NOAA OEd Higher Ed Programs

• Ernest J. Hollings Undergraduate Scholarship

• Educational Partnership Program with Minority Serving Institutions
  – Undergraduate Scholarship Program (USP)
  – Cooperative Science Centers (grad, undergrad)
Approx 125 Hollings Scholarships awarded each year to applicants in NOAA mission fields. Awards include:

• Academic assistance of $9,500 per year for junior and senior years
• Paid summer internship at any NOAA facility
• NOAA mentor
• Travel funds to present results at NOAA and a conference
• To qualify for the program, you must:
  - Be a U.S. Citizen
  - Apply in Sophomore year
  - Maintain a 3.0 GPA

EPP Undergraduate Scholarship is awarded to about 10 students per year. In addition to the Hollings Scholarship criteria above, EPP students:

• Must be from a Minority Serving Institution
• Maintain a 3.2 GPA
• Complete a second paid summer internships at NOAA HQ in Silver Spring, MD
NOAA Cooperative Science Centers

- Program established in 2001
- Consortia of MSIs and majority institutions
- Research themes align with NOAA’s four Line Offices
- Train undergraduate and graduate students in NOAA research
- NOAA is a partner
  - Students conduct research at NOAA labs
  - NOAA scientists provide mentoring

NOAA Center for Earth System Sciences and Remote Sensing Technologies

NOAA Living Marine Resources Cooperative Science Center

NOAA Center for Coastal and Marine Ecosystems

NOAA Center for Atmospheric Sciences
Cooperative Science Centers

**Living Marine Resources Cooperative Science Center**
- University of Maryland Eastern Shore
- Hampton University
- Savannah State University
- Delaware State University
- Oregon State University
- University of Miami
- Univ of MD Center for Env Science-Inst of Marine & Environmental Technology

**NOAA Center for Atmospheric Sciences**
- Howard University
- Jackson State University
- Pennsylvania State University
- University of Texas El Paso
- University of Puerto Rico Mayaguez
- University of MD College Park
- San Jose State University
- University of Maryland Baltimore County
- SUNY Albany

**NOAA Center for Earth System Sciences and Remote Sensing Technologies**
- City College CUNY
- Hampton University
- University of Puerto Rico Mayaguez
- University of Maryland Baltimore County
- San Diego State University
- University of Texas El Paso

**Center for Coastal & Marine Ecosystems**
- Florida A&M University
- Jackson State University
- Bethune-Cookman University
- Texas A&M University Corpus Christi
- University of Texas Rio Grande Valley
- California State University Monterey Bay
Tracking Students

Maintain student database of all BS, MS and PhD students supported by programs

- Name
- University
- Ethnicity (voluntary)
- Major
- Funding amount
- Research foci
- Est/Actual grad date
- Awards/pubs
- Post graduate information
OEd Performance Measures

Students Trained in NOAA Mission sciences
Students Graduated in NOAA Mission sciences
Graduates entering/completing advanced degree programs
Peer-reviewed publications, esp by students
Awards/fellowships
Graduates entering NOAA or NOAA-related workforce
Impact on diversity in NOAA sciences

Benchmarks:
- National Center for Education Statistics IPEDS
- Survey of Earned Doctorates
- Bureau of Labor Statistics (Standard Occupation Classification)
- US Census-American Community Survey
Challenges

Definition of NOAA-Mission fields

- Specific vs general majors

IPEDS

- Inconsistency of major definition across institutions
- Lack of granularity in marine sciences
- Large data sets

BLS

- Lack of detail
- Data aggregation

SED

- Data suppression

ACS

- Survey sampling resolution
Post Graduate: Hollings Scholars
### Where do Hollings Alumni go to Graduate School?

