribution of dolphins in the May River estuary, South Carolina and determine if those patterns are associated with the arrival and departure of the migratory stock. If so, the goal is to then monitor temporal variations in the migratory stock’s movement and whether or not it is due to variations in water temperatures associated with annual climate variability.

6 A BOTTLENOSE DOLPHIN (*TURSIOPS TRUNCATUS*) POPULATION CHARACTERIZATION STUDY IN CAPTAIN SAM’S INLET, SC. Bayles, C (GPMB, The University of Charleston, SC)

The population structure of the bottlenose dolphin (*Tursiops truncatus*) is complex, with seasonally migratory stocks often overlapping with year-round resident stocks (Speakman et al., 2009). It is historically unknown whether there is a resident population of dolphins in Captain Sam’s Inlet, between Seabrook and Kiawah Island. Frequency of use by the Charleston Estuarine System Stock (CESS) - a known population of dolphins documented to inhabit Price’s Inlet to North Edisto River- in this area is also unknown. At least one known individual from the CESS has been documented in this area, thus far. This project aims to capture novel data in regards to the structure of bottlenose dolphins in this area in regards to population size and time of use during the year; through the use of land-based photo-ID. For management and educational purposes, it is important to know how many animals could be affected by increased development and tourism, in this area. The impact of tourism and development to local beaches and water-based tours/experiences have been documented through the National
Marine Fisheries Service reports specifically in Captain Sam’s Inlet due to the rarity of strand-feeding events in this area. Therefore, surveys of beach-goers will also be conducted to determine the perception of dolphin presence as well as the importance of having marine biologists on site- through a Town of Kiawah Island funded project- to locals and tourists. It is the hope that the findings from this study will enact better management practices for the marine mammals in this area so they can still be observed and appreciated but exist and feed in an environment not plagued by the possibility of constant stressors.

7  **PREDATOR AVOIDANCE COSTS OF EGG-CARRYING IN SNAPPING SHRIMP (DECAPODA: ALPHEIDAE).** Bergeson, P (GPMB, The University of Charleston, SC)

Offspring-carrying can be one of the costliest activities associated with reproduction. Parents carrying offspring can experience reduced foraging efficiency, predator avoidance, and travel speed. While these costs have been widely studied in terrestrial organisms, considerably less is known about similar costs in marine invertebrates. The snapping shrimp *Alpheus angulosus* and *A. heterochaelis* are small, intertidal caridean shrimp found in burrows beneath oyster rubble. Although both species are commonly found in monogamous pairs, only females perform parental care by carrying and tending to fertilized eggs on their abdominal appendages until the larvae hatch and disperse. The present study seeks to quantify the antipredator costs associated with carrying eggs in the female snapping shrimp. The ability of a gravid female to avoid predators will be tested by 1) using an underwater treadmill to measure travel speed, as well as 2) observing difference between gravid and non-gravid females’ tail-flipping behavior. It is hypothesized that both travel and tail-flipping speed of egg-carrying females will be slower compared to non-gravid females, and that these costs will depend on size-specific fecundity. Findings from this study can also be applied to future investigations of similar costs in other crustaceans, including those of considerable cultural and commercial importance.

8  **ADDRESSING LIFE HISTORY INFORMATION GAPS IN TWO CARIBBEAN PARROTFISHES, SCARUS TAENIOPTERUS AND SCARUS VETULA.** Jones, D (GPMB, The University of Charleston, SC)

The demography and life history of fish populations – including population structures by age or size, growth rates, reproductive seasonality, and size- and age-at- maturity and sexual transition – are critical inputs for fishery management. Despite the relative abundance and ecological importance of Caribbean parrotfishes on reefs, little has been published on their life history. Parrotfish research has often focused on aspects of their functional ecology – especially their grazing of coral reefs – while many basic demographic and life history questions have been left unanswered. The objective of the present study is to determine the life history and population structure of two parrotfish species, the princess parrotfish *Scarus taeniopterus* and queen parrotfish *Scarus vetula*, in the U.S. Caribbean. Monthly parrotfish samples are being collected from St. Croix, USVI, where these species are common. To-date, we have collected a total of 469 princess parrotfish and 221 queen parrotfish samples from US Caribbean waters. Our preliminary results indicate that both species are protogynous hermaphrodites and females exhibit a relatively unique oocyte shape compared to other reef fish species. Sampling efforts will continue to fill in monthly collection gaps so that a comprehensive assessment of life
history for these two species will be finished within the next year. This research will fill a knowledge gap in the literature and increase scientific understanding of Caribbean reef fisheries.

