

# THE LIVING SEA

The e-newsletter of the LMRCSC



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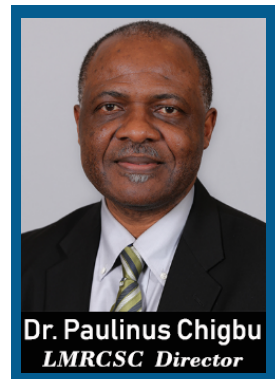
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## TO THE LMRCSC COMMUNITY

Greetings! I am pleased to introduce you to the Fall 2019 edition of the LMRCSC's (Living Marine Resources Cooperative Science Center's) newsletter, *The Living Sea*. In this edition, you will find that the Center has continued an upward trajectory of educating and preparing its students to be excellent scientists!



The LMRCSC spent the past summer developing both students, and educators, through the success of our leveraged programs. Our Research Experience for Undergraduates, and Geosciences Bridge programs hosted both college, and soon to be college students, and prepared them for a career in marine science. In addition, our Coastal Marine Science Workshop for teachers, also held this summer, provided local educators with the tools necessary to better educate their students on marine life.

The LMRCSC, as always, will continue to strive to better prepare students for careers in marine science. Through outreach and the passion of our team, we will never cease to make positive impacts in our communities!

*Paulinus Chigbu, Ph.D.*

# UNDERGRADUATE INTERNSHIPS

Many of our NOAA EPP LMRCSC undergraduate scholars participated in summer internships. Below is a highlight of what some students have accomplished during Summer 2019!



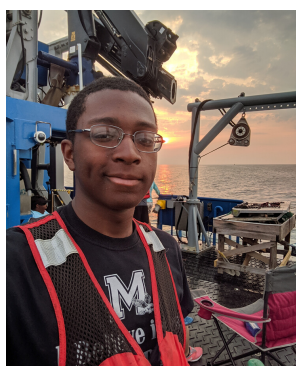
**Alexandria Ambrose**

**Senior, Savannah State University, Marine Science**

**Mentor: LaTreee Denson, NOAA-EPP LMRCSC Graduate Fellow, Ph.D. Candidate, RSMAS**

"This past summer I interned at the University of Miami Rosenstiel School of Marine and Atmospheric Science in Miami, FL. During this internship, I studied how environmental factors affect the distribution of larval King Mackerel, and how that would impact the migration patterns of adults in the Gulf of Mexico. The data were collected via a NOAA funded project and satellites. Using the

statistical computer program R, the relationships between larval CPUE and multiple environmental factors were examined. Significant factors were included in a larger geospatial model, to improve the stock status of King Mackerel in the Gulf of Mexico. From this experience, I learned how to use a new statistical computer program, while being exposed to a new aspect of the marine science field. I am grateful to LaTreee and everyone I met while in Miami, for encouraging and guiding me through that experience."



**Teemer Barry**

**Sophomore, University of Maryland Eastern Shore, Environmental Science**

**Mentor: Dr. Tara Cox, Savannah State University**

"In the summer of 2019 I took part in Savannah State University's *Bridge to Marine Science* research program. During the first three weeks of the program, our workshop focused on various topics, such as ethics, communication, and organization. A major part of the experience was the time we spent out on the open ocean on the R/V *Savanna*. For two days we traveled through a number of sampling sites while acting as recognized scientists on board a research vessel.

While on the vessel, we took and categorized samples, performed tool maintenance, and got in a little fishing as well. After the workshop ended, I began my own project that focused on analyzing the distribution of non-native lionfish in the area. The project itself mostly entailed making calls and organizing interviews with a considerable amount of Geographic Information Systems (GIS). Ultimately, this experience was great for acclimating to the ins and outs of an actual research setting, as well as sharpening my knowledge of spatial analysis. Additionally, this experience greatly improved my understanding of the process by which information is gathered by different organizations, as well as the benefits that can be gained from each of them."



