REPORT ON THE EDUCATIONAL PARTNERSHIP PROGRAM | 2001-2007

"Demonstrating NOAA's Commitment to Education through Partnerships"

NOAA | OFFICE OF EDUCATION | OCTOBER 2008

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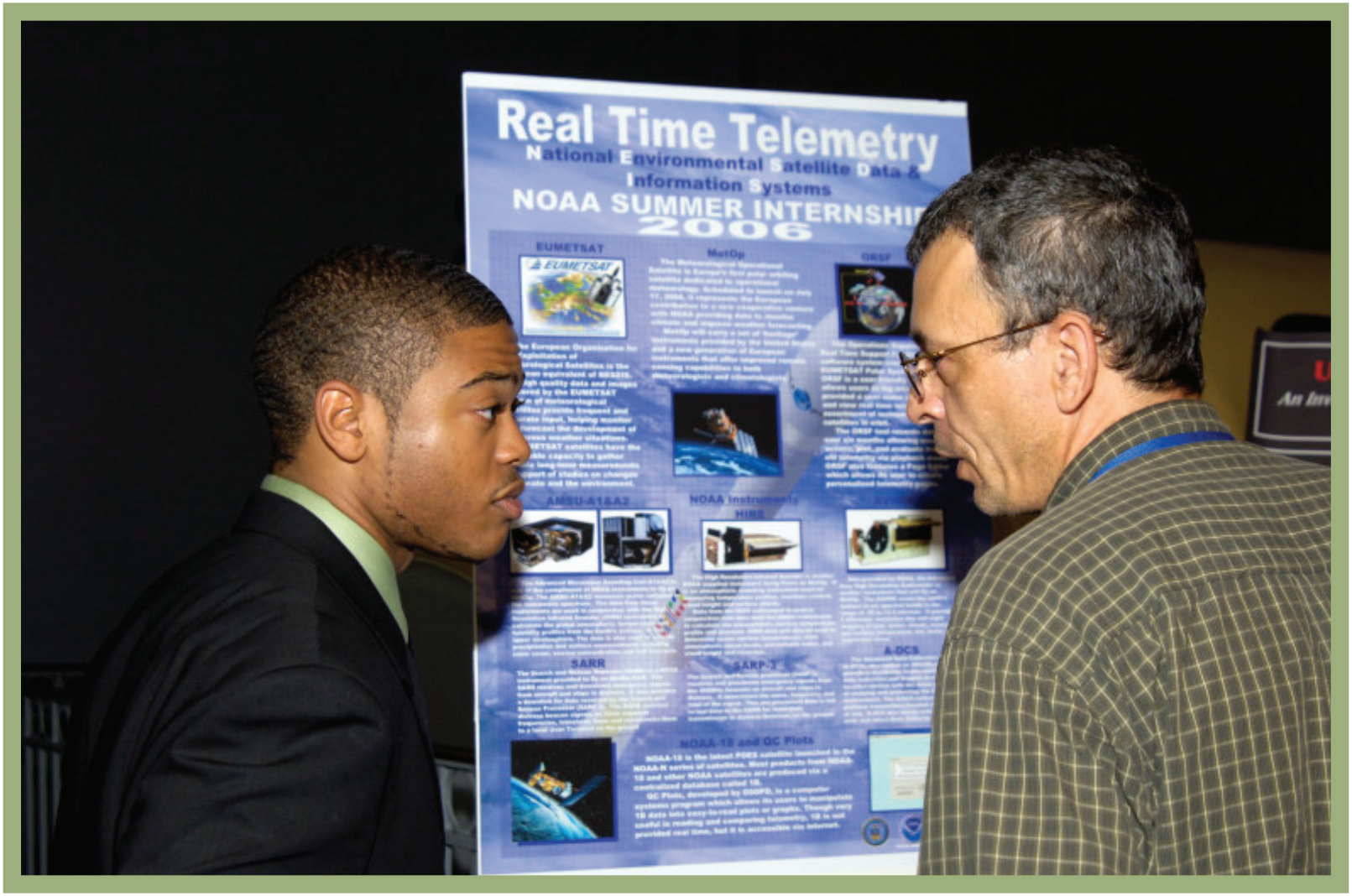
“Demonstrating NOAA’s Commitment to Education through Partnerships”


Real Time Telemetry
National Environmental Satellite Data & Information Systems
NOAA SUMMER INTERNSHIP
2006
EUMETSAT
MetOp
ORSF
AMSU-A1&A2
NOAA Instruments
HIRS
SARR
SARP-3
A-DCS
NOAA-18 and QC Plots

From the Director of the Educational Partnership Program

From the first planning meeting in December 1997, to the first grant awards made in 2001, the educational programs and training activities of the Educational Partnership Program at the National Oceanic and Atmospheric Administration (NOAA) have inspired and challenged us to employ new and better ways to train and develop next generation scientists for our nation.

The cumulative accomplishments of program participants over the last seven years have been a source of inspiration to me, and to the NOAA community. The achievements in this report reflect national impacts as well as direct and immediate benefits to NOAA. For example, 53 students transitioned from academia to NOAA employment and 99 undergraduates, co-mentored by NOAA employees and academic advisors, attended graduate school and are conducting research in marine, atmospheric, and environmental sciences. Further, as a result of Educational Partnership Program funding, mentoring and training activities, national graduation rates of students in science and engineering fields have increased. In addition to student achievement, academic institutions participating in these NOAA sponsored programs are also witnessing capacity-building transformations evidenced by new academic programs, revised curricula, enhanced research capacity and more meaningful partnerships with NOAA scientists, centers and institutes. These outcomes clearly demonstrate the breadth and significance of the contributions that the program's participants are making in support of NOAA's mission, and to their institutional objectives.

The challenge to the program persists, however, because national education statistics and NOAA's workforce demographics continue to demonstrate the need for continued outreach to ensure that all students, particularly those from underrepresented communities, are afforded the opportunity to explore and value the wonders of science, technology, engineering and mathematics relevant to NOAA's mission. To this end, the Educational Partnership Program can serve as a model to other Federal, state and private entities interested in engaging underutilized communities to address our present and future human workforce needs in Science, Technology, Engineering and Mathematics (STEM) disciplines.

This report highlights the accomplishments of all components of the Educational Partnership Program. I would like to thank faculty and student participants at our partner academic institutions, and NOAA staff and managers who share in the Program's commitment to increase and diversify the number of students educated and graduated in NOAA mission-critical disciplines. Perhaps above all, the leadership of the Department of Commerce and NOAA are to be commended for their vision and long-standing support for this education program over the years. Collectively, these partners have demonstrated their commitment to enhancing the public's interest and competency in science, policy and stewardship to ensure that the nation's environmental resources are effectively managed for future generations.

Jacqueline Rousseau
Director of the Educational Partnership Program

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Executive Summary

The Educational Partnership Program (EPP) is producing results of national significance for student achievement and institutional capacity-building. Between 2001 and 2006, the Program more than doubled the number of African Americans across the United States who earned doctorates in atmospheric and environmental sciences. Over the last five years, nearly 20% of science professionals hired by the National Oceanic and Atmospheric Administration (NOAA) from underrepresented communities were sponsored by EPP.

Since its inception, the Educational Partnership Program has supported 1,046 undergraduate, graduate, and PhD students in NOAA mission-critical areas of study. Significantly, 71% of these students were from underrepresented communities. Forty-two students, 30 of whom were from underrepresented minority populations, obtained PhDs with support from this Program. It is estimated that within five years, the number of minority doctoral graduates with degrees in NOAA-mission critical sciences sponsored by this Program will triple.

Between 2001 and 2006, the Educational Partnership Program more than doubled the number of African Americans across the United States who earned doctorates in atmospheric and environmental sciences

The Educational Partnership Program manages two competitive scholarship programs, one providing graduate level training and the other providing paid summer internships and stipends for undergraduates. Robust oversight of all scholarship recipients has resulted in a 92% retention rate for both graduate and undergraduate students. Eighty-seven students have obtained NOAA mission-critical degrees with support from the Graduate Sciences and Undergraduate Scholarship Program. To date, NOAA has hired 53 student participants from the Educational Partnership Program.

The five Cooperative Science Centers, each led by a Minority Serving Institution (as defined by the U.S. Department of Education), include 30 university campuses. These Centers are responsible for increasing the number of students from underrepresented populations who are graduating with degrees in NOAA mission critical fields as well as strengthening NOAA's research capacity. To date, the Centers and their partner institutions have graduated 475 students with degrees in NOAA mission critical sciences, with another 440 students in the pipeline. The Educational Partnership Program Cooperative Science Centers have made a significant impact in the expansion of NOAA related education and graduation rates at Minority Serving Institutions and are responsible for the addition of:

- 5 new STEM degree programs established at partner institutions
- 62 new faculty hires to support the Centers
- 204 research papers published in peer-reviewed journals
- 152 collaborative projects undertaken with NOAA staff and

The Environmental Entrepreneurship Program, a component of the Educational Partnership Program, trains students in the application of NOAA sciences as a way to foster economic development opportunities in economically distressed communities. A total of 51 different projects have

been funded that are often spearheaded by high school students and their teachers. To date, 504 students have received educational opportunities through the Environmental Entrepreneurship Program. Participant activities vary greatly, from mentoring high school students to more advanced levels of training. Nine hundred and fifty six college students have completed research or formal education experiences sponsored by the Environmental Entrepreneurship Program.