9 CHARACTERIZING MICROPLASTICS IN THE GASTROINTESTINAL TRACTS OF BOTTLENOSE DOLPHINS (TURSIOPS TRUNCATUS) AND OTHER SMALL DELPHINIDS. Pfeifer, T (GPMB, The University of Charleston, SC)

Plastic pollution is a well-documented and global environmental concern. In recent years, microplastics have emerged as a growing concern in marine ecosystems because they are easily ingested by a wide range of organisms with a multitude of feeding strategies. Ingestion of these small particles has been documented in lower trophic level organisms via direct consumption. However, little is known about the presence, pathways, and potential bioaccumulation of microplastics within larger marine predators. This study will utilize gastrointestinal tracts from small delphinids, primarily bottlenose dolphins (Tursiops truncatus) that have stranded along various locations of the U.S. coast. We will characterize microplastics from the gastrointestinal tracts by size, color, and shape. Additionally, we will document trends in organism recovery location and prey items. We anticipate defining the pathways by which microplastics entered these organisms by comparing our findings with previous and ongoing studies which characterize microplastics in the common food items of delphinids.

10 RELATING SHRIMP BLACK GILL AND PARASITE INFECTIONS TO POPULATION ENERGETICS OF WHITE SHRIMP LITOPENAEUS SETIFERUS. Zuidema, S (GPMB, The University of Charleston, SC)

The white shrimp Litopenaeus setiferus fishery constitutes one of the most valuable fisheries in South Carolina. In the last two decades, an increase in the prevalence of the condition “black gill” occurred in white shrimp throughout the South Atlantic Bight. Black gill, the melanization of gill tissue, results from a defense response in crustaceans that is triggered by gill irritants (e.g. fungi, bacteria, heavy metals). This condition in the South Atlantic Bight has been attributed to infection by an apostome ciliate and is associated with reduced physical condition of infected shrimp. However, it is unclear if and how black gill relates to the presence of non-ciliate shrimp parasites and how these infections affect population-level energetics of white shrimp. The objectives of this study are to assess the relationship of visible black gill and 1) non-ciliate parasites in white shrimp; 2) environmental factors and shrimp life-stage; and 3) parasite infection on white shrimp population energetics. This study examines post-larval to adult life-stages of white shrimp and is being conducted in the estuarine tributaries of the Ashley and Wando rivers, and Charleston Harbor in Charleston, SC. To understand how black gill and parasite infections relate to shrimp population energetics, measurements of shrimp biomass will be used to calculate secondary production of white shrimp, and will then be tested for correlation with black gill prevalence and parasite biomass. Findings will provide insight into the health of white shrimp in Charleston, SC and help natural resource managers to understand interannual variability in these populations.
11 **REEXAMINING THE TAXONOMIC PLACEMENT OF *HYPNOGORGIA PENDULA* USING MITOCHONDRIAL DNA AND MORPHOMETRICS.** Vill, C (GPMB, The University of Charleston, SC)

Restoration of mesophotic octocorals affected by the Deepwater Horizon (DWH) oil spill in the Gulf of Mexico is currently hindered by a lack of knowledge regarding octocoral genetic diversity and population connectivity. This study focuses on the population genetics and phylogenetics of the mesophotic octocoral *Hypnogorgia pendula*, one of the common large octocoral species indicative of the mesophotic reefs impacted by the DWH oil spill. The study intends to 1) increase sample size to conduct a more robust examination of the mtDNA haplotype distribution of *H. pendula* from the Gulf of Mexico and 2) examine the taxonomic placement of *H. pendula* using molecular systematics to verify diagnostic morphometric characters for species identification and compare that to *Muricea pendula*, a closely related shallow water octocoral. The study will use a portion of the mitochondrial *mutS* gene to confirm species identifications and to assess the genetic diversity within this taxon. This study will resolve the differences between *H. pendula* and *M. pendula* both genetically and morphologically.

