

The Woods Hole Partnership Education Program (PEP)

Directors' Report for 2023 PEP's 15th Summer

September 2023
Onjalé Scott Price

2023 Overview

The Woods Hole Partnership Education Program (PEP) is a ten-week summer internship hosted by six Woods Hole science institutions in collaboration with the University of Maryland Eastern Shore (UMES). Founded in 2009 by the Woods Hole Diversity Initiative (WHDI), PEP was created to bring diverse talent to study and work in the Woods Hole science community. Over its fifteen years, PEP has developed a model for recruiting and mentoring undergraduates from communities under-represented in marine and environmental sciences. Equally important, the PEP model focuses on facilitating change in the host community, creating a more inclusive and welcoming science community. (See Appendix Two for the PEP Model.)

PEP welcomed its 15th cohort in 2023, a class of 15 students from 15 colleges and universities, including 10 schools that were new to PEP, and five HBCUs and three Minority Serving Institutions (MSI). PEP has now hosted students from 123 colleges or universities, including 37 HBCU/MSIs (see Appendix One for the complete list of schools).

2023 Program

Recruitment and Selection

Intern recruitment was done both in-person and virtually this year. In-person recruiting is a key component in the PEP model. Having been unable to make regular campus visits since 2020 due to the pandemic, in 2023 the PEP staff made an extended two-week trip in January and February to re-connect with existing HBCU allies and to establish new relationships on campuses where we don't have existing relationships.

The trip included visits to 16 campuses (15 HBCUs) from Delaware to Georgia, meeting with 26 faculty and six administrators, and visiting 18 classes with approximately 230 students. The recruiting trip included visits in Silver Spring with key NOAA allies Natalie Huff of Equal Employment Opportunity (EEO) and Diversity Office and Christos Michalopoulos of Office of Education; 25 members of the NOAA African American Employee Resource Group (ERG); NOAA Office of Inclusion and Civil Rights Director (OICR) Dr. Ngozi Butler-Guerrier and

NOAA Office of Human Capital Services Director Hakeem Basheerud-Deen; the staff also visited with the priests and wardens in St. Ambrose Church in Raleigh NC.

The recruiting team for the two-week trip consisted of: George Liles (NOAA Northeast Fisheries Science Center); Lindsay Fullencamp (NOAA Office of Sustainable Fisheries) in the DC area; Ambrose Jearld (PEP) in NC and GA; Darius Johnson (NEFSC) in Atlanta; Mirta Teichberg (MBL) in Atlanta; and PEP alumni Malika Brown (UMES), Juan Ramos (Delaware State), Jonathan Nash and Derrick Richardson (Hampton University), and Monét Murphy (Savannah State).

PEP Director Onjalé Scott Price recruited in-person at the 2022 AGU Conference in Chicago, IL. Virtual visits were made to a number of campuses and classes in 2022 and early 2023. The 2023 recruitment effort yielded an applicant pool that was deep and diverse, with more than ten completed applications for every one available spot in the program. The Selection Committee was chaired by PEP Director Onjalé Scott Price.

2023 PEP Roster

First Name	Last Name	Class Standing	College/Univ	Major	Research Mentor	Institution
Samuel	Barrett	Sophomore	Cape Cod Community College	Environmental Technology	Jesús Pineda	WHOI
Avion	Brown	Sophomore	Tennessee State University	Agriculture	Kathleen Savage	Woodwell
Destiny	Coleman	Junior	FAMU	Environmental Science	David McElroy	NOAA
Aaron	Edley	Sophomore	Virginia State University	Mechanical Engineering Technology	Hilary Sullivan	Woodwell
Esmeralda	Garcia	Junior	College of the Holy Cross	Environmental Studies	Adam Subhas	WHOI
Julia	Hill	Senior	University of Hawai'i at Hilo	Marine Science	Chris Sherwood	USGS
Cameron	Johnson	Junior	Bethune-Cookman University	Biology	Ann Tarrant/Becky Gast	WHOI
Autumn	Johnson	Junior	Bryn Mawr College	Geology and Environmental Studies	Loretta Roberson	MBL
Isis	Kees	Freshman	Cal Poly Humboldt	Oceanography	Lauren Mullineaux	WHOI
Jonathan	Kopeliovich	Junior	University of Connecticut	Digital Media and Design with a concentration in filmmaking	Heather Goldstone	Woodwell