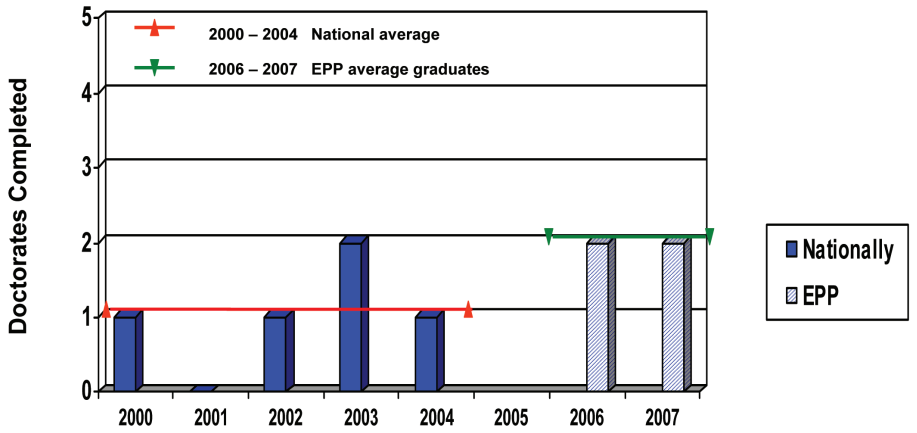
Program Overview

Established in 2001, the Educational Partnership Program (EPP) involves a strong network of education and training programs created to sustain the National Oceanic and Atmospheric Administration's (NOAA) mission and enhance its capabilities into the 21st century. The Program promotes NOAA's vision of an informed and scientifically literate society that has a comprehensive understanding of the interdependent relationship of the ocean, coasts and atmosphere in the global ecosystem. The Program's collaborative projects play an integral role in achieving NOAA's mission to understand and predict changes in the Earth's environment. The EPP is part of NOAA's effort to promote environmental literacy and to develop a future science, technology, engineering and technology workforce, particularly from underrepresented communities, in disciplines critical to NOAA's mission. Between 2001 and 2006, the Educational Partnership Program more than doubled the number of African Americans across the United States who earned doctorates in atmospheric and environmental sciences. These statistics were generated by comparing data collected by the Educational Partnership Program against data from the Department of Education's National Center for Education Statistics.

NOAA, like many other Federal agencies, is addressing the issues of an aging workforce and is working towards ensuring that mission-critical requirements are met by well educated and skilled candidates. The Educational Partnership Program is an important element of NOAA's succession planning efforts. An analysis of data by NOAA's Workforce Management Office has determined that by 2014, approximately 37% of NOAA's workforce will be eligible to retire. The agency, and the nation as a whole, needs to attract talented individuals educated in atmospheric, environmental and oceanic science; engineering; and related sciences that are representative of the nation's diversity.

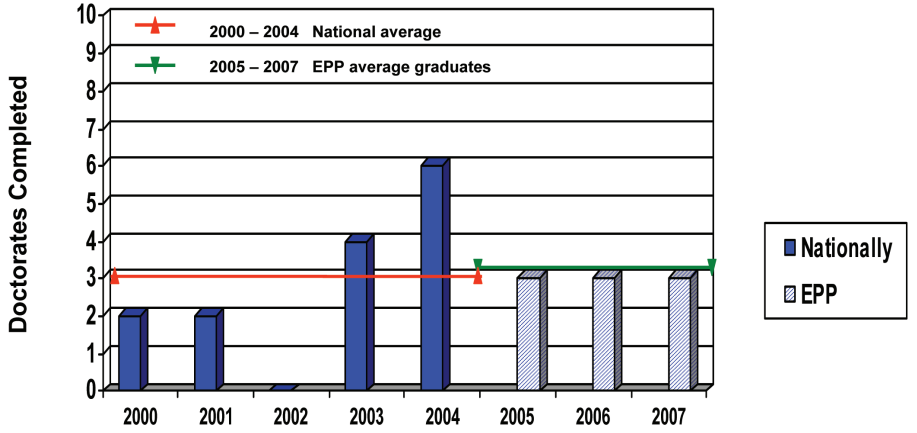
Currently, the broad and increasingly diverse American public is not adequately represented in the scientific community, nor is it represented

Atmospheric Science African American Doctorates



Note: The Educational Partnership Program began producing Atmospheric Science PhD graduates in 2006
Sources: Educational Partnership Program Administrative Data (EPP) / Department of Education's National Center for Education Statistics (NCES)

Environmental Science African American Doctorates



Note: The Educational Partnership Program began producing Environmental Science PhD graduates in 2005
Sources: Educational Partnership Program Administrative Data (EPP) / Department of Education's National Center for Education Statistics (NCES)

Education and Science Forums

The Educational Partnership Program sponsors biennial conferences that draw representatives from government, research centers, academia and the private sector who are engaged in activities supporting NOAA's mission and are interested in providing educational and career opportunities for students. Three of these Education and Science Forums have been held to date, with the location rotated among the Cooperative Science Centers. The first forum was held in 2002 at The University of Maryland Eastern Shore, the second at The City College of the City University of New York in 2004, and the third forum was held at Florida A&M University in 2006. Each forum has grown successively larger; the most recent surpassed 450 participants, and included over 150 posters and 82 oral presentations. The Forums highlight the successes of the partnership between NOAA and the MSI community in promoting a diverse workforce for NOAA's mission.

in the NOAA workforce. According to recent data from the National Science Foundation, the numbers of employed non-academic, STEM professionals from underrepresented groups is growing but remains very small. The proportion of African Americans in non-academic Science & Engineering (S&E) occupations increased from less than 3% in 1980 to 5% in 2005. The proportion of Hispanics/Latinos in non-academic S&E occupations increased from 2% in 1980 to 5% in 2005. At the doctoral level, African Americans, Hispanics/Latinos, and American Indians/ Alaska Natives combined represented just over 4% of employment in nonacademic S&E occupations in 1990, rising to 6% in 2005. In comparison, 94% of PhDs in S&E occupations are represented by White, Asian & others.[1]

Over the past decade, a paucity of underrepresented minorities in Science, Technology, Engineering and Mathematics (STEM) has alarmed policymakers and educators, leading to numerous studies and calls for action. The National Science Foundation has been tracking, through a number of independent reports, how the lack of higher education in STEM fields continues to contribute to higher minority unemployment, lack of minority upward mobility, and a decrease in overall national productivity: Higher education in S&E has been receiving increasing attention as an important component contributing to the nation's maintenance of a strong economic position in the world (NSB 2003).[2] A number of recent reports including "Rising Above the Gathering Storm: Energizing & Employing America for a Brighter Economic Future"[3] and others,[4] call for increasing the quantity, quality, and diversity of the students studying and graduating in S&E fields. NOAA is responding to this call by increasing the number of students from underrepresented communities who take coursework and graduate with degrees in STEM fields at the Bachelor's, Master's and PhD level.

Educational Partnership Program Students Supported 2001-2007

	Undergraduate	Masters	Doctorate	Total
Graduates				
Total Students	384	145	42	571
Total Minority Students	266	84	30	380
In the Pipeline				
Total Students	263	107	105	475
Total Minority Students	218	71	77	366

There are four components to the Educational Partnership Program:

1. Graduate Sciences Program

This scholarship program trains outstanding candidates—often minorities and women--in NOAA-related disciplines. The Graduate Sciences Program pays for tuition, books, and lab fees. It also provides a housing allowance at the selected university, travel expenses, and salary during 16 weeks of NOAA work experience per year for each participant at a NOAA facility.

2. Undergraduate Scholarship Program

This scholarship program provides NOAA internships and one-on-one mentoring to increase the number of students from underrepresented communities graduating with degrees in fields integral to NOAA's mission. Each scholar receives approximately $28,000 for two academic years to cover the costs of actual tuition and fees and other allowable expenses.

3. Five Cooperative Science Centers

These Centers advance education and collaborative research with NOAA, as well as graduate students and build capacity in NOAA-mission sciences at Minority Serving Institutions. Each center is lead by a Minority Serving Institution and partnered with a NOAA Line Office. Together, the 5 Centers include 30 university campuses.

4. Environmental Entrepreneurship Program

The Environmental Entrepreneurship Program promotes student training in the application of NOAA sciences to create business opportunities and enhance STEM programs at minority serving institutions.

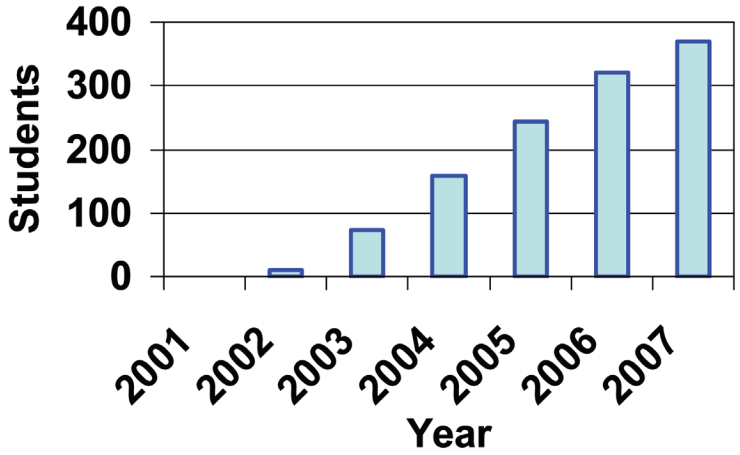
Educational Partnership Program Annual Budgets FY2001 - FY2007

FY2001	$15 million
FY2002	$15 million
FY2003	$14.9 million
FY2004	$14.8 million
FY2005	$16.7 million
FY2006	$14.2 million
FY2007	$14.2 million

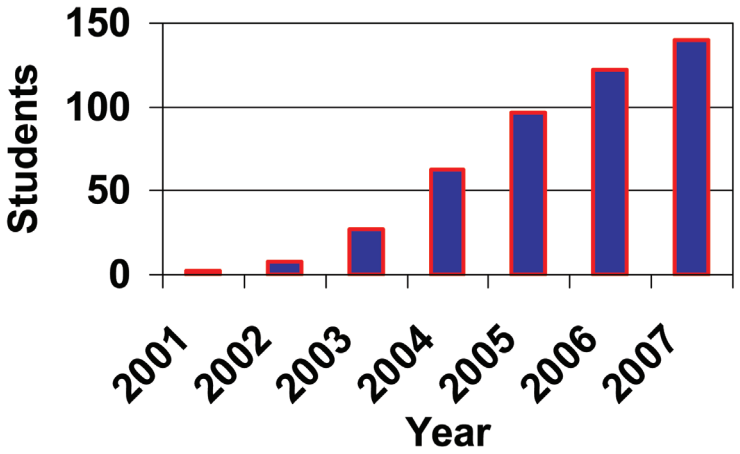
Provided an annual budget and using competitive processes, these program components support education, research internships and employment opportunities in NOAA-related sciences. The goal of the Educational Partnership Program is to increase the number of students from underrepresented communities who are educated, trained and graduated in fields that directly support NOAA's mission. Over the last 5 years, nearly 20% of science professionals hired by NOAA from underrepresented communities were sponsored by EPP. Collaboration with Minority Serving Institutions to build capacity, strengthen curricula and improve research infrastructure provides professional options to students who have not traditionally chosen careers in earth and environmental sciences.

