



# Contributions of the Department of **Biology and Marine Biology (BMB)** to the Marine Sciences

## Faculty and Student Research Highlights

*BMB faculty and students are involved in various international and interdisciplinary research projects in collaboration with other research universities and government agencies and supported by more than \$44 million to date with a recent yearly average of \$5.4 million in funding.*

- **Dr. Ray Danner** and students have found that coastal bird populations are dependent on careful conservation research and planning.
- **Dr. Mike Durako's** lab conducted annual surveys of the dominant seagrass in Florida Bay, *Thalassia testudinum*, from 2006-2019 and found significant reductions in flowering following a 2015 die-off event and Hurricane Irma, illustrating there are limits to its resilience following successive disturbances.
- **Dr. Steve Emslie** and students discovered an ancient penguin colony now revealed by snowmelt in the Ross Sea that shows the effect of climate and sea ice on penguin colony locations over millennia.
- **Dr. Aly Fleming** and students leading research on a vast collection of rediscovered baleen from the Smithsonian archives and modern molecular methods to study the past ecology of Antarctic ecosystems.
- **Dr. Nikki Fogarty** and students documented that coral hybrids are healthier and grow faster than their threatened parent species.
- **Dr. Jessie Jarvis'** lab determined that seed weight, a commonly used metric to separate out the good (heavier) from bad (lighter) seeds for use in seagrass restoration, is not an accurate measure of eelgrass seed quality.
- **Dr. Stephanie Kamel** and students found that mean incubation duration of loggerhead nests on Bald Head Island has decreased by 7 days over the past 25 years, significantly reducing the number of male hatchlings produced.
- **Dr. Ann Pabst** and her lab discovered that rare winter visual and acoustic surveys off the coasts of North and South Carolina demonstrate high densities of sperm whales.
- **Dr. Joe Pawlik's** lab found that sponges and seaweeds are taking over reefs in the Caribbean by cycling food and nutrients to the detriment of corals.
- **Dr. Martin Posey's** lab recently determined that the maturation of created marshes is significantly accelerated by the creation of numerous dendritic channels feeding into a common embayment.
- **Dr. Fred Scharf** and his students recently estimated population connectivity and natural mortality rates of southern flounder, contributing key information for a coastwide stock assessment.
- **Dr. Michael Tift** and students have discovered that some species of mammals have levels of carbon monoxide (AKA 'The Silent Killer') that resemble those seen in chronic cigarette smokers..
- **Dr. Kara Yopak** lab discovered that Greenland shark brains contain some of the largest olfactory bulbs of any shark species described to date, which may allow these slow, cryptic sharks to follow odor trails long distances and prey on sleeping Arctic seals.
- The iMESA Lab led by **Drs. Patrick Erwin** and **Susanna Lopez-Legentil** focuses on animal microbial symbiosis and marine invasive species.

## Research Topics

- Benthic Ecology
- Biological Oceanography
- Coastal/Marine Plant Biology
- Comparative Physiology
- Conservation Biology
- Coral Reef Ecology
- Disease ecology
- Estuarine Ecology
- Fisheries Biology
- Ichthyology
- Marine Chemical Ecology
- Marine Evolutionary Ecology
- Marine Lipid Physiology
- Marine Mammalogy
- Marine Molecular Ecology
- Shellfish Research

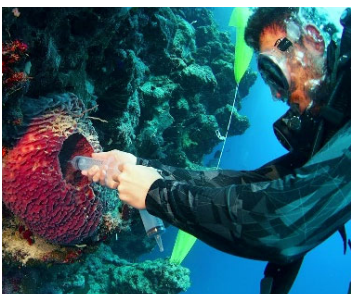
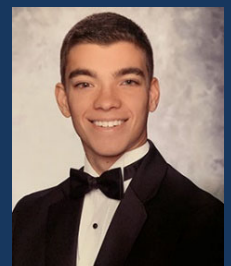
### 2020 STUDENT ACCOMPLISHMENT

Juan Zuluaga, a recent UNCW graduate who completed his Honors work with Dr. Ray Danner, was awarded an NSF Graduate Research Fellowship.



### 2020 STUDENT ACCOMPLISHMENT

Marine biology major, Ashton Cloer, and biology major, Ryan Walsh were awarded NOAA's Hollings scholarship providing academic assistance for two years and a 10-week internship at NOAA.



