

Morgan State University
Patuxent Environmental and Aquatic Research Laboratory

The Morgan PEARL

Director's Update

While summertime can be a slower time for the on-campus set, it is peak season at the Morgan PEARL. Our interns – nine of them this summer – are providing a blast of energy, enthusiasm and critical support on a variety of research projects. These projects include oyster genetics research, a blue crab survey in it's 51st year, and a project to create living shorelines through establishing oyster colonies on hard-surfaced waterfront property.

Summer is also a busy time for our oyster aquaculture program. The record-setting rains soaking Maryland over the past 18 months have resulted in unusually low salinity Chesapeake Bay waters that have challenged oyster hatcheries and impacted natural oyster reproduction across the state. Overcoming this, I am happy to report that the aquaculture team of Dr. Ming Liu and Ms. Amber DeMarr have successfully produced juvenile oysters. The efforts of our Shellfish Genomics expert, Dr. Ming Liu, to produce a line of low-salinity tolerant oysters could not be more timely.

Beyond aquaculture but still sticking with oysters, we have recently completed a NOAA-funded study that examined the economic impacts of oyster reef restoration. This was classic interdisciplinary research, harnessing Dr. Tom Ihde's applied ecology expertise and my environmental economics skillset to track the contribution of restored oyster reefs to the aquatic food web, seafood harvest, and commercial fishing revenue.

PEARL continues to strengthen the connection with Morgan faculty and students. Morgan Ph.D student Nikelene Mclean (a former PEARL intern!) started her Ph.D. research this summer at PEARL, and we are supporting the bio-fuel research of Dr. Viji Sittther in our algal production facility.

We wish everyone a fantastic summer! When things cool down, we hope to see you at the PEARL Open House (October 4th, 2019)! Please RSVP to Jody Gregory at jody.gregory@morgan.edu.

Best Regards,



Scott Knoche, Ph.D.

scott.knoche@morgan.edu

Director, PEARL



Vision Statement

An environmental research laboratory that:

- *generates scientific knowledge through innovative, interdisciplinary environmental research;*
- *embraces a public university's role in translating this knowledge to stakeholders for the benefit of the public; and*
- *inspires the next generation of scientists, policy-makers and environmentally-aware citizens through coastal field experiences, mentored research opportunities, and environmental education.*



PEARL Collaborations

Porter Lab, Univ. Baltimore

Dr. Elka T. Porter, Assistant Professor of Environmental Science, University of Baltimore, and three summer students are investigating the effect of oysters and water flow on sediment-water interactions and subsequent effects on water quality. In this experiment, the Porter group uses shear turbulence resuspension mesocosms (STURM), which are special tanks that Dr. Porter designed. This is the fifth year Dr. Porter has participated with the PEARL Summer Intern Program.

Sitther Lab, Morgan State

The HaloCyTech biofuel research team, led by **Dr. Viji Sitther, Morgan Biology Professor**, and **Dr. Ben Tabatabai, Morgan Research Associate**, is developing value-added products from the unique and fast-growing cyanobacterial strain *Fremyella diplosiphon*. This strain thrives in a wide range of water salinities and light conditions to produce raw materials for biotechnological applications such as nutritional supplements, therapeutics, and bioenergy. This project focuses on growing this cyanobacterium to explore its potential for these high-value applications. Collaboration with the PEARL, with the support of an MSU Office of Technology Transfer grant, has enabled scale-up studies in quantities up to 100 gallons, much higher than prior laboratory efforts. A nutritional analysis will identify additional benefits compared to current strains available in the nutraceutical market. Photosynthetic pigments will be assessed for their potential as antioxidants, cosmetics, and dyes. Fats extracted from the cyanobacteria offer a potential source of renewable fuel. MSU has patented this technology based on its potential for commercialization.

2019 Summer Internship Program

This summer marks the fifteenth year for the PEARL Summer Internship Program and is highlighted by a number of program milestones and achievements. This includes the 100th intern since the program started in 2005, the 2nd largest-ever group of interns (9), and the most Morgan State University students (4). This dynamic class of interns are working on a wide variety of project topics this summer ranging from oyster genetics, plankton population dynamics, the economic value of a Chesapeake Bay vessel navigational system, and the impacts of oyster biodeposit resuspension on water chemistry and plankton. The program culminates in an August symposium with formal presentations by the interns followed by a lunch celebration with family and friends.



