Northeast Fisheries Science Center Reference Document 99-18

Expanding Opportunities in Oceanic and Atmospheric Sciences

Proceedings of a Conference to Strengthen Linkages among HBMSCUs, NOAA, and Graduate Studies in Marine and Atmospheric Sciences, March 29-31, 1999, Richard A. Henson Center, University of Maryland Eastern Shore, Princess Anne, Maryland

by

Ambrose Jearld, Jr., Compiler and Editor

December 1999

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Ambrose Jearld, Jr., Compiler and Editor

National Marine Fisheries Serv., 166 Water St., Woods Hole, MA 02543-1026

U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Marine Fisheries Service
Northeast Region
Northeast Fisheries Science Center
Woods Hole, Massachusetts

December 1999

Northeast Fisheries Science Center Reference Documents

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This report's publication history is as follows: manuscript submitted for review -- December 13, 1999; manuscript accepted through technical review -- December 14, 1999; manuscript accepted through policy review -- December 16, 1999; and camera-ready copy submitted for publication -- December 23, 1999. This report may be cited as:

Jearld, A., Jr., compiler and editor. 1999. Expanding opportunities in oceanic and atmospheric sciences: proceedings of a conference to strengthen linkages among HBMSCUs, NOAA, and graduate studies in marine and atmospheric sciences, March 29-31, 1999, Richard A. Henson Center, University of Maryland Eastern Shore, Princess Anne, Maryland. *Northeast Fish. Sci. Cent. Ref. Doc.* 99-18; 147 p. Available from: National Marine Fisheries Service, 166 Water Street, Woods Hole, MA 02543-1026.

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FOREWORD

These *Conference Proceedings* provide a clear and objective account of *Expanding Opportunities in Oceanic and Atmospheric Sciences: A Conference to Strengthen Linkages Between HBMSCUs, NOAA and Graduate Studies in Marine and Atmospheric Fields*. The conference was held at the Richard A. Henson Center of the University of Maryland Eastern Shore (UMES) in Princess Anne, Maryland on March 29-31, 1999. The event was sponsored by the line offices of the National Oceanic and Atmospheric Administration, including the National Marine Fisheries Service, National Weather Service, National Environmental Satellite, Data, and Information Service, National Ocean Service, and the Office of Oceanic and Atmospheric Research. Co-sponsors were the University of Maryland Eastern Shore, National Association of State Universities and Land-Grant Colleges, National Association of Marine Laboratories, American Society of Limnology and Oceanography, and the National Association for Equal Opportunity in Higher Education. Nearly 250 individuals from state and private agencies, majority and minority colleges and universities, government agencies, and other oceanic, atmospheric, and environmental science institutions participated in the conference.

This conference is significant in several ways. First, it is a follow-up and extension of the work begun by the first *Expanding Opportunities Conference* held in 1995. Second, it marks the first time that all the line offices of NOAA, along with the Department of Commerce itself, have joined together to address issues of diversity. Third, the large number of participants—almost three times as many as attended the first conference—indicates that issues of diversity and true equal opportunity are crucial for all in our schools and businesses, and, more generally, in society and our nation. Thus, conference participants came to work actively on developing strategic actions to expand diversity and opportunities for individuals from traditionally underrepresented ethnic groups in the marine, atmospheric, and environmental fields.

In commissioning this document, the Conference Steering Committee hopes that it will serve not only as a source of information about the conference, but also as a call to action. To meet the challenges of the 21st Century, America must mobilize and take full advantage of all its human resources. This means that the American workforce who contributes to oceanic, atmospheric, and environmental sciences must be representative of the diversity that is present in American society. As minority underrepresentation in these fields is a complex and pervasive issue, a simplistic approach to increasing the numbers of minorities in the occupational and educational sectors will not work. What is needed to produce a workforce which reflects the diversity in the general population are long-term, system-wide, and permanent changes. The implementation of such fundamental changes is essential to attract, educate, employ, and retain minorities in the occupational and educational sectors.

This document may serve as a resource for policymakers in educational and occupational sectors, educators at all levels, historians, and other parties interested in expanding opportunities for minorities in the marine and atmospheric sciences. In addition, many of the issues discussed and recommendations which emerged during the conference reflect broader social, political, and economic issues related to minority funding, support for structural change, and retention of minority employees. Consequently, the document has potential utility and relevance that extend

beyond this conference to individuals, groups, and organizations who share an interest in and commitment to increasing the participation of traditionally underrepresented minorities in the oceanic, atmospheric, and environmental sciences.

The conference produced a number of substantive and far-reaching discussions, recommendations, and subsequent actions. While details of these are presented in the body of this report, the themes and concerns that were raised most frequently are highlighted below.

The Need for Communication and a Centralized Information System

Communication remains a key strategy for expanding opportunities for HBMSCUs. It is vital for attracting and retaining minorities in the sciences. Individuals must know what the marine and atmospheric sciences are, what NOAA does, what job opportunities are available, and how the majority and minority institutions can educate them in these fields. Within HBMSCUs and NOAA, communication must be centralized so that new advances in these scientific fields, employment possibilities, and funding opportunities are accessible to all. HBMSCUs must be afforded the same level of communication that majority schools specializing in these areas now receive.

The Need for Shared Responsibility

Federal funding alone cannot significantly increase diversity in the educational and employment sectors. All institutions and all individuals must do their part. Minority institutions must keep up with advances in sciences and technology; NOAA must allow for faculty-research exchanges; the Department of Commerce must enable NOAA to increase the number of contracts to minority-owned businesses; students must act as spokespersons for their chosen profession. This is just a partial list of how responsibility must be shared.

The Need for Increased Collaboration

Increased collaboration among the private sector, government agencies, and academia allows for shared policies, effective and current research, and integrated programs to increase diversity. These partnerships and collaborations must be designed to be equitable, long-term, mutually-beneficial, and to maximize the combined strengths of all involved parties.

The Need for Flexible and Creative Solutions

Increasing diversity means expanding our own ways of thinking beyond simple, traditional approaches. Churches and community groups can be called on to publicize the mission. Contract positions, short-term employment, and non-science positions—particular those specialized positions in the social sciences—must be used to expand opportunities for minorities. Private companies may partner with HBMSCUs and federal agencies to conduct research and development. Corporations may provide the equipment to HBMSCUs to update research facilities. Field trips for minority secondary students may be sponsored to provide important exposure to the marine sciences. In addition, we urge that individuals, groups, and institutions

devise and capitalize on a wide variety of mechanisms—formal and informal, spontaneous and systematic, ad-hoc and long range—to achieve true sustainable diversity.

The Need for Sustainable Change

It is crucial that mechanisms by which change is sustained and maintained are established. Any proposal for change must clearly specify ways by which true strategic transformation will become self-sustaining, and a part of the permanent educational, cultural, and administrative infrastructure. This is why diversity effected through legal means is usually successful, since federal law will ensure its continuation.

The Need for Increased Funding and Infrastructure Change for HBMSCUs

The allocation of funding and resources for HBMSCUs must be significantly increased. To increase funds, all parties must advocate for earmarking resources to explicitly support the strategic goals of HBMSCUs. Increased funding supports the needed changes in the institutional capacity and infrastructure of HBMSCUs to develop, expand, and maintain quality research facilities, to keep faculty and curricula current and responsive to the needs of the oceanic and atmospheric sciences, and to ensure long-term, continuous development.

The Need for Long-Term Strategic Planning

We must formulate a strategy for increasing diversity which is connected to the overall mission of participating organizations and institutions. This strategy would lay out, in concrete terms, what the key issues are, how they will be approached, what resources are available, and when these changes will be implemented. This long-term strategy must be in tandem with a full examination of the budgets, fiscal, and administrative policies of the participating organizations and institutions to identity those policies which hinder diversity.

The Need to Ensure Full Diversity

Changes must be made in the allocation of individuals and groups to specific positions and tasks within the educational and occupational sectors. These changes will allow minorities to be employed not only in all levels of the oceanic and atmospheric sciences but also in numbers significant enough to sustain and promote a culture of true diversity.

The Need for Moral Committment

Expanding diversity must be seen as part of a larger moral issue. We can present a stronger case for diversity—to the Congress, to our colleagues, to other institutions, to the public—if diversity in the sciences is regarded as one way to affirm human equality and dignity and to recognize and draw upon our national strength.

ANDREW ROSENBERG, PhD
Deputy Assistant Administrator for Fisheries
NOAA/NMFS

PREFACE

The proceedings of a second conference in the Expanding Opportunities effort, this time held on the campus of the University of Maryland Eastern Shore, are as emblematic as the first of our continued resolve to increase minority involvement in the fields of atmospheric, oceanic, and environmental research, science and graduate education. This holds true for both the educational and occupational sectors where the numbers of minorities engaged in these fields are very low compared to the dominant population. Indeed, the conference revealed how vast a gulf still separates minority and majority participation in scientific fields which NOAA depends on to meet its mission and honor the public trust.