## Selected Recent Publications in High-Impact Scientific Journals from BMB Faculty and Students

\*Student co-authors, BMB faculty and research associates in bold

- **Tift, MS**, Ponganis, PJ. 2019. Time Domains of Hypoxia Adaptation – Elephant Seals Stand Out Among Divers. *Front. in Phys.* 10, 677.
- **Pawlik, JR**, McMurray, SE 2020. The emerging ecological and biogeochemical importance of sponges on coral reefs. *Annu. Review of Mar. Sci.*, 12: 3.1-3.23
- **Fogarty, ND** and KL Marhaver. 2019. Coral spawning, unsynchronized. A breakdown in coral spawning synchrony may threaten coral reef recovery. *Science* 365, 987-988
- MM Peñalver, **MJ Durako**, BT Furman, MO Hall. 2020. Multiple stressors result in reduced reproductive effort by *Thalassia testudinum* in Florida Bay, USA. *Mar. Ecol. Prog. Ser.*
- **Scheffel, TK\***, J.E. Hightower, JA Buckel, **JR Krause\***, and **FS Scharf**. 2020. Coupling acoustic tracking with conventional tag returns to estimate mortality for a coastal flatfish with high rates of emigration. *Can. J. of Fish. and Aqua. Sci* 77:1-22.
- Hanke\*, MH, **MH Posey** and **T Alphin**. 2017. The influence of habitat characteristics on intertidal oyster *Crassostrea virginica* populations. *Mar. Ecol. Prog. Ser.* **571**: 121-138.
- **Yopak KE**, McMeans B, Mull C, Feindel K, Kovacs K, Lydersen C, Fisk A, Collin SP. 2019. Comparative brain morphology of the Greenland and Pacific sleeper sharks and its functional implications. *Sci. Rep.* 9: 10022
- **Adrian\***, AJ, **CE Lack\***, **SJ Kamel**. 2017. Kin aggregations occur in eastern oyster *Crassostrea virginica* reefs despite limited regional genetic differentiation. *Mar. Ecol. Prog. Ser.* 584: 79-90
- **Kristan\***, AK, **SD Emslie**, and WP Patterson. 2019. Stable isotope analyses of ancient and modern Adélie penguin (*Pygoscelis adeliae*) mummies from the Ross Sea region. *Ant. Polar Biol.* 42: 1183-1192.
- **Mapes\***, KL; **Pricope**, NG; **Baxley\***, JB.; **Schaale\***, LE; **Danner, RM**. 2020. Thermal Imaging of Beach-Nesting Bird Habitat with Unmanned Aerial Vehicles: Considerations for Reducing Disturbance and Enhanced Image Accuracy. *Drones.* 4, 12.
- **Evans\***, JS, **Erwin PM**, Shenkar N, **Lopez-Legentil S**. 2017. Introduced ascidian species harbor highly diverse and host-specific microbial assemblages. *Sci. Reports* 7: 11033
- **Kroeger\***, JP, **McLellan, WA**, Arthur\*, L.H., Velten\*, BP, Singleton, EM, **Kinsey, ST**. and **DA Pabst**. 2020. Locomotor muscle morphology in three species of pelagic delphinids. *J. of Morphology.* 281:170–182.
- McMurray, S.E., **Stubler\***, **AD**, **Erwin, PM**, **Finelli, CM**, **Pawlik, JR** 2018. A test of the sponge-loop hypothesis for emergent Caribbean reef sponges. *Mar. Ecol. Prog. Ser.*, **588**: 1-14.
- **Erwin PM**, **Rhodes RG**, **Kiser KB**, Keenan-Bateman TF, **McLellan WA**, **Pabst DA**. 2017. High diversity and unique composition of gut microbiomes in pygmy (*Kogia breviceps*) and dwarf (*K. sima*) sperm whales. *Sci. Rep* 7: 7205
- **Fleming AH**, Kellar NM, Allen CD, Kurle CM. 2018. The utility of combining stable isotope and hormone analyses for marine megafauna research. *Front. in Mar. Sci.* 5:338.

## Contributions to Marine Science Curriculum

Degree Programs:

Biology (B.A., B.S., M.S.), Marine Biology (B.S., M.S, PhD), Marine Biology- Marine Conservation Option (B.S.), Biology-Terrestrial and Freshwater Option (B.S.)

- Antarctic Ecology
- Behavioral Ecology
- Biology of Crustaceans
- Biostatistics
- Coastal Marine Ecology
- Conservation Ecology
- Coral Reef Ecology
- Deep Sea Biology
- Ecology
- Evolutionary Biology
- Fisheries Biology
- Global Environmental Problems
- Ichthyology
- Intro. to Coastal Management
- Invertebrate Zoology
- Mammalogy
- Mariculture
- Marine Botany
- Marine Phycology
- Marine Mammals
- Ornithology
- Phytoplankton



## U.S. Institutional and Governmental Collaborations and Advisory Committees

S. Atlantic Fishery Management Council	Shellfish/Crustacean Fisheries Advisory Committee	Coral Restoration Consortium	NC Oyster Steering Committee	Dept. of Environmental Quality	NSF
National Estuarine Research Reserve System	Coastal Habitat Protection Plan Steering Committee	UN Environment	Lower Cape Fear River Monitoring Program	SeaGrant	BOEM
NC Division of Marine Fisheries Strategic Habitat Area	Masonboro Island Reserve Local Advisory Committee	NC Wildlife Resources Commission	East Coast Shellfish Research Institute	US Dept. of the Interior	NOAA
Southern Regional Oyster Restoration Committee	S. FL Water Management District	National Fisheries Service	North Carolina Marine Fisheries Commission	Office of Naval Research	NPS
Albemarle Pamlico Sound National Estuary Program	Submerged Aquatic Vegetation Assessment and Monitoring	Everglades National Park	US Fish and Wildlife Service	Cape Fear River Assembly	DEP