Blaze	Miles	Freshman	University of Illinois Urbana-Champaign	Undeclared	Hauke Kite-Powell	WHOI MPC
Emily	Orozco	Junior	Colorado State University	Ecosystem Science and Sustainability	Ruth Haas-Castro	NOAA
Gabriella	Prelosky	Senior	University of Guam	Biology	Andrew Gillis	MBL
Taina	Sanchez	Senior	University of Miami	Marine Biology and Ecology	Stace Beaulieu/Heidi Sosik	WHOI
Lauren	Stephenson	Junior	Saint Augustine's University	Chemistry	Carolyn Tepolt/ Yaamini Venkataraman	WHOI

Mentoring

Mentor recruitment is a word-of-mouth, year-round, on-going process. In December 2022 we sent emails to the Woods Hole Diversity Initiative (WHDI) partner institutions inviting mentors. Potential new mentors met with the PEP Director Onjalé Scott Price to discuss the program and its goals, and to learn about the potential mentor’s motivations for and experiences with mentoring. Most mentors provided a short description of the project they had available for students and those project descriptions were posted on the PEP website for applicants to view. The application instructions asked the students to indicate which mentors and projects most interested them, but in keeping with the PEP Model we explained to potential applicants that the PEP staff does the matching, considering any interests expressed by the students but not guaranteeing the students would be matched with the mentors they identified. The matching process was led by Onjalé. Shortly after the students were accepted, the matches were announced.

The May 25 training session was a half-day workshop on cross-cultural mentorship (recognizing we and the students have been through two years of mostly virtual-only mentorship), the roles of mentors, and allyship. The trainer was Dr. Marisela Martinez-Cola, an Assistant Professor of Sociology at Morehouse College. The workshop included facilitated ‘active listening’, and ‘what would you do scenario’ activities.

In addition to having a research mentor, every PEP intern is assigned a Program Advisor. These advisors are generally members of the PEP senior staff (or in some cases alumni of the program). The Advisors meet regularly with their advisees over the summer to support and encourage the interns, ensuring they are having a productive experience in all elements of the program and helping facilitate networking.

This year, “coding mentors” were engaged to help the students through the course and their research projects. These mentors were fellows, research assistants or graduate students from the participating institutions (mostly WHOI) who were excited to teach others about coding. Many students took advantage of these mentors and met with them in small groups and individually to learn coding skills.

Staffing

PEP staffing changes from year to year as we respond to changing times and changing challenges and opportunities. The staffing is designed to provide ample support for the interns and an ever-evolving suite of career-building activities.

The 2023 staff was composed of Dr. Ambrose Jearld, Jr., Senior Advisor who has advisory oversight of all aspects of the program. PEP Institutional Advisor George Liles focused on strategic planning and overall program development, while Director Onjalé Scott Price oversaw all aspects of the current program. Monét Murphy (PEP 2022 alum) joined the staff as Program Coordinator and managed the students and various logistics throughout the summer, and Dr. Ben Harden returned as Course Director.

Course

The PEP 2023 course (“Global Climate Change: Ocean and Environmental Sciences”) was offered in partnership with the University of Maryland Eastern Shore). The course was held on Mondays in June and July (excluding holidays) from 9-5, and one additional afternoon in June.

During the second week, Course Director Dr. Benjamin Harden took the students for a three-day research cruise in New England waters aboard the SEA *SSV (Student Sailing Vessel) Corwith Cramer*. Beginning in 2017, PEP has been able to begin the residential summer program with a research cruise, a program component that was not available in the pandemic years of 2020 and 2021. The 2023 interns responded enthusiastically to this component of the cruise (despite stormy weather that kept them docked for the first day). This cruise component of the program provided an opportunity for the students to learn research skills as they gathered data. Back in the classroom they used those data in small groups to complete a mini-research project and present their findings in a poster session. In addition to the research cruise and subsequent mini projects, the course offered instruction in coding and computational work, and presentations by guest speakers from Woods Hole institutions.