12 **TURTLE TRACKING TROUBLE: DO CARAPACE MORPHOLOGY AND COMPOSITION DICTATE SATELLITE TRACK DURATIONS FOR HARD-SHELLED SEA TURTLES?** Hoffman, K (GPMB, The University of Charleston, SC)

For several decades, satellite telemetry has enabled global collection of spatial distribution data across sea turtle species. Data collection windows vary among species and location, but generally speaking shorter track durations are associated with Kemp’s ridley sea turtles (*Lepidochelys kempii*) than loggerhead sea turtles (*Caretta caretta*). Using similar transmitter attachment procedures, researchers with the South Carolina Department of Natural Resources (SCDNR) have obtained track durations of 17 to 173 days for Kemp’s ridley sea turtles but 6 to 510 days for 80 loggerhead sea turtles since 2004. Given extensive overlap in spatial distribution and diving behavior for these tracks across species, additional research is needed to investigate potential causes of track duration disparities. As such, I propose to evaluate potential interactions between carapace morphology and composition on transmitter adhesion, and in turn, track longevity. The first objective will be to use a suite of morphometric data for both species captured in the SCDNR surveys (2000 to 2018) to test for significant differences in carapace curvature, and ultimately, whether such differences would result in differential water shear force at the point of transmitter attachment. The second objective will be to test for differences in epoxy adhesion strength between species (as well as among scutes) using keratin obtained from stranded sea turtles. Preliminary results from these first two thesis objectives will be presented, along with a timeline for completing the remaining three thesis objectives.

13 **IMPOSEX INDUCTION BY ENDOCRINE DISRUPTING CHEMICALS: EFFECTS OF TBT AND WASTEWATER EFFLUENT ON THE EASTERN MUD SNAIL.** Mathis, E (GPMB, The University of Charleston, SC)
Environmental endocrine disrupting chemicals (EDCs), such as the well-known diethylstilbestrol (DES) and the plasticizer bisphenol A (BPA), and many more mimic ligands involved in multiple hormonal signaling pathways, including those that perturb PPAR/RXR molecular signaling. By regulating development, lipid metabolism and energy homeostasis, PPAR/RXR signaling may influence adaptation and fitness of organisms exposed to these EDCs. Charleston Harbor and its surrounding waterways are now experiencing a dramatic shift due to dredging, accommodations for the supertanker ships, and population increase. These waterways may also become subjected to offshore oil drilling. Dredging and “convenient port of call” tankers may increase the burden of the antifouling paint, Tributyltin (TBT) and use of Corexit oil dispersants, both increase the burden of EDCs in our coastal ecosystem. Here, we propose to explore how EDCs have their impact at the cellular and organismal level. Specifically, we will investigate the EDCs TBT (PPAR/RXR ligand) and accumulation of EDCs in wastewater effluent.

14 EVALUATING THE EFFICACY OF MARINE PROTECTED AREAS FOR SNAPPER-GROUPER SPECIES IN THE US SOUTH ATLANTIC. Pickens, C (GPMB, The University of Charleston, SC)

Marine Protected Areas (MPAs) have been used widely by fisheries managers to curb habitat destruction and increase biomass and sizes of fish inside MPAs to promote spillover into adjacent regions. In 2009, nine MPAs were established off the Southeast United States' Atlantic Coast to provide refugia from exploitation for a variety of deepwater demersal reef-associated species (snapper-grouper complex) targeted by fishers in this region. A previous study of two of these deepwater MPAs, using a time series (2001-2014) of underwater video, found no change in community composition and abundance of a targeted snapper species inside and outside of the MPAs. Three of the deepwater MPAs are frequently sampled by a collaboration of the Marine Resources Monitoring Assessment and Predictions (MARMAP) program, Southeast Area Monitoring and Assessment Program, South Atlantic (SEAMAP-SA), and Southeast Fishery Independent Survey (SEFIS) using traps (1990-present) and underwater video (2011-present). This study will utilize the trap and camera deployment time series data collected by these partners in three of the deepwater MPAs to test for changes in fish community composition, abundance, and life history parameters (age distribution, sex ratios, and spawning presence) inside-outside of the MPAs as indicators of MPA effectiveness. Regardless of the impact that these MPAs have had, the results will be useful for the South Atlantic Fisheries Management Council and their management of the economically important snapper-grouper species, helping to identify if MPAs are an effective management strategy for this fish complex.

