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**Report of the Workshop: Optimizing the
Research Intern Experience to Build
Inclusion and Diversity in the
Geosciences Workforce**

**US DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Marine Fisheries Service
Northeast Fisheries Science Center
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Report of the Workshop: Optimizing the Research Intern Experience to Build Inclusion and Diversity in the Geosciences Workforce

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I. EXECUTIVE SUMMARY

In celebration of the 10th anniversary of the Partnership Education Program (PEP) in Woods Hole, MA, a workshop was held from June 27-29, 2019, to discuss ways to increase diversity and inclusion in the geosciences workforce. The Workshop brought together former interns, administrators of research internship programs, and directors of scientific organizations to share perspectives on how well current research internship programs are working and what can be done to make them more supportive and more effective in encouraging members of underrepresented minorities to pursue careers in the geosciences.

The Workshop focused on two topics: (1) identifying potential roadblocks that discourage minority students from entering the geosciences and (2) identifying steps that can be taken to help students overcome those roadblocks. There are many such roadblocks, and not all of them can be solved by the research institution. However, there are often ways an institution can structure a research internship program so it is a more positive, inclusive experience.

Key points raised during this Workshop were:

- A well-structured research internship can be an effective way to increase diversity in the geosciences. Conducting research demystifies science and introduces students to the joy of pursuing new knowledge, and frequent interactions with faculty show that scientists are human and approachable. Additionally, explaining one's research builds a student's confidence that they could succeed as a scientist. For many of the former students who attended the Workshop, the research internship was a turning point in their lives and the point at which they decided to become scientists.
- Minority students who have chosen to pursue a career in the geosciences still often feel isolated and uncomfortable on Predominantly White Institutions (PWIs). To gain the full benefit of diversity, it is not enough to have some people of color on a campus; they must also feel welcomed into the community. To accomplish this, institutions should seek not only to address the needs of minorities on campus, but they should also help majority staff members understand, welcome, and feel comfortable with new members from different backgrounds.
- Statements not intended to be hurtful or exclusionary may nonetheless be perceived as such by someone who has regularly experienced discrimination. To encourage minority participation in the geosciences, one must accept these perceptions as real and work to minimize actions and statements that are hurtful, even if those actions and statements are well intentioned. Dismissing negative reactions by saying, "You are too sensitive," is in itself insensitive and shows a lack of willingness to understand the minority perspective.
- Undergraduate intern research programs can play a role in changing the culture of the institution hosting the program. Programs are not simply a mechanism for providing students with opportunities; they can also provide opportunities for the hosting institution to learn about itself and for staff at hosting institutions to develop cultural competency and learn how to be inclusive in teaching, mentoring, and conducting professional relationships. The undergraduate intern research programs should not be viewed as 10-week summer programs, but rather as year-round programs that are active in providing training and programming for the year-round community at the hosting institution.

- Teaching research techniques is necessary but not sufficient to build diversity within the geosciences. Internship programs can help to prepare students for scientific careers by exposing them to career-enhancing skills like public speaking, grant and report writing, how to apply for jobs, and other “soft” social skills that help any person get hired.
- Some of the most basic challenges faced by minority students may not be obvious to a person who grew up in the mainstream culture.
- It is important not to attempt to be “color blind” but to acknowledge and learn about issues that affect students of color interning at PWIs.
- Progress is being made. Some research internship programs for minority students have been operating for more than a decade. There is now a cadre of former interns who have continued on in scientific fields to get PhDs or master’s degrees. They can serve as role models for new interns. Mentors are beginning to request students from the Research Experience for Undergraduates (REU) program. Change could be faster, but it is taking place.

II. INTRODUCTION

How can we increase inclusion and diversity among people working in the geosciences? This was the topic of a Workshop held in Woods Hole, MA, from June 27-29, 2019.

The Workshop also addressed a related—in fact, inextricable—question: How can we help Predominantly White Institutions (PWIs) become more welcoming to minorities currently underrepresented in geosciences? How can the undergraduate research internship programs help PWIs become aware of expertise in the Minority Serving Institutions (MSIs)? How can these programs help PWIs become more competent on the topics of race and inclusion?

The Workshop brought together people holding a variety of positions interested in learning how to increase diversity at their institutions. Workshop participants brought a diversity of experience to the discussions. Participating programs are hosted at MSIs, Historically Black Colleges and Universities (HBCUs), and PWIs. Participants included directors of existing programs and faculty and administrators at HBCUs who are seeking to establish programs. The deliberate mix of roles and experiences provided a rich discussion of perspectives and a creative sharing of ideas. Participants included leaders of all 6 research institutions in Woods Hole, administrators and support staff from around the country who manage internship programs for underrepresented minorities, faculty from HBCUs and other MSIs, members and leaders of technical organizations, and directors of federal programs that support educational, research, and occupational experiences designed to increase diversity in the geosciences workplace. Participants also included graduates of the 8 participating programs. For many of these program alumni, their internship was the basis of a decision to pursue a career in environmental or geosciences. They provided first-hand accounts of the challenges they have faced and the factors that helped them to face those challenges.

Why it matters: As a group, geoscience practitioners do not reflect the racial and ethnic diversity within the United States. This limits academic and research institutions, which are not drawing from the full talent pool available to them. Students from underrepresented groups have the same innate abilities as anyone else. They also tend to have exceptional drive and determination. These are often students who have surmounted significant challenges and who can put their experience to work to succeed in any chosen career.

A lack of diversity means institutions miss out on the creativity that is engendered when people of diverse backgrounds and perspectives come together to solve complex problems.

Furthermore, the lack of diversity means some institutions, especially government agencies, have a more difficult time communicating to the full population they serve. This limits the ability to convey scientific information on important matters, such as climate change or overfishing, to populations affected by these topics.

A lack of inclusion and diversity is daunting to students from underrepresented minorities. For many minority students, pursuing a career in the geosciences is challenging not only for academic reasons but for cultural ones, as well. At the Workshop, students frequently commented on the difficulties inherent in being the first of one's background in an institution, even when the institution is making a good faith effort to improve diversity. Problems include the difficulty in finding role models, different expectations because of their background, feeling unsure of social protocols, lack of confidence in one's abilities, encounters with discrimination from some individuals at the institution, and a concern that by joining a mostly White institution, the students are abandoning their own culture and community.

The Workshop was convened to identify best practices in optimizing the intern experience and to identify and explore the barriers to improving diversity within the geosciences, both from the institutional and the intern perspectives. Workshop participants also shared ideas for making progress mitigating these barriers. Some of the discussion centered on strengthening existing programs; other discussions focused on the challenges of establishing new Research Experience for Undergraduates (REU) programs at HBCUs and in collaboration between institutions.

The 8 participating programs were described and discussed in several panels. The hosting program, the Partnership Education Program (PEP), was described in some detail. A product of the Woods Hole Diversity Initiative, PEP was observing its 10th anniversary the month of the Workshop. The PEP staff provided a document (Appendix D) articulating the PEP model, and PEP staff and graduates described program features that include the selection process (a holistic process that utilizes a range of factors); the PEP course (which provides information about marine and environmental sciences); recruitment (featuring campus visits to recruit broadly across all disciplines that involve STEM); and at-sea experience (to familiarize students with field research and with marine sciences). The PEP director, staff, and graduates described the program's focus on providing a rich learning environment in which students are supported and provided the opportunity to explore new research topics and to learn from research and program mentors, PEP staff, and each other.

This report is not a chronological record of all the statements made during the Workshop. Rather, it attempts to synthesize the challenges identified and the recommendations made during the Workshop. Challenges are grouped by topic, even though they may have been expressed on different days. The hope is that this will provide a more readable—and more usable—compilation of ways to create pathways for students from underrepresented minorities to pursue careers in geosciences and ways the geoscience research communities can prepare themselves to welcome this infusion of talent.

III. WORKSHOP STRUCTURE

The agenda for the Workshop is attached as Appendix A of this report.

The first day of the Workshop took place at the Jonsson Conference Center at the National Academies of Science. Participation on the first day was limited to professional staff who run or support research internship programs targeting minority students. Programs represented were:

- Woods Hole PEP
- Significant Opportunities in Atmospheric Research and Science (SOARS)
- Monterey Bay Regional Ocean Science REU

- Honors Scholars Program, New York City College of Technology, CUNY
- University of Maryland Eastern Shore REU and the NOAA Living Marine Resources Center for Cooperative Science
- Savannah State University Bridge to Research in Marine Sciences for Undergraduates
- Woods Hole Research Center – The Polaris Project
- University of Chicago/Marine Biological Laboratory REU
- Woods Hole Oceanographic Institution (WHOI) Summer Student Fellowship program
- National Technical Association
- United States Geological Survey (USGS) at Tennessee State University
- NOAA REU at University of Alaska Fairbanks, Office of Education’s Hollings Program, National Marine Fisheries Service (NMFS) Diversity and Equal Opportunities Program
- National Association of Geoscience Teachers’ HBCUs Working Group

A full list of participants and their home institutions is included as Appendix B.

The Workshop was convened by Captain Peg Brandon (president of the Sea Education Association and chair of the Woods Hole Diversity Committee). The first panel was comprised of top officials at all of the Woods Hole research institutions (Woods Hole Research Center, WHOI, USGS, Sea Education Association, NOAA NMFS, and the Marine Biological Laboratory). Panel members explained their goals for diversity in their institutions and identified some of the challenges they had encountered that they wanted the Workshop to consider. The Workshop participants were then led in a SWOT analysis (identifying Strengths, Weaknesses, Opportunities and Threats).

On the second and third days of the Workshop, the professional staff was joined by former interns from their internship programs that included REU and Woods Hole PEP. Former students provided insights into their experiences in various programs.

The second day opened with a presentation and discussion of the Woods Hole PEP program, including its successes and ongoing challenges. Ideas discussed during the panel are incorporated later in this report.