PEP Students presenting their mini projects in a poster session.

Projects

Research projects are always at the heart of PEP. The students are matched with mentors well before they arrive for orientation, and they are encouraged to be in touch with their mentors for background reading, familiarizing themselves with new software, etc. The course schedule (being held only on Mondays) provided the opportunity for interns to start working in their labs at least 4 days a week starting at the beginning of the program.

PEP hosted a ‘science communication’ project for the first time, which included a new mentor. In total, most mentors (11) were returning, with four mentoring for the first time. The projects covered a wide range of scientific interests and questions, spanning science communication, benthic ecology, wetland restoration, marine policy, oceanography, geology, chemistry, marine biology, fisheries science, and microbiology.

Some interns explored Cape Cod (local salt marsh ecology, shellfish farms, coastal change, coral communities) while others had the opportunity to collect data from forests and hatcheries in Maine, and at sea in the Gulf of Maine. Institutionally, students worked with mentors at MBL (2) WHOI (7), Woodwell Climate Research Center (3), Woods Hole USGS (1), and NOAA NEFSC (2). The students presented their work during an in-person symposium on August 11 (see Appendix Four for project titles).

Activities

PEP has from its 2009 inception been a three-legged stool, with career development activities being as critical as the course and research projects. The suite of career development activities evolves every year and always includes activities designed to provide information about graduate school and careers and professional life; networking opportunities; and cohort building activities. Specific networking events are also hosted with local organizations of interest to the PEP interns. Field trips are fun cohort building activities that also allow interns to explore and appreciate the culture and history of New England.

Career development activities:

Some of the career development activities in 2023 were held virtually, to allow PEP alumni and guest speakers to participate on panels and give presentations (*denotes a virtual event).

- Opportunities after PEP: panel of representatives from WHOI SSF, IN FISH, SEA Semester, MBL SES
- Applying to Graduate School; panel of 4 PEP alumni*
- Ambrose Jearld, Jr. Lecture; part of Woods Hole Diversity Advisory Committee programming.
- Résumé/CV Workshop; hosted by PEP Director, Onjalé

Networking events/activities:

- Summer Student BBQ (with all summer students around Woods Hole)
- Ice cream social with Woodwell Polaris Students & PEP alumni
- College Light Opera Company play (The Little Mermaid)
- “Tea Party” with Dr. Harden (hosted at his home)

- Woods Hole Science Stroll

Field trips:

- Whale Watching in Provincetown
- New Bedford Whaling Museum
- Harvard Museum of Natural History
- Martha's Vineyard Hatchery Tour

Additional activities hosted by other Woods Hole institutions were strongly encouraged, with few being mandatory (*denotes a mandatory event). All were held in-person.

- WHOI Summer Student Fellow lectures (held weekly)
- WHOI Ethics Workshop*
- USGS & NOAA Federal Career Panel, 2 parts
- WHOI Tioga – single day cruise aboard *R/V Tioga* out of Woods Hole*
- WHOI sponsored Graduate School panel + discussion
- WHOI SSF and WHOI supported PEP students poster session



PEP (& IN FISH) students in front of the WHOI R/V Tioga

Evaluation

Since PEP was founded in 2009, the program has had an unwavering commitment to rigorous evaluation. The program employs an independent professional evaluator, Dr. Emorcia Hill. Every year as the summer programming is wrapping up, Dr. Hill interviews PEP students, faculty, staff, and mentors. She also interviews members of the Woods Hole Diversity Initiative, the consortium that hosts PEP. Dr. Hill's reports contain data and analysis of every component of the program, and a set of recommendations for strengthening the program and for increasing the impact PEP has on the Woods Hole science community and the national STEM research enterprise. Anyone interested in Dr. Hill's evaluation reports may contact PEP Director Onjalé Scott Price.