<table>
<thead>
<tr>
<th>University</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>University of Washington</td>
<td>38</td>
</tr>
<tr>
<td>University of Oklahoma</td>
<td>33</td>
</tr>
<tr>
<td>Colorado State University</td>
<td>21</td>
</tr>
<tr>
<td>University of Colorado Boulder</td>
<td>20</td>
</tr>
<tr>
<td>Penn State University</td>
<td>15</td>
</tr>
<tr>
<td>Stanford University</td>
<td>15</td>
</tr>
<tr>
<td>University of Michigan</td>
<td>14</td>
</tr>
<tr>
<td>University of Miami</td>
<td>12</td>
</tr>
<tr>
<td>Oregon State University</td>
<td>12</td>
</tr>
<tr>
<td>North Carolina State University</td>
<td>11</td>
</tr>
<tr>
<td>Florida State University</td>
<td>10</td>
</tr>
<tr>
<td>Duke University</td>
<td>10</td>
</tr>
<tr>
<td>University of Wisconsin-Madison</td>
<td>9</td>
</tr>
<tr>
<td>Scripps Institution of Oceanography</td>
<td>8</td>
</tr>
<tr>
<td>Princeton University</td>
<td>8</td>
</tr>
<tr>
<td>University of Rhode Island</td>
<td>8</td>
</tr>
<tr>
<td>University of California, Berkeley</td>
<td>7</td>
</tr>
<tr>
<td>Texas A&amp;M University</td>
<td>7</td>
</tr>
</tbody>
</table>

### What do Hollings Alumni Study in Graduate School?

<table>
<thead>
<tr>
<th>Field</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Atmospheric Science/Atmospheric Science</td>
<td>172</td>
</tr>
<tr>
<td>Marine Science</td>
<td>73</td>
</tr>
<tr>
<td>Environmental Science</td>
<td>34</td>
</tr>
<tr>
<td>Biology/Biomedical Sciences, General</td>
<td>32</td>
</tr>
<tr>
<td>Engineering, Other</td>
<td>30</td>
</tr>
<tr>
<td>Geological &amp; Earth Sciences, General</td>
<td>29</td>
</tr>
<tr>
<td>Ecology</td>
<td>24</td>
</tr>
<tr>
<td>Law</td>
<td>22</td>
</tr>
<tr>
<td>Oceanography, Chemical &amp; Physical</td>
<td>22</td>
</tr>
<tr>
<td>Fisheries (Biology)</td>
<td>18</td>
</tr>
<tr>
<td>Natural Resources/Conservation</td>
<td>17</td>
</tr>
<tr>
<td>Fishing &amp; Fisheries...</td>
<td>12</td>
</tr>
<tr>
<td>Chemistry, General</td>
<td>11</td>
</tr>
<tr>
<td>Business Administration &amp; Management</td>
<td>11</td>
</tr>
<tr>
<td>Civil Engineering</td>
<td>10</td>
</tr>
<tr>
<td>Geography</td>
<td>10</td>
</tr>
<tr>
<td>Medicinal/Pharmaceutical Sciences</td>
<td>10</td>
</tr>
<tr>
<td>Engineering</td>
<td>10</td>
</tr>
</tbody>
</table>

Of approx 1000 graduates 93 awarded NSF GRFP Fellowship to support grad study. 94 hon mention

These 18 fields represent **547**, or **75.5%**, of graduate degrees earned by Hollings Alumni. **n = 724**.
What Jobs Do Hollings Alumni Have Now?

- Meteorologist: 47
- Postdoc: 29
- Research Assistant: 22
- Software Engineer: 18
- Science Teacher: 17
- Research Associate: 15
- Research Technician: 13
- Meteorologist Intern: 12
- Commissioned Officer: 10
- AmeriCorps Member: 9
- Laboratory Technician: 9
- Intern: 7
- Project Manager: 7
- Assistant Professor: 7
- Fisheries Biologist: 7
- Fulbright Scholar: 7
- Fisheries Observer: 7
- Instructor: 6

Where do Hollings Scholarship Alumni Work?

- Academia: 41%
- Federal, State, Local, or Tribal Government: 14%
- Contractor: 13%
- NGO - Non Governmental Organization: 15%
- NOAA Contractor: 4%
- NOAA Employee: 1%
- Private Industry: 7%
- Other: 5%
Post-Graduate:
EPP Undergraduate Scholars
135 USP Scholars with available post-graduate information

- 50 entered workforce
  - 8 entered NOAA mission fields
  - 24 entered other STEM fields
  - 18 non-STEM fields

- 85 pursued advanced degrees
  - (54 Completed)

- 4 enrolled in another degree (1 complete)

- 10 non-STEM

- 44* in NOAA mission fields

- 31 other STEM

- 28 employed in NOAA mission fields

- 12 employed in other STEM

- 18 non-STEM fields

*Includes 4 recently graduated or current position unknown

Other STEM

NOAA Mission Fields

Non-STEM

Other STEM
Where do USP Scholars go to graduate school?