15 FROM THE SEAFLOOR TO ESTUARINE SHORES: ZETAPROTEOBACTERIA IN CHARLESTON, SC. Enriquez, A (GPMB, The University of Charleston, SC)

The deep ocean hydrothermal vents are a source of high amounts of iron. Zetaproteobacteria are the only organisms known to oxidize iron in such an environment under nearly neutral pH conditions. Previous research identified their ability to grow on carbon steel, and recently, in more estuarine environments such as Chesapeake Bay. Given these recent findings, it is reasonable that Zetaproteobacteria live in the Charleston Bay area. The goal of these studies is to identify areas in Charleston where Zetaproteobacteria grow and to assess any
biogeographical differences between samples, as well as the potential to colonize mild steel in a salt marsh and coastal environment. Sediment samples were collected at low tide across sites with varying salinity from the Charleston area rivers: the Stono, Ashley, Wando, and Cooper. In addition, in situ dissolved oxygen, temperature, and salinity were recorded when possible. At all sites, samples were collected for measurement of Iron (II) and total iron. Preliminary PCR analysis confirms the presence of these bacteria; the abundance will be quantified using qPCR. In addition, Microbial Iron-Oxidation Chambers (MOICs) were constructed with small steel coupons and will be deployed in the same area as the sampling sites. These MOICs will also be assessed for the presence of Zetaproteobacteria using PCR. Identifying how and where these bacteria can grow in Charleston area rivers will allow for a better understanding biogeographical differences between Zetaproteobacteria in coastal estuarine environments.

ORAL PRESENTATIONS

1.1 ASSESSING THE RELATIONSHIP BETWEEN GEOMORPHOLOGY AND DEEP-SEA MEGAFANAL COMMUNITIES ON THE WEST FLORIDA ESCARPMENT. Proux, Z (GPMB, University of Charleston, SC)

The Gulf of Mexico has the highest diversity of deep-sea coral anywhere in the United States. The distribution of deep-sea corals, and other sessile megafauna, depends primarily on depth, presence of hard substrate, and vertical relief of the seafloor, but less is known about how those assemblages vary with different geomorphologic features. Flats, mounds, and ridges are common geomorphologic features on the West Florida Escarpment. The primary goal of this study was to compare abundance, composition, and diversity of deep-sea megafaunal assemblages as they relate to flats, mounds, and ridges. This study focused on four proposed Habitat Areas of Particular Concern (HAPC) recommended for regulation by the Gulf of Mexico Fishery Management Council with depths between ~300 and 750 m. High-resolution multibeam echo sounder data from surveys by NOAA Ship Nancy Foster in 2008 and R/V Falkor in 2012 provided reference surfaces. Additionally, megafauna greater than 10 cm were identified and enumerated in 146 transects from 22 ROV dives. Species accumulation curves identified ridges as the most species rich geomorphology type and flats as the least species rich. A non-metric multidimensional scaling ordination (nMDS) based on an underlying Bray-Curtis similarity matrix and the ANOSIM Global-R statistic determined communities were significantly different between flats, mounds, and ridges. Future expeditions onto the West Florida Escarpment can use geomorphology as a proxy when looking for specific assemblages. Furthermore, managers can use geomorphology to classify large areas of seafloor that have been mapped, but not explored by ROV.
1.2 A LIFE HISTORY STUDY OF THE GOBIID FISH GOBIOSSOMA BOSC IN SOUTH CAROLINA ESTUARIES. Taylor, MA (GPMB, University of Charleston, SC)