It is only a scant four years since the Expanding Opportunities Conference held at Hampton University (HU), and just three years since the Savannah State University (SSU) Workshop where we thought there were opportunities on the immediate horizon for changes in NOAA and graduate institutions with disciplines in atmospheric, oceanic, and environmental sciences. Excitement was in the air over the heightened possibility for an Oceans Act and the impending boards that would have, as part of their trust, advisory responsibilities for budgetary and policy issues related to all aspects of the Oceans. During the four years, we have continued to be persuasive in our support for inclusion on boards, councils, committees at every level of power. We now have African-Americans on the NOAA Science Advisory Board, and there are African-Americans and other minority men and women serving on the Marine Fisheries Advisory Committee (MAFAC).

We wished, no matter how unrealistically, that a report could have been issued to participants of the UMES Conference, proclaiming that all the recommendations from the first conference proceedings had been met and the slate was clean for fresh ideas and recommendations. Our challenge and obligations, however, still remains. We must continue, as Dr. Spikes, President of UMES suggested, to keep making progress and to continually change our infrastructure to stay in, if not ahead of, the race. There has been small but steady support for minority students at all rungs of the ladder of higher education for course work, internships, and experiential opportunities such as attending and presenting at professional and technical societies. There has been concerted effort, although comparatively very small, on the part of some Line Managers to provide sustained support, support which has added to the capacity of a few HBMSCUs to participate in and contribute to NOAA's programs: Hampton, Clark-Atlanta, Savannah State University, Florida A&M University, University of Maryland Eastern Shore, Delaware State University, Howard University, South Carolina State University, Jackson State University, Morgan State University, University of Puerto Rico and Tribal colleges.

In keeping with the conference theme—Too Few to Count and Promises Yet to Keep—we are convinced that a radical change can occur in NOAA Commerce and in academia with the leadership and commitment to do the right thing, and we are inspired by individuals like U.S. Department of Commerce, Deputy Secretary Robert Mallett and Chairman of the White House Initiative Advisory Board on Historically Black Colleges and Universities, Dr. Earl S. Richardson. These two leaders in synergy with conference planners provided a set of lucid and cogent questions to stimulate and guide discussions, debate, and action. The able panelists

included the top leadership in NOAA, other federal agencies, universities and industry, and, conference participants represented various sectors of disciplines and employment including students, educators, scientists, managers and business persons. All of these people helped to raise our expectations for, and our commitment to, far greater achievement in NOAA's race for meaningful diversity in the 21st Century. We all hope to begin the new century with our dedicated and unceasing pursuit for true opportunity for all in our country and in the world.

These proceedings are structured to capture the tone of discussion energized, informed, developing, and broad in scope. They reflect the issues, concerns, and information brought to the table by participants, and they focus on specific recommendations. They begin with a Foreword meant to be comprehensive in scope, and compelling and the provocative addresses by keynote speakers. The step-by-step working aspect of the conference, where time was made for in-depth exchanges of information, began with a series of eight panel discussions focusing on a range of topics, including "Opportunities in Marine and Atmospheric Sciences—Then, Now, and Beyond Y2K" and "Building and Expanding Sustainable Alliances Between HBMSCUs and NOAA." Three working groups looked at issues particular to atmospheric, oceanic/marine, and coastal/ limnological sciences while reviewing the current relationships between NOAA and academia, particularly those with the HBMSCUs. Working lunch periods provided the time for free discussion, networking, and visiting classes at the University of Maryland Eastern Shore. One of the highlights of this conference was the sheer magnitude and presence of the invited student participants, who at the poster session were the center of attraction, surrounded by NOAA posters and exhibitors.

I should like to think that these proceedings reflect and transmit something of the commitment of NOAA to break the prison of inequality.

AMBROSE JEARLD, JR., PhD
Chairman, Steering and Conference Committees

ACKNOWLEDGMENTS

This conference was conceived, planned and sponsored by the line offices of NOAA including the National Marine Fisheries Service, National Weather Service, National Environmental Satellite, Data, and Information Service, National Ocean Service, and the Office of Oceanic and Atmospheric Research along with the University of Maryland Eastern Shore. Other sponsors include the National Association of State Universities and Land-Grant Colleges, National Association of Marine Laboratories, the American Society of Limnology and Oceanography, and the National Association for Equal Opportunity in Higher Education. It was hosted at the University of Maryland Eastern Shore.

As with most ambitious activities, there is a cost, and someone needs to give the final go-ahead. In this case, we are grateful to both Dr. Andy Rosenberg and Mr. Scott Gudes. We thank the NOAA and NMFS Administrators for their support, and we thank the co-sponsors and endorsing organizations.

Special tribute is due to Dr. Emorcia Hill who raised the importance of and who followed through with drafting a set of guiding questions to build a framework for the conference and, more importantly, to serve as a focus for each session and the expected outcome. She spent countless telephone hours, nights, entire days and weekends assisting in building the conference announcements, agenda, program, facilitating the conference, as well as chairing sessions, transcribing and developing minutes of meetings. Her post-conference commitment and contribution have been just as enormous in time, writing and editing, and participating in meetings to follow up on recommendations.

I am grateful to Ms. Denise Peloquin who transcribed the tape recordings of the conference sessions and typed draft after draft as they were filled in from notes by several individuals and from reports. Ms. Peloquin assisted me with assembling all the tape recordings, my notes and those from other individuals (Ms. Donna Johnson, Dr. Maurice Crawford, Dr. Sheila Stiles, Dr. Livingston Marshall, Dr. Emorcia Hill, Dr. Carolyn Brown) along with the reports from session moderators duplicating, collating, binding, switching between different word processing programs. Then there is the gratitude for all of the panelists who took time to review and edit for accuracy the transcribed and synthesized version of their oral presentations at the conference. The final version I take responsibility for any errors either because of omission or commission on my part.

As with all undertakings, such as doing this conference, there are the unusually talented groups of professionals and scholars that provide the extra eyes, ears, legs, and minds to get the job done. Ms. Helen Mustafa is due thanks for helping as my assistant in getting the project off and running. Her untimely illness was felt by all and was a set back for me personally. The great news, however, is that she fully recovered; not in time to attend the conference but in time to help with the proceedings. At times, my office has been full force on the proceedings under Helen's management. Ms. Teri Frady, Mr. Jon Gibson and Ms. Laura Garner of the NEFSC Communication staff added depth and breadth to the conference and proceedings. Special thanks to Ms. Teri Frady for the final touches on the conference program and to Ms. Laura Garner for

her very helpful editorial and structural recommendations for these proceedings. We are grateful to Dr. Sheila Stiles, Ms. Donna Johnson and Dr. Kelly Mack for their hard work in developing, organizing and managing the Poster and Exhibit session from contacting and getting participants to submit entries to putting them up and forming an awards judging team (Dr. Carolyn Brown, Ms. Donna Johnson, Dr. Mack Felton, Mr. Harold Foster, Mr. Dennis Hansford and Dr. Sheila Stiles) for best student poster presentations. Dr. Carolyn Brown helped with the staging of posters as well. We are grateful for the able and unselfish assistance given to facilitate the conference in unimaginable ways behind scene and out front by what I affectionately refer to as our damage control team: Equal Employment Office (EEO) and Diversity Officers, particularly Mrs. Natalie Huff. To the Henson (Hotel and Restaurant School) managers and staff and the students who put in long and extra hours because of demands, we overbooked the conference and to the NEFSC Procurement staff and the contract administrators at UMES, we thank you.

Special recognition is due Dr. Joyce Payne and the entire Office of Public Black Colleges staff for their hosting meetings, often on short notice. Moreover, for Dr. Payne's extraordinary sagacious and insightful leadership in managing matters of inclusion from a historical and current context. And, for her critical insight and tactful support in building institution-to-institution relationships, and for exceptional expertise in congressional affairs.

I am particularly grateful to and thank Ms. Emily Miller who, through some special magic, but most assuredly due to her intellect and talent as a writer and editor, pulled all the voices and written pieces together into a coherent, clear and lucid proceedings. Her service has been invaluable.