PEP-II

Since 2021, PEP has included an exciting new component that provides a Woods Hole-based research opportunity for PEP alumni. The new program element, PEP-II, was launched virtually in 2021 with support from the Woods Hole Sea Grant program and additional funding from the Woods Hole Oceanographic Institution Marine Policy Center (WHOI MPC) and the Woodwell Climate Research Center. Additional support has continued from the Buzzards Bay Coalition (BBC) and the Barnstable County Cooperative Extension.

PEP has always looked for opportunities to bring PEP graduates back for additional research experiences in Woods Hole. PEP graduates have returned every year since 2010 to participate in WHOI’s Summer Student Fellows Internships, the Woodwell Climate Research Center’s Polaris Project, and SEA’s semester programs. Others have stayed on into the academic year to work in their research mentor’s laboratory.

In spring of 2023, Onjalé and other supporters submitted a grant to NSF for a year-long post-baccalaureate program based on the PEP-II model. If funded, this post-baccalaureate program will replace PEP-II in the future.

Name	PEP Cohort	Degree received	Mentor	Institution	Research Project	FPS Collaborator
Ayanna Mays	2022	BS, Marine Biology and Ecology	Neel Aluru and Chris Murray	WHOI	Hypoxia Tolerance in <i>Menidia menidia</i>	Chinna Mapp Integration Coach
José Cabral*	2020	BS, Geophysics	Sean Hayes and Danielle Cholewiak	NOAA NMFSC NEFSC	Fin Whale Assessment of Habitat Use and Connectivity Relative to Marine Protected Areas in the Gulf of Maine: Implications for Management	Kristina Woods, 7 th grade science
Alicia Yodlowsky	2022	BS, Agricultural and Environmental systems	Rachel Jakuba and Lara Gulman	BBC	Buzzards Bay Salt Marsh Ecology and Anti-fouling Measures	Caitlin Church, 7 th grade science

*José was still an undergraduate student – however he was a PEP student in the 2020 virtual cohort and had not had an opportunity to conduct research in Woods Hole.

PEP-II was also in person, and the researchers lived on the SEA campus with the PEP students. This was a natural opportunity for peer-mentorship and cohort building. The researchers did not participate in the course (they completed it during their PEP year). They were invited to all the PEP activities including the professional development, social events, and field trips.

Designed and administered by PEP Director Onjalé Scott Price, the PEP-II experience includes a research project and an education/outreach project working to develop curriculum and/or education tools in partnership with educators from the Falmouth Public Schools (FPS). An integral part of a successful researcher’s career is the ability to communicate their science

with the public. This partnership provides an opportunity for the PEP-II researchers to communicate their science through lesson plans and other curriculum development activities. The outcome of each partnership varies on the researcher's project, the FPS teacher's subject, and the classroom needs. The final product of these 2023 collaborations, in summary are:

- Using the 5E method to teach students about the scientific method, using the PEP-II Researcher's research as an example.
- A class curriculum exploring how marine sanctuaries and their role in commercial fishing negatively affect marine mammals.
- an interactive educational map of Buzzards Bay designed to show the sites where the Buzzards Bay Coalition does long-term water quality monitoring and research on salt marsh crabs.



PEP-II Researchers (From Left: Ayanna Mays (PEP 2022), Alicia Yodlowsky (PEP 2022), José Cabral (PEP 2020))

Program Data

PEP students' ethnic identities (as self-identified), 2009-2023: African (2), African-American/Black (112), Afro-Caribbean (1), Asian/Chinese/Thai (6), Bengali (1), Bi-Racial/Mixed (16), Cape Verdean (1), Caucasian/White (21), Filipino (2), Hispanic or Latinx (40), Indian (1), Japanese American (1), Mexican or Mexican American (4), Native American (7), Native Hawaiian (1), Pacific Islander (3), Puerto Rican (1), West Indian (2), Declined to identify (6).