The strong relationships established between the Minority Serving Institutions and NOAA ensure that students and faculty have opportunities to participate in mission critical research and to understand career options within the agency. The tables that follow illustrate the success of the program at increasing graduation rates in NOAA mission sciences. In addition to the core program components, EPP has sponsored related activities that broaden its impact, e.g., Education and Science Forums. Collectively, the EPP programs build relationships between MSIs, other research institutions, the private sector, non-governmental organizations and NOAA. This increased coordination serves not only NOAA's interests, but those of the nation at large.

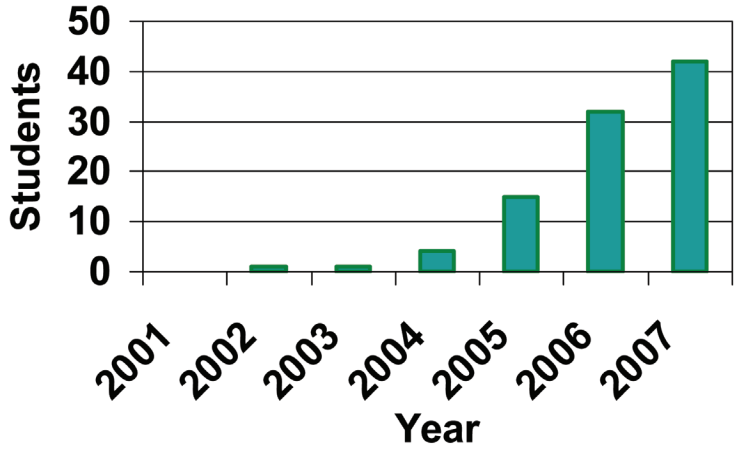
Cumulative Educational Partnership Program Undergraduate Degrees Granted



Cumulative Educational Partnership Program Master's Degrees Granted



Cumulative Educational Partnership Program Doctorate Degrees Granted



The National Aquarium in Baltimore

A partnership between NOAA's Chesapeake Bay Office and the Educational Partnership Program in 2003 resulted in a grant to the National Aquarium in Baltimore to support a wetland nursery program. "Schoolyard Spartina: Chesapeake Bay Wetland Nursery Team," involved students from inner-city Baltimore and Washington, DC schools in growing wetland plants at their schools and planting the seedlings at created tidal wetlands. The goal of the project was to give students hands-on experience in helping restore the Chesapeake Bay and to raise awareness of the importance of a sustainable Bay to their communities. Students from Baltimore City's Morrell Park and Franklin Square Elementary Schools, along with other Maryland students were given the opportunity to build wetland nurseries. Teaching modules developed for each grade level focused on: the ways wetlands serve as an intermediary between land and water; how to use scientific methods to assess variables of plant growth; and how to enhance students' problem solving skills.

Pacific Island Education Consortium

In 2005, the Educational Partnership Program provided support to the Pacific Island Educational Partnership Consortium to enhance the ability of regional institutions of higher education to provide technical and educational services to governmental agencies, community-based organizations, the private sector and the broader community of stakeholders in the marine and environmental sciences. The award was made to the University of Guam with participating institutions including the American Samoa Community College, College of Micronesia, College of the Marshall Islands, Northern Marianas College, Palau Community College, and the University of Guam.

This effort was aimed at increasing the ability of local institutions and individuals to address the growing challenges faced by the islands. A cooperative, regional approach was used, focusing on coral reefs, fisheries, marine biotechnology, and ocean resources management.

The Consortium activities includes: support to students (high school, undergraduate and graduate level); improvements to educational curriculum; program development; teacher training; enhanced research capabilities in the NOAA core sciences; and outreach to elementary and secondary school students. Student research projects ranged from investigating the effects of land-based development and erosion on watersheds and near shore ecosystems, to sustainable aquaculture, and pollution education.

Curriculum development included: creating a Marine Option Program at American Samoa Community College; starting a research lab and scuba certification course for students at the College of Micronesia; and, hiring a marine science and technology instructor at the Northern Marianas College.

Scholarship Programs

The Educational Partnership Program scholarships provide a direct link between NOAA and a robust pipeline of talented students studying NOAA mission critical sciences. These programs provide financial support that allow students to pursue academic studies and research opportunities in science and management techniques that directly support NOAA's mission. EPP Scholarship programs provide specialized training opportunities and experiences for students at the Bachelor's, Master's and PhD levels. EPP scholarship recipients conduct scientific research; contribute to papers in peer-reviewed journals; and finish science degree programs at all academic levels (undergraduate through postdoctoral levels). A core component of the EPP scholarship programs is mentoring relationships developed between NOAA employees, students and their academic advisors. EPP staff monitors each scholarship recipient through structured reporting requirements to ensure that students are on track in their studies and in their NOAA internships.

NOAA's Educational Partnership Program administers and manages two competitive scholarship programs:

a. The Graduate Sciences Program (GSP) provides graduate level training for outstanding underrepresented minority and women candidates who seek employment with NOAA; and,
b. The Undergraduate Scholarship Program (USP) provides paid summer internships, plus stipends for two academic years to students attending MSIs to conduct research at NOAA facilities.

EPP scholarship programs have increased the number of students, particularly from underrepresented groups, who graduate in NOAA mission critical sciences and management techniques. Sixty-six undergraduates supported by USP have obtained degrees in NOAA-related fields, and to date the GSP program has trained 39 students in NOAA-mission-critical sciences. Upon completion of training programs, students become full-time NOAA employees. EPP scholarship programs are clearly an important element of the agency's efforts to educate and attract next generation scientists for NOAA's professional workforce.

Dr. Marco Vargas completed his Doctoral degree in Electrical Engineering, specializing in remote sensing, in January 2007. He is now a full-time employee of NOAA's Center for Satellite and Applications Research. Marco's fascination with remote sensing was spurred by the images of the earth taken by astronauts during space missions. The NOAA Cooperative Remote Sensing Science and Technology Center (CREST) supported Marco during his studies until he joined the GSP. Marco is currently working on the phrenology of phytoplankton from time series of satellite ocean color observations, as well as the validation of a new algorithm for snow water equivalent from satellite microwave measurements.

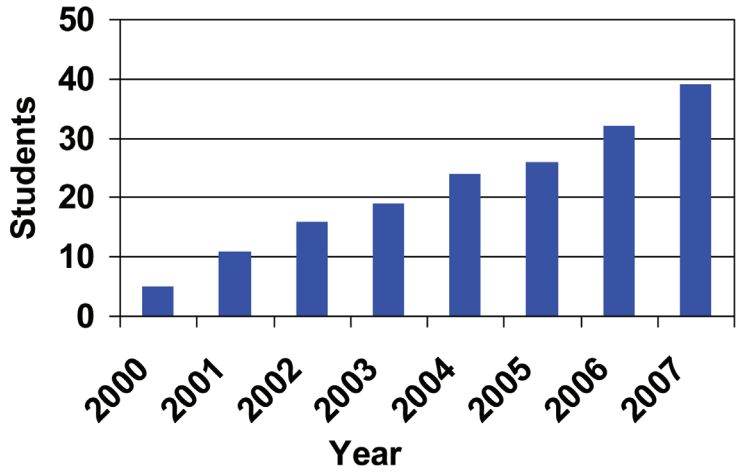
Graduate Sciences Program (GSP)

The goal of the GSP is to recruit and train outstanding underrepresented minorities and women in NOAA-mission related sciences. Its success is demonstrated in increasing opportunities for students to pursue research and educational training in atmospheric and oceanic sciences at Minority Serving Institutions, when possible. This multi-year program provides qualified graduate students with formal periods of work, study and structured classroom training in an array of NOAA-related fields,

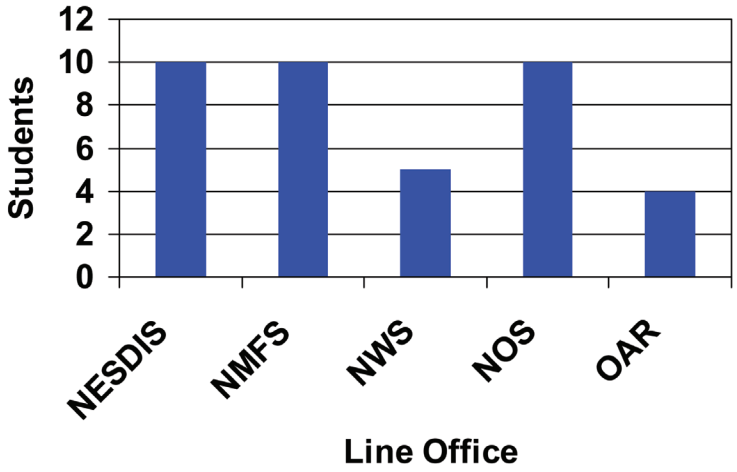
including engineering, environmental planning and law, meteorology, oceanography, and marine biology, among others. The Graduate Sciences Program pays for tuition, books, lab fees, and provides a housing allowance at the selected university, travel expenses, and salary during 16 weeks of NOAA work experience per year for each participant at a NOAA research facility.

