

Woods Hole Partnership Education Program (PEP)

Directors' Report for 2021 PEP's 13th Summer

December, 2021

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2021 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 thirteen 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 one for the PEP Model.)

PEP welcomed its 13th cohort in 2021, a class of 14 students from 13 colleges and universities, including four schools that were new to PEP, and eight HBCUs and one Minority Serving Institution (MSI). PEP has now hosted students from 109 colleges or universities, including 33 HBCU/MSIs (see Appendix Two for the complete list of schools).

In response to the COVID 19 pandemic, PEP was offered in 2020 as a virtual program that sought to retain as much as possible the key features of the successful residential program. Although we had hoped to resume residential programming in 2021, the continuing pandemic required that we run a virtual program again in 2021, following the practices instituted in the 2020 (see “Same Program; Different Delivery” – <https://aslopubs.onlinelibrary.wiley.com/doi/full/10.1002/lob.10414>). By mid-summer the pandemic had abated enough that we were able to plan a short residency program, with appropriate safeguards and safety protocols. On August 5 the fourteen 2021 PEP students plus five PEP II researchers arrived on the Sea Education Association (SEA) campus for an intensive, ten-day Woods Hole experience.

2021 Program

PEP II – The PEP program in 2021 included an exciting new component that provided Woods Hole-based research opportunities for PEP alumni. The new program element, PEP II, was launched with support from the Woods Hole Sea Grant program and additional funding from the WHOI Marine Policy Center and the Woodwell Climate Research Center. 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 this summer when five alumni were invited to return to conduct research – some in the lab where they did their PEP research and others in labs where they had not previously worked.

| Name | PEP Cohort | Academic status at time of PEP-II application | Mentor | Institution | Project |
|----------------------|------------|--|-------------|-------------|--|
| Adryne Jones | 2017 | BS Biology; 2018 | Ann Tarrant | WHOI | Copepod Physiology in the Western Antarctic Peninsula: Adaptation and Implications of Climate Change |
| Christopher Sandoval | 2020 | BS Environmental Science: Biology; 2020 | Josh Hatch | NOAA | Loggerhead Sea Turtle Migration Patterns in the Mid Atlantic Bight |
| Andrea (Regan) Scott | 2020 | BS Biology with Environmental Concentration; 2020 | Brian Stock | NOAA | Diversity Trends of Fish Observed Near the Hawaiian Islands |
| Angela Trejo | 2019 | BS Environmental Science with a Hydroscience Concentration; 2020 | Di Jin | WHOI MPC | Estimating Current and Future Ecosystem Service Values from the Florida Keys Reef |
| Tiffany Windholz | 2020 | Senior, Environmental Science - Natural Resources | Sue Natali | Woodwell | Analyzing Terrestrial Carbon Flux Site Distribution Across the Arctic |

PEP II is intended to be a residency program in which the researchers live on the SEA campus, but the initial PEP II program had to be offered virtually. 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 local public schools. An integral part of a successful researcher’s career is the ability to communicate their science with the general public. This partnership aims to facilitate an opportunity for the PEP II researchers to communicate their science through lesson plans and other curriculum development activities.

Recruitment and Selection – Recruitment for PEP was done virtually this year, with PEP staff making virtual visits to a small number of colleges. 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, once again chaired by Dr. Larry Alade and Kwanza Johnson (PEP 2016), was able to choose a talented cohort and fifteen students accepted our offers in March (one student withdrew from the program in the fourth week due to health issues).