A tremendous amount of gratitude goes to all the planning committees inside NOAA and at UMES. The Conference Steering Committee is as follows:

Ambrose Jearld, Jr., National Marine Fisheries Service (Chair)
James H. Arrington, South Carolina State University
Brian Bingham, Western Washington University
Carolyn Brown, National Marine Fisheries Service
Susan B. Cook, Harbor Branch Oceanographic Institution, Inc. (HBOI)
Benjamin E. Cuker, Hampton University
Matthew R. Gilligan, Savannah State University
Natalie Huff, National Marine Fisheries Service
Roman Jesien, University of Maryland Eastern Shore
Darryl Keith, U.S. Environmental Protection Agency
Margaret S. Leinen, University of Rhode Island (URI)
Kelly Mack, University of Maryland Eastern Shore
Livingston S. Marshall, Jr., Morgan State University
Helen Mustafa, National Marine Fisheries Service
Mildred D. Ofosu, Delaware State University
Joseph Okoh, University of Maryland Eastern Shore (Co-Covener)
Joyce Payne, National Association of State Universities and Land-Grant Colleges
Marlin O. Perkins, National Environmental Satellite, Data, and Information Service
Carlos Robles, California State University

Harold M. Stanford, National Ocean Service
Denise Stephenson-Hawk, Spelman College
Robert H. Stockman, Department of Commerce
Sharon H. Walker, Office of Oceanic and Atmospheric Research
Benjamin Watkins, National Environmental Satellite, Data, and Information Service
Julian "Skip" Wright, National Weather Service
Please see Appendix B for names of persons on both the NOAA and UMES Planning Committees.

We thank the fine speakers who came to this conference and offered us their wisdom: Mr. Robert Mallett, Dr. Dolores Spikes, Dr. Earl Richardson, Dr. Eucharia E. Nnadi, and Mr. Scott Gudes. We thank too all those who attended and participated in the conference.

Finally, for all of the panelists and working session chairs, and to the many, many more who go unnamed for your relentless support and inspiration.

I. OVERVIEW OF THE CONFERENCE PROGRAM

The *Expanding Opportunities in Oceanic and Atmospheric Sciences* conference (the second in the Expanding Opportunities effort) was held March 29-31, 1999 at the Richard A. Henson Center of the University of Maryland Eastern Shore, Princess Anne, Maryland. Two hundred and forty-one participants from state, private, majority and minority colleges and universities, government agencies, and research laboratories attended this conference sponsored by the National Atmospheric and Oceanic Administration's (NOAA) line offices and five co-sponsors external to NOAA. Complete lists of co-sponsors and attendees are provided in the Appendices. The conference's four objectives were as follows: 1) to assess the progress made from the first conference held in June 1995, 2) to strengthen the links between Historically Black and Minority-Serving College and University (HBMSCU) undergraduates and institutions with graduate programs in the oceanic, atmospheric, and environmental sciences, 3) to examine the relationships between HBMSCUs and NOAA and the way business is now done, and 4) to develop a set of strategies and actions to increase the number of minorities who are educated and employed in the oceanic, atmospheric, and environmental sciences.

Conference participants were welcomed by Dr. Eucharia E. Nnadi, Vice President of Academic Affairs, University of Maryland Eastern Shore. The charge to the group under the theme, *Too Few to Count: Building Sustainable Alliances*, was jointly given by Mr. Scott Gudes, Deputy Under Secretary for Oceans and Atmosphere, NOAA, and Dr. Earl S. Richardson, President of Morgan State University, and Chairman, President's White House Initiative Advisory Board on HBCUs. Moderator for the presentation of the charge was Dr. N. Joyce Payne, National Association of State Universities and Land-Grant Colleges. Two other featured speakers addressed the group. Mr. Robert Mallett, Deputy Secretary, U.S. Department of Commerce gave the keynote address, and Dr. Dolores Spikes, President of the University of Maryland Eastern Shore spoke at the conference banquet.

A series of eight panel discussions focusing on a range of topics, including "Opportunities in Marine and Atmospheric Sciences—Then, Now, and Beyond Y2K" and "Building and Expanding Sustainable Alliances Between HBMSCUs and NOAA." Three working groups looked at issues particular to atmospheric, oceanic/marine, and coastal/limnological sciences while reviewing the current relationships between NOAA and academia, particularly those with the HBCUs. Working lunch periods provided time for free discussion, networking, and visiting classes at the University of Maryland Eastern Shore.

Dr. Ambrose Jearld, Jr., Conference Chairman and Dr. Andrew Rosenberg, Deputy Assistant Administrator for Fisheries closed the conference with remarks about *Promises Yet to Keep*.

II. WELCOME: Dr. Eucharia E. Nnadi, Vice President of Academic Affairs University of Maryland Eastern Shore

Dr. Nnadi welcomed the attendees, on behalf of the University of Maryland Eastern Shore. "It is my privilege to represent the University of Maryland Eastern Shore family. Welcome to UMES, the best kept secret in higher education." She emphasized the importance of the conference, "a conference to promote careers in oceanography, atmospheric and several supporting fields. Conferences like this are very important because as we all know there are very few minorities in most science fields. It's wonderful to see so many people of color in the sciences present in one place."

Dr. Nnadi commended and chastised NOAA' suggesting "we need your help. I'm sure you here are very aware of some of the challenges we at HBCUs and minority-serving institutions face, particularly making the best out of very little. We appreciate all the efforts you have made for us in the past and I'm grateful for NOAA's recognition of the importance of HBCUs. However, when I recognized that only 0.3% of your funding went to research at HBCUs, I was very disappointed. We need your help in making sure you increase your funding to help us with all our efforts." For their part, HBCUs were encouraged to become more collaborative. Sometimes our resources get so thin that we can't do it alone. At that point, we must reach out to each other to make it happen."

Dr. Nnadi thanked all those who made this conference possible, including Dr. Ambrose Jearld of NOAA and Dr. Okoh of UMES. "We appreciate all your hard work. If any of you in the audience have not been involved in putting a conference such as this together you will have no idea the amount of work [these individuals have done]." She then welcomed the featured speakers, stating, "We welcome Dr. Joyce Payne, Director of Office of Advancement of Public Black Colleges at National Association of State Universities and Land-Grant Colleges (NASULGC), Mr. Scott Gudes, Deputy Under Secretary of Oceans and Atmosphere, NOAA and Dr. Earl Richardson, the President of Morgan State University, our pride and joy. We welcome our president, Dr. Delores Spikes, as well as Dr. Andrew Rosenberg, the Deputy Assistant Administrator at NOAA Fisheries . . . And we are honored that Mr. Mallett, Deputy Secretary of the Department of Commerce will speak to us later on this morning and we are especially grateful for his support for HBMSCUs."

She challenged everyone to continue to work on the expanding opportunities effort, even after the conference was over, and recommended that "we always think of how we can best help our students, how we can best increase the number of students going into the sciences. Again, welcome to UMES, the land of Expanding Opportunities, and thanks for honoring us with your presence and, more importantly, for choosing our beautiful campus as the location for this great conference."

III. CHARGE TO THE CONFERENCE

Moderator: Dr. N. Joyce Payne, Director,
Office for the Advancement of Public Black Colleges
National Association of State Universities and Land-Grant Colleges

Too Few to Count: Building Sustainable Alliances
Mr. Scott B. Gudes
Deputy Under Secretary for Oceans and Atmosphere
National Oceanic and Atmospheric Administration

Charge to the Community
Dr. Earl S. Richardson, Chairman
President's White House Initiative Advisory Board on HBCUs
President, Morgan State University

Guiding Questions

- What is the representation of minorities in oceanic/marine, environmental, and atmospheric professions within academic institutions and the workforce?
- What has the trend been over the last five years?
- How can NOAA and academia work together to improve minority access to employment and educational opportunities in the oceanic/marine, environmental, and atmospheric professions?
- What are those traditions that should be retained and those that should be relinquished to ensure success in improving minority access?
- Of what importance is it that minority access to employment and educational opportunities in the oceanic/marine, environmental, and atmospheric professions be significantly improved?
- What are realistic measures of success of minority participation in the oceanic/marine, environmental, and atmospheric professions?

Dr. N. Joyce Payne—The Conference Charge

Dr. N. Joyce Payne set the conference tone and laid out the challenges conference participants face as they explore and implement ways to increase minority representation in marine and atmospheric sciences. "We have the awesome charge of trying to put this conference in motion, by challenging you to do what is best for the nation, NOAA, and for the minority communities we serve." Dr. Payne said we have two responsibilities: 1) to increase the numbers of minorities who enter the sciences and 2) "to make a radical change in how we go about the business of doing this."

In 1996, minorities accounted for only 3% of those in the sciences; within the atmospheric sciences, this number sinks to only 1%. "This percentage by no means represents the commitment that HBCUs and Hispanic-serving institutions have made in making a difference." How, then, can we find better ways to increase diversity? Thus the fundamental charge to the conference is "to explore these issues and to find better ways to make a difference."

Dr. Payne recognized attendees who have ". . . advanced the land-grant mission and the historically Black colleges and universities, and introduced representatives from three Maryland congressional districts, including Lee Wiley, for Senator Paul Sarbanes, Cindy Betts, for Senator Barbara Mikulski, and Jody Beecham, for Congressman Wayne Gilchrest. She extended her acknowledgment of individuals who have worked strenuously on behalf of these institutions, including Dr. Richardson, President, Morgan State University. She explained that Dr. Richardson did not just lobby Congress; he "educated Congress and helped them understand the critical nature of increasing diversity in the sciences." Dr. Payne added that Dr. Richardson also "played a major role in creating an appropriation of more than $30 million from the Department of Education for support of graduate programs at HBCUs in areas of national need."