Beyond student education, NOAA also assigns scientists as mentors during the training period. Since the establishment of the program, 21 GSP students have received their degrees and been hired as NOAA professionals; an additional 15 are in the pipeline. GSP students work in nearly all NOAA line offices and account for a significant portion of underrepresented minorities hired into NOAA professional positions.

Cumulative Graduate Sciences Program Students Hired by NOAA



Graduate Sciences Program NOAA Line Office Placement 2000 - 2007



Dr. Marian Westley completed her Doctorate degree in Oceanography in December 2006. She is now a full-time employee at NOAA Research's Geophysical Fluid Dynamics Laboratory (GFDL). Marian has had a fascination with oceanography since her childhood growing up in Kenya, learning to snorkel in tide pools along the Kenyan coast. "I have always loved the ocean," she says, "but to me, it was an exotic, almost magical place. I was a physics major at Yale and it did not occur to me that I could actually work in the ocean until I took a semester off and went to study marine science at the University of Hawaii at Hilo. They sent me on a research cruise and I was hooked! I went to graduate school at the University of Hawaii at Manoa to study both oceanography and ocean policy. When NOAA announced that they were looking for graduate students, I jumped at the chance to work for an agency that is dedicated to both science and service." At GFDL, Marian is initially working to integrate GFDL's ocean biogeochemistry model into a new ocean physical model.

Dr. DaNa L. Carlis completed his Doctorate degree in Atmospheric Sciences in May 2007. Dr. Carlis is now a full-time employee at NOAA's National Weather Service (NWS) National Centers for Environmental Prediction (NCEP) Environmental Modeling Center (EMC). DaNa's dissertation investigated the effects of diurnal variation (daytime heating vs. nighttime cooling) and the strength of trade-wind flow (strong vs. weak trade-wind flow) on island-induced circulations, particularly the Maui Vortex. DaNa's passion for weather and the environment began during his childhood in Tulsa, Oklahoma, but was put on hold until he began working on a Doctorate degree at Howard University. DaNa continues to collaborate with the NWS Honolulu Weather Forecast Office and the University of Hawaii towards improving the suite of high-resolution numerical weather prediction models such as the Weather Research and Forecasting (WRF) model. DaNa's new position at EMC will involve working with the Global Forecast System (GFS) model.

Undergraduate Scholarship Program (USP)

Recognizing that hands-on research experience is integral to the development of scientists in environmental sciences, NOAA's Undergraduate Scholarship Program provides exceptional opportunities for students to build their research skills and resumes through this two year scholarship. Each undergraduate intern has the opportunity to engage in one-on-one mentoring with world-class scientists. Additionally, individualized research projects (based on the scholar's academic field of study) challenge students to expand their capability beyond formal academic training and to build research skills that focus on NOAA research or operational issues. Each scholar receives approximately $28,000 for two academic years to cover the costs of actual tuition and fees and other allowable expenses.

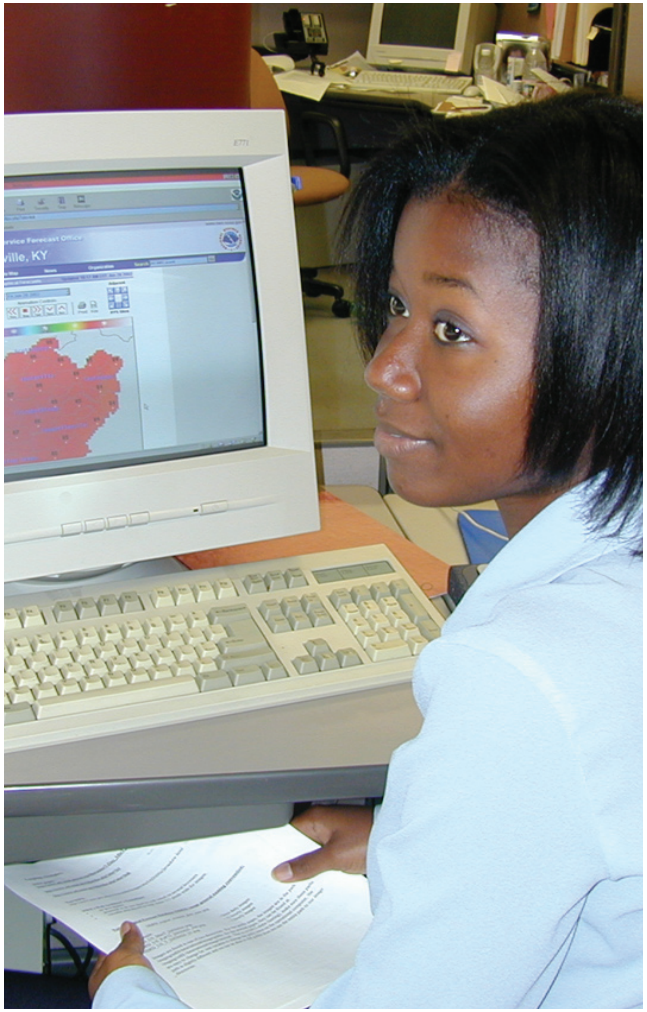
Targeting students in the MSI community, the USP selects recipients during their sophomore year, at a time when they have chosen (or are about to choose) their major field of study. Scholars are selected based on several objective criteria: academic record; interest in NOAA sciences; community activities; and, communication skills. Students are given a two-week orientation to learn about the agency's mission, and are immediately immersed in research projects with NOAA mentors. Two consecutive paid 10-week summer internships provide USP recipients opportunities to work with notable NOAA environmental scientists. Scholars complete a research project each summer, presenting their results to the NOAA community and at national conferences. Opportunities also exist to publish findings.

In 2007, 25 undergraduate scholars were trained. Sixty-six students have completed the program, with 70% of those going on to graduate school. Three graduates currently work for NOAA in mission-related sciences, while a fourth graduate works as a contractor for the agency.

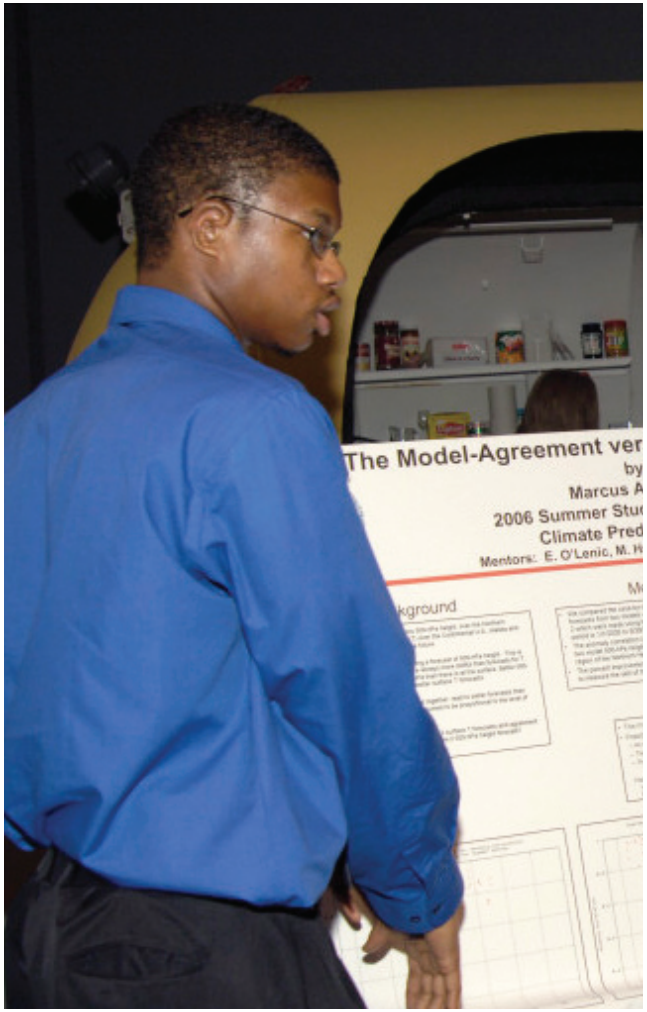
Undergraduate Scholarship Program

The Educational Partnership Program has placed 99 students in summer internships to date.

Line Office	FY01	FY02	FY03	FY04	FY05	FY06	FY07	Total
GC	2	0	0	0	0	0	0	**2**
NESDIS	1	1	0	2	4	1	2	**11**
NFA	1	0	0	0	1	0	0	**2**
NMAO	0	1	0	0	1	0	0	**2**
NMFS	2	1	1	3	2	4	5	**18**
NOS	0	2	5	7	13	3	3	**33**
NWS	1	1	2	3	5	5	5	**22**
OAR	1	2	2	0	2	2	0	**9**
TOTAL	**8**	**8**	**10**	**15**	**28**	**15**	**15**	**99**



NOAA
EDUCATIONAL PARTNERSHIP PROGRAM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Cooperative Science Centers

The Educational Partnership Program has established five Cooperative Science Centers (CSCs) at Minority Serving Institutions. These partnerships provide formal education to students in coursework directly related to NOAA's mission. Each Center strengthens and builds capacity and research experience in specific NOAA scientific areas, including fisheries sciences and management, environmental sciences, coastal resources management, atmospheric science, meteorology, environmental technology and remote sensing. These Science Centers provide student training in NOAA mission goals of climate, weather and water and ecosystems. By establishing the Centers at Minority Serving Institutions, they effectively support the program's essential goal to increase the number of students, particularly from underrepresented populations, who graduate with academic degrees that support NOAA mission critical areas. Moreover, these Centers increase diversity in the NOAA workforce and beyond, contributing to an increased national labor pool of individuals from underrepresented groups receiving degrees and entering the workforce in fields directly relevant to NOAA.