**Chryston Best-Otubu**

**Senior, University of Maryland Eastern Shore, Marine Science**

**Mentors: Dr. Scott Large and Robert Gamble, NOAA NEFSC, Woods Hole, MA**

"For my research, we analyzed the condition factor (a weight/length relationship) of female summer flounder using structural equation modeling (SEM). Data were collected from stock assessments, as well as internal NOAA reference documents and databases of the Northeast Fisheries Science Center (NEFSC). Using structural equation modeling, framework models were built to evaluate how environmental indicators influence summer flounder condition. We also evaluated the relationships between condition factor and fishing pressure on the spawning stock

biomass of this species. The models were fit using the lavaan package in R. Only the most significant variables ( $p$ -value  $< 0.05$ ) were retained, while the final selection was based on the Akaike Information Criterion (AIC) score. These kinds of analyses have the potential to improve stock assessments and future decisions in fisheries management by providing more information on how environmental indices affect life history traits of managed stocks. The Woods Hole PEP internship at the NOAA Northeast Fisheries Science Center in Woods Hole, MA was extremely valuable, as it has helped me identify what I want to pursue a career in."



**DaQuan Davis**

**Junior, University of Maryland Eastern Shore, Environmental Science**

**Mentor: Dr. Harold Schreier, UMCES-IMET**

"In the Summer of 2019, I interned at IMET (Institute of Marine and Environmental Technology) under Dr. Rosemary Jagus, the Project Director of the NOAA Living Marine Resources Cooperative Science Center (LMRCSC) at IMET. IMET is in Baltimore, Maryland right by the Baltimore Inner Harbor. The IMET facilities concentrate on integrating research excellence with education, training, and economic development. For the summer, I was fortunate to work with

Dr. Harold Schreier in his microbial laboratory. We studied the occurrence of antimicrobial resistance in the Inner Harbor and IMET's aquaculture research center. Our research was conducted by testing for antibiotic sensitivity on bacterial isolates, identifying the bacterial colonies with multiple resistance to certain antibiotics, and finding bacteriophages for phage therapy techniques. This amazing experience has surely made me a more confident researcher and I've learned a lot from Dr. Schreier's lab – mainly about how serious of an issue antimicrobial resistance is in our society. One unexpected benefit was I got the chance to meet CEO's of companies, government officials, other university presidents, and international researchers. The Summer program ran by Dr. Jagus provided me with knowledge about how science is impacted by government, economics, and the public."



**Ileana Fenwick**

**Senior, Hampton University, Marine and Environmental Science**

**Mentor: Dr. Holly Moeller, University of California Santa Barbara**

"This summer I conducted research for eight weeks at the University of California, Santa Barbara through the UCSB Ocean Change Biology REU Program in the Moeller Lab. Using non-epibiont and epibiont covered giant kelp *Macrocystis pyrifera* blades, I set out to: (1) test talitrid amphipod consumption rates and (2) measure organic matter exudation into the sand due to amphipod consumption and kelp condition. This program contributed significantly to my professional journey; I was exposed to ecological modeling, gained experience as a scientific scuba diver, participated in professional development seminars and gained numerous connections in the field of marine science."



**Semaj Fielding**

**Sophomore, University of Maryland Eastern Shore, Environmental Science**

**Mentors: Stephen Julka and Matt Fountain**

"This past summer, I worked with Mayor John T. Tecklenburg and the Ackerman Foundation as a member of the inaugural class of Mayoral Fellowship in Charleston, South Carolina. In this capacity, I was one of the lead researchers for the Stormwater Management Department's FEMA buyout project. My specific research included habitat restoration and management plans for lands that have already been acquired through the FEMA buyout process. The qualitative research allowed for identification of the most applicable restoration and management plans for the City of Charleston's newly acquired properties. They include bioretention rain gardens, impervious pavement, stormwater infiltration trenches, stormwater wetlands, and urban tree canopies. Along with this, I was able to meet with and discuss my project with rainproofing experts from Amsterdam, Netherlands. This experience has benefited me because I gained more knowledge on flood mitigation and firsthand experience with public service jobs that relate to environmental and marine science."



**Erianna Hammond**

**Sophomore, Savannah State University, Marine Science**

**Mentor: Dr. Dionne Hoskins-Brown, Savannah State University**

**Wendy Leeds, Pacific Marine Mammal Center**

**Keith Matassa, Pacific Marine Mammal Center**

"I had the honor of working at the Pacific Marine Mammal Center in Laguna Beach, CA this summer as an undergraduate intern. The center focuses on rescue, rehabilitation, and release of pinnipeds, so it was quite exciting to help start their new initiative to conduct research and observational studies, eventually leading to published literature. During my period of interning, I studied Human Interactions with Pinnipeds over 36 years by analyzing and categorizing a historical dataset collected by the center. I had the opportunity to categorize human interactions based on the cases of pinniped injuries; the data included locations, dates, description of injury, and other details. I took the initiative to look at this study from a broad perspective, then narrowed the results by focusing on the species of pinnipeds, month of the year when the injury occurred, the ages of the pinniped, and the type of human interaction that caused the injury. After my day of research, the Pacific Marine Mammal Center let me volunteer with rehabilitation of pinnipeds and go out on the boat for animal releases."