This panel was followed by a plenary speaker, Dr. Brian Chad Starks (Delaware Space Grant, University of Delaware). Dr. Starks explored the social conditions that contribute to feelings of safety or discomfort in internships. Key points included:

- When you come from a place of structural inequality, there needs to be extra effort to gain a student’s trust. In particular, the mentors of minority students need to actively seek to understand the intern’s background and perspective. Effective mentors will provide support and encouragement, as well as teach scientific techniques.
- Trust issues work both ways in a relationship. Mentors can help students, but the students have to earn the mentor’s trust, as well. Social change takes place one relationship at a time. To break down barriers, students should talk to professors, and professors should reach out to students.
- Sometimes you lose social status and comfort when you do the right thing.
- Institutions should not expect students from different backgrounds to embrace mainstream culture.
- Although many scientists are introverts and may be uncomfortable talking about difficult issues, breaking down social barriers requires open and truthful conversations. Institutions can help by providing training to staff and creating expectations that a campus will be truly inclusive.

The plenary session was followed by a panel of administrators of internship programs. The purpose of the panel was to introduce participants to PEP, REU, and other programs, and to discuss the impacts of these programs, particularly with regard to how they have increased diversity in their local scientific communities and beyond. Ideas discussed during the panel are incorporated later in this report.

During a working lunch, there was a presentation by Dr. David Padgett (Tennessee State University) and a discussion of environmental justice and how geosciences are needed to address environmental problems. Key points included:

- Physical scientists need to be involved in finding solutions to environmental problems and in informing the public about the nature of these problems. However, sociologists and advocates also need to be involved to help communicate issues and engage people who are affected by environmental problems in efforts to rectify them.
- Scientists need to learn how to speak to general audiences in order to convey their information to people who stand to be affected by changes in their environments.
- Enlisting college students to teach high school students is an effective strategy for conveying information and helping high school students see positive paths they could follow. High school students can relate better to college students than to college professors.

Following the lunchtime discussion, a panel of former interns spoke about their internships and how they had shaped subsequent career choices. This was the first of 2 panels aimed at understanding the student perspective on the intern experience. In addition to identifying benefits of participating in such programs as members of underrepresented groups in the environmental/earth science fields, they also spoke to the challenges faced after the internship in various post-internship positions (e.g., graduate school, fellowship, post-doc, academia, business, federal/state/local government, non-governmental organizations) to identify ways in which internships can better prepare students for the future. Panelists also commented on post-internship challenges such as impostor syndrome, the need for skillset development, and the importance of a strong support network.

After listening to the student perspective, the Workshop participants were divided into 5 “breakout” groups to discuss specific points the former interns had raised. The breakout groups discussed the following topics:

- (1) How to help students develop confidence in themselves
- (2) How to help students develop networking abilities
- (3) How to help students develop relationships with advisors
- (4) How to address mental health issues and impostor syndrome
- (5) How to position students to be competitive for future career advancement.

Ideas developed during the breakout sessions are included elsewhere in this report.

At the end of the second day, each former intern presented either a poster or a 4-minute speed talk about their current academic or work experiences. This session provided more information about the experiences of individual interns and how their careers have progressed since their internship programs. It also served to provide an opportunity for the former interns to network with professionals in their fields and additional practice in public speaking and presenting information at conferences.

The third day started with another panel of former interns. The purpose of this panel was to focus on major milestones that occur after the internship and explore how well the internship helped prepare for those milestones. Panelists identified pivotal transition points that occur after the internship is completed and discussed attributes and skills they had necessary for academic success and success in the workplace. Former interns provided advice and suggestions for how to make best use of/optimize the research intern experience.

The Workshop participants were then divided into 5 breakout groups to discuss specific points raised by the panel members. Topics the breakout groups were asked to discuss were:

- (1) Are “gap years” helpful for science students? What kind of experiences should be sought during a gap year? Can an internship program help maximize the gap year experience?
- (2) How can relationships between an intern and their mentor be improved? Should internship programs seek to formalize peer-to-peer mentoring?
- (3) Would it help interns if programs established mechanisms to keep in touch with other members in their program? What form should that formal connection take? Are there ways to help students who are not joiners stay engaged with the group?
- (4) What kind of “soft skill” training should an internship program provide? Should such training be managed in house or by outside experts?
- (5) What advice can we give to students who are the first of their background to go into the geosciences? What pressures and expectations are they under? What kinds of decisions do they need to make? What expectations do we place on them?

Ideas expressed during the breakout groups are included later in this report.

During a working lunch, Dr. Ambrose Jearld (NOAA/NMFS, ret.) summarized the 10-year history of the PEP program. Keys to success of the PEP program include:

- bringing a critical mass of students of color so they do not feel completely out of place;
- having a wide variety of projects available within the Woods Hole community;
- committed funding that allows the program to plan for the future;
- sufficient funding to provide full scholarships, housing, and transportation;
- a core of committed and determined leaders who are willing to push others to go outside their “comfort zone” in order to effect change;
- personal relationships with faculty at MSIs who can identify good candidates for the internship program;
- designing the program to address students’ emotional needs, as well as challenge them academically, and having program organizers who are sensitive to those needs;
- expecting intellectual rigor and helping students rise to the challenges of their studies;
- helping students see and appreciate their successes; and
- making a long-term commitment so the program becomes incorporated into business as usual at the institution.

Dr. Jearld then shared his views of the challenges all such programs continue to face. He noted that technology is changing rapidly. Current and future students face a very different social environment than students even 10 years ago. Dr. Jearld asked the Workshop participants to consider what internships for underrepresented minorities will look like in the future and how we can keep up with the changes that are coming. Areas that should perhaps receive special consideration include:

- How do we help students maintain their mental and personal health?
- What structural changes would we recommend to research institutions?
- What changes in social expectations or legal requirements do we need to prepare for?
- What changes in technology should we prepare for?

Dr. Jearld instructed the last panel of the Workshop, comprised again of administrators of internship programs, to discuss how they can support each other and to consider whether a formal structure for collaboration should be established. The purpose of the panel was to take stock of what the Workshop participants had discussed over the past 3 days and to ask, “Where do we go from here?” Panel members shared their thoughts on what has worked, what hasn’t worked, and what elements are necessary to fully optimize and sustain research internship programs. Thoughts expressed by the panel members and during the discussion that followed are included in the section of this report entitled “Improving the Internship Experiences.”

The Workshop adjourned at 4:00 on June 29. All Workshop participants were invited to a reception to celebrate the 10th anniversary of the PEP program in Woods Hole.

IV. SWOT ANALYSIS

On the first day of the Workshop, participants shared their views of the strengths, weaknesses, opportunities, and threats (known as a SWOT analysis) relating to internship programs for underrepresented minorities. The SWOT analysis did not focus on any particular program. Rather, the goal was to consider the general situation of such programs and actions the Workshop participants thought would improve them.

Identified strengths included:

- Internships in which students can engage in real research can be a transformative experience. They can show students a road to a career in science and can give them the confidence that they can succeed. Doing research provides training in the process of science and in planning and executing projects, a skill that is helpful in any career.
- There is a core group of institutions and funding agencies dedicated to improving diversity in the geosciences. Partnerships and collaboration among these institutions can offer students a broader range of research topics and can show alternative career paths. These institutions provide support for each other and can share information about best practices and concepts that do not work well.
- Most (though not all) mentors in the internship programs are deeply committed to helping their students succeed, both during the internship and beyond. Former interns attending the Workshop often commented on how important it was that their mentor believed in them and helped them surmount challenges. In many cases, it was the support and encouragement from a single mentor that persuaded the student to choose a career in geosciences.
- Many internships provide opportunities for students to network with multiple scientists, not just with their mentors. Programs like “Take a Scientist to Lunch” help to humanize science, thereby making it easier for students to visualize themselves as scientists.

- Bringing together a group of interns from multiple institutions helps students feel more comfortable during their internships. They learn that they are not alone in their interest in science and that they are not alone in facing challenges to achieve their dreams. The camaraderie is particularly strong if students live together, which makes it easier to spend social time with fellow interns.
- Some internship programs have been operating for years. There is now a significant number of graduates from these programs who can provide advice and support to current interns. Graduates of internship programs know what the intern is facing, and it is easier for interns to trust their advice. “Near peer” support is highly effective in encouraging students to continue in science, as they provide role models that minority students can relate to.

Identified weaknesses included:

- Qualified students can be reluctant to participate in internships for a variety of reasons, some of which are personal and difficult to address. These may include:
 - feeling uncomfortable taking the risk of traveling to a new location or of committing to work at a PWI;
 - pressure from parents to seek careers in better known or more remunerative fields, such as medicine;
 - social pressure from friends to stay in their community;
 - fear of failure and lack of confidence in one’s own abilities;
 - anxieties about being isolated during the internship; and
 - the need to spend a summer making money.
- Many staff of internship programs are not trained or equipped to deal with student mental health issues, yet internship programs for underrepresented minorities can be very stressful. Recognizing, acknowledging, and helping students cope with stress can turn a bad experience into a good one. A student who feels that their research experience is a positive one is much more likely to continue in the geosciences.
- When funding is uncertain, it is difficult to plan for long-term success. Steps which could build a successful program may not be taken if the immediate cost is high and the payoff would not be seen for years.
- The selection process for internships often depends on standardized criteria (such as grade point average (GPA)) or on personal references from known colleagues. These favor students who are from institutions that already have relationships with research institutions.
- Because practitioners in the geosciences come from similar backgrounds, their contacts at other institutions tend not to be diverse. Finding minority students takes extra time, which scientists may feel they do not have. Programs that aim to recruit minority students may not have the right contacts among faculty at MSIs.
- There is a tendency for researchers to say, “We do not care about what color a student is; we just want the best.” This is often said without examining how one measures “the best.” Measures such as GPA or the reputation of a college that a student is attending fails to account for social inequities such as the requirement to work during college or to attend a less expensive institution. Just wanting “the best,” therefore, can be a

rationale for maintaining the *status quo*. Taking the student with the highest GPA disadvantages students who need to work during the school year and cannot devote as much time to studying. (However, students who work their way through college come with greater experience overcoming obstacles and more valuable experience outside academia.)