| First Name | Last Name | University/ College | Major | Classification | Research Mentor | Institution |
|---------------------|------------------|--|--|-----------------------|-----------------------------------|--------------------|
| Christabelle | Agyapong | Morgan State University | Biology / Chemistry | Senior | Carolyn Tepolt | WHOI |
| Hannah | Brunelle | Wheaton College | Environmental Science | Senior | Hauke Kite-Powell | WHOI |
| Lyric | Carter | Tennessee State University | Environmental Science | Junior | Jennifer Watts | WHOI |
| Hector | Delgadillo | California State University, Long Beach | Marine Biology | Senior | Jennifer Watts | Woodwell |
| Xzayana | Henderson | Dakota State University | Biology | Junior | Samuel Laney | WHOI |
| Miles | Jordan | Florida Agricultural and Mechanical University | Marine Biology | Junior | Meagan Eagle | USGS |
| Jabari | Lottie | Morehouse College | Biology | Junior | Sofie Van Parijs & Jennifer Turek | NOAA-NMFS-NEFSC |
| Xavier | Manning | Howard University | Environmental Science | Sophomore | Christopher Neill | Woodwell |
| Jessica | McLaughlin | University of Rhode Island | Ocean Engineering | Junior | Anna Michel | WHOI |
| Maya | McWilliams | Jackson State University | Biology | Junior | Matt Charette | WHOI |
| Jonathan | Nash | Hampton University | Marine Biology /Environmental Sciences | Sophomore | Heidi Sosik | WHOI |
| Derrick | Richardson | Hampton University | Marine & Environmental Sciences | Sophomore | Julie Huber | WHOI |
| Mya | Rufus | University of Maryland Eastern Shore | Environmental Science | Senior | Elizabeth Pendelton | USGS |

| | | | | | | |
|---------------|----------|------------------------------|---------|--------|--|-----------------|
| Rhegan | Thomason | University of Texas, El Paso | Biology | Senior | Scott Large, Kim Hyde and Kim Bastille | NOAA-NMFS-NEFSC |
|---------------|----------|------------------------------|---------|--------|--|-----------------|

Mentor recruiting is a word-of-mouth, year-round, on-going process. In December 2020 we sent emails to the Woods Hole Diversity Initiative (WHDI) partner institutions inviting mentors. As always, any potential new mentors met with the PEP Senior Advisor Dr. Ambrose Jearld, Jr. and PEP Co-Director George Liles to discuss the program and its goals and to learn about the potential mentor’s motivations for and experiences with mentoring. Potential mentors provided a short description of the project they available for students. Those 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, taking into account 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 Dr. Jearld and in March, shortly after the students were accepted, the matches were announced.

Two training sessions were provided for mentors and PEP mentors and staff. The sessions were also open to mentors and staff of a new NOAA Fisheries internship program (IN FISH). The training sessions took place on May 20 and May 27. The first session was a facilitated discussion of Dr. Kendall Moore’s documentary film “Can We Talk? Difficult Conversations with Underrepresented People of Color: Sense of Belonging and Obstacles to STEM Fields.” The discussion was facilitated by Catalina Martinez, a scientist in NOAA's Office of Exploration and Research and one of the producers of the film, and Dr. Vernon Morris, a scientist and professor at Howard University (since moved to Arizona State University) and one of the interviewees in the film.

“Can We talk?” captures the unique socio-emotional experiences of students, scientists, faculty, administrators, and medical professionals from underrepresented communities of color who are pursuing, in, and/or have left STEM fields. It provides the opportunity to reflect on cultural and systemic obstacles that are limiting inclusion for certain groups in STEM, and helps create context, language, methods, strategies, and spaces, to help invested communities and individuals develop ways to address these important, sensitive issues and subjects.

The May 27 session was a three-hour workshop on mentoring, with emphasis on mentoring across divides that include race or ethnicity. The trainers were Dr. Bryan Dewsbury, an Associate Professor of Biology, and the Principal Investigator of the Science Education And Society (SEAS) research program at the University of Rhode Island (URI), and Dr. Samantha Meenach, associate professor at URI. Throughout the summer, informal PEP mentor meetings were scheduled for mentors to talk with each other and staff about challenges and successes of mentoring virtually.

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 Advisor meets regularly with their advisees over the summer to support and

encourage the interns and to ensure that the interns are having a productive experience in all elements of the program.



Figure 1: The 2021 PEP II Researchers, PEP students and PEP staff on Martha's Vineyard

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 2021 staff was composed of Dr. Ambrose Jearld, Jr., Senior Advisor who has advisory oversight of all aspects of the program. PEP 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 2021 staff, led by Scott Price, included Course Director and Computational Advisor Dr. Benjamin Harden; Program Coordinator Ayanna Butler (PEP 2020); Career Development Coordinator Deborah Leopo (PEP 2017); and Course Assistant Jaily Dorsett (PEP 2020).

Course – The PEP 2021 course (“Ocean and Environmental Sciences: Global Climate Change”) was held (virtually) in the first four weeks of the program (June). Directed once again by Dr. Benjamin Harden, the course focused on building background knowledge and research skills. Dr. Harden reports that the course assistant in 2021 was “the amazing Jaily Dorsett (PEP 2020).”