PEARL's 2019 Summer Interns.

The PEARL Summer Internship Program — which began in 2005 — hosted its 100th intern in 2019!

Former Intern begins PhD research at PEARL!

Ms. Nikelene Mclean is a former PEARL intern who worked under the supervision of Dr. Chunlei Fan at the PEARL during the summer of 2017. Ms. Mclean graduated from Morgan State University in Spring 2018 with a B.S. in Biology, and was accepted into the Bio-environmental Ph.D program at Morgan. This will allow her to continue her work with Dr. Fan to study the population dynamics of the Atlantic Sea Nettle in the Patuxent River. Her Ph.D. research began this summer at PEARL, deploying the innovative advanced sonar imaging systems (ARIS) and PlanktonScope to explore the interactions between jellyfish and mesozooplankton population dynamics in the Chesapeake Bay.



Nikelene Mclean giving a presentation of her Ph.D project to 2019 Interns.

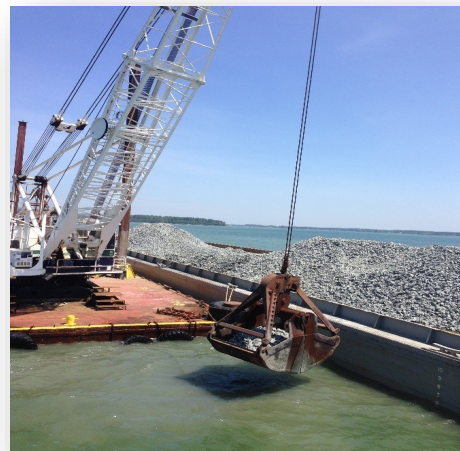
Environmental Economics Research

Economists at the PEARL are developing a systematic approach for evaluating proposals applying for Maryland boating infrastructure enhancement funds. Ultimately, this project will produce a Decision Support System tool to help decision-makers choose the most impactful recreational boating infrastructure projects. This project is supported by the Maryland Department of Natural Resources Chesapeake and Coastal Service. In the state of Maryland, recreational boating generates approximately \$1.9 billion in annual economic impact. Effectively spending boating infrastructure funds is key to serving the needs of recreational boaters.

This summer, Olamiposi “Lami” Sunmola, a rising senior studying economics at Morgan State University joined PEARL’s Internship Program. She’s conducting an economic inquiry into the Physical Oceanographic Real-Time System (PORTS) vessel navigational system in Maryland, administered by NOAA. “I’m studying the benefits of PORTS and how shipmasters use it to make navigational decisions in the Chesapeake Bay,” said Sunmola. She will be presenting her work to faculty and staff at the conclusion of her internship.

Oyster Restoration Research Completed — Potential Large Gains to Watermen

A combination of overharvesting, habitat loss, and disease have reduced the Chesapeake Bay oyster population to 1% of historic levels. This has resulted in costly and controversial efforts to protect and restore oyster reefs. To better understand the benefits of oyster restoration, Dr. Scott Knoche and Dr. Thomas Ihde of Morgan PEARL developed ecological and economic models to estimate the impact of oyster restoration on seafood harvest and regional economies. Their findings suggest that if these restored oyster reefs are allowed to mature, regional blue crab harvest could increase by 80%, generating an additional \$4.5 million in sales revenues received by Maryland watermen. For additional information, see article in the Bay Journal (https://www.bayjournal.com/article/study_finds_maryland_oyster_sanctuaries_likely_to_boost_crab_perch_fisherie).



*Depositing oyster shell in the Choptank River
(photo by: Stephanie Westby, NOAA)*