Dr. Payne ended with a strong message about our ethical and moral obligation to increase diversity and social democracy as a means of improving the quality of life for all Americans. She then introduced the two featured speakers—Mr. Scott B. Gudes and Dr. Earl S. Richardson —as individuals who can set the charge in motion and help us move the conference agenda forward.

Mr. Scott B. Gudes—An Overview of NOAA

Mr. Gudes gave an in-depth presentation on NOAA's programs. He commented on the lack of public knowledge about NOAA, saying "I find when I go out around the country and talk about NOAA, people shake their heads up and down, and I realize they don't really know what NOAA does." He observed that even if people are familiar with a particular component of NOAA, such as the National Weather Service, they do not realize this is a part of NOAA. Accordingly, he gave an overview of NOAA, its mission, and its different line offices. NOAA, he said, has "two major missions. We do environmental assessment and prediction, and we provide environmental stewardship for the nation by protecting the oceans, marine species, and the nation's shorelines." NOAA also is the atmospheric and oceanic forecast and warning system for the nation.

NOAA, which was created in 1970, has an operating budget around $2.2 billion and employs around 12,000 people "scattered around this country and around the world. We actually have a Corps officer in the South Pole who helps measure the ozone each day." There are also several key sites for NOAA—Seattle, Boulder, Kansas City, Miami, Tampa, and St. Petersburg. A good portion of the budget goes to our Satellite Services which provides information for all of our line offices.

NOAA has five separate line offices—National Ocean Service (NOS), National Marine Fisheries Service (NMFS), National Weather Service (NWS), Oceanic and Atmospheric Research (OAR), and National Environmental Satellite, Data, and Information Service (NESDIS): [A NOAA

organizational chart is presented in Appendix E]. The National Ocean Service traces its lineage "all the way back to 1807 with the creation of the Coast Survey." It is responsible for "mapping, charting, hazardous materials, and damage assessment like the Exxon Valdez and like the algae bloom outbreak." NOS "manages marine sanctuaries and estuarine reserves like the Coastal Zone Management Program and the Coastal Services Center."

NMFS employs about 2,800 people who work with endangered species, fisheries management regulation, protected species recovery, and the industrial and economic impact of fishing on marine and coastal species. "As you might expect, most of our budget goes into building sustainable fisheries and recovering protective species."

"The Office of Oceanic and Atmospheric Research (OAR) is our long-term research arm that researches the science that helps all our line offices do their job." OAR does "air quality, climate, severe storm dynamics, research and development on observing systems, and marine and undersea research." In short, OAR looks at long-term global impact and change. OAR's laboratories are concentrated in Boulder, Colorado; Miami, Florida; and Norman, Oklahoma.

"Our largest line office is the National Weather Service (NWS) which employs about 4,800 people." NWS does both long- and short-term weather predictions, including "the severe weather watches you see on TV." NWS also does hydrology, flood forecasting. NWS is perhaps the most underrated line office, as most people believe their local weather forecasters are actually gathering the data that allows them to make weather predictions.

Finally, there is the National Environmental Satellite, Data, and Information Service (NESDIS) that controls the satellite systems that gather atmospheric data. NESDIS, along with NWS, tracks the hurricane systems. There are also a few components of NOAA that do not fit neatly into the line offices structure. For instance, "the NOAA Corps, which is the seventh uniform service in the United States, flies aircraft directly into hurricanes and operates fisheries research vessels on the ocean." Mr. Gudes recognized Admiral Select Evelyn Fields, who was selected to take over the NOAA Corps and its 2,400 officers. "Evelyn was the first African-American woman to command a U.S. vessel, the *MacArthur,* and we're proud of her."

In short, "NOAA is about life on earth—from outer space with our stationary satellite—220 miles in geostationary orbit—to the bottom of the ocean with our deep submersibles." Mr. Gudes expressed his deep personal interest in and commitment to NOAA, which he described as an agency that "has more to do with people's lives on a daily basis than any other federal agency, because this agency deals with Mother Nature and the effects Mother Nature has on us and we have on her."

NOAA is a vital and powerful institution for the nation. However, for all its power, Mr. Gudes went on to say, NOAA has not increased its percentage of minorities in the past ten years. From 1984 to 1994, minorities accounted for a consistent 12% of its total workforce, and most of these were employed in lower level positions.

Mr. Gudes described NOAA 's diversity plan as a multi-level strategy with its logo: "Many faces, One vision." The diversity plan has five objectives:

1. Attract students to its workforce by offering internships that convert to permanent employee status after graduation.
2. Hire more minorities at the GS-13 level.
3. Develop management support from the top to get a more diverse workforce.
4. Examine the culture of NOAA, assessing how the agency views and values diversity, and changing the climate to be more supportive of minority employees.
5. Create sustained relationships with community and academic institutions, in particular proposing a million dollar initiative with HBCUs to create centers of excellence.

In his conclusion, Mr. Gudes encouraged conference participants to engage in fruitful dialogue. "This conference presents a special opportunity for outreach. It is an opportunity to build relationships."

Dr. Earl S. Richardson—A Charge to the Community

Dr. Richardson pressed conference participants to consider the essential role that HBCUs have and continue to play in producing minorities with bachelor degrees. He cautioned the audience not only to think of the physical beauty of the campus but also to contemplate what goes on in the classroom. "This is a very beautiful campus, but the real beauty takes place in the classroom, in what happens to the young people who come here, and HBCUs have a critical role in the education of minorities." He offered some crucial statistics: "The under-representation of minorities occurs in all disciplines, even education. Whites are twice as likely to have a B.Sc. degree than Blacks. What this means is that before we can talk about finding people to populate our workforce, we have to talk first about educating them." HBCUs, he said, enroll only 16% of all Black students in higher education, "but produce 30% of the Black population who hold baccalaureate degrees and 28% of those in the sciences, engineering and mathematics (SEM). In physical sciences, the numbers are even higher, with HBCUs granting 47% of the degrees." Just as we have produced a disproportionately high percentage of the SEM degrees at the undergraduate level, HBCUs hold the same potential for graduating African-Americans at the master's and doctoral levels. In 1998, 27 African-Americans received doctoral degrees in electrical engineering; with appropriate resources, HBCUs can more than double production in that discipline.

To demonstrate the potential of HBCUs, Dr. Richardson compared business and education, saying "where there is the greatest yield you should invest accordingly." The effectiveness of HBCUs in educating people make them a prime place for government agencies, like NOAA, to invest their time and money. He noted that $2 billion of research funds go to five majority universities, yet in spite of these significant investments, the numbers of minorities in the sciences remain unchanged. Dr. Richardson urged that the research and development funding be reallocated to include HBCUs and thus ensure that these institutions will have as much of an impact at the graduate level as they now do at the undergraduate level. HBCUs are doing a great job with our undergraduates; now we must do an even better job with our graduate students by

"become part of the community of institutions producing PhDs in the sciences. If each institution increased its doctoral rate by one person, it would have a huge impact on the national figures." We must invest where minority students are—the HBCUs—as only that will significantly increase diversity in the sciences. Increased research funding, he added, provides the research experience needed to socialize students into the profession, by training them to think like scientists: "to analyze like scientists, to pose questions like scientists. The Research Experience for Undergraduates (REU) allows African-American students to experience being scientists and is generally far more important to an African-American student who has no other medium through which to get that experience."

Dr. Richardson also spoke of the need to increase minority access to science education, by increasing financial aid, and enriching educational opportunities at all levels. "Forty-nine percent of African-American families with children 18-24 years old make annual incomes of $20,000 or less. Juxtapose this with educational costs. Educational costs at Morgan State University, for example, are approximately $10,000 for Maryland residents and $15,000 for non-residents. We're not even talking about private institutions—these are publicly-funded institutions. Financing is simply a major barrier to our students. But through our relationships with federal agencies, such as NOAA," we can bring financial and research resources for these students.

Dr. Richardson ended by echoing Dr. Payne's words, that to increase diversity in the sciences is "in the best interest of the nation."

IV. KEYNOTE ADDRESS: Mr. Robert Mallett, Deputy Secretary U.S. Department of Commerce

Guiding Questions

- Why are alliances between Government Organizations and HBMSCUs important to America's future in Y2K?
- What unique characteristic of HBMSCUs must be considered when building these alliances?
- What types of alliances are possible?
- What post-conference activities are required to ensure that these alliances are built and sustained?