- Mentors at PWIs may feel awkward working with students of color. While this could be from overt racism, it can also be due to anxieties about inadvertently saying the wrong thing or doing something the student will misinterpret.
- Students may feel excluded from a program based on the stated application criteria, and therefore may not even apply. A representative from NOAA reported that students of color were more likely to drop out during the application process, but if they complete the application, they are just as likely to be selected as anyone else.
- Highly qualified minority students may have multiple internship opportunities.
- A belief persists among some researchers that the training is not as rigorous at MSIs as it is at the best known PWIs.
- Fundamentally, efforts to increase the representation of minorities in the geosciences represents a deliberate effort to change society. It requires work to change the *status quo*. Such efforts can encounter resistance.

Identified opportunities included:

- Events like the Workshop can strengthen collaboration and mutual support. Such events can help people who run internship programs for minority students speak with a unified voice and perhaps develop a phrase that describes all the internship programs.
- Greater collaboration among internship programs could allow programs to find the best fit for a given candidate. There could be joint recruiting sessions, as well.
- Programs that fail or are struggling can provide useful information about what works and what does not.
- Program administrators and interns could take better advantage of social media. Electronic communication can provide a “common space” for the community of administrators of internship programs and can help students keep in touch with and provide support to each other after the internship program is over.
- Some faculty members consistently provide strong support to students. Time spent assisting and advising students detracts from time spent doing research. Institutions should find ways to support these faculty members, such as giving awards and taking student support into account in promotion considerations.
- Faculty at MSIs know which of their students would benefit from research internship programs and can be a great recruiting tool for internship programs. Establishing relationships with faculty at MSIs should be a high priority for programs seeking to recruit minority students for internships.
- There are many professional societies trying to improve the diversity of sciences. Internship program administrators can tap into these societies for assistance in advertising internships and finding students. Attending conferences of these societies is a good way to find colleagues who can help locate good candidates for internship programs, but it is important to have a consistent presence at meetings. Showing up just once is not sufficient to develop strong relationships. (A list of professional

societies mentioned during the Workshop as sources of support can be found in Appendix C.)

- There is now a cadre of former interns who are making a career in the geosciences and who want to help the next generation of students. Former interns are highly effective as spokespersons to recruit and encourage new students, providing they are willing to do so. (However, not all former interns are comfortable recruiting or mentoring students, and in the competitive world of science, it could be detrimental to one's career to spend time speaking to students rather than performing research. An institution should not assume that former interns will serve as spokespersons for a program.)
- Researchers in the geosciences may not be fully aware of the social aspects of internships and the kinds of barriers students face. Consulting with sociologists may help to develop a more supportive learning environment for students.

Identified threats included:

- Some people are not comfortable with diversity and do not want to see change. These people can thwart progress by making a student feel uncomfortable in the research environment.
- People may not recognize the value of diversity in solving complex research problems, and therefore may not be willing to make the effort needed to diversify.
- The image many people hold of a scientist is a White male. This makes it difficult for students from underrepresented minorities to envisage themselves as scientists.
- Geoscientists do not often participate in events in predominantly minority communities, and when they do speak to minority communities, they often do not connect well with their audience. Therefore, they are not very successful in communicating the importance of their work, and they don't generate much interest in pursuing a scientific career.
- Negative views expressed in the media and by public figures discourage student interest in science.
- The organizers of some of the most successful intern programs have retired or are nearing retirement age. Others are becoming professionally exhausted. Finding the right people to take over these demanding and crucial roles may be difficult.
- Technology is continually changing. If intern programs do not keep up with student expectations of how to use technology to communicate and work, we risk losing their interest.
- It may be difficult for students to explain their research, and why it matters, to family and friends. If the people who are important to the student do not perceive a value in the student's interests, it makes it harder to commit to a career in that field.
- Some efforts to increase diversity are not well conceived. They may be designed without careful consideration of the racial and cultural differences that need to be surmounted for a student to feel included in a research community. Experiences with these programs can make students wary of all intern programs.

V. IMPROVING THE INTERNSHIP EXPERIENCE

Finding Students

Internship program administrators said a major challenge is finding students who are interested in doing research in geosciences. Their usual ways to advertise for students do not seem to be reaching as many students at MSIs. It is particularly important to find students who have strong potential but who are struggling with the normal academic process. For example, a student who has to work full time as well as go to school may not be doing well academically and may not be considering going to graduate school, but could be a great scientist.

Some people hold a belief that if an institution wants to increase its percentage of minority students, it will have to lower its standards. This is not true, and debunking this myth is a strong motivation for increasing diversity in a program. However, finding the best students may require an institution to take a hard and holistic view of the characteristics of a successful scientist. Previous academic success is only one trait required for a successful career in science. Attributes like persistence, time management skills, creativity, and a willingness to work long hours are just as important to success as the academic achievement measured in standardized tests, but they are more difficult to quantify. Students who have overcome obstacles to finish college may have the determination needed to overcome future obstacles in graduate programs and in their careers. People who have experienced discrimination may work exceptionally hard to prove the critics wrong.

Finding the most talented students may be affected in the following ways:

- Institutions may not have as many contacts among faculty at MSIs than at PWIs. Busy scientists and program administrators may find it easier to reach out to colleagues they already know than to make new contacts.
- Students at MSIs may be more focused on careers in better known, more lucrative fields, such as medicine, and may not be interested at first in a research experience away from home in a field they have had little interaction with.
- A particular challenge faced by several of the institutions is finding male students who are interested in conducting research. Many internship programs have substantially more female than male applicants (this is an issue with majority populations, as well).

Steps identified to find qualified students include:

- Cultivate and maintain contacts with faculty at MSIs. Faculty members know their students and are often looking for opportunities to enhance their educational experiences. Institutions running research internship programs can get help in finding students from faculty members, providing faculty members believe the program will benefit their students. To be effective, this requires an ongoing relationship with the faculty member. Consider visiting the campus every year and giving guest lectures to get to know the students better. Also consider inviting the faculty member to visit the research institution during the internship program so they can see how their student is doing and make connections with researchers at the host institution. Programs might seek funding to provide financial support for faculty to visit the hosting campus.
- Be prepared to address concerns of faculty and administrators at HBCUs who may have concerns that their students will not be fully appreciated and adequately supported at PWIs.

- Make use of the many professional groups focused on encouraging minorities in science. Take the time to attend conferences of such groups to meet students and other scientists. Having a table at these conferences can be a direct recruiting tool (see Appendix C).
- Seek help from program alumni in finding future candidates. Graduates of research internship programs will tell fellow students about the program upon returning to their home institutions. An institution could capitalize on these informal contacts by letting their interns know that it would appreciate help in locating future interns. Consider requiring interns to give a talk about their research at their home institution in order to receive the final payment of the intern's stipend. This gives the intern experience in public speaking and spreads the word about the program.
- Reach out to potential applicants early in the application process to make sure they know that their application is welcomed. A NOAA spokesperson reported that minority students tend to drop out of the application process at a greater rate, but those who complete their applications are just as likely to be accepted for a NOAA internship as anyone else.

Selecting Students

Selecting students is a sensitive aspect of an intern program. One wants to be sure the student can work to the standards of the host institution and that they will not feel so unprepared that they are miserable during the experience. At the same time, standard measures of selection may disadvantage some of the best candidates. For example, GPA is often used as an indicator of academic ability. A student who works full time in addition to studying may have lower grades than someone who has the financial backing to concentrate full time on their studies. Scholastic Aptitude Test and Graduate Record Examination scores are similarly flawed. One Workshop participant told of an undergraduate who had presented original research at scientific conferences but who was turned down by graduate schools because their GPA was too low. Several former interns who are now in graduate school or beyond described how they struggled with their GPA because they had to work. Their internship programs took a risk on them and turned their lives around.

Workshop participants suggested the following steps an institution could take to create a selection process that gives more weight to attributes other than standardized scores:

- Establish a policy to take some risks on students. In programs lasting more than 1 term, it may make sense to admit the student with the understanding that participation will be reviewed at the end of the first term. Try to select some students who seem unlikely to succeed but who are eager for the experience. These students may have the love of science and the determination to succeed in a career.
- Include questions on an application that allow the student to discuss the challenges they have faced. Questions like, "Is there anything about you that you would like us to consider?" or "Describe a challenge you have faced," will help identify students who do not fit the usual mold. Also, asking nontraditional questions like, "How do you feel about sharing a room?" and "What do you think you would bring or contribute to the internship experience?" can help get a better sense of the student's character.
- Establish a selection panel rather than having 1 person make the decisions. The selection panel should comprise a diversity of backgrounds and should be familiar with the program's goals and objectives. At a minimum, 2 people with different perspectives should review each application.

- Conduct interviews by phone or Skype. Do not just consider a paper application form. A selection committee will have a much better sense of a student's abilities and personality from talking with them.
- Allocate enough time to give a careful review of all applicants. When decisions have to be made quickly, one tends to make decisions on simple criteria rather than trying to evaluate the whole person.