**Rhyan Knight**  
**Senior, University of Maryland Eastern Shore, Environmental Science**  
**Mentor: Florencia Fahnestock, University of New Hampshire**

"My internship was at New Hampshire University in Durham, New Hampshire. While there, we did field work, collecting sediment cores from different areas such as the salt marshes, great bay, and a few rivers. We studied the mercury, methane, grain size and LOI (Loss on Ignition) within these cores. We took small parts of the core at different depths and freeze dried those samples. After they were freeze dried, the chunks were crushed into smaller pieces. The sediments were then analyzed for grain size and mercury, and were put into a furnace to burn in order to obtain the LOI. Methane was taken directly from the core once we had obtained that core. This experience benefited me by giving me more hands on experience, but also to help me stay in the geoscience field."



**Janelle Layton**  
**Senior, Hampton University, Marine and Environmental Science**  
**Mentor: Jeffrey Seminoff, Ph.D., NOAA SWFSC**

"I interned at the NOAA Southwest Fisheries Science Center in La Jolla, CA on a project entitled, *Investigating marine wildlife ecotourism in southern California: a case study for La Jolla Cove with Jeffrey Seminoff PhD*. I learned that in southern California, marine-based ecotourism is becoming more popular each year. Thousands of individuals are visiting La Jolla Cove, [located] in San Diego County, to view a variety of species, including (non-dangerous) leopard sharks, seals, sea lions, rays, whales, sea birds, and green sea turtles. I gave interview-based surveys (n=144) on visitors to the Cove to better understand the stakeholder groups that visit La Jolla Cove and the drivers for why visitors choose the Cove over the many other tourist attractions in the San Diego region. In addition, pre-and-post surveys (n=21) were conducted for people participating in local ecotours to discover how much these groups are learning and retaining. From these surveys, we learned about the demographics of these stakeholders, as well as what they learned about local wildlife. For the first time, we have a better understanding of the marine wildlife viewing stakeholders in La Jolla Cove and the level to which this ecotourism provides educational and conservation benefits for both the viewing public and marine wildlife. The results obtained will provide information to assist in the creation of outreach materials for the public, and to educate the largest possible target audience about environmental issues that affect their lives."



**Nylah McClain**

**Senior, University of Maryland Eastern Shore, Marine and Environmental Science**

**Mentor: Dr. Ten-Tsao Wong, UMCES-IMET**

"This summer I interned at IMET in Baltimore, Maryland. There I worked with Dr. Ten-Tsao Wong and Kuan-Chieh "Jay" Peng on optimizing methods to genetically type reproductively sterile sablefish. We used DNA extraction and PCR to determine if chromosomes XX (female), or XY (male) were present that way we could properly monitor the growth of farm-grown sablefish. In

attempting to optimize genetic typing methods, we tested three DNA extraction methods and two PCR protocols. We determined that using 240 microliter lysed fin samples, our newly made primers, the GoTaq PCR protocol, and an annealing temperature of 55°C provided the best product on our gels. Through this experience I not only learned how to perform PCR, but I learned how to make my own primers using Primer3."



**Isaiah Milton**

**Senior, Hampton University, Marine and Environmental Science**

**Mentor: Ann Tarrant, WHOI**

"During the summer of 2019 I spent 10 weeks in Woods Hole, Massachusetts on the Sea Education Association Campus as a Partnership Education Program (PEP) Student. I was paired with a mentor at the Woods Hole Oceanographic Institute (WHOI) in the Redfield Laboratory, Ann Tarrant, working on a project titled, *The Effects of Feeding Activity on the Bioenergetics of a Pelagic Calanoid Copepod*,