<table>
<thead>
<tr>
<th>University</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Florida A&amp;M University</td>
<td>7</td>
</tr>
<tr>
<td>University of Maryland Eastern Shore</td>
<td>4</td>
</tr>
<tr>
<td>Howard University</td>
<td>3</td>
</tr>
<tr>
<td>North Carolina A&amp;T University</td>
<td>3</td>
</tr>
<tr>
<td>Texas A&amp;M University</td>
<td>3</td>
</tr>
<tr>
<td>Indiana University</td>
<td>2</td>
</tr>
<tr>
<td>Johns Hopkins University</td>
<td>2</td>
</tr>
<tr>
<td>Ohio State University</td>
<td>2</td>
</tr>
<tr>
<td>University of Arkansas</td>
<td>2</td>
</tr>
<tr>
<td>University of Maryland College Park</td>
<td>2</td>
</tr>
<tr>
<td>University of Michigan</td>
<td>2</td>
</tr>
</tbody>
</table>

USP Scholars who were also part of CSCs:

<table>
<thead>
<tr>
<th>CSC</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECSC</td>
<td>13</td>
</tr>
<tr>
<td>LMRCSC</td>
<td>9</td>
</tr>
<tr>
<td>CREST</td>
<td>4</td>
</tr>
<tr>
<td>NCAS</td>
<td>4</td>
</tr>
<tr>
<td>ISET</td>
<td>5</td>
</tr>
</tbody>
</table>
USP: Fields of study in graduate school (n=85)

- Math/Comp Science/Engin: 18
- Env Science/Engineering: 9
- Marine Science: 7
- Geo/Earth Sci/GIS: 6
- Atm Sci/Meteo: 6
- Chem/Physics: 6
- Biology/Biomedical: 5
- Law: 2
- Fisheries: 2
- Health Sciences: 12
- Business: 5
- Other STEM: 4
- Education: 3

NOAA Mission Areas
USP: Fields of employment (n=100)

Engineering: 14
Math/Comp Science: 13
Marine Science: 7
Chem/Physics: 6
Biology/Biomedical: 6
Atm Sci/Meteo: 6
Env Science/Engineering: 4
Law: 3
Geo/Earth Sci/GIS: 3
Fisheries: 1
Business: 12
Education: 11
Health Sciences: 9
Energy: 3
Other/Unknown: 2

NOAA Mission Areas
**USP: Working in NOAA sciences**

Of 36 currently* working in NOAA sciences:

<table>
<thead>
<tr>
<th>Category</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Academia</td>
<td>18</td>
</tr>
<tr>
<td>NOAA</td>
<td>11</td>
</tr>
<tr>
<td>Private</td>
<td>4</td>
</tr>
<tr>
<td>State Agency</td>
<td>2</td>
</tr>
<tr>
<td>Other Fed</td>
<td>1</td>
</tr>
</tbody>
</table>

*3 other USP scholars have worked at NOAA and have left
Cooperative Science Centers
Jackson State University (partner in NCAS and CREST) is the largest producer of black BS degrees in Atmospheric Science. Most were supported by NOAA.

39% of Black BS degrees in marine/aquatic biology, bio oceanography, marine science and fisheries awarded by LMRCSC institutions with NOAA support.