In fifteen years (2009-2023), 229 students have completed PEP. Just over half (119) of the 229 PEP alumni have come from HBCU/MSIs. PEP graduates include 118 women and 81 men from minority groups under-represented in science. Additionally, PEP has provided career building opportunities for five people (all African-American Women) who served as coordinators in 2010-2023, and 3 PEP alumni to participate in the 2023 PEP-II (all URM in STEM)

PEP gathers data about degrees and jobs status of program alumni. The last official data gathering project was in the spring of 2019. Those data showed that 70% of our alumni go on to do graduate work, including 25% matriculated in PhD or MD/DVM programs. In 2019, 81 of the first 122 PEP alumni were employed in science, with 17 employed by government (federal, state, local, tribal), 15 employed by an NGO, 21 working in industry, and 28 doing science in academia.



2023 PEP Staff and students. Photo credit: Jayne Doucette, WHOI

Looking Forward

At the end of our 15th year, PEP is a strong, well-established, high-profile program that is having an impact on the Woods Hole science community. PEP continues to serve as the flagship program devoted to increasing diversity in the Woods Hole scientific community. PEP is also having an impact outside Woods Hole: a ten-week NOAA Fisheries internship program (IN FISH) modeled on PEP began in 2021 and provides career-building experiences for a diverse cohort of undergraduates.

PEP remains true to its founding principles, envisioned by PEP founding director Dr. Ambrose Jearld, Jr., and articulated in PEP Model (Appendix Two). While PEP continues to embrace those founding principles, the program is evolving and exploring ways to increase the impact on students' careers and on the Woods Hole community that seeks to attract these students to return to our scientific workforces. As of this report, six PEP alumni are either in the WHOI-MIT Joint Program, working full-time, or completing a fellowship in Woods Hole (and Falmouth).

Over the last few years, PEP has added staff, expanded mentor training, and increased mentor-to-mentor interaction. Other tasks remain – PEP needs to find additional funding to support these program developments. Knowing that one experience in Woods Hole is a great start but that additional experiences (such as PEP-II) are needed to open more doors for PEP alumni, we continue to look for ways to provide additional opportunities to study and work in the village, such as the submission of the NSF grant for a year-long post-baccalaureate program.

The PEP staff is frequently invited to participate on panels and to engage in discussions about increasing diversity in marine and environmental sciences. Considering the growing national focus on diversity, inclusion, and equity in STEM, the PEP story should be made more widely available. In the fall of 2023, the PEP staff will participate in an international conference (ICES – International Council for the Exploration of the Seas) to showcase the PEP model. This will be the ICES organization's first time hosting a Diversity, Equity, and Inclusion section of their annual conference. Additionally, PEP staff hopes to publish additional articles on the PEP experience, sharing the PEP Model and reflecting on best practices in the effort to build a more diverse and inclusive research community.

Appendices

One: Participating colleges

Two: PEP Model

Three: PEP-II Symposium

Four: PEP Symposium

Appendix One: Participating Colleges and Universities, 2009-2023

Institutions (123) that have sent students to PEP:

Italic = Historically Black Colleges and Universities and/or Minority Serving Institution (37)

Amherst College	Duke University
Arkansas State University (2)	East Carolina University
Auburn University	Eastern Michigan University
Barry University	<i>Elizabeth City State University (2)</i>
Beloit College	<i>Fisk University</i>
<i>Bethune Cookman University (3)</i>	<i>Florida A&M University (5)</i>
Boston College (2)	<i>Fort Valley State University</i>
Bridgewater State University (2)	Georgia State University (2)
Bowdoin College	Green Mountain College
<i>Bowie State University (3)</i>	Grinnell College
Brown University	<i>Hampton University (2)</i>
Bryn Mawr College	Harvard University
<i>Cal Poly Humboldt (formerly Humboldt State University) (16)</i>	<i>Howard University (4)</i>
California Polytechnic State University	Illinois State University
California State University, Bakersfield	<i>Jackson State University</i>
California State University, Chico (2)	<i>Juniata College</i>
California State University Long Beach	<i>Kentucky State University</i>
Cape Cod Community College	Loyola University Chicago
<i>Cheney State University</i>	<i>Morehouse College (6)</i>
<i>City University of New York</i>	<i>Morgan State University (4)</i>
Coastal Carolina University	New Mexico Institute of Mining and Technology
College of San Mateo	<i>New Mexico State University, Socorro</i>
College of the Holy Cross	New York City College of Technology
College of William and Mary	New York University, Abu Dhabi
Colorado State University	<i>North Carolina Agricultural and Technical State University (6)</i>
Columbia University	<i>North Carolina Central University (5)</i>
Cornell University (2)	Northeastern
Dakota State University	Nova Southeastern University
Davidson College	Oklahoma State University
<i>Delaware State University (3)</i>	<i>Philander Smith College</i>
DePaul University	Rice University
<i>Dillard University</i>	