Persuading Students to Participate

One might think every student who wanted to go into the geosciences would jump at the chance to spend a summer doing research at a prestigious institution. This is not the case. There are a number of reasons why a student may be reluctant to accept an invitation for a research internship. These include:

- The student may be reluctant or anxious about working at a PWI and/or living even for a few weeks in a community that is predominantly White. It takes courage to subject oneself to feeling out of place and risking discrimination. Social expectations are different, topics of conversation are different, and the student may feel awkward about getting into social situations where they do not know the rules.
- Students may feel that they do not really belong at such an institution. Several former interns talked about "imposter syndrome" and reported that they struggled with a sense that they did not deserve the internship. Students may view the internship as a gift and an honor but not something they had earned for themselves.
- Frankly, the student may never have heard of the institution. One workshop participant who was well along in his career said he was offered an internship at WHOI early in his studies. He had never heard of WHOI but came, anyway, and was surprised to find himself at a world-class institution. He also said his lack of awareness helped keep him from feeling intimidated.
- Students may need to work during the summer to earn money for college.
- Students may face resistance from parents. Parents may be protective of their child and not want them to risk facing discrimination at a PWI. One faculty member at the Workshop told of his mother saying, "Real men work with their hands," because she wanted to protect him from the pain of what she viewed as likely failure if he pursued a career in a predominantly White field. Parents may not see the value of a career in geoscience research—they may be pressuring their child to enter better known or more lucrative fields like medicine instead.
- Students may face resistance from their peers in their community, especially students who live in communities where going to college is not expected.
- A dilemma for summer internship programs targeting Alaskan natives and other communities dependent on self-sufficiency is that summertime is hunting season, and students may be reluctant to miss it or may need to hunt to help provide food for the winter.

Key to persuading students to accept the internship is making sure they feel welcome and that the institution really wants them. If at least 1 person from the program can develop a personal relationship with each student before they travel, this can go a long way to reassuring them that there will be someone at the institution to support them. Anything that can reduce the fear of the unknown will help reduce the anxieties that could keep a student from accepting an internship.

Some steps include:

- Do not force students to choose between making money for college and the internship. Institutions should provide a stipend for students and, if necessary, free housing (or find volunteers to provide housing). Although an institution may be able to find good interns who will work on a volunteer basis, such programs exclude students who must work during the summer and hence perpetuate the bias toward people with means.
- Mentors should call the students to welcome them to the program, discuss their research projects, and begin building a relationship. Because the mentor/intern relationship is so important, if the student feels they will be able to work with the mentor, they are likely to agree to come.
- Programs should strive to accept enough minority students that the students will not feel totally isolated in a predominately White community. If it is possible to house the interns close to each other so they can socialize, this improves the sense of camaraderie and builds a supportive network for students that can last beyond the internship.
- Institutions should provide information to students about the benefits of careers in the geosciences and the range of possible careers that rely on skills and knowledge acquired by studying science. For students who think they need to attend medical school, mentors should not try to turn them from that course but can plant the idea that a career in geoscience research is a great “Plan B” if one does not get into medical school. A summer of research experience will also strengthen a medical school application and will provide the medical student (and eventually the physician) with skills and knowledge that will make them a better physician.

Ensuring a Positive Intern Experience

An internship program will be most successful in persuading students to go on in the geosciences if the students feel both intellectually challenged and psychologically safe during the internship. Workshop participants expressed no doubts about the ability of research programs to challenge students intellectually, although they did advise that programs should incorporate opportunities to show off what they have accomplished during the internship. This will give the students a sense of accomplishment and build confidence, both important aspects of encouraging students to continue in the geosciences.

Workshop participants discussed at length the psychological aspects of internships. Virtually all of the former interns spoke of feeling profoundly uncomfortable during the internship, especially at the beginning. There is a variety of reasons for this, including:

- feeling vulnerable in a predominantly White society, especially if their past experience has involved significant, overt discrimination;
- self-doubt about whether one is up to the challenge (“imposter syndrome”);
- distrust of the people in the program and the institution—mentors may look like someone who had discriminated against the student in the past, so students are wary until trust is established;
- doubts about how committed the research institution is to real change—students may suspect that they have been brought to campus as a token of diversity, not because the institution really is seeking to diversify, and this suspicion will become stronger if the student encounters any racism from any source on campus;
- embarrassment about economic status;

- feelings of isolation during conversations about activities students have not experienced—one participant told a story of feeling left out and uncomfortable during a conversation about the sport of curling because he knew nothing about curling and could not join the conversation without exposing his ignorance;
- feeling that they are always being judged because they are different and researchers are looking to see how they “measure up”—the judgments reflect not only on the intern as an individual but on their race or cultural group, so the students may feel both a sense of responsibility and a frustration that those judging start with pre-conceived notions of their abilities, experiences, and behavioral norms;
- reluctance to try new things for fear of public failure, so they may not take full advantage of opportunities presented in conjunction with the internship;
- feelings of discomfort when it comes to asking questions that might betray a lack of experience they believe White students have by their age—one former intern talked about the fear of asking “tiny questions” like, “Does the bus take cash?” but without getting answers to such questions, the intern’s experience is more limited and more stressful; and
- an inability to see the value in their research experience.

Research institutions may believe providing a research experience is sufficient for an internship program, but if the goal is to encourage diversity within the geosciences, the institution should strive to make the students feel welcomed and valued, as well as teach research techniques. Accordingly, programs should incorporate measures to make the students feel comfortable within the research community and should design programs so students leave with a feeling of accomplishment. Measures to accomplish this include:

- Hire an intern coordinator who should be not much older than the students and who can help the students adjust. In addition to managing the logistics of the intern program, the coordinator should be able to help students adjust to the new environment. The coordinator should be someone the interns can relate to—someone students feel comfortable asking the “tiny questions” and who can help identify any major problems before they get out of hand. If the students live together in a dormitory, it is advisable that the coordinator live with them.
- The program must commit to protecting the mental health of the students. Talk with the students at the beginning of the program about concerns they may have. Let the students know their mentor will not expect them to know everything the day they enter the lab. Make sure students know it is okay to ask for help. Identify potential issues like imposter syndrome or feelings of being out of place so interns can have a name for what they are feeling and know that others have felt the same thing. Have resources available in case the students need counseling.
- Provide effective diversity training to the members of the research community. Make sure members understand that the students are taking risks as well as getting an opportunity. Discuss how language can be hurtful, even if it is not intended to be. Make sure the research community understands the institution’s firm commitment to diversification, and enlist their help in achieving it.
- Program administrators should meet with each student every other week to check on how their experience is going.

- Ensure that there is a critical mass of minority students so they do not feel isolated throughout their internships.
- Plan some fun, non-stressful activities for students and mentors to help them feel comfortable with each other as people in addition to laboratory partners.

The Mentor/Student Relationship

A strong relationship between a mentor and an intern is key to convincing the intern that they can succeed in the geosciences. Many of the former interns at the Workshop thanked their mentors publicly and said it was the mentor's support and encouragement that gave them the confidence to continue in science. A good mentor teaches more than scientific theory and technique. They show that scientists are human and can provide advice and support that helps the student surmount hurdles. Workshop participants spoke of how powerful it was to feel that their mentors "had their backs." In return, the mentor can get the deep satisfaction of helping to build the next generation of scientists, thereby passing forward the advice and support they received during their own careers.

Communicating across racial, ethnic, cultural, and generational boundaries is challenging, but it can be an enriching experience for the mentor as well as for the intern. It takes time, patience, courage, and sensitivity to build a relationship based on trust. The Workshop participants identified hurdles to open communication between a mentor and an intern, including:

- Minority students may have customs and behaviors that differ from students at PWIs. A faculty member from an MSI stated the issue simply as, "My students may not act like your students." Mentors should not expect interns to "dis-identify" with their community or culture while on campus.
- Interns may have been subjected to what they perceive as discrimination from people who look like or have similar positions as the mentor. Students therefore start from a position of distrust, which needs to be overcome.
- Students may feel awkward asking questions for fear of showing that they do not know something that everyone is "supposed" to know. Therefore, mentors may not be aware of what the intern knows or does not know.
- Students may be unaware of social expectations at the institution. Social conventions like punctuality or when it is appropriate to interrupt someone vary across cultures.
- Mentors may be busy with their own projects or have deadlines that need to be met, so they cannot give enough attention to the intern to build a strong relationship. Lack of attention, which the mentor may consider regrettable but unavoidable, can be interpreted by the intern that the mentor does not care about him/her.
- In some labs, the research mentor has another lab member function as a co-mentor or sub-mentor. It is important that co-mentors are also trained in and aware of the program philosophy. Everyone in the lab has the potential to make the intern experience difficult or rewarding for the intern.
- Mentors may feel uncomfortable talking about race, ethnicity, or cultural differences for fear of saying something that offends or hurts the intern, and interns may not feel that it is appropriate to bring up such issues. Therefore, major concerns may be left undiscussed and unresolved. Mentors who are not comfortable with cultural differences may avoid important discussions with the intern and may not share concerns with program staff.

- Students may be afraid to try new things or to express ideas for fear of failure. Therefore, they may appear reticent or disengaged to the mentor.

These are formidable hurdles. They are unlikely to be fully resolved in the course of a single internship. However, there are steps that can be taken to help mentors and students develop a good relationship. The key is to strive to develop open and trusting communication between the mentor and the intern. Generally speaking, mentors—with their greater experience and authority—will need to take the lead in developing this atmosphere of trust. Ideas expressed at the Workshop on how to facilitate this include:

- Provide training to the mentors in cross-cultural communication before the beginning of each internship. Mentors need to understand that interns from minority groups may perceive certain statements differently than they are intended and that, regardless of the intent, some statements can be hurtful. Training in cross-cultural communication should not be limited to identifying phrases to be avoided, however. It is more important to provide training in how to discuss difficult topics and work through miscommunications. Mentors should not sidestep difficult conversations, but they need training in how to engage in such conversations constructively.
- Interns benefit from having several mentors—a Research Mentor for the intern’s research project and a Program Mentor to guide the student in other aspects of the program. The Program mentor (or someone on the program staff) should be in close communication with the Research Mentor.
- Mentors need to understand that they have an opportunity with minority students not only to teach research techniques and get help with a research project. They also have the opportunity to help shape the future workforce of the geosciences and, indeed, to take a step to break down racial, ethnic, and cultural barriers that place so much stress on our society. Many elements of effective mentoring (e.g., goal setting) are broadly applicable in all kinds of mentoring, but mentoring across lines (such as race, gender, and generations) presents additional issues, which should be acknowledged and embraced. It is important, for instance, not to attempt to be “color blind” but to acknowledge and learn about issues that affect students of color interning at PWIs.
- Mentors should strive to support the intern as a whole individual, not just as a research assistant. This will be facilitated by getting to know the intern through interactions outside the laboratory, including going to lunch together or inviting the intern to join an extracurricular activity.
- Mentors should talk to students about their goals. If, as with many students, their goals are not fully formed, mentors can help interns talk about their interests in order to help them shape their goals. If mentors are willing to review a student’s CV or personal statement, this can both benefit the student directly and help the student feel that the mentor supports their future growth.
- Mentors should make clear to students at the outset of the internship that there are no questions too small or large to ask. Seek to establish a relationship in which the intern feels safe to raise any topic. (Note: One workshop participant pointed out that the ability of a mentor to have a truly private conversation with an intern is becoming more difficult. Because of court cases regarding allegations of sexual assault by faculty members against students, universities are changing requirements about what mentors can hold in confidence. On some campuses, mentors are required to report on the

nature of every conversation with interns, so that privacy cannot be assured. Professors may risk dismissal if they fail to comply with university requirements.)

