

The Woods Hole Partnership Education Program (PEP) Directors' Report for 2022 PEP's 14th Summer

September 2022
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2022 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 fourteen 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 14th cohort in 2022, a class of 17 students from 17 colleges and universities, including five schools that were new to PEP, and seven HBCUs and one Minority Serving Institution (MSI). PEP has now hosted students from 113 colleges or universities, including 33 HBCU/MSIs (see Appendix One for the complete list of schools).

In response to the COVID 19 pandemic, PEP was offered in 2020 & 2021 as a virtual program that sought to retain as much as possible the key features of the successful residential program (see “Same Program; Different Delivery” – <https://aslopubs.onlinelibrary.wiley.com/doi/full/10.1002/lob.10414>). The PEP staff (and students) were excited to return to an in-person program for 2022, incorporating many of the lessons learned and innovative methods into the residential program.

Returning to PEP in-person came with welcomed challenges. We managed COVID-19 restrictions, significant inflation costs, and, for some students, new experiences including their in-person college class and/or first communal living adventure. The Woods Hole scientific community and PEP staff worked together to overcome these challenges and worked towards making this a great summer for everyone.

2022 Program

Recruitment and Selection

Intern recruitment was done virtually again this year, with PEP staff making virtual visits to a small number of colleges and online conferences. PEP is fortunate to have a well-established network of colleagues, administrators, faculty, and former PEP students who aid the recruiting effort. The PEP applicant pool was as diverse and deep and it has been in recent years, with more than ten completed applications for every one available spot in the program. The Selection Committee was chaired by PEP Co-Director Onjalé Scott Price.

2022 PEP Roster

First Name	Last Name	College/Univ	Class Standing	Major	Mentor(s)	Institution
Malika	Brown	University of Maryland Eastern Shore	Junior	Environmental Science-Marine Science	Ruth Haas-Castro	NOAA
Alexandra	Figueroa	University of Massachusetts Boston	Senior	Environmental Science, Marine Science Track	Scott Large	NOAA
Madison	Griffin	Duke University	Junior	Biology (Marine Biology Concentration)	Chris Neil	WCRC
Alexis	Hernandez	Humboldt State University	Freshman	Marine Biology	Joel Llopiz/Rubao Ji	WHOI
Tyvonta	Johnson	Morgan State University	Junior	Biology	Elizabeth Pendleton	USGS
Caniah	Lentz	North Carolina Central University	Senior	Environmental, Earth and Geospatial Science	Hauke Kite-Powell	WHOI MPC
Aaron	MacDonald	University of Toronto	Junior	Biodiversity and Conservation Biology	Adam Subhas	WHOI
Ayanna	Mays	University of Miami	Junior	Marine Biology and Ecology	Neel Aluru/Chris Murray	WHOI
Jordan	McDavid	University of Tampa	Sophomore	Marine Science - Biology (double major)	Melisa Diaz and Catherine Walker	WHOI
Parker	Mooney	Boston College	Junior	Environmental Geoscience	Lauren Mullineaux	WHOI
Monet	Murphy	Savannah State University	Senior	Marine Science and Environmental Science	Lauren Mullineaux	WHOI
Jillian	Paquette	Davidson College	Sophomore	Biology	Heidi Sosik/Emily Peacock	WHOI
Kimberly	Porras	College of San Mateo	Junior	Environmental Science	Rachel Jakuba and Virginia Parker	BBC
Haley	Roche	St. Mary's College of Maryland	Freshman	Biology and Biochemistry	Jessica Mark Welch/ Scott Chimileski	MBL
Morgan	Smith	Bowie State University	Junior	Computer Technology	Heidi Marotta	NOAA
Zachary	Taylor	Tennessee State University	Senior	Agricultural Science	Meagan Eagle	USGS
Alicia	Yodlowsky	North Carolina A&T State University	Sophomore	Agricultural and Environmental Systems (Environmental Studies)	Ken Foreman	MBL

Mentoring

Mentor recruitment is a word-of-mouth, year-round, on-going process. In December 2021 we sent emails to the Woods Hole Diversity Initiative (WHDI) partner institutions inviting mentors. Potential new mentors met with the PEP Co-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 26 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. The feedback from mentors was overwhelmingly positive, with a returning mentor stating "...honestly the best DEI training I've been to."