Deputy Secretary Robert Mallett began by expressing his pleasure at being part of the conference and shared his personal connection with minority-serving institutions. "I am a product of a minority-serving institution. I am a graduate and son of Morehouse College in Atlanta. I have an obvious affinity for the capacity of these institutions to build students into fine professionals." He then decided not to speak from his prepared notes, remarking that "the first time I met with Dr. Richardson, he recited the statistics to me, and I was embarrassed because I knew we could do better. This is my second time meeting with him and speaking to you and I hope that I do better in addressing this issue than I did the first time." Mr. Mallett underscored his department's strong commitment to make things work, noting that "we do such excellent things when we are committed to them." Mr. Mallet was clear that the responsibility for change should be borne by all constituencies—federal agencies, NOAA, minority institutions, and majority institutions.

Several themes were repeated throughout Mr. Mallet's address:

- First, the diversity in the United States which Mr. Mallett urged the participants to recognize and be proud of. "There are very few places on earth—and I've been all over—that have the greatness of diversity the United States does. That is our strength—our diversity and our willingness to embrace different cultures. This is true in spite of our checkered history."

- Second, the significant financial investment of NOAA to the growth of large, majority, research-intense institutions. "We can do wonderful things with capacity-building. The University of Oklahoma at Norman has become an expert in tornado forecasting and attracts good faculty and students. It did that with the commitment of NOAA."

- Third, the pace of change, which as Mr. Mallett noted "occurs slowly." Two situations are true: we have made progress and we need to do better. "We at the Department of Commerce are trying to speed up the pace of change. Part of that means we not only change our personnel practices to make the Department look more like the United States, but also we change our contracting system so that more small businesses and minority-owned enterprises

can share in our resources. We must also change the culture of the Department so we can fully embrace the gifts of diversity."

- Fourth, models for partnerships between large and small institutions. He pointed to the federal government's own success in the procurement process where agencies have " . . . subcontracting programs for minority and women-owned, small businesses." He added that " . . . no matter what we think about these kinds of programs, this is as it should be because that money comes from taxpayers of all stripes. Not just White people pay taxes, not just men pay taxes, women pay taxes, Blacks pay taxes . . . we all participate in creating the public purse that the government doles out, so all kinds of people should participate in the government's programs."

He further urged that smaller institutions not begrudge the larger institutions who are recipients of funds. "I believe that the larger institutions of higher education will continue to be the primary recipients of most federal dollars—that's a reality check for you. But they represent an opportunity, not a threat." Minority institutions must enter into partnership with larger institutions, and larger institutions must become mentors and collaborators. "We all have a part in changing our culture."

- Fifth, he emphasized how HBCUs can make themselves fundable and competitive. Mr. Mallett encouraged participants to enact all forms of legislative support, to be their own advocates on the state and federal levels. "Write your Congressman; write your local and state governments for funding. You must be aggressive about asking for money. You must demonstrate your commitment to your own institutions, and commit your local and state governments to assist in your endeavors. Minority-serving institutions have not done the kind of job they need to do in terms of their own advocacy." Without aggressive commitment, no partnership can thrive. He also stressed that when funding levels increase, HBMSCUs must be "meticulous managers of public resources, and put the best auditors and accountants on the task."

- Finally, he advised students to be the brightest stars they can be. Participate in programs, seek exposure for yourself and others to diversity, responsibility, and intelligence. Do all this so that "your institutions can show you off." Remember that "we must celebrate our unique position in the globe—our diversity is our strength."

Mr. Mallet not only offered suggestions to conference participants, he was also solicitous of attendees and sought their advice. While those are the positive changes in the Department of Commerce, Mr. Mallett noted that of the $262 million of grant money awarded in the past year by the Department, only $2.8 million, approximately 1.1% of total award money, went to HBMSCUs. "We know that we have a responsibility to do better, and we need your help. We need to create new partnerships and new opportunities so that we can inspire new funding opportunities for HBMSCUs." Mr. Mallett suggested faculty members of HBMSCUs come to NOAA while on sabbatical to understand its needs and to be able to target their universities

towards training qualified students. "We need your help to show us new programs, how you design your academic curriculum, how you can intersect with NOAA."

In the question and answer period that followed, Mr. Mallett was asked "why do you think we're here at this conference?" He responded that "we're having this conference because we know that the $2.8 million allotment was an embarrassment to the Department of Commerce and we want to improve our record of support to minority-serving institutions. This conference is a start in that direction." He emphasized again that minority investment is crucial to keep the nation running. In fifty years, it is estimated that the population of the United States will be approximately 340 million, and half of that population will be non-White. "The Latino population is increasing at three times the rate of Whites; Blacks at twice the rate; Asians at three times. So it is in our self interest as a country to make sure that everybody participates, that minorities are trained as scientists and engineers." While this may seem like rhetoric, and "it is rhetoric to the extent that we need to talk about these issues, this conference presents an opportunity to make institutional changes, to provide the commitment to create an infrastructure to do the right thing."

V. CONFERENCE BANQUET SPEAKER: Dr. Dolores Spikes, President, University of Maryland Eastern Shore

Dr. Spikes emphasized the tremendous service HBMSCUs provide to the nation, and she urged that they be better funded. Her urgent message began with sobering information—the Southern Education Foundation in a report entitled "Miles to Go" showed that Black access to higher education has not changed substantially in twenty years. "The proportion of Blacks among doctoral degree earners has not budged between now and 1976. Black representation among first time full-time freshmen in four-year institutions continues to lag behind the representation of 18 to 24 year-olds in the general population. For instance, South Carolina, where Blacks comprise a bit more than 36% of the relevant population, has only 20% Black freshmen. There are many of us, perhaps even some of us here, who tire of hearing such facts. Some even call them irrelevant. But we can not ignore the fact that in the changing demographics in the United States, African-Americans, Latinos, Asian-Americans will become the majority population." If we do not pay attention now to the needs of the workforce, we will have a crisis on our hands.

She noted that HBMSCUs provides the best support for minority students in the nation. These HBMSCUs are found in 19 states, primarily in the South, and 75% of all African-American college students were enrolled in these 19 states. Statistics also show African-Americans moving back to the south in record numbers. For these reasons, "these 19 states have importance for the entire nation. We should direct more of our funding to the HBMSCUs to accommodate the expected increase in enrollment in HBMSCUs. In the state of Maryland, for example, we expect that there will be a tremendous increase in college enrollment within the next five years. The University of Maryland has projected that the greatest increase will be among African-Americans and thus foresees that the fastest growing institution in Maryland will be the University of Maryland Eastern Shore, one of the HBMSCUs."

This population growth means that HBMSCUs need to continue their aggressive stance towards funding since in these southern states the average Black family's income is not greater than $30 thousand. She urged that HBMSCUs be committed to their programs and responsible for their funding so that they can show the nation its investment in diversity and quality. "We cannot sit back and simply put our hands out and expect them to be filled. We have an obligation as well. We must have faculty who are aggressive enough and committed enough to put in the time and effort necessary to devise programs which meet the workforce demands of this country. We have no time to say that this isn't fair. Life isn't fair. And I'm not going to be satisfied with first rate baccalaureate programs only when there's a need for doctoral programs for minorities. We have the wherewithal to do this—not in isolation—but in partnership."

Dr. Spikes criticized NOAA for being long on talk and short on diversity, and she cautioned participants to keep track of the earlier conference proceedings. "Do not make the same suggestions as you did in 1995," she said. "Not only is the situation a terrible indictment of the American dream, but the lack of progress is a further indictment. We must keep making progress; we must change our infrastructure."

She ended by reading Maya Angelou's poem, "Equality" which urges until there is true equality, there is not true freedom: *Equality and I will be free* (see Appendix F). "I hope I've taken the blinders from your vision and the padding from your ears. We must have the courage to walk forward."

VI. PANEL SESSIONS

The eight panels were the backbone of the conference, allowing those with experience and knowledge to formally present their views. The panelists provided insight on academic and government institutional culture, current and potential opportunities in the marine and atmospheric sciences, and the role of partnerships between the academic, government, and private sectors. Each panel was moderated by a representative of NOAA and/or from academia, and after all panelists spoke, the floor was opened for questions, answers, and discussion.

A. Panel One: *Opportunities in Marine and Atmospheric Sciences—Then, Now, and Beyond Y2K*

Moderator: Dr. Andrew A. Rosenberg, Deputy Assistant Administrator
NOAA/National Marine Fisheries Service

Panel Members:

Part A: *Perspectives from NOAA's Leadership*

General John J. Kelly, Jr., USAF, Ret.
Assistant Administrator, NOAA/National Weather Service
Mr. Gregory W. Withee,
Deputy Assistant Administrator for Satellite and Information Services
NOAA/National Environmental Satellite, Data, and Information Service
Dr. Ronald C. Baird, Director, National Sea Grant College Program
NOAA/Office of Oceanic and Atmospheric Research
Dr. Margaret Davidson, Director, Coastal Services Center
NOAA/National Ocean Service

Part B: *Perspectives from Academia's Oceanic, Atmospheric and Environmental Leaders*

Dr. Margaret Leinen, Dean of the Graduate School of Oceanography
University of Rhode Island
Dr. James Arrington, Vice President for Academic Affairs
South Carolina State University
Dr. Larry Earvin, Dean of the School of Arts and Sciences
Clark-Atlanta University

This panel identified the opportunities that are currently available to minorities in marine and atmospheric sciences and recommended steps to increase opportunities.