*Pleuromamma xiphias*. During the first four weeks of the program, the PEP students spent the morning in Global Climate Change: Ocean and Environmental Sciences course, and in the afternoon, we would meet with our mentors. During the second week of the program, we lived aboard the SEA R/V SSV *Corwith Cramer* as crew and [we] conducted research projects about the Rhode Island Sound, which is where we sailed to and back from for the week. The last six weeks of the program were spent in the labs with our mentors all day. I continued to work with Dr. Tarrant and even traveled with her to St. Georges Island in Bermuda to the Bermuda Institute of Ocean Sciences (BIOS) station to collect copepod samples for my project. I gained experience in copepod identification, molecular extraction techniques, and learned a small amount about bioenergetics. At the end of the program we all presented our research projects at the research symposium and graduated from the PEP program."



**India Oliver, NOAA EPP/MSI Undergraduate Scholar**  
**Senior, University of Maryland Eastern Shore, Biology**  
**Mentors: Dr. Ashley Elgin and Dr. Hank Vanderploeg, NOAA Great Lakes Research Lab**

"This summer, I worked on investigating invasive mussel populations using their shells to learn more about their dynamics. I worked at the NOAA Great Lakes Environmental Research Laboratory in Ann Arbor, Michigan with Drs. Ashley Elgin and Hank Vanderploeg. The research I conducted had two objectives:

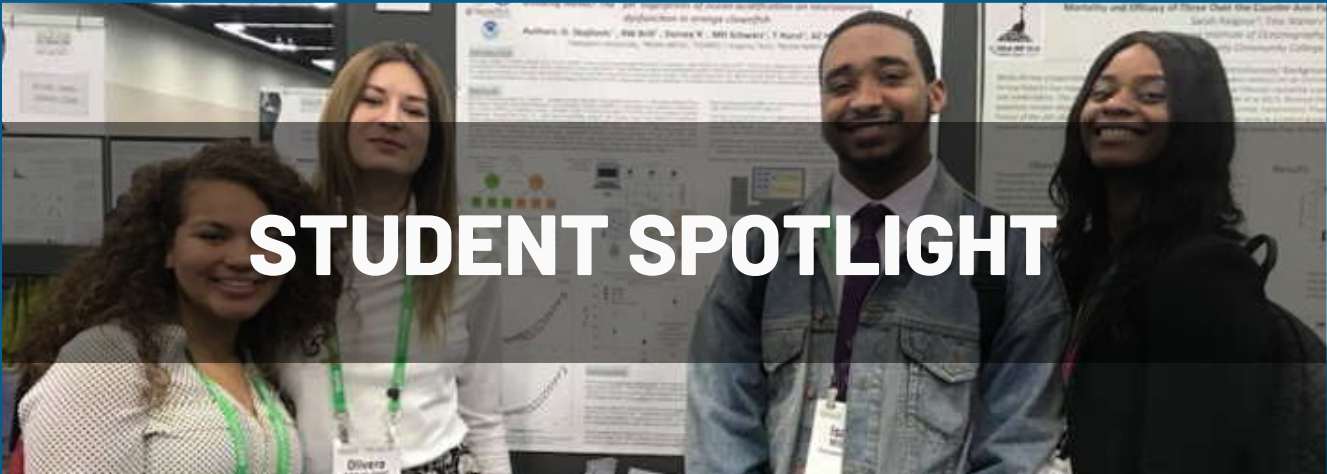
(1) assess the shell length and weight relationship across different lakes and depths in Lakes Michigan, Huron, and Ontario and (2) to compare size distributions of live mussels and empty shells between Lakes Erie and Michigan at different depths. Both objectives had interesting results and showed significant differences. This experience has benefited me because I learned how to use R Studio for the first time and I got to experience how federal employees work in a laboratory setting and operate every day. Also, I strengthened my time management because of the heavy deadlines and high expectations my mentor had for me. This opportunity was amazing and I am so happy I got the opportunity to participate!"



**Sena Tay**  
**Senior, Savannah State University, Marine Sciences**  
**Mentor: Dr. Gina Ylitalo, NOAA NWFSC, Seattle**

"Over the summer I worked at NOAA's Montlake office in Seattle, WA with Dr. Gina Ylitalo and her team. I was working with common bottlenose dolphin (*Tursiops truncatus*) blubber collected in the estuarine waters near Savannah, GA.