San Jose State University
Savannah State University (6)
Skidmore College
South Carolina State University
Southwestern College
Spelman College (2)
St. Augustine's University
St. George's University
St. Mary's College of Maryland (2)
St. John's University
SUNY Albany
SUNY Maritime College
Syracuse University
Temple University
Tennessee State University (3)
Texas A&M
Tuskegee University (5)
University of Arkansas, Fayetteville
University of Arkansas, Pine Bluff
University of California, Berkeley
University of California, San Diego (2)
University of California, Santa Cruz (3)
University of Central Florida
University of Connecticut
University of Delaware
University of Florida
University of Guam
University of Hawaii
University of Hawai'i at Hilo
University of Illinois Urbana Champaign

University of Maryland, Baltimore County
University of Maryland, College Park (2)
University of Maryland Eastern Shore (15)
University of Massachusetts, Amherst (2)
University of Massachusetts Boston (4)
University of Miami (2)
University of New England (2)
University of New Haven
University of North Carolina, Pembroke
University of North Carolina, Wilmington
University of Puerto Rico, Humacao (2)
University of Puerto Rico, Mayaguez (2)
University of Rhode Island (2)
University of Rochester
University of San Francisco
University of South Carolina, Columbia (2)
University of South Florida
University of Tampa (2)
University of Texas, Arlington
University of Texas at El Paso (6)
University of Texas, Rio Grande Valley
University of Toronto
University of the Virgin Islands (2)
University of Wisconsin, Stevens Point (2)
Virginia Commonwealth University
Virginia State University
Wellesley College (2)
West Virginia University
Western Washington University (2)
Wheaton (MA) College (2)



Appendix Two: The PEP Model

Woods Hole Partnership Education Program Model Key Design Elements

Partnership Overview

Participating Organizations. The Woods Hole Partnership Education Program (PEP) is a social intervention designed to address a specific societal issue, that is, the underrepresentation of Blacks, Hispanics, Native (Indigenous) American and Asian Americans (hereafter referred to as underrepresented minorities (URM)) in the marine and ocean sciences. PEP is a project of the Woods Hole Diversity Initiative (DI), and a multi-institutional effort with the overarching goal to promote diversity in the Woods Hole Science Community, via a 2004 Memorandum of Agreement (MOU) signed by the six CEOs of participating institutions and recommitted in 2012.

Eligibility. PEP is designed primarily for college juniors and seniors. Prerequisite coursework includes oceanography, marine and/or environmental science, or some combination of biology, chemistry, geology, and physics. Applications are welcome from students from all backgrounds and especially students from groups underrepresented in the marine and environmental sciences. Housing, tuition, travel allowance, room and board, and a stipend are provided to students. A Student Contract is in place and includes language about adherence to organizational policies.

Goals and Objectives

Diversity Initiative-Related Goals

- Be a resource that supports students in achieving their full potential within the Woods Hole research, learning, and work environment regardless of their race, religion, color, creed, gender, age, national origin, citizenship status, sexual orientation, physical or mental ability, socio-economic status, or veteran status.
- Cooperatively undertake recruitment, retention and mentoring programs that will result in a diverse group of students (and ultimately) employees and postdoctoral researchers in ocean sciences, biological sciences, geosciences, and ocean engineering and technology, marine and environmental policy activities undertaken by the Woods Hole scientific and educational organizations.

PEP-Specific Objectives

- Member Institutions develop outreach/mentoring/intern programs at and among the institutions by making a concerted effort to attract individuals from underrepresented groups and to offer them support (housing, board, and funding) to be in Woods Hole.
- Offer students from under-represented groups the opportunity to study, conduct research, and receive training in their areas of interest, working in labs with leading researchers in marine and environmental sciences.

