Marine and environmental science disciplines are almost completely unrepresented in terms of minority degree candidates, with many minority students who are interested in science, often not enrolling into health-related fields, presumably in part due to a lack of exposure to alternative scientific disciplines.

Despite the national need to maintain a diverse cultural, racial, and gender balanced gender mix of human resources to solve a variety of future social and scientific problems, the percentage of minorities in these professional fields remains small.

In 2005, only 4% of Ph.D. degrees and 8% of M.S. degrees received by U.S. citizens in science and engineering disciplines were awarded to African-Americans (NSF, 2007).

Since 1999, staff at the South Carolina Department of Natural Resources’ Marine Resources Division (MRD) have provided "hands on" research experiences to 120 minority undergraduate students (74 from 1996-2005) recruited from colleges across the United States through summer internship programs.

NSF funding in 1996-2000 and 2001-2005 enabled MRD staff to develop the Minorities in Marine and Environmental Sciences (MIMES) Program, an intensive program of student-mentor guided research for undergraduate minorities.

The loss of key staff resulted in a program hiatus from 2006-2009, current staff, however, recognizing the importance and previous successes of the MIMES Program, reformed a diverse and motivated organizing committee to resurrect the MIMES Program.

In 2009, MRD staff were successful in acquiring NSF funding to resume the MIMES Program for the summers of 2010 and 2011 and subsequent proposals to NSF have succeeded in supporting the MIMES Program through the summer of 2015.

**History of the Program**

- Marine and environmental science disciplines are almost completely unrepresented in terms of minority degree candidates, with many minority students who are interested in science, often not enrolling into health-related fields, presumably in part due to a lack of exposure to alternative scientific disciplines.
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**Goals of the Program**

The goals of the MIMES Program are to:

- Increase the number of undergraduate minorities, primarily African-Americans, who choose marine or environmental science as a profession.
- Provide opportunities for minority undergraduate students to complete rigorous mentor-assisted, independent research projects in marine and environmental science disciplines.
- Expose students to the fundamental principles of scientific theory, critical thinking, testable hypotheses, data analysis, and effective scientific communication in both written (final reports) and spoken form (oral presentations at the end of program colloquium).
- Provide minority students with opportunities to interact with successful, professional minority scientists as role models through both invited seminars and interactions with researchers from across the Fort Johnson Marine Resources Center.

**Student Project Gallery**

**Project title:** Relative growth rate of the invasive seaweed, Gracilariaicorniculata and its association with the native polychaete, Dapedium capitata

**Mentor:** Dr. Erik Setka (College of Charleston)

**Intern:** Wilmindra Cruz-Marino, University of Puerto Rico (2011).

**Project title:** An update of the population dynamics of black sea bass, Centropristisstriata, off the coast of the southeast United States.

**Mentors:** Drs. Marcel Reichen & Joseph Ballenger (SCDNR)

**Intern:** Stephen Bitterboller, University of the Virgin Islands (2010).

**Project title:** Investigations of the relative toxicity of “green” products to estuarine organisms compared to conventional formulations.

**Mentors:** Dr. Denise Sanger (SC Sea Grant) & John Watters (The Citadel)

**Intern:** William Boyd III, Benedict College (2010).

**Project title:** Variability of local colonial and Enteromorpha bacteria levels in different sediment types.

**Mentors:** Dr. Janet Moore & Brian Thompson (NOAA)

**Intern:** Mizpah Fernandez, South Carolina State University (2013).

**Project title:** Assaying the comparability of fish communities in two tidal creek systems, Folly Beach, South Carolina.

**Mentors:** Dr. Denton Sarge & George Richard (SCDNR)

**Intern:** Elijah Ferguson, Savannah State University (2012).

**Project title:** Red vent condition in the American eel: Does the nematode ernstlebeni affect vent size in American eels.