Guiding Questions

- What are the prospects for employment, education and research funding for individuals and institutions in the oceanic/marine, environmental, and atmospheric professions?
- What has your organization or institution done over the past five years to enhance opportunities for minorities in the oceanic/marine, environmental, and atmospheric professions?
- What does your organization or institution plan to do in the next five years to enhance opportunities for minorities in the oceanic/marine, environmental, and atmospheric professions?
- What challenges to your success have you, or must you overcome to meet your organization's or institution's objectives to significantly improve minority participation?

Recognizing the Growth Potential in NOAA

Dr. Andy Rosenberg described this conference as a vehicle for both NOAA and academia to strengthen their organizations by exchanging information and ideas and building partnerships. He enumerated numerous NOAA programs that currently support students, faculty, and research and reminded the conference participants that these would be discussed throughout the meeting. NOAA can increase its interactions with HBMSCUs since they provide new talent which to date has been mostly an untapped resource. He went on to say NOAA is a relatively small agency, but that this small size should not "make us believe that opportunities are limited. Prior to the conference, I did a quick check and there are currently 139 vacancies within NOAA. So there are opportunities." He went on to make two key points: 1) that the strength of NOAA is increased with diversity and 2) that NOAA has the potential to expand. Gen. John Kelly seconded this idea of growth, saying "the United States is subject to some of the most severe weather in the world and NOAA/NWS responds to these demands." Mr. Gregory Withee and Dr. Ronald Baird added to this, remarking that NOAA was also researching global phenomena regarding the environment, such as waste management, environmental impact, and air quality, all decidedly growth areas. Dr. Baird indicated that universities and students the next century will see expanding opportunities for both programs and careers in the environmental sciences. All panelists agreed on the importance of diversity as an integral part of NOAA's growth.
Dr. Arrington attested to the success of outreach efforts. His first-hand experience working with managers at NOS and NMFS led to South Carolina State University (SCSU) graduates being employed by these two NOAA line offices. He pointed out that as agencies attempt to diversify their workforce "some of their best recruiters or ambassadors are going to be satisfied employees" who are graduates of HBCUs and have been treated well in the "system".

Recognizing the Growth Potential in Academia

Panelists offered multiple perspectives on how academia could and should position itself to grow and develop its infrastructure. These strategies are not dictated by the size of the institution, but can be scaled to fit the resources and capabilities of each institution. Dr. Rosenberg generally observed that academia can strengthen its programs and ability to train students, as well as convincing students that environmental science is an extremely exciting and interesting field.
Dr. Arrington described the difficulties that HBCUs and state-related institutions face and the

issues they grapple with on a regular basis. He specifically referred to the difficulties encountered by institutions in communicating with funding agencies and preparing entering students. Yet these difficulties have not prevented them from becoming number one among their peers in securing external research dollars, and within the top 15 institutions in graduating African-Americans with baccalaureate degrees. He implored NOAA and other federal agencies to "provide us with assistance through partnerships, through collaborations, and through scholarships, as those are the kinds of opportunities we need in order to produce students who can assume positions in NOAA and participate in graduate education."

Academia's Transition from a Three-legged to a Four-legged Stool

Dr. Leinen noted that academia is increasingly being called on to take a more active role in economic development, as well as teaching, research, and outreach. Economic development is becoming the "fourth leg" of the traditional "three-legged stool" of teaching, research, and outreach. For example, Governors have said that the [land-grant] university's job is to be relevant to the development and growth of the state economy, and in many states "we are seeing a call for the universities and the agencies with which they partner to become forces of economic development in the states." Dr. Leinen acknowledged that these changes are taking place in a climate of very limited resources, and therefore partnerships between academia and government agencies such as NOAA are essential. She pointed out that "on the NOAA side, the challenge then is to find those institutions who have made a commitment, and make a strategic commitment to be partners with them." She also noted that these partnerships are not restricted to dollar contributions only, but include situations, for example, where through NMFS NOAA's personnel work directly in the university in a true partnership. In these situations, "people plan the work together, they execute it together, and they discuss the impact of the work afterwards." She urged the conference participants to be creative in thinking about the types of partnerships which will extend beyond traditional university structures and mandates. Dr. Arrington informed conference participants that SCSU has already assumed a role in the economic development of the state of South Carolina through its National Aeronautics and Space Administration (NASA)-funded Center of Excellence which involves public municipalities and educational institutions.

Opportunities in Non-Science Fields at NOAA

Panelists outlined the range of disciplines NOAA's employees represent and discussed the non-scientific positions that are available at NOAA. These constitute one-third of NOAA's positions and many require specialized training, including policy analysts, enforcement agents, public administrators, legal personnel, and economists. Panelists gave examples of the kinds of activities with which these professionals were involved. Dr. Rosenberg talked about employment such as legal counsel, both in-house, and, as Dr. Larry Earvin said, as legal consultants to Congress, advocating NOAA's policies. Mr. Withee reminded the audience that NOAA stores enormous amounts of data each year, equivalent to five Libraries of Congress, and that these data require computer specialists and librarians trained in computer archiving and retrieval. Dr. Rosenberg added that with the need for additional funds comes a real need for grant writers, people skilled in procuring funding.

The Success of Interconnected Programs at NOAA

Panelists praised the success of programs developed in conjunction with private or other government agencies. Gen. Kelly remarked that NOAA itself hires 30 new meteorologists a year, and that the Navy and Air Force collectively hire between 20 and 40 people specializing in meteorology and oceanography. In addition, "this year we'll bring on board about 30 students under the Oak Ridge Institute of Science and Education (ORISE) and two faculty members to work at Weather Service forecast offices." Mr. Withee said that the success of the joint Air Force and NOAA satellite program "NPOES" continued to increase NOAA's research and hiring capacity with over 40 new people hired this year.

The Success of Strong Student Programs at NOAA

Currently there are several student programs that provide experiential learning opportunities within NOAA. These include the Sea Grant program, directed by Dr. Baird, which is a partnership between NOAA and 29 colleges, including the University of Puerto Rico, the University of Virgin Islands, and Native American Schools. Many of the local Sea Grant programs have a special relationship with their local HBCU; for instance, Maryland Sea Grant "has an extension specialist located here at our host institution, UMES." Sea Grant is not a source of employment, but is an education and research facility that trains the next generation of scientists and introduces students K-12 to the marine sciences. Dr. Davidson mentioned the fellowship program that NOS runs where students work in the coastal management offices for different states, as well as the Memoranda of Understanding (MOUs) that NOS has established with Duke University. Every major agency operating under NOAA has a summer jobs program, and some of these have monies dedicated to hire minority students as full time employees such as in NESDIS. Dr. Davidson noted a National Science Foundation (NSF) survey which showed that "we should capture the attention of young folks between the ages of eight and eleven because that's when they believe they still have opportunities." Mr. Withee mentioned smaller programs that sponsor minority students in college, like the joint fellowship program with the American Meteorological Society.

Focus on Excellence

Dr. Arrington acknowledged that SCSU "realized they can't be everything to everybody and have created several Centers of Excellence" that focused on their strong areas such as Environmental Science. Historically, SCSU has strategically focused its resources on the traditional basic sciences, but in recent times has expanded into new, more specialized fields. Dr. Earvin shares this perspective, and emphasized the need for HBCUs to retain a focus on traditional curricula while simultaneously introducing students to specialties to which they may not have been exposed prior to coming to college. Dr. Earvin stated that capacity-building is essential in order for institutions to do both. Dr. Arrington described SCSU's transition into specialized fields. He specifically mentioned the Savannah River Environmental Field Station where SCSU "has worked with at least three federal agencies: the Forestry Service, Environmental Protection Agency, and United States Department of Agriculture" to establish this Center. In addition, other HBCUs within a three to four hundred miles radius have full

access to the Center and its resources, which affords them the opportunity to form strong collaborations on environmental issues. These Centers of Excellence are collaborative efforts which attract students to the fields, provide a qualified focus for funding, and assure that the faculty and facilities are kept up to date. Dr. Arrington reported that this Center recently received the Hammer Award, a national award for excellence. Dr. Earvin mentioned the long-term alliance between NOAA and Clark-Atlanta, where "Dr. Denise Stephenson-Hawk developed an Earth Science System to ensure our students have exposure to the opportunities that exist within environmental sciences."