- Provide a first-hand introduction to emerging issues and real-world training in the research skills students need to advance in science, either as graduate students or bachelors-level working scientists.

Guiding Principles

Selection Criteria. PEP established selection criteria that broaden the diversity of the available pool of students for the ocean and marine sciences. PEP shifted from traditional quantifiable criteria such as GPA, test and broad scores to more expansive and holistic factors. The PEP selection process considers a broad array of factors that include the applicant's academic, educational, social, cultural, and personal background characteristics.

Critical Mass. Each summer, PEP brings 15 students to Woods Hole. This is consistent with our belief that to have meaningful impact and to effect change, a sufficient number of individuals from the requisite racial/ethnic and academic backgrounds must be introduced into the Woods Hole Community.

Resource Availability. PEP benefits from resources that are allocated from local institutions based on a specific formula. This aligns with our perspective that programs offering summer experiences must provide a level of financial support that is sufficient for efficient program operations and constantly be alert to funding prospects.

Management and Administration. Over its 10 years, PEP has stabilized its management and administration infrastructure to include personnel whose race/ethnic, academic and career/professional backgrounds are well aligned with student participants. PEP sees these synergistic affiliations as essential to its creation of an environment of support.

Monitoring and Evaluation. Continuous self-reflection and awareness coupled with responsive and strategic actions are a hallmark of PEP design, development, and sustainability planning. Thus, informal, and formal evaluative mechanism have been in place since the program's inception.

Diversity Training. Diversity (and inclusion) are at the forefront of PEP's work. To ensure that the Woods Hole community has a fuller and PEP-aligned understanding of the tenets and underpinnings of diversity, annual trainings are provided.

Program Components

PEP is an integrated program that includes two primary components as well as supplemental activities. The two primary components are an educational credit-bearing course and an experiential research internship. Supplemental activities include a variety of career, personal, and professional development.

Education. PEP's educational component is a four-credit, four-week course (Global Climate Change) offered through the University of Maryland Eastern Shore (UMES). The course is organized as a series of modules, each of which addressed specific topics and pertinent issues related to global climate change. Each module includes lectures and labs led by scientists from DAC member organizations. The course description (content and structure) was submitted to the UMES Curriculum Committee for approval, course number, and credit assignment. Students can request transfer of credits from UMES to their own institution, added to their transcript and used to fulfill degree requirements in their respective institution. Course instructors come from the scientific ranks—as well as doctoral students at Woods Hole Oceanographic Institution—and each has responsibility for a specific module. In PEP's Year 10, the opportunity for a research

cruise on the SEA-owned research vessel (SSV Corwith Cramer), presented itself and consequently changes were made to accommodate the ship's local availability.

Research Internship. The experiential learning component takes the form of a six-to-ten-week mentored research internship in a lab in one of the partner research institutions. Each participating student is matched with a locally based research scientist who submits a short description of the proposed project prior to student assignment. Projects are closely related to the scientists' primary interest and involve tasks that are a part of current work or that would guide future areas of research that respond to major scientific questions.

Supplemental Activities. Students are provided a variety of supplemental activities that leverage resources within the Woods Hole community, including Scientific Ethics, Writing, Public Speaking, and SUCCESS Workshops, as well as field trips to museums and New England sites related to science, fishing, and whaling.

Results, Outcomes, and Lessons Learned

PEP is a seven-institution collaboration that includes Woods Hole institutions and UMES. In ten years (2009-2018), PEP has brought to Woods Hole 153 students from 92 colleges and universities, including 29 Minority Serving Institutions (MSIs), and public and private colleges and universities representing all geographic areas of the United States. Just over half (79) of the 153 PEP students are from MSIs. PEP graduates include 80 females and 51 males from groups underrepresented in science.

Ten years of PEP has underscored the unquestioned need for commitment. Dedication to the partnership's goals and objectives, and to the program's design elements has been the sustaining force. From this foundation, we look with optimism to PEP's next 10 years and the prospects and opportunities that lie ahead.