- If a mentor thinks a student is unhappy or is disengaged from the research program, they should consider talking to the program coordinator about their concerns rather than ignoring possible warning signs. On some topics, program organizers may be able to approach the intern more easily than a mentor can.
- Mentors should be encouraged to share with interns stories of their own failures and setbacks. Students often think a single significant failure will ruin a career and that everyone who is an established scientist always knew they wanted to be a scientist.

Preparing Students for the Future

A major topic of discussion at the Workshop was how to use the internship experience to prepare students for challenges they would face later in their careers, such as getting into graduate school or getting a job. Former interns identified a range of skills or knowledge that would have helped them in their careers, including:

- improving writing skills;
- a better understanding of the process for publishing research results;
- learning how to apply for grants and where to find grant opportunities;
- learning how to conduct literature searches;
- learning the importance of networking, developing networking skills, and using the internship to broaden one's network;
- gaining experience in presenting research results at conferences;
- practicing public speaking;
- improving time management skills;
- identifying and practicing leadership skills;
- figuring out how to balance their personal and professional lives;
- knowing how to negotiate a salary offer;
- identifying and focusing one's goals, including understanding how to create an Individual Development Plan;
- improving one's sense of self-confidence;
- learning conflict management techniques, especially how to deal with bullies at work;
- managing stress levels;
- learning to say "no" to extra requests for work beyond one's job description;
- better understanding the politics in a workplace;
- using a personality assessment like the Meyers/Briggs Type Indicator or Skillfinder International;
- learning how to cope with failure or rejection; and
- knowing how much sacrifice is needed to finish graduate school and succeed in a career in the geosciences.

There are several ways internship programs could provide experience that will help students with future life situations. These include:

- Provide an experience that is both challenging and achievable. Requiring students to give a talk or poster session at the end of the internship about their research project

motivates students to work hard during the internship and gives them a sense of accomplishment at the end. It gives them practice in public speaking and builds confidence that they can make it as a geoscientist.

- Hold a weekly evening session to talk about skills needed for career advancement. Such sessions could explain the need for networking, discuss the process of getting a paper published, demonstrate literature search techniques, or help the intern create an Individual Development Plan.
- Have sessions to practice and critique public speaking skills. For example, sessions could have each student give a 30-second “elevator” speech and have other students critique the delivery, or they could do somewhat longer sessions aimed at translating science for general audiences.

While the above list comprises career skills all students need to learn, Workshop participants identified one significant topic that is particularly meaningful to students from underrepresented minorities: namely, how to deal with the stresses and expectations that come with being one of the first with their background to go into their field of science. Such people can be considered pioneers in their fields. Extra challenges they face include:

- Being the first person from any group means that person will be judged based on stereotypes of that group, at least until they can establish relationships based on who they are as individuals. They may find that their ideas are not taken seriously, and they may feel extreme pressure not to fail because failure could reinforce stereotypes. Minority students in these situations are likely to overcompensate and work extremely hard, increasing the chances of a successful career but also increasing the risk of “burning out.” They may strive hard to fit in and reduce tensions in a laboratory team, but they may feel at the same time that they are betraying their own culture.
- Institutions where they work may look on pioneers as representatives of their communities and expect them to serve as liaisons to that community. Pioneers are likely better able to communicate with people from the communities they grew up in, and many of them want to give something back to their communities and to help the next generation of students. However, they may not want to engage in the kinds of outreach activities envisaged by their home institutions. They may be introverts who do not like public speaking, or they may believe that time spent in outreach to their community is time not spent conducting their own research, writing for grants, or establishing their reputation as a scientist.
- Friends and family in their community may not understand or appreciate the career choices scientists have made. The student’s support network back home may think the student is “selling out” by joining a PWI. This can cause the young scientist to feel that choosing a career in the geosciences would cut them off from friends and the culture they are comfortable in.

Many workshop participants had experience being a pioneer in their fields. Some advice to students facing this dilemma included:

- If you are getting resistance from your old community, build a new community. Seek support from organizations that have formed to encourage students like them. Keep contact with others who are going through similar things.

- Educate and advocate for others who are facing similar challenges. As a pioneer, one is a role model for younger students who aspire to a similar career. Help them if you can. Mentor younger colleagues, and help efforts to recruit more minorities into the geosciences.
- Speak up for yourself and for others.
- Take pride in being an agent of change.

Post-intern Follow Through

Even though a research internship can be a transformative experience, students go back to their former jobs and companions upon completion. This can steer the student away from the research track. Workshop participants considered steps a program could take to keep students focused on science. Ideas included:

- Cover the costs of attending a conference of a recognized geoscience organization after the internship is complete. This will allow a student to present their research and will provide a networking opportunity.
- Develop a social media site for interns to keep in touch, or encourage interns to establish their own site. This will help them support each other after their return to home institutions.
- Encourage interns to join professional organizations that can provide support and encouragement and keep them engaged in science.
- Talk with interns near the end of the program about resistance they may encounter upon their return to their home communities. Verbalizing the potential disconnect between their research experience and the experience of other students who did not travel outside their community can help students understand that they are not alone if they feel conflicted about the experience.
- Programs should try to keep in touch with former interns. Check contact information yearly to make sure it is up to date.
- Encourage mentors to reach out to former interns to see how they are doing.
- If the student is interested in another research opportunity, try to find a good fit for that person through networks of program administrators.
- Programs might seek funding to establish second-year and third-year opportunities such as additional internships and/or fellowships.

Institutional Considerations

At the beginning of the Workshop, the heads of each Woods Hole scientific institution expressed their determination to increase diversity within their institutions. Throughout the Workshop, participants made observations that could help institutions be more successful at achieving diversity and inclusion of minorities. Key points were:

- Be aware that it is rare for a person of color to feel completely comfortable in a PWI, no matter how long he or she has been there or how committed an institution is to inclusion.
- Adding staff from diverse backgrounds is a necessary but not a sufficient step to achieving a truly diverse institution. Staff need to feel included as equals. They need to feel welcomed in the research community. Their ideas need to be considered and

their opinions valued. They need to feel comfortable and safe from discrimination. This will require that institutions actively change their current culture and engage all staff in helping minority members feel at home.

- Institutions should adopt and enforce policies that support the inclusion of underrepresented minorities. As one Workshop participant put it: If you do not change policy, you do not change much.
- Changing institutional practices and culture is not easy. Progress will be fastest if the leadership of the institution fully and publicly embraces a cultural shift toward inclusion and models the behaviors they expect others in the institution to practice.
- Diversity training should be provided for all staff on a regular basis. Training should allow for difficult conversations to occur in safety. Institutions should seek advice from sociologists, human resources professionals, or other experts in diversity and inclusion to understand the needs of minority staff and research interns, and to understand how majority staff can be encouraged to become allies in the diversity and inclusion effort.
- Minority staff need to know they have someone high up in the organization who supports them. They need to feel free to take concerns about the actions or attitudes of other staff members to someone who has the power to address those concerns. Minority staff should not fear that their jobs could be affected if they speak up when they are subjected to unwelcoming behavior, whether it is overt racism or unintended micro-aggressions.
- Be alert to added expectations placed on minority staff and students. Do not expect them to serve as representatives of their communities, although many of them may be willing to do so.
- Confront the assumptions (sometimes hidden) that are barriers to diversity and inclusion. For instance, it is critical to address the mistaken idea that “if we want diversity, we need to lower our standards.” This could mask measures that maintain the *status quo*, especially if standardized scores and institutional reputation are used as criteria for selection of research interns. Institutions should take a holistic view of characteristics needed for a career in the geosciences, such as the ability to manage time, determination, and creativity, as well as academic achievement.
- Find ways to compensate faculty for taking on interns. Make the training of an intern from an underrepresented minority a career-enhancing activity.
- Provide training for mentors in what to expect and how to communicate with and support their interns.
- Measure success not only by the number of interns from minority serving institutions or by the number of interns who continue on in the geosciences. Success should also be measured by changes in the attitudes of mentors.
- The effort is worth it to create an institution at which all staff feel they can contribute equally. This will enhance the flow of ideas and enthusiasm for the research. It can help the institution communicate its research and its mission to a broader audience. And, by facilitating meaningful conversations across boundaries imposed by racial, ethnic, cultural, gender, and age differences, it will broaden the perspectives and enrich the lives of all its staff.