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.

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 2022 staff was composed of Dr. Ambrose Jearld, Jr., Senior Advisor who has advisory oversight of all aspects of the program. PEP Co-Director George Liles focused on strategic planning and overall program development while Co-Director Onjalé Scott Price oversaw all aspects of the current program. The 2022 staff, led by Scott Price, included Course Director Dr. Benjamin Harden and Resident Advisor Hector Delgadillo (PEP 2021, PEP-II 2022).

Course

The PEP 2022 course ("Global Climate Change: Ocean and Environmental Sciences") was offered in partnership with the University of Maryland Eastern Shore). The course was held in the first four weeks of the program, from 0900-1200, M-F. During the first 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 2022 interns and responded enthusiastically to this component of the cruise (despite stormy weather that kept them docked for the first two days). 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 in the mornings) provides the opportunity for interns to start working in their labs or in the field during the afternoons. For some projects this time is spent doing more background reading or learning lab and field techniques for use throughout the rest of the summer. The interns began working on their research projects full-time after the course ended at the end of June.

The Buzzards Bay Coalition (BBC) hosted a PEP student for the first time, and there were two additional first-time mentors. A few mentors were returning, but mentoring for the first time in-person, including PEP 2013 alumni Melisa Diaz, a post-doctoral scholar at WHOI (and now an assistant professor at University of Colorado Boulder). The projects covered a wide range of scientific interests and questions, spanning oceanography, geology, chemistry, marine biology, fisheries science, microbiology, wetland restoration, benthic ecology, information technology, sea level rise, and resource management.

Some interns explored Cape Cod (Coonamessett River restoration, local salt marsh ecology, local groundwater monitoring) while others worked with data from Maine, Antarctica and Greenland, and deep-sea hydrothermal vents of the East Pacific Rise. Institutionally, students worked with mentors at BBC (1), MBL (2) WHOI (8), Woodwell Climate Research Center (1), Woods Hole USGS (2), and NOAA NEFSC (3). 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:

The career development activities in 2022 were held virtually, to allow PEP alumni and guest speakers to participate on panels and give presentations.

- Opportunities after PEP: panel of representatives from WHOI SSF, IN FISH, SEA Semester, MBL SES
- Applying to Graduate School; panel of 3 PEP alumni
- Ambrose Jearld, Jr. Lecture; part of Woods Hole Diversity Advisory Committee programming.
- Careers Outside of Academia, 2 parts; panel of 5 PEP alumni and panel of 4 PEP alumni
- Writing a Personal Statement; panel of 3 alumni
- Abstract Writing Workshop; hosted by PEP Co-Director, Onjalé
- National Association of Black Scuba Divers

Networking events/activities:

- Pizza dinner with GLOW (Gays, Lesbians and Others in Woods Hole)
- Lunch with Brian Chad Starks (Juneteenth lecturer)
- Mentor Mapping + BBQ with the MBL REU (Research Experience for Undergraduates) and MBL graduate students
- 'End of Summer Social' sponsored by the Woods Hole Business Association

Field trips

- Whale Watching in Provincetown (scheduled during the Portuguese Festival)
- New Bedford Whaling Museum and Underground Railroad Walking Tour (through National Park Service)
- Harvard Museum of Natural History

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; included 1 PEP alumni
- WHOI SSF and WHOI supported PEP students poster session



PEP Students aboard the WHOI R/V Tioga for a half-day sampling trip

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 Co-Director Onjalé Scott Price.

PEP-II

In 2022 PEP included an exciting new component that provided 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. In 2022, support came from the Woods Hole Sea Grant, the WHOI MPC and the Buzzards Bay Coalition (BBC).