*Gobiosoma bosc* is a scale-less, cryptic, short-lived goby abundant in shallow coastal habitats, oyster reefs, and estuaries throughout its geographic range. Previous studies on the reproductive life history of *G. bosc* failed to include aging or histological analyses, therefore basic knowledge of *G. bosc* population demographics and reproductive biology remain unknown. The aim of the current study is 1) to determine the age and growth rates for individuals of all size classes for both sexes of *G. bosc*; 2) determine the duration of the spawning season and spawning periodicity for populations of *G. bosc* within the Charleston Harbor; and 3) histologically verify the sexual strategy and reproductive biology of *G. bosc*. Specimens have been collected from the Charleston Harbor, Charleston SC and Waddell Mariculture Center, Bluffton, SC monthly beginning in May 2017. Prior to fixation, sagittal otoliths were removed from taxonomically identified specimens for aging and growth analyses. Formalin-fixed dissected gonad tissue and surrounding viscera were sectioned and sequentially mounted to obtain a full cross-sectional series of the gonad. Histological analyses provide descriptions of the sexual strategy and reproductive biology of some *G. bosc* populations in South Carolina estuaries. Results from this study will provide data necessary for population assessments of *G. bosc* and their ecological role within oyster reefs and estuarine ecosystems.

1.3 METABOLIC RESPONSE TO HIGH WATER TEMPERATURES IN CULTURED JUVENILE RED DRUM, *SCIAENOPS OCELLATUS*. Welling, E (GPMB, University of Charleston, SC)

Estuarine organisms are exposed to high water temperatures which reduces water oxygen concentration and increases fish metabolic rate and overall oxygen demand. Routine and maximum metabolic rates (RMR and MMR) increase with temperature to maximum values at their optimum temperatures and decrease as temperatures increase past optimum. Aerobic scope, the difference between MMR and RMR, represents aerobic metabolic capacity, and reduced aerobic scope may inhibit physiological performance and alter behavior. When aerobic metabolism cannot meet the full demand, anaerobic metabolism supplements demand but may cause pH shifts and a large oxygen debt. This study investigates the effect of high temperature on the metabolism of juvenile red drum. Oxygen consumption was measured at four temperatures mimicking summer temperatures: 24°C, 27, 30°C, and 33°C. Fish were starved, and RMR was measured overnight. To estimate MMR, fish were chased until exhaustion and placed back into the respirometer. Another set of fish were exercised and immediately sacrificed. Lactate concentration will be quantified from these fish and used as a anaerobic metabolism indicator. RMR was $13.47 \pm 0.67 \text{ mmol kg}^{-1} \text{ h}^{-1}$ at 24°C and increased with temperature to a maximum value of $17.49 \pm 0.87 \text{ mmol kg}^{-1} \text{ h}^{-1}$ at 33°C. MMR and aerobic scope peaked at 27°C and decreased at temperatures lower and higher than this optimum. Red drum aerobic scope did not decrease significantly at the highest temperature tested, and so fish performance in the wild may not be reduced at high summer temperatures.
1.4 LARVAL SURVIVAL AND SETTLEMENT IN THE COMMENSAL BARNACLE *CHELONIBIA TESTUDINARIA* UNDER DIFFERING SALINITY CONDITIONS. Reilly, M (GPMB, University of Charleston, SC)

*Chelonibia testudinaria* is an epibiotic acorn barnacle that attaches to sea turtles, manatees, and crabs. Much is unknown about the mechanisms by which this epibiont finds its host during the planktonic larval stage. This study identified the salinity tolerance of *C. testudinaria* larvae in order to understand what water masses they are likely to occur and also be able to settle on a host. Egg masses were collected from adult barnacles growing on horseshoe crabs and sea turtles. Larvae were reared in filtered seawater at 20 or 30 ppt salinity until they reached the cyprid stage and then groups of cyprids from the same cohort were transferred into beakers with salinities at 10, 15, 20, 25, and 30 ppt respectively. After 72 hours all cyprids were counted and classified as alive, settled, metamorphosed, or dead. Percent mortality and percent settlement were calculated based on total larvae per beaker. Mortality was significantly reduced in the 10 ppt salinity treatment (P < 0.01) and showed a general trend of increasing mortality with decreased salinity. Settlement was the sum of both settled and metamorphosed larvae and showed a general trend of decreasing rates of settlement with decreased salinity. Settlement was significantly reduced in the 10 ppt salinity treatment (P < 0.01) but had greater variability between trials than mortality rates. Mortality ranged from 2-100% and settlement ranged from 0-89%.