Research Internship Program Considerations

The focus of the Workshop was how to improve research internship programs for underrepresented minorities, with the goal of increasing diversity and inclusion in the geosciences workforce. Ideas that were expressed during the Workshop included:

- Develop strategic partnerships with institutions and faculty members that can help find and encourage students for the internship. To be most effective, such partnerships need to be based on long-term relationships that are actively maintained. Program officials should consider visiting the partner institution on a regular basis. Mentors from the intern program could travel to the students' institutions to give lectures and meet students. Collaborative projects between the faculties of both institutions should be encouraged. Program officials can meet many potential collaborators by attending professional meetings where MSI faculty are in attendance. These collaborations will be helpful with recruitment and also with program development as the program staff benefits from the expertise that exists within the HBCU faculty and administration.
- Recruiters should be sent to HBCUs and other MSIs to meet prospective students. This can help students feel that there is a person in the program who they know and trust.
- Broaden the range of internships that are offered to students by partnering with other research institutions in the area. The PEP program and the REU at California State University in Monterey both have successfully partnered with multiple institutions so the students have a wide array of interesting projects to select from.
- Be willing to take some risks on students. Understand the challenges each student is facing and decide if the individual has the drive to succeed.
- Consider expanding current programs. Could summer programs be extended to a full year opportunity? Could a 1-year program be turned into one that lasts 2 or more years?
- Consider asking alumni of the internship program to help explain the program to other students. Graduate interns could speak at their alma mater as part of the internship program. Undergraduate interns could be asked to talk to students at their high schools. This will provide practice for the interns in public speaking, increase the pool of students who know about the research program, and could help the intern learn about the joys of teaching. "Near peer" learning can be more effective in garnering interest in the internship than a lecture by a distinguish researcher.
- Beware of relying too heavily on a small group of mentors. Although consistency is valuable in the program, mentors can burn out.
- Hire a fulltime coordinator to work with the students during the application phase through the completion of the internship and follow up. The coordinator should be a person who the interns can trust and confide in.
- Create a "take a scientist to lunch" program through which any scientist at the institution and any intern in the program can go to lunch. This will help the students build a network and help students see that scientists are people, too.
- Consider hiring a "mentor for life skills" or training the internship coordinator to provide advice to students on life skills. A mentor for life skills could help students maintain emotional balance while explaining rules of etiquette, the importance of networking, and potential difficulties in returning to their communities.

- Actively look for ways to reach out to the shy and “non-joiner” interns. Check to make sure things are going okay for those who might not bring concerns to anyone’s attention on their own.
- In multiyear programs, consider assigning a second-year student to help each first-year student adjust to the rigors of the program.
- Set up a social media site for each class so they can keep track of each other and continue to support each other through their academic careers.
- Deliberately schedule networking opportunities into the internship program.
- Be prepared to provide external help for mental health issues.

Considerations for Student Interns and Former Interns

Throughout the Workshop, former interns spoke of the positive and negative aspects of their internship programs, and Workshop participants offered advice. Here are points for interns to consider that were not captured elsewhere in this report:

- It is okay to take a “gap year,” which could be better described as an “individual development year.” Taking a break from one’s studies helps one to explore other options and find out what is important for them.
- Failure is a part of life. Indeed, we learn more from failures than from successes. Virtually everyone has setbacks. It is okay to try but fail.
- Keep your mental state positive. Take a break when you need to.
- In balancing the needs of your career with the expectations and demands placed upon you as a pioneer, there is no single right course to take. Any way that it makes sense to you to balance your life choices can be right. The only wrong choices are those that make you feel uncomfortable.
- As a minority student in the geosciences, you will be a role model for others who are also interested in these topics. If you believe in yourself, you will help others believe in themselves. If you act with courage and determination, you will help others follow in your footsteps. Remember, courage does not mean the absence of fear; it means doing something worth doing even if you feel afraid.

Other Topics and Next Steps for Workshop Participants

Many Workshop participants said they were glad to have participated and were energized by the exchange of ideas and the sense of camaraderie during the 3 days. There was a sense that meetings like this should take place more often, although the details of the next such meeting were not decided. There was a generous offer that there could be a continuation of discussions at the Fall meeting of the National Technical Association, which will take place in Baltimore from September 25-27, 2019. (For more information, see <https://www.ntaonline.org>.)

The founders of several of the most successful research internships for underrepresented minorities are getting old or have already reached retirement age. The Workshop acknowledged their leadership and the loss that their absence would cause but provided no specific advice on how to find replacements.

Marlene Kaplan, of NOAA’s Office of Education, gave a presentation to inform the former interns at the Workshop about NOAA’s opportunities for fellowships and other internships. NOAA funds 4 cooperative science centers at MSIs. These programs have funds to support research internships. NOAA provides 2-year Knauss Fellowships for students to work in Congress or the

Executive Branch, and each National Estuarine Research Reserve has a new Margaret Davidson Graduate Fellowship. Many fellows find jobs in NOAA at the end of their fellowships. NOAA also has several undergraduate internships available, the most notable being the Ernest F. Hollings Undergraduate Scholarship. See <https://www.noaa.gov/office-education>.

APPENDIX A

AGENDA

CONFERENCE THEME: OPTIMIZING THE RESEARCH INTERN EXPERIENCE TO BUILD INCLUSION AND DIVERSITY IN THE GEOSCIENCES WORKFORCE

Thursday, June 27, 2019

12:00-5:00 p.m.

National Academies Jonsson Conference Center

11:15 a.m. – Vans depart from Holiday Inn for National Academies of Science

11:00 a.m.-12:00 p.m. – Registration at Main House

12:00-12:45 p.m. – Working lunch

Welcome and Greetings: Peg Brandon, Sea Education Association (SEA) President and Woods Hole Diversity Initiative (DI) Chair

1:00-1:30 p.m. – Panel: “Who We Are in Woods Hole” at Carriage House

Objectives:

- Introduce Workshop members to the Woods Hole Diversity Initiative
- Begin the identification of issues to be addressed at the workshop

Panelists: Peg Brandon (President, SEA); Rob Thieler (Center Director, USGS); Max Holmes (Deputy Director, Woods Hole Research Center); David Mark Welch (Director of Research, MBL); Nicole Cabana (Deputy Director, Northeast Fisheries Science Center); and Margaret Tivey (Vice President for Academic Programs, WHOI).

Moderator: Peg Brandon

Facilitator: Harold Bibb, Associate Dean Emeritus, University of Rhode Island (Dr. Bibb will facilitate all panels Thursday through Saturday)

1:30-3:00 p.m. – Panel: “Investing in Capacity Building in the Geosciences”

Objectives:

- Provide an overview by participating Intern Program Leaders
- Offer capacity-building philosophies and approaches
- Consider converging practices, philosophies, and approaches
- Explore ways to strengthen programs (funding, recruitment, selection, mentoring, partnership responsibilities, growing lasting connections)

Panel 1 Panelists: Paulinus Chigbu (UMES), Carol Pride (Savannah State University), Allen Mensinger (University of Minnesota–Duluth), Corey Garza (California State University–Monterey), George Liles (NOAA/NMFS), Richard Gragg (Florida A&M)

Panel 2 Panelists: Thomas Byl (USGS), Kaja Brix (NOAA/University of Alaska–Fairbanks), Aditya Kar (Fort Valley State University), Michelle Claville (Hampton University), Janet Liou-Mark (New York City College of Technology), David Padgett (Tennessee State University), and other workshop participants.

Moderator: Ambrose Jearld

3:00-3:15 p.m. – Break for refreshments

3:15-4:30 p.m. – SWOT Analysis

Objectives:

- Share perspectives on the challenges facing the Workshop participants and to identify ways we can work together to face the challenges
- Begin building a shared vision among Workshop participants
- Ask for views on the strengths, weaknesses, opportunities, and threats facing us as a collective group (not with regard to each individual program)

Facilitator: Harold Bibb

4:30-5:00 p.m. – Closing: Wrap-up and expectations for remaining two days of conference (Harold Bibb)

5:00 p.m. – Vans depart from National Academies of Science for Holiday Inn

Optional evening lecture:

On Thursday, June 27, the Marine Biological Laboratory’s Summer Program in Neurosciences Excellence and Success (SPINES) course is hosting the Joe Martinez and James Townsel endowed lecture at 7:00 p.m. The talk is being offered this year by Dr. Elba Serrano, Regents Professor at New Mexico State University.

Title: “From Giant Molluscan Neurons to Mechanosensation: Insights from a Lifetime of Research on Membrane Transport”

When: Thursday, June 27, 2019 from 7:00-9:00 p.m.

Where: Lillie Auditorium, Water St., Woods Hole, MA

SPINES has had an outstanding 20+-year track record of training successful neuroscientists from backgrounds underrepresented in neuroscience to be leaders in the field, honing a variety of important

professional skills, including communicating science, winning grants, honing quantitative skills, and preparing to be a top notch PI. The course attracts 20 leading faculty from across the country to teach 15-20 students in a 3-week intensive immersion experience dedicated to creating and sustaining an outstanding diverse workforce in neuroscience. Joe Martinez and James Townsel were the founding course directors.