Having offered the course virtually in 2020, Ben and the PEP staff recognized that students may suffer from “zoom fatigue” and the 2021 course focused even more acutely on developing course activities that limited zoom time to specific in-person required activities (guest speaker discussion, student discussions, Q&As). The class ran 12-3PM ET daily. A typical course meeting began with 15 min check-in and updates, followed by a Student Work block with instructors available until 2 PM ET. From 2-3 the students engaged in Group activity (guest speaker, students discussions, presentations, etc.).

For 2021 the faculty developed a self-paced online model wherein students worked (during the Work block) through levels in modules at their own pace and received instructor feedback after each level. The self-paced work was coupled with numerous in-person discussions and team-working opportunities.

The 2021 course used data from the Ocean Observatories Initiative (<https://oceanobservatories.org/>), exposing students to conditions around the globe. We used Wonder.me to facilitate group work and one-on-one time with course instructors.

At the conclusion of the course, the students reported they had learned about environmental science, undertaking research, reporting research findings, coding (especially R), working as a team, and working to deadlines. The student feedback, gathered in late July via survey, is available in the appendix to this report.

Projects – Research projects are always at the heart of PEP. The students are matched with mentors well before the May 29 program opening. Mentors and mentees discuss the project and students learn what skills and background knowledge they might need to get maximum benefit from the project. Students may do preliminary project work during the June portion of the program such as familiarizing themselves with softwares or techniques, reading related scientific papers and meeting with their research mentor and lab group. In late June when the course ends, they begin full-time work on their projects.

In 2021 we offered projects that could be done remotely, which in most cases meant projects working with data that had already been gathered. Some of our long-time PEP mentors were not able to offer projects that can be done remotely, but others were able to design projects appropriate for a virtual era when field work is impossible. Additionally, we had five new PEP mentors who provided projects for six of the 14 PEP interns. As usual, the projects covered a wide range of scientific interests and questions, spanning oceanography, geology, chemistry, marine biology, fisheries science, ecosystems, and resource management. Some interns explored Cape Cod (hydrology and chemistry of the Coonamessett River) while others worked with data from Alaska and others studied life in the deep ocean. Institutionally, students worked with mentors at WHOI (7), the Woodwell Climate Research Center (3), Woods Hole USGS (2), and NOAA NEFSC (2). The students presented their work during an in-person symposium August 10 (see Appendix for project titles).

Activities – PEP has from its 2009 inception been a three-legged stool, with career-building activities being as critical as the course and research projects. The suite of career-building 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. The 2021 career-building activities were designed and administered by Debora Leopo (PEP 2017) and PEP Co-Director Onjalé Scott Price. In 2021 the activities were virtual and began with Orientation in late May and ran through the early August. Activities included:

- Weekly WHOI Summer Student Fellow (SSF) lectures
- Weekly Career Development Activities such as:
 - Soft Skills/Netiquette
 - Graduate school panels
 - Résumé and CV building
 - Presentations of other opportunities such as WHOI SSF, Fulbright, MBL Semester in Environmental Science (SES), etc.
- Bi-weekly “PEP Rally” social events

The 2021 cohort arrived in Woods Hole on August 5 for a ten-day residency program that provided welcomed in-person opportunities for cohort building and career-building activities.

| SUNDAY | MONDAY | TUESDAY | WEDNESDAY | THURSDAY | FRIDAY | SATURDAY |
|---|--|---|--|---|--|---|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| | | | | PEP, PEP-II & Staff Arrive | 10-12: PEP-II Presentations - Woodwell | |
| | | | | | 12-14: Lunch with your mentor - SEA | 11-16: Cookout with WHOI SSF - Quissett |
| 8 | 9 | 10 | 11 | 12 | 13 | 14 |
| | 830-1130: R/V Tioga Trip (Group 1) | 0930-1400: PEP Symposium - Redfield | MV Trip | 10-12: Tours of Quissett Labs | Whale Watching in Plymouth | PEP, PEP-II & Staff Depart |
| 15-17: Tea party at Ben Harden's House! | 12-1500: R/V Tioga Trip (Group 2) | 1400: Graduation & Lunch | 0930: Ferry to MV (Oak Bluffs) | 12-13: Lunch at Carriage House - Quissett | 0630: Leave SEA for Plymouth | |
| | WHOI/MBL Library, MBL MRC & Aquarium Tours (alternates with Tioga trips) | 1500: Welcome event at Woods Hole Wharf | 1030: MV African American Heritage Tour (OB) | 1900: MBL Undergrad Night | 1600: Depart Plymouth | |

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 George Liles.