1.5 RELATIONSHIP BETWEEN TEMPERATURE TRENDS AND THE TEMPORAL CHANGES IN THE LARVAL RECRUITMENT OF A NON-NATIVE CRUSTACEAN ALONG THE LEADING EDGE OF ITS RANGE. Popp, T (GPMB, University of Charleston, SC)

The non-native porcelain crab, *Petrolisthes armatus*, was first seen on intertidal oyster reefs in South Carolina in 1995. Since then, its range is theorized to have expanded north in a series of surges and setbacks, where particularly cold winters may cause mortality in the northernmost populations. While *P. armatus* has occurred along the coast of South Carolina for nearly thirty years, relatively little is known about its reproductive biology and ecological impacts in its introduced range. *Petrolisthes armatus* reproduces year-round in the native range whereas its reproductive season in the novel range is limited to warmer months. Variation in the timing and duration of larval recruitment are not known for the introduced range and these factors may affect further range expansion. My research examines whether *P. armatus* larval recruitment is related to temperature variation, in particular, the severity of winter temperatures. Biweekly larval tows collected in the North-Inlet Winyah Bay National Estuarine Research Reserve since 1981 provide a valuable resource for assessing *P. armatus* recruitment trends. I analyzed samples collected from 1994 to 2018 to determine whether the timing and duration of larval ingress varied over time and was related to temperature variation. *Petrolisthes armatus* larvae reached the region in 1995 and once established, has been present every year since. Results also show trends within the reproductive season that correlate with winter and spring temperature lows which will aid in understanding how this species will expand its range north.
1.6 DETERMINING POTENTIAL WATER QUALITY THREATS TO *ACROPORA PALMATA* REPRODUCTION AT SALT RIVER BAY NATIONAL HISTORIC PARK AND ECOLOGICAL PRESERVE IN ST. CROIX, USVI. Bayless, A (GPMB, University of Charleston, SC)

*Acropora palmata* (Elkhorn coral) was historically one of the most abundant reef building corals in the Caribbean, but they have declined more than 80% in the last 30 years. Surviving *A. palmata* in Salt River Bay National Historic Park and Ecological Preserve (SARI) in St. Croix, USVI have shown reproductive impairment with almost no gonadal material from tissue biopsies. In contrast, *A. palmata* from Buck Island Reef National Monument (BUIS), northeast of the St. Croix mainland, have a greater reproductive output at most sites. One hypothesis is that poor reproductive capability could be attributed to poor water quality in the vicinity of SARI. Sediment and coral skeletons were analyzed for trace elements using ICP-MS to examine potentially toxic metals and elemental proxies of water chemistry parameters. Most elements analyzed in the sediment were significantly higher in SARI, but the distribution of many elements was correlated with sediment grain size. In *A. palmata* skeletons only lead (42 ppb), zinc (3 ppm), and iron (8 ppm) were higher, while boron (63 ppm), barium (36 ppm), and phosphorus (50 ppm) were higher in BUIS skeletons. In a sea urchin embryo toxicity test, porewater from all SARI reef sites, which are outside of Salt River Bay, and all sites at BUIS caused abnormal development. However, porewater from many sites within Salt River Bay resulted in normally developed embryos. Salt River may not be the major source of poor water quality for *A. palmata*, and porewater near the colonies needs further evaluation for toxic compounds.

2.1 IMPROVING DIET RESOLUTION FOR LARGE REEF-ASSOCIATED PISCIVORES IN THE U.S. SOUTHEAST ATLANTIC USING MOLECULAR TOOLS. Spanik, K (GPMB, The University of Charleston, SC)

The importance of predator-prey interactions on marine fish populations has been recognized for quite some time. Since it is suggested that predation mortality rates often exceed fishing mortality rates, consideration in fisheries management is imperative. Diet studies are rapidly becoming a common practice of fisheries ecology, and are able to provide valuable insight on competition for resources, habitat use, energy flow, natural mortality, and seasonal variability that is essential for emerging ecosystem-based fishery management models. This type of information is especially important in South-Atlantic (SA) reef ecosystems, where many species exhibit high site-fidelity and spatial-overlap among multiple life history stages is common. Many large, piscivorous predators in the SA exhibit high digestion rates, and consequently their prey items are commonly unable to be visually confirmed through traditional morphological analysis techniques. This study employs DNA barcoding to provide more informative diet composition information for an assemblage of large, reef-associated, piscivorous predators from the SA. Since genomic DNA of prey items from stomach contents can be highly degraded, a portion of mitochondrial gene encoding the enzyme cytochrome oxidase subunit I was chosen as a target amplicon because of its abundance within cells, and publicly available primers and reference sequences that can be used to achieve species-level resolution. Both inter- and intra-specific
composition was investigated using a suite of traditional metrics and potential influences of prey selection were explored using multi-variate analyses.