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. PEP had not, however, hosted a formal program for PEP returnees until now.

Name	PEP Cohort	Degree received	Mentor	Institution	Research Project	FPS Collaborator
Ayinde Best	2020	BS, Environmental Science	Hauke Kite-Powell and Yaqin Liu	WHOI MPC	An Economic Evaluation of Recreational Shellfish Fishing in Cape Cod	Carmela Mayeski, 8 th grade science
Hector Delgadillo	2021	BS, Marine Biology	Alice Besterman and Rachel Jakuba	Buzzards Bay Coalition	Examining the tidal elevation positions of two marsh cordgrass species	Kristina Woods, 7 th grade science
Rhegan Thomason	2021	BS, Biological Science	Jennie Rheuban	WHOI/Woods Hole Sea Grant	Effects of environmental quality on early-stage juvenile shellfish growth and survival: An aquaculture approach using in situ eutrophication and coastal acidification gradients	Caitlin Church, 7 th grade science

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 all from virtual cohorts and were therefore invited to participate in the PEP sail aboard the *SSV Cramer* and help the students gather their data. They were also invited to all the other PEP activities including the professional development, social events, and field trips. Specific coding and professional development workshops were offered only to the researchers.

Designed and administered by PEP Co-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 2022 collaborations, in summary are:

- A weeklong project where students learn about estuaries through three different stations: phytoplankton, oysters, and seagrass.

- An ArcGIS Storymap describing salt marshes utilizes key terminology, videos, links, pop quizzes, and games to engage the students.
- A guided activity on creating and disseminating a scientific survey.

The final symposium and graduation were held on August 10, one day before the PEP student symposium.

By the end of the program, all the PEP-II Researchers were moving along swiftly in their careers. Ayinde was hired full-time at the WHOI MPC, Hector headed to the University of California, Berkeley for a master's program, and Rhegan was accepted to C-CoMP, a 2-year Bridge-to-PhD fellowship at WHOI.



PEP-II Researchers (From Left: Rhegan Thomason, Hector Delgadillo, Ayinde Best)

Program Data

PEP students' ethnic identities (as self-identified), 2009-2022: African (2), African-American/Black (104), Afro-Caribbean (1), Asian/Chinese/Thai (6), Bengali (1), Bi-Racial/Mixed (14), Cape Verdean (1), Caucasian/White (19), Filipino (2), Hispanic or Latinx (39), Indian (1), Japanese American (1), Mexican or Mexican American (4), Native American (7), Native Hawaiian (1), Pacific Islander (2), Puerto Rican (1), West Indian (2), Declined to identify (6).

In fourteen years (2009-2022), 214 students have completed PEP. Just over half (111) of the 214 PEP alumni have come from HBCU/MSIs. PEP graduates include 109 women and 78 men from minority groups under-represented in science. Additionally, PEP has provided career building opportunities for four graduate students (all African-American) who served as coordinators in 2010-2021, five PEP alumni who (all URM) returned as PEP staff in 2021, five PEP alumni (all URM) who returned in 2021 to participate as researchers in the inaugural PEP-II program in 2021, and three PEP alumni (all URM) who returned in PEP-II in 2022.

PEP gathers data about degrees and jobs status of program alumni. The last 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. In the winter of 2022/23, we expect to gather updated information on degrees and jobs.



2022 PEP Staff, PEP and PEP-II Cohorts

Looking Forward

At the end of our 14th 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 was offered in 2022 and provided career-building experiences for a diverse cohort of 15 undergraduates doing projects in eleven locations ranging from Maine to DC to Seattle and Santa Cruz.

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, nine PEP alumni are either in the WHOI-MIT Joint Program, working full-time, or completing a fellowship in Woods Hole.

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.