I extracted persistent organic pollutants (POPs) from the samples using Dionex 300 ASE and prepared them to be run on a gas spectrometer/mass spectrometer. This project was extremely beneficial to me because it gave me hands-on experience on a topic I hope to pursue for my Master's. It also gave me an opportunity to meet and work with high profile people in the field."



# STUDENT SPOTLIGHT

## NICOLE KLEPONIS

### NOAA EPP LMRCSC M.S. GRADUATE

Recently earning her master's degree from Delaware State University, Nicole Kleponis was making her mark in the Natural Resources field long before walking across the graduation stage in December 2019.

Since September of 2018, Ms. Kleponis has conducted a field study on the winter habitat characteristics of the Red-throated Loon. The smallest species of its family, the Red-throated Loon is an aquatic bird found in both North America and Europe. Ms. Kleponis' research takes place in the Mid-Atlantic, more specifically the areas surrounding Northern Virginia, Delaware, New Jersey, Maryland, and Southern New York. Nicole's readings have shown that the small bird has an increased population in the Delaware Bay; however, it is not understood why the species is so abundant in this area.

Although the species is found in large quantities in areas surrounding the Delaware Bay, the Red-throated Loon located in the Mid-Atlantic, overall, has had a significant reduction in population.

"The Red-throated Loon exists mostly in the water, with the exception of when they are breeding," stated Kleponis.



**NICOLE KLEPONIS**

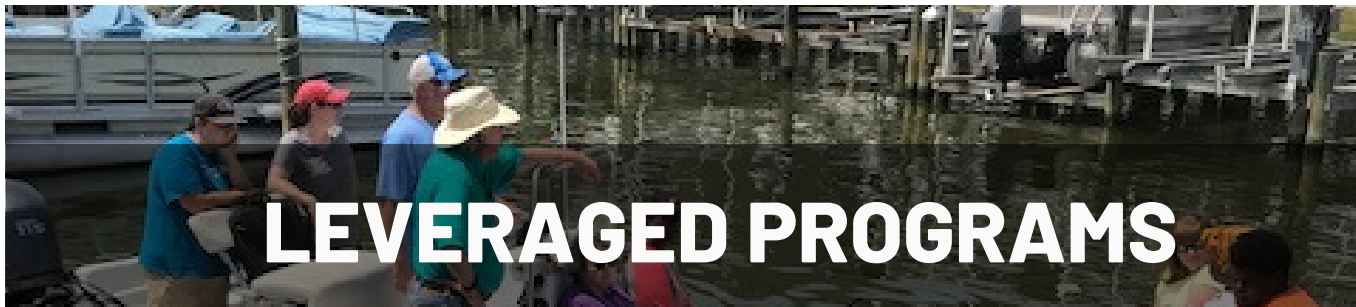
**Makes a Big Impact  
on a Small Species**



Many times when fishermen cast their gillnets, loons swim into them and end up drowning. This has been one of the reasons for their decrease in population.”

With the use of point count surveys, observing wind speed, wave sizes, air temperatures, and water salinity, Ms. Kleponis has contributed to the understanding of the winter habitat preference of the small bird.

“With my research, I hope to discover where the Red-throated Loon is most commonly found between the months of November and March, stated Nicole. With that information, scientists can then work on helping to rebuild the population.”



# LEVERAGED PROGRAMS

This summer, the LMRCSC hosted its annual leveraged summer programs. Students and teachers came from across the country to gain a thorough education in the marine sciences.

## REU PROGRAM



REU Program at  
the NOAA Living  
Marine Resources  
Cooperative  
Science Center



NSF Grant: 1757795



The NOAA Living Marine Resources Cooperative Science Center (LMRCSC) successfully held its annual Research Experience for Undergraduates (REU) Program in Marine and Estuarine Science this

summer. Funded by both The Chesapeake Research Consortium and the National Science Foundation, in addition to being and leveraged by the NOAA Educational Partnership Program, UMES hosted nine undergraduate students from across the country and provided a ten-week paid internship program, which aided the students in their interests and enhanced their skills in marine and estuarine science.

With support from eleven faculty mentors, (seven graduate students, as well as program staff), the interns conducted research projects, attended science based field trips, and participated in workshops and seminars that were related to their research interests and endeavors. Research projects were on a host of topics, such as fecal coliforms, biofouling, and food web dynamics of fish primarily focused on the Maryland Coastal Bays.