Funding provided to the Science Centers supports the education, training and matriculation of students in NOAA mission sciences. The aim is to build sustainable capacity via improved curricula and degree programs, increased laboratory facilities, enhanced national reputation, and a pipeline of students trained in science and engineering. Since the program's beginning, the Centers have been integral in training 915 students in NOAA-mission sciences.

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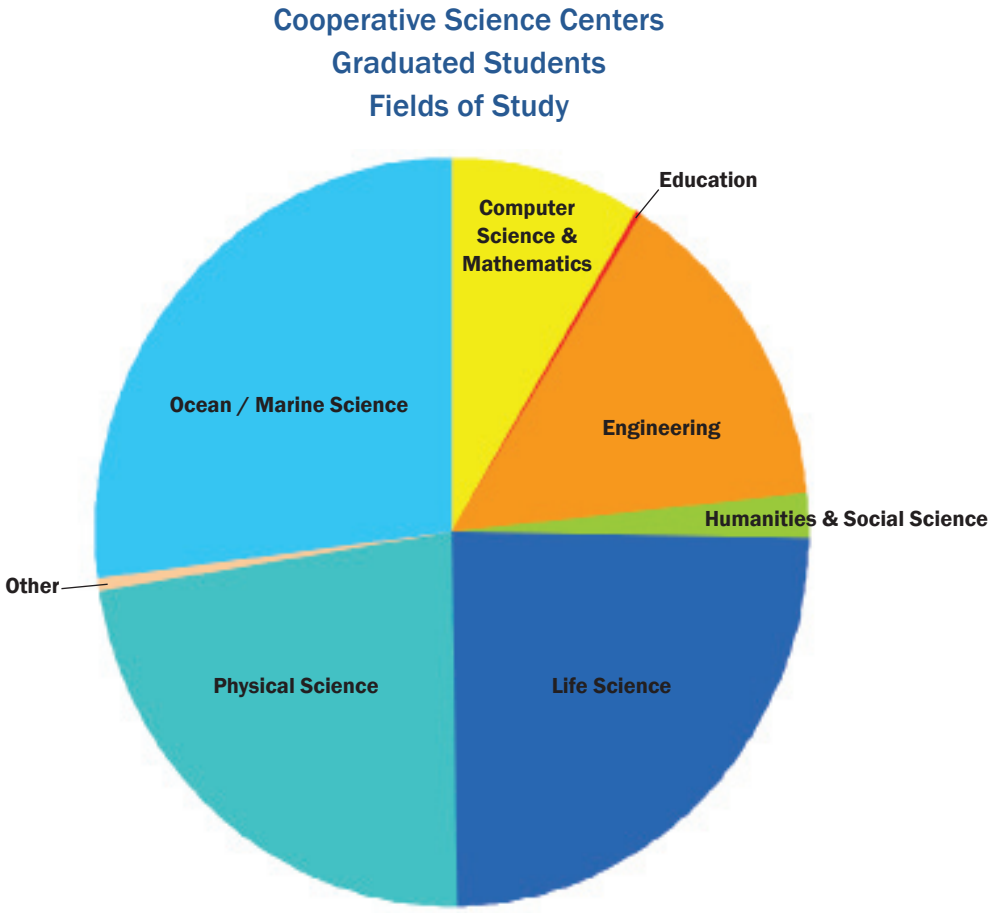
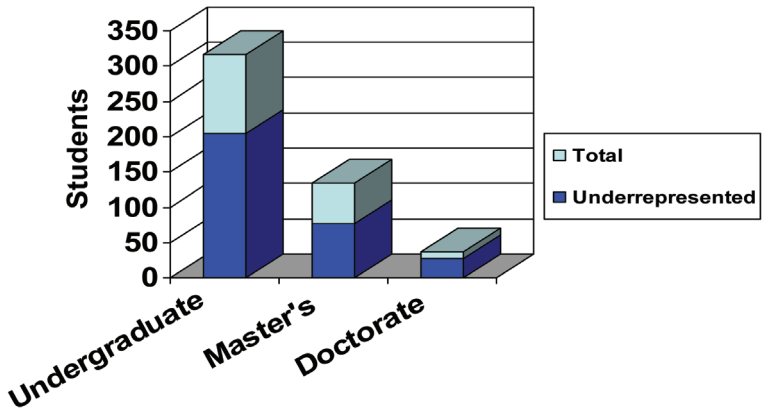


EPP places an emphasis on student preparation in understanding and improving environmental observations, predictions and comprehension, particularly through the development and application of next-generation instrumentation and modeling technologies. Center Directors recognize that managing the Nation's resources requires more than excellence in science and technology and, therefore, training in social sciences, including environmental policy and resource economics that impact environmental outcomes on the larger society has been integrated into many Science Center programs.

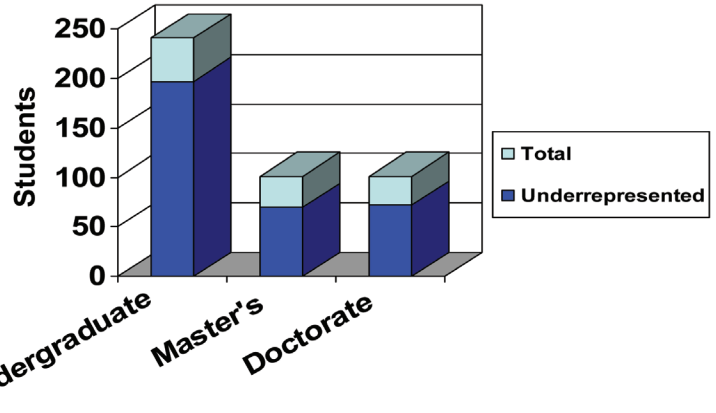
Each Center is led by a Director, who is assisted by administrative staff and advised by an Executive Committee made up of principal investigators from each participating institution. The committee meets routinely to coordinate and integrate Center activities among the center institutions and within their respective academic programs. Each Center retains a Distinguished Scientist to develop and direct significant research projects for their Center, ensuring coordination among partnering academic institutions and support of NOAA's mission.

Each of the five cooperative science centers is partnered with a NOAA Line Office and receives scientific guidance from a Technical Monitor, and one or more advisory bodies whose members include NOAA scientists as well as individuals from academia and the private sector. These multiple coordination and oversight mechanisms enhance attainment of programmatic and scientific goals.

Cooperative Science Center Degrees Completed



Cooperative Science Center Pipeline Students



Four of the five centers - the Cooperative Remote Sensing Science and Technology Center, the Environmental Cooperative Science Center, the Living Marine Resources Cooperative Science Center and the NOAA Center for Atmospheric Sciences - successfully competed for a second five-year funding cycle; and, in 2006 NOAA designated a fifth center, the Interdisciplinary Scientific Environmental Technology Cooperative Sci-

ence Center. NOAA support to the Centers has resulted in 489 degrees awarded to students in core NOAA sciences to date. Sixty-two new faculty members have been added to the educational institutions associated with the 5 centers. Over 150 collaborative research projects have been undertaken involving NOAA and MSI partners. Furthermore, more than 200 peer-reviewed publications have been produced by scientists (faculty and students) sponsored by NOAA's Educational Partnership Program.

Cooperative Science Center Accomplishments

	CREST	ECSC	LMRCSC	NCAS	ISETCSC*	TOTAL
New Faculty Added	35	10	9	5	3	62
No. of Undergraduate and Graduate Degrees Awarded	129	89	174	88	9	489
No. of Articles Published in Peer Reviewed Publications	55	42	44	60	3	204
No. of Collaborative Projects with NOAA	32	9	45	53	13	152

***Newest Center, established in 2006**

New Degrees/Minors/Departments Created at Partner Institutions, Resulting from Establishment of Cooperative Science Centers

- Howard University launched a new PhD program in 2001 in atmospheric sciences and supported the development of a weather research facility in Beltsville, Maryland leveraging funds from NOAA and other Federal agencies
- North Carolina A &T State University created a Bachelor of Science degree in Atmospheric Science and Meteorology in 2007
- California State University, Fresno created a Bachelor of Science degree in Environmental Science in 2007
- University of Maryland Eastern Shore created a summer Fish Stock Assessment training program in 2007 that includes internships at NOAA labs
- The City College of CUNY established a new multidisciplinary Engineering and Science curriculum in 2007, with a focus on remote sensing, leading to a Bachelor degree in engineering or science
- Hampton University created a minor in Space, Earth and Atmospheric Sciences which resulted in the formation of a new department, Atmospheric and Planetary Sciences in 2007
- University of Puerto Rico at Mayaguez established a minor in Meteorology /Atmospheric Sciences in 2007
- Florida A & M University added an environmental science course for non-majors in 2007 to satisfy their basic science requirement, enhancing both environmental literacy for students majoring in teacher certification and recruitment into the University's Environmental Science Institute

Ocean Science Bowl Support

The Educational Partnership Program is committed not only to increasing opportunities for formal education for underrepresented students, but to boosting informal education prospects as well, for communities that have not been active in ocean and environmental sustainability. Two Cooperative Science Centers train talented high school students for participation in the Ocean Science Bowl competitions. The Environmental Cooperative Science Center (ECSC) and the Cooperative Remote Sensing Science and Technology Center (CREST) have vigorously prepared students for competitions that focus on increased understanding of the oceans on the part of teachers and parents as well as the students. Participants meet regularly with mentors and academic coaches and participate in mock competitions, reviewing material related to ocean biology, chemistry, geology, physics, navigation, geography, and history and literature of the ocean.