The Need for Capacity-Building

Dr. Earvin spoke at length about the need for capacity-building, the need to ensure that academia changes and grows as marine and atmospheric fields evolve. "We have to keep providing opportunities for our existing faculty to be trained, to have faculty professional development opportunities . . . I am currently working with an initiative, trying to develop an educational partnership program between nine schools (Clark-Atlanta University, Florida A&M, Howard University, Hampton University, Jackson State University, UMES, Delaware State University, Morgan State University, and Savannah State University) and the government. This will be a two-way partnership, benefiting all of us—HBMSCUs, NOAA, and majority institutions." Capacity-building requires the direct cooperation with NOAA, good communication between research scientists and faculty, and dedicated funds that allow facilities to continually improve and develop. Dr. Earvin was emphatic that "capacity-building is something that we cannot overlook. Sustained relationships we must have. The notion of a partnership is fundamental for HBCUs."

Interdisciplinary Connections to Marine and Atmospheric Sciences

Dr. Leinen shared the successes of the School of Oceanography at the University of Rhode Island (URI) in preparing people for careers in marine sciences. She remarked that this success has three meanings for URI: 1) agencies, civilian and government, can call upon URI for knowledgeable, trained scientists, 2) other schools may want to look at how URI has developed its successful program, and 3) this success has begun to draw students from a much broader academic background. She said, "whereas before one would get an undergraduate degree and accidentally stumble your way to the marine sciences, now there are different ways of getting to the sciences as colleges become more interdisciplinary." Students are recognizing that there are a number of diverse ways to work within the marine and atmospheric sciences. In particular, Dr. Leinen stressed that academia and NOAA should take a broad view and push into the area of economic development, as this has become the natural extension of the (fourth part) land-grant model.

Specific Recommendations:

- HBMSCUs need to develop a national K-12 program to get students interested in marine and atmospheric sciences.

- NOAA needs to coordinate, on a national level, its opportunities for minorities.
- NOAA and HBMSCUs need to have consistent faculty exchanges so that government and academia can engage in mutually beneficial interactions and exchanges.
- HBMSCUs want real partnership not just funding. NOAA needs to find ways to be actively involved with the work they fund and have a visible physical presence.
- There must be a presence in Washington that lobbies for increased federal funding earmarked for diversity.
- Sustained, long-term partnerships have proven to be the most valuable. This is the primary model NOAA and HBMSCUs should use in their continued work.

B. Panel Two: *Student Perspectives—A Reflection on Institutional Culture*

Moderators:

Dr. Brian Bingham, Huxley College of Environmental Sciences
Mr. Robert Stockman, Strategic Planner
NOAA/National Weather Service

Panel Members:

Danica R. Starks, Senior, International Studies and Economics
American University
Ricardo Lopez, Senior, Marine Biology
University of Alaska
Avery Henry, Senior, Computer Science Major
University of Maryland Eastern Shore
Rafael Mahecha, Junior, Department of Physics
Jackson State University
Ashanti Johnson-Pyrtle, PhD Candidate, Chemical Oceanography
Texas A&M University
Kelly Clark, PhD Candidate, Marine Estuarine and Environmental Science
University of Maryland College Park

This panel discussed why students chose marine and atmospheric sciences, the support they have received, and the barriers they have experienced.

Guiding Questions

- Why did you choose a career in the oceanic/marine, environmental, or atmospheric fields?
- What are some of the joys and pains you have experienced as you study and work in the oceanic/marine, environmental, or atmospheric fields?
- What or whom has been most helpful to you in your academic institution or the workplace? Have you been mentored?
- Have you participated in professional or trade organizations and how have these been helpful?
- Have you participated in experiential learning programs (internships or traineeships) and how have these been helpful to you?
- What advice do you have for younger students interested in the oceanic/marine, environmental, or atmospheric professions?

Choosing a Career in Marine and Atmospheric Sciences

Local environment and early exposure are the two factors which had the most influence on participants' career choices. Growing up in a place of natural beauty made some students more sensitive to their environment. Ricardo Lopez said, "Growing up in Alaska, you grow up in awe

of the environment. It is important for Alaskans to know about their environment." For those who were raised far from the ocean, early exposure to the marine sciences made a profound difference: "I grew up in West Texas, far from the ocean, but was exposed to the marine sciences in the third grade and have been attracted to it ever since," said Ashanti Johnson-Pyrtle. Rafael Mahecha commented that the global effect of weather determined his choice, since "no matter where you go, the weather is there and affects everyone." Finally, several students mentioned the popularity of Jacques Cousteau who, through his television programs, gave wide exposure to the marine sciences.

A Variety of Opportunities

One remarkable characteristic of the panelists was the variety of career paths they had chosen. Ashanti Johnston-Pyrtle and Ricardo Lopez are both in the marine sciences and each had benefited from a fellowship that promoted diversity—a fellowship from the Ford Foundation and an REU fellowship at the Scripps Institute of Oceanography (SIO). Kelton Clark is also a marine science scholar, who chose marine science after a career in restaurant management. Danica Starks is currently working as a foreign affairs research assistant and she hopes "to go into U.S. Trade and Economic Policy, possibly focusing in the area of ocean sciences and fisheries." Rafael Mahecha is a "meteorology major, currently doing some research for a NWS sponsored program." Avery Henry is a computer science major who says her "internship at the NOAA Fisheries in Woods Hole was one of the best. I was exposed to a new environment, new science, and new people all in one summer."

Acknowledging What Makes a Difference: Support Systems and Mentors

All of the students identified people in their lives who have made a real difference. Faculty and peer mentors and the opportunity to become a peer mentor were mentioned as the most significant factors in student success. Also valuable were those people who helped students "navigate the bureaucracy" of the government and other agencies, and those people and institutions who provided connections to other opportunities, such as the American Indian Science and Engineering Society for Mr. Lopez. Mr. Clark talked about how too often the people who were closest to the minority communities lacked knowledge about the marine sciences. "When I left the dream of Jacque Cousteau and went out into my community, the possibility of making my dreams come true wasn't there. I would speak to my minister, to my aunts and uncles, about this career, and no one had any idea what I was talking about." Mr. Clark advocated that students write articles for predominantly minority publications in order to increase the exposure of marine sciences within the Black community. Ms. Starks also advocated travel to broaden exposure to people and places: "Traveling helps broaden your perspective; many youths from underprivileged areas have only seen fish that comes out of a TV dinner box."

Reasons for Attrition: Cultural and Financial Barriers

Students listed four central reasons why minority students either left programs in marine and atmospheric sciences or never enrolled.

1. Financial Burden. Forty-nine percent of minority families with children of college age earn less than $20,000 per year. This creates significant barriers to attending college. High tuition rates for college and graduate school discourage students. Minority students often are at a disadvantage in knowing how to find scholarships and loans.
2. Cultural Insensitivity. One student said that there "are PhD students who settle for M.S. degrees just to leave the program, since some other students whisper about the African-American graduate students." Another said that it was difficult knowing that White students saw her as "representing the entire race."
3. Unresponsive People. Students complained about "people who are not responsive to inquiries about these careers" and those who do not provide enough information for minority students, specifically how to take student skills and turn them into a career.
4. Lack of Publicity. Students said that HBMSCUs do not publicize their marine science programs.
5. Lack of Managerial Support. One student asked that managers arrange for students to meet with people in their related fields, encourage them to learn more about the organization, show students that there are real possibilities beyond summer internships, and finally, to treat students with respect.

Specific Recommendations for Other Students:

- Be visible in your community as a representative of the marine and atmospheric sciences.
- Be on your best behavior and be aware of your own negative attitudes.
- Meet people—go out and shake hands.
- Choose a field because it is your passion.
- Apply for every scholarship available.
- Join the appropriate professional organizations.
- Don't get discouraged if you don't immediately get a job—network.
- Take advantage of every opportunity, especially hands-on programs.
- Go into the unknown—that's where scientists are!
- Publish university and NOAA announcements and articles in minority targeted journals and news outlets to increase the exposure and access of minorities and underserved individuals to oceanic, atmospheric and environmental services.

C. Panel Three: *Agency Perspectives—Support for Programs in Marine and Atmospheric Sciences*

Moderators:

Dr. Denise Stephenson-Hawk, Chair, Department of Physics
Clark-Atlanta University
Member, NOAA Science Advisory Board
Dr. Brad Brown, Director, Southeast Fisheries Science Center (SEFSC)
NOAA/National Marine Fisheries Service

Panel Members:

Mr. Frederick J. Thompson, Senior Environmental Protection Specialist
U.S. Environmental Protection Agency
Dr. Matthew Gilligan, NSF:CIRE/REU
Savannah State University
Dr. Ian MacGregor, Senior Science Associate
NSF Directorate of Geosciences
Dr. James Harrington, NASA

This panel discussed the existing programs and recommended additional ones.