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 2022, the PEP staff intends to gather more data on our alumni and to create a more formal alumni tracking and support system. In 2022/23, we hope 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, 2009-2022

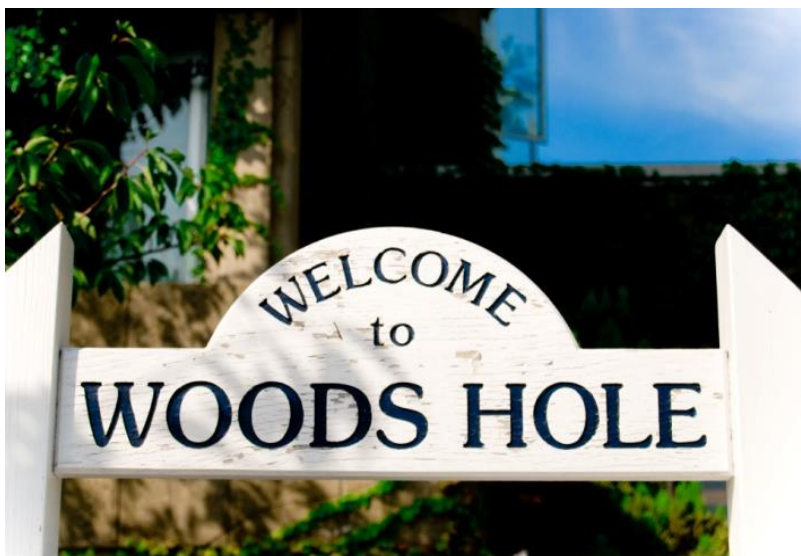
Institutions (113) that have sent students to PEP:

Italic = Historically Black Colleges and Universities and/or Minority Serving Institution (33)

Amherst College	<i>Florida A&M University (4)</i>
Arkansas State University (2)	<i>Fort Valley State University</i>
Auburn University	Georgia State University (2)
Barry University	Green Mountain College
Beloit College	Grinnell College
<i>Bethune Cookman University (2)</i>	<i>Hampton University (42)</i>
Boston College (2)	Harvard University
Bridgewater State University (2)	<i>Howard University (4)</i>
Bowdoin College	<i>Humboldt State University (15)</i>
<i>Bowie State University (3)</i>	Illinois State University
Brown University	<i>Jackson State University</i>
California Polytechnic State University	<i>Juniata College</i>
California State University, Bakersfield	<i>Kentucky State University</i>
California State University, Chico (2)	Loyola University Chicago
California State University Long Beach	<i>Morehouse College (6)</i>
<i>Cheney State University</i>	<i>Morgan State University (4)</i>
<i>City University of New York</i>	New Mexico Institute of Mining and Technology
Coastal Carolina University	<i>New Mexico State University, Socorro</i>
College of San Mateo	New York City College of Technology
College of William and Mary	New York University, Abu Dhabi
Columbia University	<i>North Carolina Agricultural and Technical State University (6)</i>
Cornell University (2)	<i>North Carolina Central University (5)</i>
Dakota State University	Northeastern
Davidson College	Nova Southeastern University
<i>Delaware State University (3)</i>	Oklahoma State University
DePaul University	<i>Philander Smith College</i>
<i>Dillard University</i>	Rice University
Duke University	<i>San Jose State University</i>
East Carolina University	<i>Savannah State University (6)</i>
Eastern Michigan University	Skidmore College
<i>Elizabeth City State University (2)</i>	
<i>Fisk University</i>	

South Carolina State University
Southwestern College
Spelman College (2)
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 (2)
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 Delaware
University of Florida
University of Hawaii
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
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
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://youtu.be/lGLyjUG4C4U>

Projects (in order of symposium presentation)

Ayinde Best

Mentors: Hauke Kite-Powell and Yaqin Liu, Woods Hole Oceanographic Institution
An Economic Evaluation of Recreational Shellfish Fishing in Cape Cod

Rhegan Thomason

Mentor: Jennie Rheuban, Woods Hole Oceanographic Institution/Woods Hole Sea Grant
*Effects of environmental quality on early stage juvenile shellfish growth and survival:
An aquaculture approach using in situ eutrophication and coastal acidification gradients*