<table>
<thead>
<tr>
<th>Top Producers of Black Bachelors degrees 2002-2015</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Meteorology/Atm Science (total=240)</strong></td>
<td></td>
</tr>
<tr>
<td>Jackson State University</td>
<td>40</td>
</tr>
<tr>
<td>North Carolina State University at Raleigh</td>
<td>21</td>
</tr>
<tr>
<td>Florida State University</td>
<td>18</td>
</tr>
<tr>
<td>Pennsylvania State University-Main Campus</td>
<td>18</td>
</tr>
<tr>
<td>SUNY Maritime College</td>
<td>10</td>
</tr>
<tr>
<td><strong>Marine Sciences (total=374)</strong></td>
<td></td>
</tr>
<tr>
<td>Savannah State University</td>
<td>74</td>
</tr>
<tr>
<td>Hampton University</td>
<td>70</td>
</tr>
<tr>
<td>University of Arkansas at Pine Bluff</td>
<td>37</td>
</tr>
<tr>
<td>University of the Virgin Islands</td>
<td>18</td>
</tr>
<tr>
<td>Coastal Carolina University</td>
<td>13</td>
</tr>
</tbody>
</table>
• 14 of 68 Black MS degrees in Atmospheric Science graduated from Howard University (NCAS lead institution).

• 27 of 74 Black MS degrees in marine/aquatic biology, bio oceanography, marine science and fisheries graduated from LMRCSC institutions.

**Black MS Degrees 2002-2015**

<table>
<thead>
<tr>
<th>Program</th>
<th>Total</th>
<th>CSC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Meteorology/Atm Science (Total=68)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Howard University</strong></td>
<td>14</td>
<td></td>
</tr>
<tr>
<td>Naval Postgraduate School</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>Florida State University</td>
<td>5</td>
<td></td>
</tr>
</tbody>
</table>

Marine Sciences (Total = 74)

<table>
<thead>
<tr>
<th>Program</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Savannah State University</strong></td>
<td>15</td>
</tr>
<tr>
<td><strong>University of Maryland Eastern Shore</strong></td>
<td>12</td>
</tr>
<tr>
<td>Stony Brook University</td>
<td>6</td>
</tr>
</tbody>
</table>
Half of Black PhD degrees in Atmospheric Sciences/Meteorology awarded by CSC institutions with NOAA-support.

>50% of Black PhD degrees in marine/aquatic biology, biological oceanography, marine science and fisheries awarded by CSC institutions.

### Black PhD Degrees 2002-2015

<table>
<thead>
<tr>
<th>Field</th>
<th>Total</th>
<th>CSC</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Meteorology/Atm Science</strong> (Total=24)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Howard University</td>
<td>11</td>
<td></td>
</tr>
<tr>
<td>University of Washington-Seattle Campus</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>University of Michigan-Ann Arbor</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Hampton University</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td><strong>Marine Sciences</strong> (Total=25)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>University of Maryland Eastern Shore</td>
<td>9</td>
<td></td>
</tr>
<tr>
<td>University of Miami</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>College of William and Mary</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>University of Maryland-Baltimore County</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>University of Washington-Seattle Campus</td>
<td>2</td>
<td></td>
</tr>
</tbody>
</table>

![Bar Chart](image-url)
- OEd programs have contributed 225 professionals to NOAA workforce (Fed, contractor, etc) since 2001. 165 currently at NOAA.
- 95 of 165 hired as Federal employees.
- At least 61 of 143 were from under-represented groups (35% did not report an ethnicity).
Next Steps

- Analysis of Cooperative Science Center post graduate outcomes beyond NOAA workforce
- Name match with SED
- Surveys to determine why people are leaving field
- Better connect students to training and workforce opportunities:
  - NSF GRFP/GRIP
  - LSAMP
  - Knauss Fellowships
  - Pathways internships
  - Contract Workforce
  - Partnerships (other Fed, State, Coop Inst)
  - Hollings Scholarship
• Percentages of Black and Hispanic scientists at NOAA (Federal) are low relative to employed biological, agricultural & life scientists nationwide (NSF 2010).
• Below figure represents Fishery Biologists; Other scientific series shown in backup slides.
• Total numbers are low: In 2014 there were 23 Hispanic and 16 Black Fishery Biologists (Federal) in NOAA of 912.

NOAA Fishery Biologists: Black and Hispanic (%)
In comparison to employed physical & related scientists (NSF 2010), percentages of Black and Hispanic meteorologists at NOAA are low.

Black (men and women) and Hispanic men have shown decrease since 2007.