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Appendix Three: PEP-II Symposium

Recording: <https://www.youtube.com/watch?v=PrW6i0fStF0>

Projects (in order of symposium presentation)

Ayanna Mays

“Hypoxia Tolerance in *Menidia menidia*”

Mentors: Neel Aluru and Chris Murray, Woods Hole Oceanographic Institution

José Cabral

“Fin Whale Assessment of Habitat Use and Connectivity Relative to Marine Protected Areas in the Gulf of Maine: Implications for Management”

Mentors: Sean Hayes and Danielle Cholewiak, National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Northeast Fisheries Science Center

Alicia Yodlowsky

“Buzzards Bay Salt Marsh Ecology and Anti-fouling Measures”

Mentors: Rachel Jakuba and Lara Gulman, Buzzards Bay Coalition

Appendix Four: PEP Symposium

Recording: <https://youtu.be/nnKM9FmvNGk>

Projects (in order of symposium presentation)

Esmeralda Garcia - “Gephyrocapsa Oceanica Physiological Response to Alkalinity Enhancement in Laboratory Cultures”

Mentor: Adam Subhas, Woods Hole Oceanographic Institution

Avion Brown - “Potential Methane Oxidation Rates in Howland Research Forest Soils” Mentor: Kathleen Savage, Woodwell Climate Research Center

Lauren Stephenson - “Understanding the Effect of Salinity on Green Crab Biochemical Pathways”

Mentors: Carolyn Tepolt and Yaamini Venkataraman, Woods Hole Oceanographic Institution

Gabriella Prelosky - “It’s Electric: Understanding the development of electroreceptors in Chain Catshark (*Scyliorhinus retifer*)”

Mentor: Andrew Gillis, Marine Biological Laboratory

Destiny Coleman - “Factors Influencing Acadian Redfish (*Sebastes fasciatus*) Presence in the Gulf of Maine Bottom Longline Survey”

Mentor: Dave McElroy, National Oceanic and Atmospheric Administration, NMFS, NEFSC

Aaron Edley - “Salt Marsh Restoration: Soil Shear Strength”

Mentor: Hillary Sullivan, Woodwell Climate Research Center

Isis Kees - “Hydrothermal Vent Communities in Late-Stage Succession along the East Pacific Rise”

Mentors: Lauren Mullineaux and Susan Mills, Woods Hole Oceanographic Institution

Samuel Barrett - “Barnacle settlement periods on Cape Cod shellfish farms”

Mentor: Jesús Pineda, Woods Hole Oceanographic Institution/WHOI Sea Grant

Emily Orozco - “Comparing Growth Between Two Year Old Hatchery and Wild Origin Atlantic Salmon in the Narraguagus, Little Falls River”

Mentor: Ruth Haas-Castro, National Oceanic and Atmospheric Administration, NMFS, NEFSC

Cameron Johnson - “Assessing spatial and temporal variation in copepod reproduction in the Gulf of Maine”

Mentors: Ann Tarrant and Rebecca Gast, Woods Hole Oceanographic Institution

Julia Hill - “Measuring coastal change through photogrammetry at Head of the Meadow Beach in Truro, Massachusetts.”

Mentor: Chris Sherwood, United States Geological Survey

Blaze Miles - “Decarbonization of The Shipping Industry” Mentor: Hauke Kite-Powell, Woods Hole Oceanographic Institution - Marine Policy Center

Autumn Johnson - “The effects of endolithic community on coral calcification of *Astrangia poculata*”

Mentors: Loretta Roberson and Mayra Sanchez-Garcia, Marine Biological Laboratory

Jonathan Kopeliovich - “The Value of Science Communication to the Partnership Education Program”

Mentor: Heather Goldstone, Woodwell Climate Research Center

Taina Sanchez - “Patterns at the Edge: Ocean Biogeochemistry at the Edge of the Northeast U.S. Shelf Revealed by Autonomous Underwater Vehicles (AUVs)”

Mentor: Stace Beaulieu, Woods Hole Oceanographic Institution