**Mentors:** Dr. Iaoure de Buron (College of Charleston) & Bill Bitterwolf (SCDNR, retired)

**Intern:** Christina Kenny, New Mexico State University (2012).

**Project title:** Physical factors affecting strobilation in the moon jellyfish, Aurelia aurita.

**Mentors:** Dr. Shaine Boylan & Shannon Toder (South Carolina Aquarium, Charleston, SC).

**Intern:** Jonathan "Zeke" Perez, Allegheny College (2013).

**Project title:** The relationships between environmental factors (elevation, salinity, and soil composition) and vegetation productivity and zonation in the ACE Basin NERR.

**Mentors:** Dr. John Lefler & Sauda Uphusich (SCDNR)

**Intern:** Jacqueline Yap, Emory University (2013).

Recent Student Highlights

- Jacqueline Yap (Emory University, GA) and Idris Tre Edge (Coastal Carolina University, SC) presented their 2013 MIMES Program research at the 2014 American Society of Limnology and Oceanography (ASLO) Conference, Honolulu, Hawaii.
- Sharamee Ward (MIMES 2013 intern) recently had her summer research on parasites in spotted seahorse published in Comparative Physiology 81:10-14.
- Edwall Veenor Jr. (SCSU, MIMES intern in 2001 & 2002) and Arena Richardson (SCSU, MIMES intern in 2002 & 2003) graduated with Ph.D.s from the University of Georgia.

**Program Deliverables**

- The MIMES Program is a 12-week paid summer internship administered by staff at the South Carolina Department of Natural Resources (MRD) in Charleston, South Carolina.
- Students are trained as professional scientists, attending classes in statistics, scientific writing, and presentation skills, training them in the key skills required for a successful future career in the marine and environmental sciences.
- Students participate in a number of field trips to experience new habitats and receive training in the standard sampling procedures required for environmental monitoring and population assessments (e.g., transect net survey, electrofishing, dredging).
- Students are paired with expert mentors for individual research projects. Student-mentor matches are based largely on the individual interests of the students.
- Partner institutions are engaged to foster interactions with a greater diversity of students and research professionals and to increase the mentor pool. Partner institutions include the College of Charleston (CoC), Medical University of South Carolina (MUSC), Hollings Marine Laboratory (HML), College of Charleston, Coastal Environmental Health and Bioremediation Research (CECHBR) and National Institute of Standards and Technology (NIST).
- The academic excellence and commitment of staff at the MRD (and its partner institutions), the immediate access that the Fort Johnson Marine Resources Center provides to coastal habitats, state-of-the-art facilities and equipment, and its past successes are key strengths of the MIMES program.
- Students meet with resident and visiting minority scientists who are active in marine and environmental science fields to discuss how to best progress in a scientific career. Visiting minority scientists give keynote presentations at the end of program colloquium.
- Students prepare both a written final report and an oral presentation on their research findings. Oral presentations are given as part of a day-long research colloquium co-hosted with students from other summer research programs at the Fort Johnson Marine Resources Center (e.g., NSF-funded CoC Fort Johnson Research Experience for Undergraduate Program, the MUSC Summer Undergraduate Research Program: Oceans and Human Health Track, and the NOAA Hollings Scholars Internship Program).

**Recruitment**

- Letters to schools
- MIMES website
- Flyers
- School visits
- Word of mouth

**Application**

<table>
<thead>
<tr>
<th>SC State Department Application Form</th>
<th>MIMES Application Form (students identify specific areas of interest)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Official college transcript</td>
<td>Statement of goals and interests, e.g., reasons for applying to Program</td>
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</table>

**Evaluation**

- GPA (20%)
- Relevance of academic courses (20%)
- Strength of letters of recommendation (20%)
- Work experience (20%)
- Overall quality of e.g., neatness, timeliness (10%)
- Bonus credit (10%)

**Selection**

- Evaluation scores are used to create a short-list.
- Phone interviews are conducted with the student, potential mentor(s) and program organizing committee.
- If all parties are satisfied, an offer is made.

**Completion**

- Selected students that accept our offers undergo background checks and are hired as SCDNR hourly employees prior to commencing the MIMES Program in mid-May.