2.2 DETECTION OF MULTIPLE PATERNITY IN DIAMONDBACK TERRAPIN (*MALACLEMYS TERRAPIN*) EGG CLUTCHES FROM CHARLESTON, SC THROUGH THE USE OF NOVEL MOLECULAR TECHNIQUES. Sporre, M (GPMB, The University of Charleston, SC)

In general, turtles do not exhibit strong social interactions that would give rise to multiple mating, nor do females receive direct benefits from having multiple mates. However, multiple paternity is commonly seen in turtle clutches. The degree of multiple paternity and clutch size are directly correlated to the probability of male encounters. Past studies of diamondback terrapins have shown variation in the occurrence of multiple paternity when under varying female dominated sex-ratios. *Malaclemys terrapin*, are a species of high priority conservation in South Carolina and, in the Charleston area, provide a good system to investigate the relationship between population sex-ratio and multiple paternity because of a high male to female sex-ratio. The presented portion of this project uses microsatellite markers to determine the frequency of multiple paternity from terrapin clutches collected in Charleston, SC. Results of this study will identify mating behaviors and effective population size of diamondback terrapins in the Charleston area while shedding light on the effects that sex-ratios have on the frequency of multiple paternity within conspecifics.

2.3 RELATING SHRIMP BLACK GILL AND PARASITE INFECTIONS TO POPULATION ENERGETICS OF WHITE SHRIMP *LITOPENAEUS SETIFERUS*. Kell, S (GPMB, The University of Charleston, SC)

Studies conducted within the Charleston Harbor, SC watershed have revealed that >90% of total microplastics at some locations are tire wear particles (TWP). Estimated annual U.S. TWP emissions are 1.6 x 10^6 tons, but little is known about the way by which they enter coastal waters and their potential effects on estuarine biota. The objective of the present study is to determine the pathways by which microplastic debris, including TWP, enter Charleston Harbor and assess the toxicological consequences of TWP exposure to grass shrimp, *Palaemonetes pugio*. Pathways will be assessed by sampling stormwater detention ponds (n=4) and adjacent receiving tidal waterbodies (at the discharge point, upstream 50 m, downstream 50 and 100 m). Laboratory exposures of TWP to adult grass shrimp will be used to quantify their residence time in the digestive tract and gills and assess any acute effects. Preliminary results suggest that stormwater runoff and ponds are an important pathway for microplastics to adjacent waterways and that stormwater ponds may serve as a sink for microplastics. Abundances >62000 particles/m² (2888 particles/kg ww), with TWP comprising 81% of the total, have been found in pond edge sediment. Grass shrimp readily ingested and ventilated environmentally relevant sizes of TWP. TWP were retained for a longer period in the gut (avg. 45-65 hrs) than gills (avg. 25 hrs). The results of this study will help increase awareness of TWP as a source of microplastics in coastal waterways, fill in existing knowledge gaps and help make better informed stormwater management decisions.
2.4 AGE, GROWTH, AND REPRODUCTIVE LIFE HISTORY OF TWO DATA-DEFICIENT PARROTFISH SPECIES IN THE CARIBBEAN. Wagner, G (GPMB, The University of Charleston, SC)