Figure 2: 2021 PEP II Researcher Angela Trejo (left) and PEP 2021 PEP student Jabari Lottie aboard the WHOI R/V Tioga

Program Data

PEP students' ethnic identities (as self-identified), 2009-2021: African (2), African-American/Black (94), Asian/Chinese/Thai (4), Bengali (1), Bi-Racial/Mixed (13), Cape Verdean (1), Caucasian/White (18), Filipino (2), Hispanic or Latinx (37), 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 thirteen years (2009-2021), 197 students have completed PEP. More than over half (104) of the 197 PEP alumni have come from MSIs. PEP graduates include 98 women and 73 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) have returned to work as PEP staff, and five PEP alumni (all URM) who returned in 2021 to participate as researchers in the inaugural PEP II program.

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 2021/22, we are gathering updated information on degrees and jobs.



Figure 3: The 2021 PEP II Researchers and PEP students at dinner in Woods Hole (missing: Adrynne Jones, who was not able to attend the in-person component)

Looking Forward

At end of our 13th year, PEP is a strong, well-established program. PEP remains true to its founding principles, envisioned by the PEP founding director Dr. Ambrose Jearld, Jr., and articulated in PEP Model. While PEP continues to embrace those founding principles, the program is also 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. In 2021 that evolution included the establishment of PEP II, under the leadership of Onjalé Scott Price. The development of a formal second year program is consistent with the recommendation of the 2019 workshop "Optimizing the Research Intern Experience to Build Inclusion and Diversity in the Geoscience workforce." Over the last three 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. We need to gather more data on our alumni and create a more formal alumni tracking and support system. And we need to publish our program and our results to document our successes and to share our best practices.

PEP was founded not only to change Woods Hole, but to develop a program model that can be used elsewhere. Published in 2019, that model served as the guide for IN FISH, the new intern program NOAA Fisheries launched in 2021. Based on PEP principles, IN FISH is now bringing to a national community the benefits PEP has long provided to Woods Hole.

Here in Woods Hole, PEP continues to serve as the flagship program devoted to increasing diversity in the scientific community. In the fall of 2021, the PEP staff is in conversation with the DI hosting institutions about how PEP and other intern programs in the village might coordinate recruitment efforts and how the various programs might provide a sequence of intern opportunities for PEP alumni

The final observation on looking forward focuses on our hopes for being able to offer residency programs. While we have demonstrated that we can run effective virtual programs, the experience of bringing the 2021 PEP cohort to the village for ten days in August reminded us all how wonderful it is to have the interns physically present with us. Residency programs energize the community, which benefits as much from the interns as the interns benefit from the community

Appendix One: Participating Colleges and Universities, 2009-2021

Institutions (109) that have sent students to PEP:

(*Italic* = Historically Black Colleges and Universities and/or MSI) (33)

Amherst College
Arkansas State University (2)
Auburn University
Barry University
Beloit College
Bethune Cookman University (2)
Boston College
Bridgewater State University (2)
Bowdoin College
Bowie State University (2)
Brown University
California Polytechnic State University
California State University of Bakersfield
California State University Chico (2)
California State University, Long Branch
Cheney State University
City University of New York
Coastal Carolina University
College of William and Mary
Columbia University
Cornell University (2)
Dakota State University
Delaware State University (3)
DePaul University
Dillard University

East Carolina University
Eastern Michigan University
Elizabeth City State University (2)
Fisk University
Florida A&M University (4)
Fort Valley State University
Georgia State University (2)
Green Mountain College
Grinnell College
Hampton University (2)
Harvard University
Howard University (4)
Humboldt State University (14)
Illinois State University