Cooperative Remote Sensing Science and Technology Center (CREST)

CREST research into cutting edge remote sensing applications for air quality, coastal waters, precipitation and water resource issues enhances critical understanding of climate variability and change as well as providing needed weather information. The Center's work strongly supports NOAA climate, weather and water and ecosystem goals. While CREST's partner at NOAA is the National Environmental Satellite, Data, and Information Service (NESDIS), their research is also well aligned with efforts by NOAA's National Weather Service (NWS) and Office of Oceanic and Atmospheric Research (OAR).

CREST research priorities include investigations into atmospheric trace gases and aerosols, optical properties of coastal waters, hydroclimates, precipitation and land hydrology. The Center's advances in data compression technology are an exciting enhancement of their research efforts.

City College of the City University of New York (CUNY) serves as the lead institute for a consortium consisting of Bowie State University (BSU), Hampton University (HU), the University of Maryland at Baltimore County (UMBC), the University of Puerto Rico at Mayaguez (UPRM), Lehman College, Bronx Community College, New York City College of Technology, Hunter College, and corporate partner Raytheon.

Education and Outreach

CREST institutions have modified a number of existing courses to incorporate NOAA-related sciences into the curriculum. The City College of CUNY has established a new multidisciplinary Engineering and Science curriculum, with a focus on remote sensing, leading to a Bachelor's degree in engineering or science. The program received a boost with the long-awaited installation of a satellite receiving station on the campus. At HU,

The City College of CUNY has established a new multidisciplinary Engineering and Science curriculum, with a focus on remote sensing, leading to a Bachelor's degree in engineering or science

a minor in Space, Earth and Atmospheric Sciences has been introduced, which resulted in the formation of a new Atmospheric and Planetary Sciences department.

At HU, a minor in Space, Earth and Atmospheric Sciences has been introduced, which resulted in the formation of a new *Atmospheric and Planetary Sciences* department

Highlights include:

- implementing strategies to recruit, mentor and train graduate students in NOAA-mission science, engineering and technology areas
- training activities that target students from middle school through college, introducing them to NOAA-mission science, engineering and technology areas
- CUNY activities geared toward inner city students, especially from Harlem, North Manhattan and the Bronx, serving a population that is more than 85% Hispanic/Latino and African American
- HU coordinates with science centers and museums to provide speakers, workshops, seminars, K-12 field trips and summer science enrichment student camps
- UPRM offers a two week program for fifty students and twenty teachers, exposing them to CREST and NOAA-related science and technology
- BSU created a pipeline that encourages their trained undergraduates toward various graduate programs offered by other CREST partners

Research

CREST air quality investigations focus on monitoring and studying regional and urban air quality in the eastern United States. Researchers are also exploring long-term impacts of air quality on regional and global climate. Potential correlations between air pollution and health impacts are being examined. This effort should contribute to an improved scientific basis for assessing air quality standards and management. Climate work focuses on quantification and characterization of "climatic forcing agents" in the atmosphere. Advancing techniques for predicting and estimating precipitation is another focus area.

Projects include:

- Improved "nowcasting" for rapidly developing thunderstorms, improved snow cover mapping, snow depth estimates and predictions, snow grain size estimation, and rainfall amounts;
- Characterizing and retrieving bio-optical properties including

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data on chlorophyll concentrations, suspended solids, types of phytoplankton and nutrients and other water constituents, water temperature and salinity;

- Developed and validated a novel polarization technique to separate chlorophyll fluorescence from elastic reflectance, for which a patent is pending. Improves researchers' ability to draw more accurate conclusions about bioptical properties, contributing to a better understanding of the health of the aquatic environment;
- Improving flash-flood forecasting; and,
- Greatly improved satellite data compression and achieved data reductions of 3.7-to-1, overturning widely held perceptions that lossless compression was limited to a 2-to-1 reduction (thereby greatly enhancing efficient use of resources); patent is pending

Accomplishments

- Trained 207 students in NOAA-related science curriculum; 70% of those students were African American or Hispanic/Latino
- Graduated 129 students in NOAA sciences; 74 Bachelor's, 43 Master's; 11 PhDs
- 4 graduates joined the NOAA workforce, each of whom was a member of a traditionally underrepresented group
- Collaborated on 32 research projects with NOAA and MSI partners in support of NOAA operations (with 73 students involved in the research projects, mostly MS and PhD candidates)
- 55 peer reviewed articles published by scientists (faculty and students) sponsored by NOAA EPP
- 35 new faculty hired since CREST was established

Environmental Cooperative Science Center (ECSC)

The ECSC mission is to educate a new generation of environmental scientists --particularly from underrepresented communities--in NOAA-related sciences, and to develop the natural and social science tools for integrated assessments of ecosystem health in support of coastal environmental decision making. The ECSC has established a regional approach to address coastal and marine environmental issues through collaborations with NOAA and its National Ocean Service (NOS), by partnering with strategically selected Reserves from the National Estuarine Research Reserve System (NERRS) that span coastal regions from the extreme western Gulf of Mexico to the Atlantic coast of Delaware. The ecological, economic, social, and cultural attributes of these coastal and marine ecosystems are vital on local, regional, and national levels and as such provide excellent study areas upon which to focus the research, training, and outreach activities of the Center.

Florida A & M University (FAMU), the lead institution is part of a consortium of nine schools that comprise ECSC, including Bethune Cookman University (BCU) Creighton University (CU), Delaware State University (DSU), Jackson State University (JSU), Morgan State University (MSU), University of Miami (UM), University of Nebraska at Lincoln (UNL), and Texas A & M University-Corpus Christi (TAMUCC).

Education and Outreach

The ECSC's objective is to enhance curriculum and educational capacities at partner institutions in NOAA-relevant disciplines by providing high quality education and research experiences to students. By interacting directly with kindergarten through 12th grade (K-12) students and enhancing the quality of teacher education programs, the Center is establishing a pipeline for the production of scientists and teachers from underrepresented communities.

Adding an environmental science course for non-majors at FAMU to satisfy their basic science requirement, enhancing both environmental literacy for students majoring in teacher certification and recruitment into the University's Environmental Science Institute

Highlights include:

- Adding an environmental science course for non-majors at FAMU to satisfy their basic science requirement, enhancing both environmental literacy for students majoring in teacher certification and recruitment into the University's Environmental Science Institute
- Modifying teacher education programs to increase awareness of environmental science
- Secondary school level lesson module developed for improving understanding of global climate change
- FAMU team of selected high school students--coached by ECSC graduate students--competed in the National Ocean Sciences Bowl, a national academic competition for high schools on topics related to the study of the oceans
- FAMU poster competition for middle and high school students to encourage their awareness of estuarine ecosystems, in conjunction with a school lesson module developed by the Apalachicola Reserve
- Established the Environmental Science Summer Camp for high school students, designed to ignite student's interest in environmental science and to raise their awareness of educational and career opportunities in the field
- Morgan State University's Eco Clues Summer Camp encourages youth to embrace urban community design and community sustainability and raises their understanding of the Chesapeake Bay watershed

Research

ECSC's framework for science to assist management decisions has four thematic areas:

- Integrated assessment in support of environmental decision making
- Integrated social sciences
- Ecological processes and indicators of ecosystem health
- Geospatial analyses and data development

Projects include:

- Risk prioritization for 5 Reserves:
  - + Conceptual models for decision making that incorporate multiple factors have been developed for NERRS
  - + Development of an adaptive management framework that provides for managers to move from models to decision making
  - + Assessments of the new protocols
- Training students in the inclusion of social and economic issues in public policy issues
- Development of a model of public policy that encourages the consideration of these issues and acknowledges the importance of public participation and the contributions of stakeholders and local communities
- Use of both quantitative and qualitative assessment techniques
- Research in remote sensing of water resources and water quality, to enhance forecasting of the impact of natural and anthropogenic stressors on the health and function of estuarine ecosystems
- Biogeochemical studies that look at food web relationships
- Bioindicator studies addressing harmful algal blooms, invasive species and habitat preference of key species
- Modeling studies that describe hydrodynamic process of a Reserve and associated river and watershed systems
- Exotoxicological studies of metal, bacterial and viral contamination of selected species

For additional ECSC information
http://www.ecsc.famu.edu/
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Accomplishments

- Trained 168 students in NOAA-related science curriculum; 73% of those students were African American or Hispanic/Latino
- Graduated 89 students in NOAA sciences; 42 Bachelors', 31 Masters', 1 JD and 15 PhDs
- 8 graduates joined NOAA workforce
- Collaborated on 9 research projects with NOAA and MSI partners in support of NOAA operations
- 42 peer reviewed articles published by scientists (faculty and students) sponsored by NOAA EPP
- 10 new faculty hired since the Center was established

Living Marine Resources Cooperative Science Center (LMRCSC)

The mission of the LMRCSC is to conduct research congruent with the interests of NOAA's National Marine Fisheries Service and to prepare students for careers in research, management, and public policy that support the sustainable harvest and conservation of the nation's living marine resources. LMRCSC efforts directly support NOAA's fisheries goal, i.e., the protection, restoration and management of coastal and ocean resources, using an ecosystem approach to management.

With the University of Maryland Eastern Shore (UMES) as the lead, six institutions comprise this CSC. UMES partners include Delaware State University (DSU), Hampton University (HU), Savannah State University (SSU), University of Maryland Biotechnology Institute Center of Marine Biotechnology (COMB) and the University of Miami Rosenstiel School of Marine and Atmospheric Science (RSMAS).