The grazing behavior of parrotfishes helps control algal growth and prevents coral reefs from becoming algae-dominated. No other organism provides this service; therefore the presence of parrotfishes is crucial to coral reef health. In the Caribbean, snapper and grouper species are commercially targeted, while parrotfishes have historically constituted a small, subsistence based fishery. In recent years, snappers and groupers have been heavily overfished, resulting in parrotfishes experiencing intense increases in fishing pressures. In 2011, the SouthEast Data, Assessment, and Review (SEDAR) stock assessment indicated severe data deficiencies regarding age, growth and reproductive biology of several parrotfish species, including redtail parrotfish _Sparisoma chrysopterum_ and stoplight parrotfish _Sparisoma viride_, the two most heavily targeted parrotfish species in the Caribbean. Due to the severe lack of data, responsible management decisions were not possible. This study is filling data gaps by utilizing ages determined from otoliths, and reproductive maturities determined from reproductive histology. Combining these data results in growth rates, population age structure, sex ratios, reproductive seasonality, and size- and age-at-maturity and transition for redtail and stoplight parrotfish in Puerto Rico, St. Thomas, and St. Croix. Preliminary results suggest that both species exhibit year-round spawning, with large numbers of individuals developing or actively spawning in every month. Additionally, differences in age structure across islands may reflect differences in the commercial fisheries of each island. The results of this study can influence management decisions such as catch limits, size and seasonality restrictions, as well as gear restrictions in order to better manage these species in a region where fisheries data are sparse.

2.5 A LIPIDOMIC APPROACH TO IDENTIFYING IMMUNE RESPONSE IN CETACEAN SKIN TO THE ATTACHMENT OF THE TASSEL BARNACLE, _XENOBALANUS GLOBICIPITIS_. Hall, A (GPMB, The University of Charleston, SC)

The pseudo-stalked tassel barnacle, _Xenobalanus globicipitis_ is an obligate commensal of cetaceans predominantly attaching to the fins and flippers of dolphins and other small whales in tropical and subtropical waters around the world. The life cycle and natural history of this species is little known as it occurs only sporadically across cetacean hosts making it difficult to study. This research explores the potential immune response of cetacean skin and plasma that may be induced by settlement of this barnacle. Plasma and non-invasive skin stripping discs collected from live dolphins during a health assessment in Sarasota, FL were extracted using traditional and novel lipid extraction techniques, respectively. The extracted samples were processed using an untargeted LC-MS/MS approach in positive, negative, and full scan modes and a list of lipids present was compiled for each sample using LipidMatchFlow software. These lipid profiles will be assembled and compared between groups of dolphins with and without _X. globicipitis_ attached during health screenings. Lipid profiles will be analyzed using a principal component analysis (PCA) and significant lipids potentially associated with an immune response will be identified. Any significant differences in lipid profiles of animals with and without barnacles attached would be indicative of a potential new health risk for dolphin populations and could open the door for further cetacean immunology studies.
2.6 STRESS RESPONSE AND POST-RELEASE SURVIVAL OF BLACKTIP SHARKS (*CARCHARHINUS LIMBATUS*) CAPTURED IN SHORE-BASED AND CHARTER RECREATIONAL FISHERIES. Weber, N (GPMB, The University of Charleston, SC)

In recent decades, the number of recreational fishermen has increased, including those participating in shore-based and charter fishing. The stress imposed on a fish through capture, and associated post-release survival rates, are poorly understood for most marine species. In the U.S. south Atlantic, the blacktip shark (*Carcharhinus limbatus*) is the most commonly landed large coastal shark species, and is targeted by both shore-based and charter fishermen. Despite its popularity, the effects of recreational capture and release on the blacktip shark are unknown. The present study aims to: (1) assess post-release survival rates of blacktip sharks captured in shore-based and charter fisheries; and (2) quantify the stress response associated with both recreational capture modes. To monitor post-release survival, sharks are fitted with acoustic transmitters and pop-up satellite tags. To quantify the stress response, blood is drawn via caudal venipuncture and analyzed for pH, lactate, hematocrit, plasma electrolytes (Na⁺, Cl⁻, Ca²⁺, K⁺), and the concentration of a heat shock protein (Hsp70). Preliminary data indicate that pH, lactate (mmol/L), and hematocrit (%) do not differ between the two capture modes (p>0.05). However, as fight time increases, pH decreases (p<0.01) and lactate increases (p<0.001) for sharks caught both from shore and from charter boats. Additionally, hematocrit increases as fight time increases for sharks caught from shore (p<0.01). The present study will enhance our understanding of the blacktip shark’s physiological response to two different recreational capture modes and will provide post-release survival estimates critical to the upcoming stock assessment of the blacktip shark.
This event was graciously sponsored by:

- Department of Biology
- Graduate Program in Marine Biology
- Graduate School, University of Charleston, S.C.
- Graduate Program in Environmental Studies
- School of Science and Mathematics