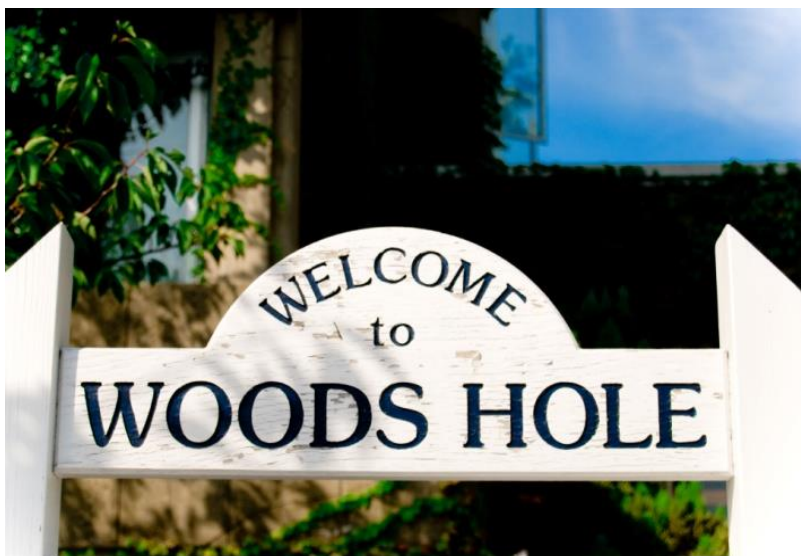
Jackson State University
Juniata College
Kentucky State University

Loyola University Chicago
Morehouse College (6)
Morgan State University (3)
New Mexico Institute of Mining and Technology
New Mexico State University, Socorro
New York City College of Technology
New York University, Abu Dhabi
North Carolina Agricultural and Technical State University (5)
North Carolina Central University (4)
Northeastern
Nova Southeastern University
Oklahoma State University
Philander Smith College
Rice University
San Jose State University
Savannah State University (5)
Skidmore College
South Carolina State University
Southwestern College
Spelman College (2)
St. George's University
St. Mary's College of Maryland
St. John's University
SUNY Albany
SUNY Maritime College
Syracuse University

Temple University
Tennessee State University
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 (14)
University of Massachusetts, Amherst (2)
University of Massachusetts, Boston (3)
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
University of Texas, Arlington
University of Texas, El Paso (6)
University of Texas, Rio Grande Valley
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 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 takes into account 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: 2021 PEP Projects

| First Name | Last Name | Research Mentor | Institution | Project Title |
|---------------------|------------|--|-----------------|---|
| Christabelle | Agyapong | Carolyn Tepolt | WHOI | Green Crab Takeover: Analysis of Ongoing Range Expansion through Genomics |
| Hannah | Brunelle | Hauke Kite-Powell | WHOI | Modeling Real Estate Value in the Proximity of Duxbury Bay |
| Lyric | Carter | Jennifer Watts | WHOI | Legacy effect of fire disturbance on Soil Respiration in Permafrost |
| Hector | Delgadillo | Jennifer Watts | Woodwell | Investigating the biotic and abiotic controls on soil CO ₂ emissions from an Alaskan boreal forest |
| Xzayana | Henderson | Samuel Laney | WHOI | Wintertime Arctic Phytoplankton: An Overview |
| Miles | Jordan | Meagan Eagle | USGS | Trace Element Cycling within the Sage Lot Pond Subterranean Estuary |
| Jabari | Lottie | Sofie Van Parijs & Jennifer Turek | NOAA-NMFS-NEFSC | Creating visualizations of sounds data collected by NOAA Passive Acoustics Group |
| Xavier | Manning | Christopher Neill | Woodwell | The Coonamessett River: Hydrology and Chemistry |
| Jessica | McLaughlin | Anna Michel | WHOI | The Sipper: A Water Sampling System |
| Maya | McWilliams | Matt Charette | WHOI | Analysis of Radium 223 and 224 Isotopes from the Pacific Ocean in 2018 |
| Jonathan | Nash | Heidi Sosik | WHOI | Quantifying the distribution of gelatinous invertebrates and their habitat conditions on the Northeast US Shelf through imagery and associated environmental data |
| Derrick | Richardson | Julie Huber | WHOI | Genomic annotation of an extremophilic, alkaliphilic methanogen |
| Mya | Rufus | Elizabeth Pendelton | USGS | Data Accuracy Assessment of the Coastal Change Likelihood in the Massachusetts Area |
| Rhegan | Thomason | Scott Large, Kim Hyde and Kim Bastille | NOAA-NMFS-NEFSC | Estuarine Data Workflow for Ecosystem-Based Fisheries Management |