Inside the Aquaculture Program



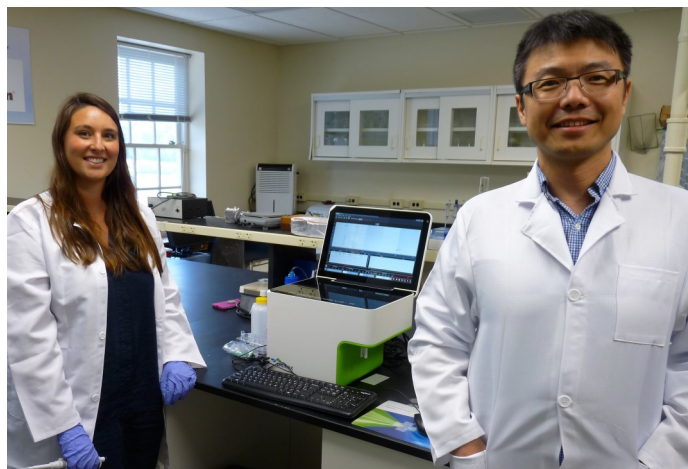
ASCEND Students at PEARL

Morgan ASCEND Student Group Performs Oyster Study at PEARL

MSU ASCEND is "A Student-Centered, Entrepreneurship Development (ASCEND) Training Model to Increase Diversity in the Biomedical Research Workforce," awarded to Morgan by the National Institutes of Health. The goal of ASCEND is to increase and strengthen Morgan State University's biomedical training and research infrastructure, with a specific focus on training undergraduate students to become outstanding biomedical researchers. A group of ASCEND scholars — Maya Purnell, Kojo Yeboah, Pakeeza Butt and Eden Wiggins — assisted with a study that involved identifying candidate genes associated with low salinity in eastern oysters. Under the supervision of Dr. Ming Liu, PEARL oyster genomics researcher, and Amber DeMarr, aquaculture program manager, the students performed a low-salinity challenge experiment in PEARL's oyster hatchery during a two-week period this May. Oysters were collected from the Patuxent River, and were challenged at three salinities, 20 ppt, 5 ppt and 1 ppt. The tissue samples were collected from each salinity group and RNA were isolated and sequenced to identify low-salinity associated genes. This work, by improving oyster survival and growth in low-salinity environments, will help support and grow the Maryland oyster aquaculture industry. ASCEND Scholar Maya Purnell continued her support of this important genetics work during the 2019 PEARL Summer Internship Program.

New Flow Cytometer Enables Specialized Oyster Production!

Through the support of the Morgan Office of Technology Transfer, PEARL purchased and installed a Flow Cytometer in May 2019. The flow cytometer is genetics laboratory equipment that is used to determine the chromosome count of oyster broodstock and offspring. This new equipment will enable the production of sterile oysters. As these sterile oysters do not direct energy towards reproduction, they are able to achieve higher growth rates and meat yields. Developing new oyster lines is one of the main objectives of PEARL, which will help support the continued growth of the Maryland oyster aquaculture industry. For additional information on the aquaculture program or for ploidy analytical services, please contact Dr. Ming Liu (ming.liu@morgan.edu).



PEARL's new Flow Cytometer

Thanks to our Partners

- A special thanks to **Morgan State University's Office of Technology Transfer (OTT)** for their past and present support of PEARL projects and personnel. OTT Vision: "An urban university where: faculty and staff are recognized and rewarded for innovation, are well informed and actively engaged; a spectrum of new technologies are transferred to existing and new businesses to benefit the public; and the University's contributions to economic development and quality of life have a positive, measured and documented impact."



- Exelon—For their support of two Summer 2019 interns.



- Dominion—For their continued support of PEARL's Blue Crab Survey.



- Southern MD Alumni—For their support for upgraded housing amenities for our Morgan Summer Interns.

Welcome to PEARL's New Personnel!



Jon Farrington, Facilities Administrator—

Jon has lived in Calvert County for 20 years while working as an engineer in the Defense Industry along with being a pioneer in Maryland's oyster aquaculture industry. Jon will be responsible for overseeing the physical plant, maintaining the seawater system and fleet of vessels for duty. He will also support the needs of researchers with regards to design/fabrication of specialized equipment.



Kaitlynn Ritchie, Research Associate—

Kaitlynn recently received her M.S. in Water Science and Policy from the University of Delaware. She has an interdisciplinary background that includes environmental economics, water resource management, and mapping & spatial analysis. Kaitlynn will be joining the Economics/Social Science team and conducting research at the environment-society nexus using economic techniques to better understand and preserve water resources.



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YOU'RE INVITED TO

MSU PEARL'S 2019 OPEN HOUSE

OCTOBER 4, 2019 | 10:00 AM TO 2:00 PM
10545 MACKALL ROAD, SAINT LEONARD, MD
20685

RSVP BY SEPTEMBER 20 TO JODY AT
JODY.GREGORY@MORGAN.EDU OR (443) 885-5925

The poster is decorated with several detailed line drawings of seashells of various shapes and sizes, scattered around the text. At the bottom left, there is a small logo for Morgan State University Patuxent Environmental Aquatic Research Laboratory, which includes the word "PEARL" in a circle.