Since its inception in 2009, the REU program, established in by Dr. Paulinus Chigbu, Director of the NOAA LMRCSC, has trained over 120 undergraduate students in the marine and estuarine sciences from over 50 different colleges and universities.

This year, the highly competitive program was able to host students from institutions such as Towson University, Scripps College, University of Wisconsin-Madison, and several others.

"The goal of the REU program at UMES is to provide future scientists with early exposure to research in order to help prepare them for successful careers in marine and estuarine sciences," stated REU coordinator and LMRCSC Assistant Director, Dr. Margaret Sexton. At the end of the ten-weeks, the interns received one-on-one mentorship from both faculty and graduate students, extensive research experience in the field and in laboratories, and multiple professional development workshops."

The REU schedule included a number of field trips, which enhanced the interns' experience. A visit to Dorchester County's Blackwater National Wildlife Refuge (NWR) was one of many adventures for the undergraduates. There, the undergraduates toured numerous plants and animals in their natural habitat including forest, marsh, and shallow water. While on this trip, the interns also visited the Harriet Tubman Underground Railroad National Historical Park, which brought a historical context to the landscape they were researching.

In addition to visiting the Blackwater National Wildlife Refuge, this year's REUs also received a tour of the NASA Wallops Flight Facility. The tour, headed by UMES alum Sam Henry, consisted of an in-depth look at the various research conducted at the facility. REUs received an up close look at the launching area of space aircraft, the construction of unmanned aerial systems as well as other scientific investigations.

The ten-week internship program concluded with a symposium held at the Paul S. Sarbanes Coastal Ecology Center on August 8. UMES Provost, Dr. Nancy Niemi, provided the keynote speech at the symposium. Her message consisted of informing the REUs, and other attendants, of the importance of their work in the STEM field, in addition to emphasizing the need of diversity and the desired presence of underrepresented communities in the science fields.

*\*Eight of the nine REU interns were funded through the National Science Foundation grant award: 1757795. This year, one intern was funded by the Chesapeake Research Consortium.*



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### Geoscience Bridge Program Prepares Rising Freshmen for Collegiate Life



NSF Grant: 1540573

## GEOSCIENCE BRIDGE PROGRAM



This past summer, the NOAA LMRCSC, in collaboration with NOAA Cooperative Science Centers (CSCs) at Howard University, City College of the City University of New York,

and Florida A&M University, hosted its annual Geosciences Bridge Program. This year, seven rising college freshmen descended upon UMES' campus to participate in a six-week paid summer internship, which prepares participants for successful careers in the geoscience fields.

The program, which is funded by The National Science Foundation, and partially by NOAA Educational Partnership Program, introduced recent high school graduates to ocean sciences, atmospheric sciences, and geographic information systems (GIS). The curriculum provided for the interns was a hybrid of classroom courses paired with time spent in the lab and field, which provided them an in-depth experience of what to expect when working in the geoscience field.

“The purpose of the internship is to expose the students to all the possibilities in the field of geoscience,” stated Geoscience Program Coordinator Ms. Cy’Anna Scott. “We want to ensure that the interns leave this experience with a thorough understanding of the sciences and better prepared for a career in the STEM fields.”

Students participated in daily classroom activities, including gaining college credit for a math course and attending bi-weekly seminars that focused on collegiate success. In addition, the interns were able to hone their research skills through hands-on activities including beach seining and measuring water quality characteristics. Field trips included visiting the NOAA research lab in Oxford, MD, touring the oyster hatchery at the University of Maryland Center for Environmental Science, Horne Point Lab, canoeing at the Pocomoke State River Park, and conducting a coastal clean-up. The final field trip – a visit to NASA Wallops Flight Facility located in Virginia – was one of the highlights of the program.

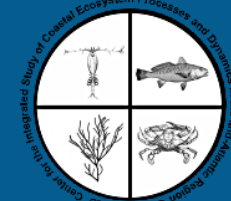
The internship concluded with the seven interns presenting their research projects focused on the Chesapeake and Maryland Coastal Bays at the final symposium, held on August 8, 2019. Each participant received a certificate of completion of the program. Six of the interns enrolled at NOAA CSC institutions in fall 2019; three at UMES, one at Hampton University, one at Florida A&M University, and one at Jackson State University.

UMES thanks all who helped make the program a great success and we wish the students a prosperous academic career!