Hector Delgadillo

Mentors: Alice Besterman and Rachel Jakuba, Buzzards Bay Coalition
Examining the tidal elevation positions of two marsh cordgrass species

Appendix Four: PEP Symposium

Recording: <https://mbl.hosted.panopto.com/Panopto/Pages/Viewer.aspx?id=1bc07190-2a61-4c51-badd-aeef013523e7>

Projects (in order of symposium presentation)

Alexis Hernandez

Mentors: Joel Llopiz, Rubao Ji, Woods Hole Oceanographic Institution (WHOI)
Analyzing the gut contents of Spiny dogfish as samplers of Ctenophores in the NE US Continental Shelf

Alexandra E. Figueroa

Mentor: Scott Large, NOAA Fisheries
Aggregating Coastal Water Quality Data for the New England and Mid-Atlantic Regions

Haley Roche

Mentors: Scott Chimileski, Marine Biological Laboratory (MBL)
Peaking at the Progression of Plaque

Malika S. Brown

Mentor: Ruth Haas-Castro, NOAA Fisheries
*Annual Temperature Variation Impact on Atlantic Salmon Smolt (*Salmo salar*) Growth in the Narraguagus River, Maine*

Jill Paquette

Mentor: Heidi Sosik, Woods Hole Oceanographic Institution (WHOI)
Seasonal patterns in abundance differ among ciliate taxa at Martha's Vineyard Coastal Observatory (MVCO)

Zachary Taylor

Mentor: Meagan Eagle, United States Geological Survey (USGS)
Investigating Porewater Exchange at the Herring River

Caniah Lentz

Mentors: Hauke Kite- Powell & Micheal Wier, Woods Hole Oceanographic Institution's Marine Policy Center (WHOI MPC)
What is the Social Benefit of an App-Based HAB Forecasting Tool?

Aaron MacDonald

Mentors: Adam Subhas & Chloe Smith, Woods Hole Oceanographic Institution (WHOI)
Emiliana huxleyi response to Ocean Alkalinity Enhancement in Laboratory Culture

Alicia Yodlowsky

Mentor: Ken Foreman, Marine Biological Laboratory (MBL)
Groundwater Nitrogen Monitoring at Little Pond

Kimberly Porras

Mentors: Rachel Jakuba and Virginia Parker, Buzzards Bay Coalition (BBC)
Citizen Science data vs HOBO Logger Data in Buzzards Bay, MA

Madison Griffin

Mentor: Christopher Neill, Woodwell Climate Research Center
How to Design Wetland Restoration Projects: Analyzing Habitat Quality and Nutrient Removal in a Restored Wetland

Jordan McDavid

Mentors: Melisa Diaz and Catherine Walker, Woods Hole Oceanographic Institution (WHOI)
Quantification of meltwater features on Greenland and Antarctic glaciers

Morgan Smith

Mentor: Heidi Marotta, NOAA Federal
Day in the Life of the IT Division

Parker Mooney

Mentors: Lauren Mullineaux & Lauren Dykman, Woods Hole Oceanographic Institution (WHOI)
*Salt Marsh Ecology: The Behavioral Responses of *Ilyanassa obsoleta* When Parasitized by *Trematodes**

Monét Murphy

Mentors: Lauren Mullineaux, Susan Mills, Michael Meneses, Stace Beaulieu & Lauren Dykman, Woods Hole Oceanographic Institution (WHOI)
Deep-Sea Destructive Disturbances: Understanding ecological succession of hydrothermal vent colonist 15 years after a volcanic eruption

Tyvonta Johnson

Mentor: Elizabeth Pendleton, United States Geological Survey (USGS)
An Application of Coastal Change Likelihood in Cape Cod for Habitat Application and Validation

Ayanna Mays

Mentors: Christopher Murray and Neel Aluru, Woods Hole Oceanographic Institution (WHOI)
*Hypoxia Tolerance of the Atlantic Silverside (*Menidia menidia*)*