FRIDAY, June 28, 2019
8:30 a.m.-4:30 pm
Woods Hole Oceanographic Institution (WHOI)

7:10 a.m. – Shuttle for former interns depart for WHOI from Holiday Inn and Inn on the Square

7:30-8:30 a.m. – Registration/breakfast at Clark on 5th floor

A continental breakfast will be provided

8:00 a.m. – Shuttles for non-former interns depart from Holiday Inn for WHOI

8:30-8:45 a.m. – Opening

Welcome and Introductions: Paul Joyce, SEA Dean of Education; Jon Hare, NOAA Fisheries Science Center Director (or proxy); George Liles, PEP Director and NOAA Northeast Fisheries Science Center Academic Programs Director

Facilitator: Harold Bibb, Associate Dean Emeritus, University of Rhode Island

8:45-9:30 a.m. – Panel: “PEP, Your Host – who we are!” at Clark 507

Objective:

- Familiarize Workshop participants with the Woods Hole Partnership in Education Program—how it is organized, it’s 10-year history, and their views of its successes and challenges

Panel Members: PEP Coordinators Jonique Howard, Onjale Scott Price, Adrienne George

Moderator: Ben Gutierrez (USGS)

9:30-10:15 a.m. – Plenary Session: “STEM Recruitment and Beyond: The Messenger is the Medium” (or “The Sociology of STEM”)

Objectives:

- Describe and discuss several major factors that contribute to the underrepresentation of minorities in STEM educational programs, specifically at the graduate level
- Identify structural inequalities that create and reinforce these disparities
- Provide suggestions for immediate improvements that in many cases lead to progress
- Empower faculty members, decision makers in STEM, administrators in education, etc., to step “outside their comfort zones” to realize they can contribute to addressing the injustice of UREM’s in STEM

Presenter: Brian Starks, Associate Director, Delaware Space Grant, University of Delaware

Moderator: Hauke Kite-Powell (WHOI)

10:15-10:30 a.m. – Break

10:30-11:30 a.m. – Panel: “Strategic efforts in diversifying the marine, environmental, and geosciences education and workforce”

Objectives:

- Introduce participants to the Partnership Education Program (PEP), the Research Experience for Undergraduate (REU), and other programs, acknowledging their impact and how these programs have increased diversity in their local scientific communities and beyond
- Provide specific examples of success stories
- Develop a better understanding of REU-type programs targeting minority students around the country

Panelists: Paulinus Chigbu (REU program, UMES), Corey Garza (REU program, California State University–Monterey), George Liles (PEP program, National Marine Fisheries Service), Veronica Martinez-Acosta (REU program, Marine Biological Laboratory), Rebecca Haacker (Director, NCAR Education & Outreach, Advanced Study Program), Carol Pride (REU program, Savannah State University)

Moderator: Hauke Kite-Powell (WHOI)

11:30-11:45 a.m. – Photography session

11:45 a.m.-12:00 p.m. – PEP alumni head to respective research mentor institution

12:00-1:45 p.m. – Networking lunch for all other participants

Presentation and discussion: “Urban Climate Vulnerability: Global to Local Scales”

Presenter: Dr. David Padgett (Tennessee State University)

Introduced by: Harold Bibb

2:00-2:10 p.m. – Explanation of pre- and post-conference surveys

Dr. Emorcia Hill (independent evaluator)

2:10-3:00 p.m. – Panel: “Achieving Educational and Occupational Goals” at Clark 507

Objective: This session is the first of 2 panels aimed at understanding the student perspective on the intern experience. This panel will focus on the student’s experience during programs such as PEP, MSPHD, and SOARS and the benefits of participating in such programs as members of underrepresented groups in the environmental/earth science fields. It will also

feature perspectives from the alumni panel on the challenges faced after the internship in various post-internship spaces (graduate school, fellowship, post-doc, academia, business, federal-state-local government, NGO) to identify ways in which these internships can better serve the needs of the students for post-internship opportunities. Panelists will also comment on post-internship challenges, such as impostor syndrome, skillset development, and the importance of a strong support network. Students will also share their perspectives on opportunities for alumni of these programs to be the catalyst agents tasked with uprooting the systemic barriers that keep underrepresented groups disadvantaged in post-internship experiences.

Panelists: Shynna Dale (Alabama A&M University), Cassandra Harris (USGS), Kelly Luis (University of Massachusetts–Boston), Alexandria Padilla (University of New Hampshire), Luis Valentin (University of California–Berkeley)

Moderator: Shanna Williamson (National Association of Counties)

3:00-3:10 p.m. – Break

3:10-4:00 p.m. – Breakout sessions to identify best practices

Objectives:

- Discuss issues identified by the student panelists
- Begin developing a list of best practices to address challenges faced by interns during their intern programs

Breakout group leaders: Sequoia Riley (University of Hawaii), Melissa Diaz (Ohio State University), Casandra Newkirk (University of Florida), Malike Uter (Massachusetts DEP), Alia Hidayat (WHOI)

4:00-4:30 p.m. – Report from breakout sessions and discussion of findings (Harold Bibb)

4:30-6:00 p.m. – Poster session and speed talks and social networking for REU and PEP participants and alumni, hosted by Woods Hole Diversity Initiative

Objectives:

- Provide information about the experiences of individual interns and how their careers have progressed since their intern programs
- Provide an opportunity for former interns to network with professionals in their fields
- Provide an opportunity for current interns to envisage future career steps

Speed Talk Moderators: Marlene Kaplan (NOAA Office of Education), Michelle Claville (Hampton University)

6:00-6:45 p.m. – Shuttles depart from WHOI to Holiday Inn and Inn on the Square

Optional evening event:

Title: “100 Years On From Spemann and Mangold”

When: Friday, June 28, 2019 from 8:00-9:00 p.m.

Where: Lillie Auditorium (Water Street, Woods Hole)

Speaker: Richard Harland, University of California–Berkeley

Lecture abstract:

The techniques of cross-species grafts were developed over a century ago and enabled the source of signals and identity of responsive cells to be definitively determined. While graduate student Hilde Mangold did not live to see her work published, Hans Spemann went on to win the Nobel Prize for the work. In the 1990s, advances in molecular biology enabled embryologists to isolate the genes that are active in the organizer and determine how they induce the nervous system and set up its head-to-tail fates. Concentrating on work from his lab, Dr. Harland will review the experiments that led to our current understanding of induction of the nervous system.

Richard Harland is the CH Li Distinguished Professor of Biochemistry and Molecular Endocrinology at the University of California–Berkeley, where he teaches developmental biology to both undergraduate and graduate students. He has been a member of the Marine Biological Laboratory Embryology course faculty since 1997, including serving as course co-director from 2002-2006. Dr. Harland has conducted significant research in developmental biology, including the understanding of molecular signals that generate the body plan in early vertebrate embryos. He has also researched mammalian skeleton formation, morphogenesis of the embryo, and performed experiments that exploited genome assemblies.

For more information, see:

<https://www.mbl.edu/calendar/?trumbaEmbed=view%3Devent%26eventid%3D132743337>

SATURDAY, June 29, 2019
8:30 a.m.-4:00 p.m.
Clark Building, WHOI Quissett Campus

7:10 a.m. – Vans for former interns depart from Holiday Inn and Inn on the Square for WHOI

8:00 a.m. – Vans for professionals depart from Holiday Inn for WHOI

8:00-8:30 a.m. – Continental breakfast and networking opportunities

8:30-9:00 a.m. – Opening Reflections: Welcome and Introductions (Harold Bibb)

9:00-10:00 a.m. – Panel: “Creating Pathways to Success in Marine, Environmental, and Geosciences”

Objectives: This is the second of 2 panels focusing on the students’ perspectives of their internship programs and the impacts of their internships on future career paths and success. This panel will focus on major milestones that occur after the internship and explore how well the internship helped prepare for those milestones. Panelists will:

- identify pivotal transitions points that occur after the internship is completed;
- identify attributes and skills necessary for academic success and for success in the workplace;
- identify opportunities for training and emerging issues for research in the geosciences;
- provide ideas for how the intern program could be shaped to provide needed skills and support for success after the student completes the internship; and
- provide advice and suggestions for how to make best use of/optimize the research intern experience.

Panelists: Jordan Allen (GDOT), Robert Botta (University of Florida), Julia Carrol (Princeton University), Rosalinda Gonzalez (U.S. Forest Service), Audy Peoples (NC Division of Marine Fisheries), Sharon Kenney (EPA), Ryder Fox (University of Miami)

Moderator: Ricky Tabendera (University of Hawaii)

10:00-11:30 a.m. – Breakout sessions

Objectives:

- Discuss issues identified during the panel
- Identify skills that intern programs could provide that are likely to be useful in further pursuit of a career
- Discuss whether it would enhance the intern experience to provide training in these career-enhancing skills

At least one panel member will be assigned to each breakout group.

Breakout session leaders: Berlinda Batista (Howard University), Yair Torres (Savannah State University), Kasondra Rubalcava (UMES), Dan Utter, William Pardis (WHOI)

11:30 a.m.-12:00 p.m. – Breakout groups reconvene to share results of discussions

12:00-1:00 p.m. – Networking lunch with presentation by Dr. Ambrose Jearld (Co-founder of PEP program)

Introduced by: Harold Bibb

1:00-2:45 p.m. – Panel: “Stepping Up and Moving Forward: Diversity in the Marine, Environmental, and Geosciences”

Objective: Major players in these efforts will discuss their specific roles and reflect on what works, what hasn’t worked well, and what elements are necessary to fully optimize and sustain research intern programs as viable strategies for increasing diversity and inclusion in the geosciences. Potential best practices and models will be offered.

Panelists: Paulinus Chigbu (REU program, UMES), Corey Garza (REU program, California State University–Monterey), Richard Gragg (Florida A&M University), George Liles (PEP program, National Marine Fisheries Service), Veronica Martinez-Acosta (REU program, Marine Biological Laboratory), Valerie Sloan (Director of the GEO REU Network National Center for Atmospheric Research), Carol Pride (REU Program Savannah State University), Margaret Tivey (WHOI)

Moderator: Ambrose Jearld

2:45-3:15 p.m. – Break and writing assignment

Workshop participants will be asked to complete the post-workshop evaluation survey during the break.