Education and Outreach

LMRCSC's goal is to enhance academic program capacities of the Center, and to generate a pool of scholars entering the field of marine sciences and fisheries. Use of a virtual campus has been a highly effective technique for ensuring efficient use of resources. Courses and seminars are offered at multiple partner campuses via use of the University System of Maryland's Interactive Video Network. Less formal meetings can also be "attended" by students at various campuses, e.g., a journal club that meets to discuss peer-reviewed articles relevant to fisheries sciences can have participants at multiple physical locations.

Highlights include:

- Established a pipeline program from high school through doctoral levels to recruit, mentor and train students in the study of living marine resources and their habitats
- Developed intensive short courses at the Center to enable students in some undergrad programs lacking fisheries/aquatic sciences courses to fulfill program requirements with these courses
- Created a summer Fish Stock Assessment program that includes internships at NOAA labs
- Provide support for high performing undergraduate students to pursue a dual B.S./M.S. degree in five years
- Developed numerous internships to provide students with hands-on experience

Created a summer Fish Stock Assessment program that includes internships at NOAA labs

- UMES collaborates with Maryland Coastal Bays Program and the National Park Service to conduct the summer Upward Bound Marine and Estuarine Science Program for about 25 high school students each year
- SSU's Marine Science Camp exposes 60 high school students to marine science each summer
- A marine science essay and art contest is conducted at SSU
- The Sci-Tech Program at COMB provides hands-on training to more than 200 middle and high school students and science training in environmental and marine science to about 150 middle school students
- COMB also provides research internships to high school students and teachers
- RSMAS has mentored more than 150 high school students through the Florida Student Shark Program, as they engage in shark research

Research

LMRCSC's research focuses on coastal/estuarine waters. The Center seeks to improve understanding of the relative importance of the complex factors influencing fish populations, fish habitats and fisheries and marine ecosystems as a whole. Research activities fall into four thematic areas:

- Fisheries socioeconomics
- Quantitative fisheries
- Essential fish habitat
- Aquaculture

Examples of research projects conducted at the Center include:

- Climatic factors: Environmental relations to larval ingression into coastal bays of the Delmarva Peninsula
- Chemical contaminants: Winter flounder nursery habitats; contaminant effects on health and survival of early life stages
- Harmful algal blooms: Roadblocks to oyster restoration; Prorocentrum minimum and Karlodinium micrum
- Fisheries socioeconomics: Recreational angling behavior in Maryland coastal bays in the Ocean City area
- Quantitative fisheries: Fish recruitment dynamics; impacts of Hematodiium parasites on blue crabs
- Aquaculture: Reducing the mortality rate of cultured cobia and other cultured fish by reducing the dependence of the aquaculture industry on antibiotics and developing land-based, fully contained marine aquaculture systems, including an anaerobic water treatment loop to enable collection and nitrate reduction of organic waste from the tanks

Accomplishments

- Trained 309 students in NOAA-related science curriculum; 55% of those were African American or Hispanic/Latino
- Graduated 174 students in NOAA sciences; 141 Bachelor's, 31 Master's, 2 PhDs
- Collaborated on 45 research projects completed with NOAA and MSI partners in support of NOAA operations
- Annual research cruises aboard NOAA vessels have exposed more than 30 LMRCSC students to open-ocean deep water research
- 44 peer reviewed articles published by scientists (faculty and students) sponsored by NOAA EPP
- 9 new faculty members were hired since the Center was established.

For additional LMRCSC information

http://www.umes.edu/lmrcsc

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NOAA Center for Atmospheric Sciences (NCAS)

NCAS mission is to conduct research and develop applications in support of NOAA's National Weather Service (NWS) strategic goal of "advancing the understanding of air quality-climate-health interactions and improving prediction of precipitation through integrated measurements, models and data analyses." Specifically, NCAS is working to train students to improve weather and climate predictions and to enhance understanding of regional air quality and its impact on climate and health. This includes infrastructure development for weather-related research and applications for NOAA, with a specific focus on urban and transition regions within the United States.

With Howard University (HU) as the lead institution, partnering universities include Jackson State University (JSU), State University of New York at Albany (SUNYA), University of Illinois at Urbana-Champaign (UIUC), University of Puerto Rico at Mayaguez (UPRM) and University of Texas at El Paso (UTEP).

Education and Outreach

NCAS' goal is to educate students from underrepresented communities for research and operational careers in weather and climate prediction. NCAS graduates will have the necessary skills to contribute to the accuracy of weather and climate forecast modeling. Efforts continue to enhance enrollment at partner institutions at both the graduate and undergraduate levels.

Highlights include:

- Establishing a PhD pipeline among the NCAS partner institutions to graduate programs across the partnership
- Critical source of student support in the form of student stipends, tuition support, scholarships and student training
- All Center partners support undergraduate researchers during both the summer and academic year, including undergraduate student exchange among partner institutions
- Curriculum development
- Establishment of a Meteorology/Atmospherics Sciences minor at UPRM
- Weather camps conducted each summer at three NCAS partner sites: Howard, JSU and UPRM; afford high school students the opportunity to learn about basic weather systems and forecasting techniques and the impact of worldwide climate and catastrophic weather events

Establishment of a Meteorology/ Atmospherics Sciences minor at UPRM

- Working with local public school systems within the jurisdictions of partner institutions to offer workshops and curriculums to K-12 teachers focusing on recent research and hands-on experiences in weather, climate and ocean topics
- NCAS faculty visit public school classrooms to provide K-12 students with hands-on experience in weather forecasting and laboratory experiments

Research

- Established research and training capacity in observations and numerical modeling; host a wealth of instruments that routinely measure surface fluxes, urban and coastal/marine boundary layer meteorological parameters, and profiles of water vapor, ozone and aerosols within the troposphere that are important for weather, climate and air quality research
  - + At Howard's Beltsville campus, NCAS established a comprehensive mini-observation station for model validation studies and satellite validation, which promotes student training in use of weather instrumentation
  - + Mesonet systems at JSU

+ Surface observation facilities at HU, JSU, UTEP and UPRM

- Regional climate and weather prediction; research conducted to
  + Evaluate and improve model prediction of convection, tropical cyclone track and boundary layer processes
  + Determine impact of soil moisture and surface boundary forcing on seasonal precipitation prediction
- Air quality research a new area of focus; impact of atmospheric chemistry on multiple scales, particularly regarding capability of air quality models to make forecasts of ozone and particulates at local, regional and global scales
  + Impacts of West African air mass outflows of mineral dust and biomass aerosols
  + Trans-Atlantic AERosols and Oceanographic Science Expeditions (AEROSE)
  + Coastal Zone OBServations (COZOBs)
  + Characterization of air quality in urban and transition zones
- Established international collaborations with meteorological bureaus in Caribbean and West Africa

For additional NCAS information
http://www.gs.howard.edu/atmosci/default.htm
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Accomplishments

- Trained 172 students in NOAA-related science curriculum; 90% of those were African American or Hispanic/Latino
- Graduated 88 students in NOAA sciences; 54 Bachelor's, 24 Master's, and 9 PhDs
- Collaborated on 53 research projects with NOAA and MSI partners in support of NOAA operations
- 60 peer reviewed articles published by scientists (faculty and students) sponsored by NOAA EPP
- 5 new faculty members hired since NCAS was established
- NCAS Principal Investigator has served as Chief Scientist on multiple missions aboard NOAA ship, Ronald H. Brown

NOAA Interdisciplinary Scientific Environmental Technology Cooperative Science Center (ISETCSC)

As the newest Center, ISETCSC is focusing its research on development of technologies that support the prediction and understanding of climate and environmental change. Global climate studies require a multi-platform (satellite, ground, airborne, shipborne, etc), multi-sensor supply of streams of multimodal data with vast geographical coverage. These include data on aerosols, wind, ocean waves, seawater quality, temperature, ice coverage and depth at the North Pole, and hurricane intensity and trajectories. Chartered during the second competitive EPP grant cycle, ISETCSC is allied with NOAA's Earth System Research Laboratory (ESRL), whose strategic plan calls for observing and understanding the Earth system and for developing products that will advance NOAA's environmental information and service on the global-to-local scale.

North Carolina Agricultural and Technical State University (NCA&T) is the lead institution in this seven member consortium. The seven other universities are California State University-Fresno (CSU-Fresno), City College of the City University of New York (CUNY), Fisk University (FU), North Carolina State University (NCSU), University of Alaska Southeast (UAS) and the University of Minnesota (UM).

Education and Outreach

ISETCSC efforts to date have been directed toward developing infrastructure; hiring faculty, establishing scholarships at all partner universities, developing new curriculum, establishing new degree programs, identifying best practices for online courses and seminars, developing summer camps for K-12, developing a student recruitment plan, providing opportunities for faculty and students to spend time at NOAA labs, and for NOAA scientists to spend time at partner universities, and identifying some additional sources of funding for specific areas of research. In 2007, this partnership produced two new Bachelor of Science (BS) degrees at ISETCSC partners. CSU-Fresno now offers a Bachelor of Science degree in Environmental Science, while NCA&T now offers a Bachelor of Science in Atmospheric Science and Meteorology.

CSU-Fresno now offers a Bachelor of Science degree in Environmental Science, while NCA&T now offers a Bachelor of Science in Atmospheric Science and Meteorology

The student recruitment strategy calls for aggressively publicizing the opportunities available at all the partners. Scholarships have been offered to a number of incoming freshmen. ISETCSC has brought exhibit booths to numerous conferences. A colloquium series was begun in January of 2007, including live broadcasts to and from partner institutions and NOAA labs. Some appearances in local media have also occurred. Students will participate in many facets of ISETCSC research and efforts are underway to ensure interdisciplinary outreach, e.g., to students and departments in journalism and mass communication.