## CMARS PROGRAM



Local Educators  
Gain New Insight in  
Marine Science  
Through the NSF  
CMARS Workshop



NSF Grant: 1547821



The 2019 Coastal Marine Science Workshop for Teachers (CMARS) took place this past July on the campus of UMES. For two weeks, five elementary and high school teachers from

the lower shore of Maryland participated in a paid two-week workshop, which provided local educators with additional tools to be more effective in their classrooms.

Guided by Education and Outreach Coordinator, Dr. Patricia Goslee and directed by Dr. Paulinus Chigbu, the CMARS workshop is part of the CREST Center for the Integrated Study of Coastal Ecosystem Processes and Dynamics, which is funded by the National Science Foundation. The CMARS workshop focuses on providing teachers on the lower eastern shore with tools, lesson plans, and lab activities focused on environmental science. This year's five participants were Ms. Brante Dashiell, Mr. Shelton Handy, Ms. Jocelyn Harmon, and Ms. Michelle Harrison, all of whom are teachers at Washington Academy High school, located in Somerset County, Md., and Ms. Debbie Whitney, who is an educator at Princess Anne Elementary School, located in Princess Anne, Md.

Workshop attendees received extra guidance from faculty mentors who aided them on a number of research projects related to climate variability impacts in the Maryland Coastal Bays.

The educational experience was not just limited to the classroom; however, exploration field activities also took place. This year's attendees delved into the waters of the Maryland Coastal Bays and visited the Horns Point Laboratory located in Cambridge, Md. At these locations, attendees received hands on lessons about the local marsh system, the restoration of seagrass, in addition to other disciplines related to oceanography. Upon completing both the field and coursework, participants were charged with creating four lesson plans to incorporate into their classrooms that reflected the research projects they studied.

At the end of the two week course, each participant presented their work and reflected on the information they gathered from the program and received a certificate of completion.

Although each presentation was unique, the consensus of the group was that the CMARS workshop challenged the educators and provided them with new tools to be more effective for their students and in their classrooms.

# FACULTY SPOTLIGHT



Distinguished  
Research Scientist,  
Dr. Bradley Stevens,  
Gives  
"Hab in the MAB"  
Presentation



## DR. BRADLEY STEVENS

This past August, the NOAA Living Marine Resources Cooperative Science Center (LMRCSC) Distinguished Research Scientist at the University of Maryland Eastern Shore (UMES), Dr. Bradley Stevens, attended the Fall 2019 meetings of the Atlantic States Marine Fisheries Commission (ASMFC) in Alexandria, VA, and the Mid-Atlantic Fisheries Management Council (MAFMC), in Philadelphia, PA, on August 6 and August 14, respectively.

Dr. Stevens gave presentations at both meetings on a research project that was jointly funded by both organizations and the Atlantic Coastal Fish Habitat Partnership. The project, titled "Hab in the MAB: Characterizing Black Sea Bass Habitat in the Mid-Atlantic Bight," was undertaken in order to determine what type of habitats were preferred by black sea bass—a highly valuable recreational and commercial fishery resource. The research was conducted largely by NOAA Educational Partnership Program Graduate Fellows at UMES, including Cara Schweitzer (PhD), Andre Price (MS), and Rebecca Wenker (MS), who all graduated in 2018.

The primary findings of the research were that black sea bass are highly structure dependent, and were rarely observed more than a few meters away from benthic habitat, including artificial and natural reefs. Fish ate a diet that consisted predominantly of Cancer crabs, but most food items were not present on the reefs. Fish abundance was significantly correlated with the abundance of gorgonian corals called sea whips (*Leptogorgia virgulata*), but not with the total amount of biological cover. The researchers also determined that sea whips showed signs of degradation that may be due to impacts by fishing gear, as well as natural causes.

Sea whips, which age up to 19 years, are slow growing, and populations may require decades to recover if damaged or removed. Both the ASMFC and the MAFMC are regulatory bodies comprised of State and Federal members, as well as representatives of the recreational and fishing industries, and typically receive scientific advice from a Scientific and Statistical Committee. Thus, it was a rare opportunity for Dr. Stevens to highlight the accomplishments of UMES students and the LMRCSC before these important management agencies.



NOAA LIVING MARINE RESOURCES COOPERATIVE SCIENCE CENTER  
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