3:15-4:00 p.m. – Wrap-up, next steps, and adjournment

Facilitator: Harold Bibb – Recap with assignments, discussion of evaluation, future of collaboration, and closing

4:00-4:15 p.m. – Vans depart from WHOI for MBL

4:15-6:30 p.m. – Closing networking and celebration of PEP 10th Anniversary reception at MBL/Swope, sponsored by the Woods Hole Diversity Initiative

5:30-7:30 p.m. – Vans shuttle every 15 minutes from MBL to Inn on the Square and Holiday Inn

APPENDIX B

List of Workshop Participants

Mark	Abbott	Woods Hole Oceanographic Institution
Jordan	Allen	Georgia Department of Transportation
Reginald	Archer	Tennessee State University
Berlinda	Batista	Howard University
Harold	Bibb	University of Rhode Island, emeritus
Robert	Botta	University of Florida
Anjali	Boyd	iNviTECH, Durham, NC
Cole	Bradley	Ohio State University
Peg	Brandon	Sea Education Association
Kaja	Brix	NOAA/National Marine Fisheries Service
James	Brown	Kentucky State University
Raquel	Bryant	University of Massachusetts Amherst
Thomas	Byl	United States Geological Survey
Nicole	Cabana	NOAA/National Marine Fisheries Service
Julia	Carroll	Princeton University
Paulinus	Chigbu	University of Maryland Eastern Shore
Kevin	Chu	Sea Education Association
Michelle	Claville	Hampton University
Shynna	Dale	Alabama A&M University
David	Davis	Georgia State University
Felicia	Davis	Clark Atlanta University
Melisa	Diaz	Ohio State University
Uvetta	Dozier	Howard University
Philip	Duffy	Woods Hole Research Center
Irene	Duran	California State University Chico
Marc	Fontáñez Ortiz	Arizona State University
Ryder	Fox	University of Miami
Corey	Garza	California State University Monterey
Myrna	Gatica	Renaissance Charter High School for Innovation
Adrienne	George	University of South Florida
Carresse	Gerald	North Carolina Central University
Rosalinda	Gonzalez	U.S. Forest Service
Benjamin	Gutierrez	United States Geological Survey
Rebecca	Haacker	National Center for Atmospheric Research
Jon	Hare	NOAA/National Marine Fisheries Service
Cassandra	Harris	United States Geological Survey
Solianna	Herrera	
Alia	Hidayat	Woods Hole Oceanographic Institution
Emorcia	Hill	External Independent Evaluator
Max	Holmes	Woods Hole Research Center
Natalie	Huff	NOAA/National Marine Fisheries Service
Ambrose	Jearld	NOAA/National Marine Fisheries Service, retired

Kwanza	Johnson	NOAA/National Marine Fisheries Service
Melissa	Johnson	NOAA/National Marine Fisheries Service
Stefani	Johnson	
Kyla	Jones	Tuskegee University
Paul	Joyce	Sea Education Association
Marlene	Kaplan	NOAA Office of Education
Aditya	Kar	Fort Valley State University
Vale	Kenny	Drexel University
Sharon D.	Kenny	U.S. Environmental Protection Agency
Hauke	Kite-Powell	Woods Hole Oceanographic Institution
Deborah	Leopo	University of California Santa Cruz
George	Liles	NOAA/National Marine Fisheries Service
Janet	Liou-Mark	New York City College of Technology, CUNY
Andrew	Lipsky	NOAA/National Marine Fisheries Service
Christina	Lovely	Town of Falmouth, MA/Marine and Environmental Services
Kelly	Luis	University of Massachusetts Boston
Veronica	Martinez-Acosta	Marine Biological Laboratory
Constance	Meadors	National Technical Association
Allen	Mensingher	Marine Biological Laboratory
Lauren	Mullineaux	Woods Hole Oceanographic Institution
Casandra	Newkirk	University of Florida/Whitney Laboratory for Marine Bioscience
Olamide	Olawoyin	Yale University School of Medicine
David	Padgett	Tennessee State University
Alexandra	Padilla	University of New Hampshire
William	Pardis	Woods Hole Oceanographic Institution
Nipam	Patel	Marine Biological Laboratory
Audy	Peoples	North Carolina Division of Marine Fisheries
André	Price	NOAA/National Marine Fisheries Service
Carol	Pride	Savannah State University
Millicent	Riggins	University of Massachusetts Boston
Sequoia	Riley	University of Hawaii at Manoa
Bernadette	Robinson	Sea Education Association
Craig	Robinson	U.S Geological Survey
Kasondra	Rubalcava	University of Maryland Eastern Shore
Kathleen	Savage	Woods Hole Research Center
Richard	Schulterbrandt Gragg	Florida A&M University
Onjalé	Scott Price	Mizar Imaging
Valerie	Sloan	National Center for Atmospheric Research
Marci-Ann	Smith	University of Maryland Eastern Shore
Paul	Speer	Marine Biological Laboratory
Porche	Spence	North Carolina Central University
Brian Chad	Starks	University of Delaware
Ricky	Tabandera	University of Hawaii

Rob	Thieler	U.S. Geological Survey
Kama	Thieler	Woods Hole Oceanographic Institution
Margaret	Tivey	Woods Hole Oceanographic Institution
Yair	Torres	Savannah State University
Melika	Uter	Massachusetts Department of Environmental Protection
Daniel	Utter	Harvard University
Erica	Valdez	Medical Organization For Latino Advancement
Luis	Valentin	University of California Berkeley
Jacquelyn	Webb	University of Rhode Island
Shanna	Williamson	National Association of Counties

APPENDIX C

Organizations Supporting Diversity Initiatives

There are many organizations dedicated to increasing diversity within the sciences. The following organizations were mentioned during the Workshop. It should not be considered a definitive list of all the sources of support. Rather, it is included here as a starting point for students who may be looking for such organizations.

500 Women Scientists

Achieving the Dream

American Indian Higher Education Consortium

Association for the Sciences of Limnology and Oceanography

Earth Science Women's Network

Environmental Protection Agency/Environmental Justice Small Grants Program

Girls Who Code

HBCU Climate Change Conference

Institute for Teaching and Mentoring

National Association of black Geoscientists

National Oceanic and Atmospheric Administration/Office of Education

National Science Foundation: Pathways into Geoscience

National Technical Association

Out in STEM

Society for Advancement of Chicanos/Hispanics and Native Americans in Science

Society for Women in Marine Science

Stanford University/Summer Research in Geosciences and Engineering

United States Geological Survey: Youth and Education Programs

APPENDIX D

Information about the Partnership Education Program of Woods Hole

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: the underrepresentation of Blacks, Hispanics, Native (Indigenous) Americans, and Asian Americans (hereafter referred to as underrepresented minorities (URMs)) 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 of promoting 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, socioeconomic 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 underrepresented 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 bachelor's-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 scores, 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 be 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 2 primary components, as well as supplemental activities. The 2 primary components are (1) an educational, credit-bearing course and (2) an experiential research internship. Supplemental activities include a variety of career, personal, and professional development.

Education. PEP’s educational component is a 4-credit, 4-week course (“Global Climate Change”) offered through the University of Maryland–Eastern Shore (UMES). The course is organized as a series of modules, each addressing 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 to have it added to their transcripts 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 is responsible 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 changes were consequently made to accommodate the ship’s local availability.

Research Internship. The experiential learning component takes the form of a 6-10 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 scientist’s 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 10 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 women and 51 men 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.

Contact: George Liles
George.liles@noaa.gov

More information about the PEP program can be found at:
<https://www.woodsholediversity.org/pep/>

Procedures for Issuing Manuscripts in the Northeast Fisheries Science Center Reference Document (CRD) and the Technical Memorandum (TM) Series

The mission of NOAA's National Marine Fisheries Service (NMFS) is "stewardship of the nation's ocean resources and their habitat." As the research arm of the NMFS's Greater Atlantic Region, the Northeast Fisheries Science Center (NEFSC) supports the NMFS's mission by "conducting ecosystem-based research and assessments of living marine resources, with a focus on the Northeast Shelf, to promote the recovery and long-term sustainability of these resources and to generate social and economic opportunities and benefits from their use." Results of NEFSC research are largely reported in primary scientific media (e.g., anonymously peer-reviewed scientific journals). However, to assist itself in providing data, information, and advice to its constituents, the NEFSC occasionally releases its results in its own series.

NOAA Technical Memorandum NMFS-NE – This series is issued irregularly. The series typically includes: data reports of long-term field or lab studies of important species or habitats; synthesis reports for important species or habitats; annual reports of overall assessment or monitoring programs; manuals describing program-wide surveying or experimental techniques; literature surveys of important species or habitat topics; proceedings and collected papers of scientific meetings; and indexed and/or annotated bibliographies. All issues receive internal scientific review, and most issues receive technical and copy editing.

Northeast Fisheries Science Center Reference Document – This series is issued irregularly. The series typically includes: data reports on field and lab studies; progress reports on experiments, monitoring, and assessments; background papers for, collected abstracts of, and/or summary reports of scientific meetings; and simple bibliographies. Issues receive internal scientific review, and most issues receive copy editing.

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All manuscripts submitted for issuance as CRDs must have cleared the NEFSC's manuscript/abstract/webpage review process. If your manuscript includes material from another work which has been copyrighted, you will need to work with the NEFSC's Editorial Office to arrange for permission to use that material by securing release signatures on the "NEFSC Use-of-Copyrighted-Work Permission Form."

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The CRD series is obligated to conform with the style contained in the current edition of the United States Government Printing Office Style Manual; however, that style manual is silent on many

aspects of scientific manuscripts. The CRD series relies more on the CSE Style Manual. Manuscripts should be prepared to conform with both of these style manuals.

The CRD series uses the Integrated Taxonomic Information System, the American Fisheries Society's guides, and the Society for Marine Mammalogy's guide for verifying scientific species names.

For in-text citations, use the name-date system. A special effort should be made to ensure all necessary bibliographic information is included in the list of references cited. Personal communications must include the date, full name, and full mailing address of the contact.

PREPARATION

Once your document has cleared the review process, the Editorial Office will contact you with publication needs—for example, revised text (if necessary) and separate digital figures and tables if they are embedded in the document. Materials may be submitted to the Editorial Office as email attachments or intranet downloads. Text files should be in Microsoft Word, tables may be in Word or Excel, and graphics files may be in a variety of formats (JPG, GIF, Excel, PowerPoint, etc.).

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The Editorial Office will perform a copy edit of the document and may request further revisions. The Editorial Office will develop the inside and outside front covers, the inside and outside back covers, and the title and bibliographic control pages of the document.

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