Research

ISETCSC is:

- conducting research on sensor science and sensor technology for oceanic, atmospheric and environmental applications
- performing analyses of global observing systems that include numerical and physical research and analyses of hurricanes
- developing information technology tools for data fusion, data mining and geospatial modeling and analysis

Atmospheric chemistry projects include:

- monitoring atmospheric trace gas constituents
- aerosol-cloud interactions

For additional ISETCSC information
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- chemistry of carbonaceous soot
- characterization of abundance of certain trace compounds in the atmosphere

Statistical analysis of storms and hurricanes is also a focus of this Center's efforts. Review of past tropical storm counts (going back to the 1870s) is ongoing, to distinguish among alternative hypotheses regarding dominant storm-controlling factors. Researchers are also searching for possible correlations between changes in the Earth's magnetic field and changes in hurricane activity in the Atlantic region. As the 2005 Atlantic hurricane season was the most active since record keeping began in 1851, virtually all the seasonal predictions fell far short of the actual level. ISETCSC is studying the relative role of tropical easterly wave disturbance activity and the climate of West Africa in modulating the unprecedented 2005 season.

A data fusion group has begun studies on hurricane data to predict storm intensification. Data mining is also ongoing to quantify the persistence of weather and see how persistence has changed with time. Work has begun on development of a geospatial information systems lab.

Accomplishments

- Trained 76 students in NOAA-related science curriculum; 64% of those were African American or Hispanic/Latino
- Graduated 9 students in NOAA sciences; 6 Bachelor's, 3 Master's, with 12 students working on PhDs
- Collaborated on 13 research projects with NOAA and MSI partners in support of NOAA operations
- 3 peer reviewed articles published by scientists (faculty and students) sponsored by NOAA EPP
- 3 new faculty hired since the Center was established

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Environmental Entrepreneurship Program

The Environmental Entrepreneurship Program (EEP) was established to provide students with training in the application of NOAA sciences in order to foster economic development opportunities. EEP facilitates partnerships among MSIs; various NOAA offices; academic, research, government and business organizations that can help prepare students with appropriate knowledge and skills to exploit environmental tools and technological resources. Projects fall into one of two categories: *Environmental Demonstration* projects are geared towards engaging MSI students and faculty in collaborative, field-based learning experiences. These endeavors train students in a complement of entrepreneurial and technical skills that may lead to business development opportunities in their local communities. *High School Pipeline* projects entrain a "pipeline" of high school (and even middle school) students to facilitate their understanding concepts of NOAA-related sciences and social sciences. The aims of both categories are to encourage the pursuit of careers, advanced degrees or environmental entrepreneurship opportunities in fields directly related to NOAA's mission.

Additionally, EEP strengthens the capacity of MSIs to promote student careers and advanced academic studies, as well as business opportunities. In a larger sense, the program has as a goal the fostering of economically viable and environmentally sustainable communities. Funds are provided on a strictly competitive basis.

EEP has awarded $15,142,674 to support 51 different projects. One thousand four hundred sixty students have been part of the program, 44% of them from underrepresented communities. Five hundred and four of those participants have been high school students, while the remainder were college students.

"GreenProofing: Growing an Environmental Enterprise" is an EEP Environmental Demonstration project. Efforts include seminars, site visits, individual research projects, and a hands-on collaborative effort to create a business. Located at the City College of the City University of New York (a Hispanic serving institution), this is a student-driven business consulting venture. These entrepreneurs are seeking to retrofit existing buildings in the local Harlem community with green roofs, using a combination of educational and community outreach to make them affordable and sustainable for disenfranchised, low-income communities with Harlem as the primary focus. The students are dedicated to increasing diversity in the field of environmentalism and sustainability, targeting not only the City College's diverse student population but also the local community of Harlem.

A training program in fisheries stock assessment was conceived at Jackson State University (JSU), Mississippi in 2001 in collaboration with NOAA Northeast Fisheries Science Center, Woods Hole MA, to expose students at Minority Serving Institutions to careers in this field. This complemented environmental and marine sciences programs that were already in place at JSU. Accomplishments have included student internships at NOAA laboratories and development of a new course, "Principles of Fish Population Dynamics and Stock Assessment," to add to their marine science curriculum. Activities under this award helped generate so much student interest that several new faculty with expertise in marine sciences were hired. The program also resulted in the development of a new training program: "Undergraduate Mentoring in Biological and Mathematical Sciences (UBM)" funded by NSF which has increased collaborations between faculty and students in the mathematics and biology departments at JSU. Reauthorization in late 2006 of the Magnuson Stevens Fishery Conservation Act identified fisheries stock assessment as a high priority, proving JSU prescient in developing their new program, and ensuring increased recognition for the University at other schools and marine laboratories.

The University of Alaska Fairbanks-Bristol Bay Campus serves an area of 55,000 square miles and 32 rural communities. Their High School Pipeline project is designed to assist in evaluating the potential effects of a prospective gold and copper mining project that would be among the largest in the world. The objective of the project is to build human resource capacity in the area's rural and indigenous communities, thereby preparing Alaskans for Alaska's jobs. Students benefit from practical participation in on-going local research. Project tools include developing dual-credit high school/college classes, an internship program and a college student/high school student mentoring program.

Glossary of Acronyms

AACU - Association of American Colleges and Universities
BEST - Building Engineering and Science Talent
COSEPUP - Committee on Science, Engineering and Public Policy
CREST - Cooperative Remote Sensing Science and Technology Center
CSC - Cooperative Science Center
DOC - Department of Commerce
ECSC - Environmental Cooperative Science Center
EEP - Environmental Entrepreneurship Program
EPP - Educational Partnership Program
ESRL - Earth System Research Laboratory
FY- Fiscal Year
GSP - Graduate Sciences Program
ISETCSC - NOAA Interdisciplinary Scientific Environmental Technology Cooperative Science Center
K-12 - Kindergarten through 12th grade
LMRCSC - Living Marine Resources Cooperative Science Center
NAE - National Academy of Engineering
MSI - Minority Serving Institution
NCAS - NOAA Center for Atmospheric Sciences
NERRS - National Estuarine Research Reserve System
NESDIS - National Environmental Satellite, Data and Information Service
NMFS - National Marine Fisheries Service
NOAA - National Oceanic and Atmospheric Administration
NOS - National Ocean Service
NSB - National Science Board
NWS - National Weather Service
OAR - Office of Oceanic and Atmospheric Research
S & E - Science and Engineering
STEM - Science, Technology, Engineering and Mathematics
USP - Undergraduate Scholarship Program

Endnotes

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- Schoolyard Spartina: Chesapeake Bay Wetland Nursery Team- photo courtesy of the National Aquarium in Baltimore
- Whale breaching- photo courtesy of 2005 Undergraduate Scholar Charles Doxley
- Xavier University SEED Program Participants-photo courtesy of Xavier University
- Graduate Scholar Dominic Hondolero- photo courtesy of Dominic Hondolero
- NOAA Undergraduate Scholars participate in NOAA Chesapeake Bay Restoration- photo courtesy of NOAA Office of Education
- Alcorn State University student conducts field research- photo courtesy of Alcorn University
- Blue Crab- photo courtesy of Amber Morris
- Schoolyard Spartina: Chesapeake Bay Wetland Nursery Team-photo courtesy of the National Aquarium in Baltimore
- Cooperative Science Center directors and university administrators attend announcement ceremony in the Russell Senate Office Building-photo courtesy of DOC Office of Photographic Services
- Alcorn State University Students conducting field research- photo courtesy of Alcorn State University
- Undergraduate Scholars attend the NOAA Scholar Orientation program- photo courtesy of DOC Office of Photographic Services

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- Graduate Scientists with Under Secretary of Commerce for Oceans and Atmosphere Conrad Lautenbacher – photo courtesy of NOAA's Office of Education

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- Undergraduate scholar discusses his research during the Scholar Research Presentation Program in the NOAA Science Center-photo courtesy of DOC Office of Photographic Services

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- Poster presentation scene at an Education and Science Forum- photo courtesy of Florida A&M University

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- Scholars attend 2008 Scholar Research Presentation Program- photo courtesy of DOC Office of Photographic Services

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- Undergraduate Scholars participate in NOAA Restoration Day activities- photo courtesy of NOAA Office of Education

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- Student participant of the Schoolyard Spartina project with the National Aquarium in Baltimore- photo courtesy of the National Aquarium in Baltimore

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- Dr. DaNa Carlis- photo courtesy of DaNa Carlis

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- Undergraduate Scholar Matthew Brown aboard NOAA research vessel- photo courtesy of Matthew Brown

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- High school students on the Ocean Science Bowl team sponsored by the Environmental Cooperative Science Center at Florida A&M University(FAMU)-photo courtesy of FAMU

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- Entrance to Hampton University- photo courtesy of Hampton University

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- Faculty and alumni of the City College of the City University of New York (CUNY) meet with U.S. Congressman Jose Serrano-photo courtesy of CUNY

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- Four Undergraduate Scholars who attend Florida A&M University (FAMU) were awarded prizes during the NOAA Scholar Research Presentation Program – photo courtesy of DOC Office of Photographic Services

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- NOAA Center for Atmospheric Science(NCAS) at Howard University graduate Michelle Hawkins with school administrators and commencement speaker - photo courtesy of Howard University

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- A high school student at the NOAA Interdisciplinary Scientific Environmental Technology Cooperative Science Center (ISETCSC) summer camp for students at North Carolina A&T University (NCA&T)- photo courtesy of NCA&T

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- CUNY student-driven Greenproofing Project- photo courtesy of CUNY

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- University of Alaska student conducting fisheries project with high school student attending a fisheries camp - photo courtesy of University of Alaska-Fairbanks

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