Source: NOAA EEO
Bachelors Degree Trends

- Per IPEDS, BS and MS degree completions in marine and atmospheric sciences have increased for under-represented groups from 2002-2015, particularly among Hispanics.
- Total number of degrees remain small.

**Includes:**
- Aquatic Biology/Limnology
- Fishing and Fisheries Sciences and Management
- Marine Biology and Biological Oceanography
- Marine/Aquatic Biology
- Marine Sciences

Marine Sciences*

Atmospheric Sciences**

**Includes:**
- Atmospheric Physics and Dynamics
- Atmospheric Sciences and Meteorology, General
- Meteorology

*Includes:
- Hispanic
- Asian
- Black
- AIAN
- NHOPI

Per IPEDS, BS and MS degree completions in marine and atmospheric sciences have increased for under-represented groups from 2002-2015, particularly among Hispanics. Total number of degrees remain small.
Masters Degree Trends

- Strong increase in MS degrees in marine sciences, particularly for Hispanics.
- Increases in Atmospheric sciences but more variability.

**Includes:**
- Aquatic Biology/Limnology
- Fishing and Fisheries Sciences and Management
- Marine Biology and Biological Oceanography
- Marine/Aquatic Biology
- Marine Sciences

**Includes:**
- Atmospheric Physics and Dynamics
- Atmospheric Sciences and Meteorology, General
- Meteorology

---

**Marine Sciences***

**Atmospheric Sciences**

*Includes:*
- Hispanic
- Asian
- Black
- AIAN
- NHOPI

**Includes:**
- Atmospheric Physics and Dynamics
- Atmospheric Sciences and Meteorology, General
- Meteorology
Spikes in PhDs in 2002/2003 and 2010 reflect large cohorts from U of Puerto Rico. PhD degree completions for under-represented groups have increased, but numbers remain small.

*Includes:
- Aquatic Biology/Limnology
- Fishing and Fisheries Sciences and Management
- Marine Biology and Biological Oceanography
- Marine/Aquatic Biology
- Marine Sciences

**Includes:
- Atmospheric Physics and Dynamics
- Atmospheric Sciences and Meteorology, General
- Meteorology

**Marine Sciences**

**Atmospheric Sciences**

Legend:
- Hispanic
- Asian
- Black
- AIAN
- NHOPI
**NOAA Workforce**

CSCs contributions to NOAA Federal workforce:
- Of 41 Black and Hispanic Physical Scientists in 2014, 9 graduated from CSC institutions (22% of total).
- 12 of 103 (12%) Black and Hispanic Meteorologists graduated from CSC institutions.

<table>
<thead>
<tr>
<th>Position</th>
<th># in NOAA - 2014</th>
<th>CSC Graduates</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Fishery Biologist (Fed) - 912</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Black Male</td>
<td>7</td>
<td>1</td>
</tr>
<tr>
<td>Black Female</td>
<td>9</td>
<td>1</td>
</tr>
<tr>
<td>Hispanic Male</td>
<td>19</td>
<td>1</td>
</tr>
<tr>
<td>Hispanic Female</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>39</strong></td>
<td><strong>3</strong></td>
</tr>
<tr>
<td><strong>Meteorologist (Fed) - 2561</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Black Male</td>
<td>31</td>
<td>4</td>
</tr>
<tr>
<td>Black Female</td>
<td>14</td>
<td>3</td>
</tr>
<tr>
<td>Hispanic Male</td>
<td>45</td>
<td>1</td>
</tr>
<tr>
<td>Hispanic Female</td>
<td>13</td>
<td>4</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>103</strong></td>
<td><strong>12 (12% of total)</strong></td>
</tr>
<tr>
<td><strong>Physical Scientist (Fed) - 657</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Black Male</td>
<td>19</td>
<td>4</td>
</tr>
<tr>
<td>Black Female</td>
<td>7</td>
<td>2</td>
</tr>
<tr>
<td>Hispanic Male</td>
<td>12</td>
<td>2</td>
</tr>
<tr>
<td>Hispanic Female</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>41</strong></td>
<td><strong>9 (22% of total)</strong></td>
</tr>
</tbody>
</table>