Guiding Questions

- What are some examples of programs where minority representation has been successful at these levels: (a) pre-college; (b) undergraduate; (c) graduate; (d) post-doctoral; (e) faculty; and (f) institutional levels?
- How successful have you been in increasing the numbers of minorities employed in your agency or institution in the last five years? What factors contributed to your success?
- How can government agencies pool their resources to support programs that increase minority representation in the oceanic/marine, environmental, and atmospheric professions?

Existing Programs

Many existing programs were named. Mr. Thompson talked about two MOUs with HBCUs, one with North Carolina Agricultural and Technical State University (NCA&TSU) located in Greensboro, North Carolina, and another with North Carolina Central University (NCCU) located in Durham, North Carolina. The Environmental Protection Agency's (EPA) Office of Air Quality Planning and Standards (OAQPS) primary focus is training and retaining Environmental Scientists and Engineers at the undergraduate, graduate, and post-doctoral levels via this initiative.

The EPA's Office of Air Quality Planning and Standards has thus far had a good measure of success retaining qualified minority interns. The OAQPS generally supports about 20-25 minority students each summer, most of whom are undergraduates. Many of them continue their training by enrolling in graduate school. Others are given offers to continue their employment with the agency.

The EPA has pooled its resources with NOAA via an interagency agreement. Many of the agency's atmospheric modelers are NOAA employees. This partnership was established more than ten years ago and has been very successful. EPA regularly supports 60-plus summer interns, with a retention rate of 75%. Dr. Gilligan said the early growth and success of a new undergraduate marine science degree program at Savannah State University, an HBCU, benefited significantly from long-term collaboration with NOAA, specifically the Southeast Fisheries Science Center and Panama City Laboratory in the 1980s. Current grants, awards, collaboratives, and partnerships at SSU exist with the Ocean Sciences Division of NSF (REU and CIRE programs), Georgia Sea Grant College Program, Harbor Branch Oceanographic Institution, Skidaway Institute of Oceanography, and Gray's Reef National Marine Sanctuary. Most recently, the Title III Program at SSU (Department of Education) is assisting with the development of a new Center for Marine, Environmental Science, and Biotechnology Research. This office should help significantly in coordinating partnerships between SSU and agencies. Dr. Stephenson-Hawk mentioned the MOU between NOAA and Clark-Atlanta University. She also listed the two programs Clark-Atlanta University has recently developed—an earth sciences program and an Environmental Management Center where students can gain work experience.

Dr. MacGregor said, "Most major oceanographic institutions have a program for minority students to assist them in entering the workforce." Another effective way of attracting minority students, he said, is through major centers such as the storm center at the University of Oklahoma, but he urged that these centers be given independence to run their own programs and not be under the control of the federal government.

Kindergarten through Graduate School: An Integrated Approach

Several of the panelists advocated more exposure in the lower grades to the marine and atmospheric sciences. Dr. MacGregor reminded the audience that the Geosciences used to be a major part of K-12 curriculum, and he saw a need to integrate this curriculum back into the schools. In particular, he wanted an integrated system of education, where introduction to marine and atmospheric sciences in the primary grades would lead to more intensive research in the upper grades, and all the way to providing work opportunities in these fields. While he agreed with this idea, Dr. Brown cautioned that sometimes advocating by science mission agencies (in contrast to those with an education mission) to emphasize K-12 science education has been a way of avoiding commitments to the recruitment, retention, and advancement of minorities. He advocated for partnering with K-12 educators, but focusing educational support on undergraduates and graduate students who are doing research and can be employed within a reasonable period of time.

Casting Wider Nets

Dr. Harrington asked both HBMSCUs and NOAA to work in "truly interdisciplinary ways." Interdisciplinary work creates flexibility and produces more successful students and employees. Dr. Brown added his support and asked also that NOAA keep an eye on creating diversity not just through its own job hires but also through its contract work. Therefore, the hiring of contract workers should be used to advance NOAA's diversity plans; contractors can be approached to fill a future opening at NOAA with a minority individual.

Building Technological, Fiscal, and Cultural Infrastructure

Participants emphasized the need for strong infrastructures. Dr. Harrington reminded the audience that since technology changes at such a rapid pace, the infrastructure must be flexible enough and well-funded enough to change as necessary. A strong infrastructure cannot be achieved with only a one-to-two-year commitment. It must be long-lasting, with sufficient ongoing fiscal investments combined with a strong desire to make a difference in the institution's capacity to be competitive. Cultural infrastructure must be treated in the same way and viewed with the same degree of seriousness. Minority employees and students cannot merely be added to the existing agency or academic structure. Their backgrounds must be taken into account and fully utilized; they must be represented at all levels of an institution.

Scientists as Adjunct Faculty

The question and answer period focused on using NOAA scientists as adjunct faculty. Drs. Gilligan and Brown said this would be a "great support for both institutions involved." Dr. Stephenson-Hawk said "we are trying to institute a rotating position for a NOAA person on campus."

Specific Recommendations:

- Support high schools in places such as New York City by investing in weather stations that, for example, record data on the heat island effect.
- Increase support for graduate programs.
- Bring HBMSCUs into the broader federal efforts, e.g. Florida Restoration Program.
- Hire more faculty to work with NOAA during the summer.

D. Panel Four: *Enhancing Professional Partnerships with the Private Sector*

Moderators:

Mr. Julian M. "Skip" Wright, Senior Advisor
NOAA/ National Weather Service
Dr. Benjamin Cuker, Associate Professor of Marine Science
Hampton University

Panel Members:

Mr. Jason Taylor, Meteorologist/Engineer
Litton/PRC Inc.
Mr. Andrew Humphrey, Meteorologist
WRC-TV/NBC4
Mr. Aaron O. Morgan, Jr., President
21st Century Aquaculture, Inc.
Mr. Michael J. Marcheselli, CEO
Electronic Innovators, Inc.
Mr. Kevin McCarthy
Benthos, Inc.

This panel looked at opportunities for collaboration among the private, government, and academic sectors.

Guiding Questions

- How can the private sector and academia work together to enhance their research and development capabilities?
- What are some of the cutting-edge technologies available in the commercial sector for scientific investigation?
- What new advances and breakthroughs are projected in the next five years?
- What are the "hot areas" for future employment in the private sector?
- What types of training and skills do students need to be competitive for employment in the private sector?

Current Collaborations with the Private Sector

Mr. Michael Marcheselli stated that ship design is an example of where the private, government, and academic sectors meet, as designers and engineers continually try to improve ship's capacity and utility. Most ship design work is currently done in collaboration with the federal government. Mr. Kevin McCarthy of Benthos said that his company continually looks for new and better ways to improve technology; Benthos actively works with NOAA, the Woods Hole

Oceanographic Institution (WHOI), and Scripps Institution of Oceanography and maintains an ongoing dialogue with academia. All participants agreed that these types of collaboration ensure that commercial as well as government and academic research facilities have the latest information and can plan their research programs accordingly. Mr. Jason Taylor added that NOAA and Litton/PRC formed a partnership to design, implement, and integrate the Advanced Weather Interactive Processing System (AWIPS). NOAA has invested $4.5 billion in AWIPS, which is providing forecasters with the ability to make quicker and more accurate weather forecasts in hopes of saving lives and billions of dollars in preventable weather damage.

Possibilities for Scientific Investigations in the Commercial Sector

Four of the five panelists mentioned some cutting edge technology is available in the commercial sector that would benefit from further scientific investigation. Mr. McCarthy pointed to the advance in imaging technology, particularly digital cameras. Mr. Aaron Morgan said that research on fish species and the genetics of fish is the next step in aquaculture development. Further genetic research is needed to determine how fish grow and to increase their growth for the commercial food market. Mr. Taylor spoke of the need for further research and development of AWIPS so that the National Weather Service can have continual improvements in weather forecasting as new technology becomes available.

"Hot Areas" for Future Employment in the Private Sector

Mr. McCarthy said robotics have replaced human deep-sea diving. Potential careers involve running and maintaining these unmanned-submersibles, and developing technology to create smaller robotic submersibles with improved guidance and imaging systems. Mr. Morgan said aquaculture, particularly involving biotechnology research, has unlimited growth potential. He named several commercial and private enterprises that are studying how to develop fish faster.

The Necessary Skills for Competitive Employment in the Private Sector

All participants agreed that strong computer skills in addition to scientific research skills was vital to employment in the private sector. Mr. Taylor specified learning Oracle, C++, and Visual Basic. Both Mr. Taylor and Mr. Morgan suggested getting a minor in Computer Science; Mr. Morgan also suggested becoming familiar with basic management training and business skills.

Specific Recommendations to Enhance the Private Sector:

- Develop genetic technology and environmental monitoring systems for aquaculture.
- Provide research dollars to support private sector research.
- Re-use old infrastructure, adapting them to private sector or research use.

E. Panel Five: *Doing Business with NOAA*

Moderators:

Mr. Benjamin Watkins, Chief, Satellite Service Division
NOAA/National Environmental Satellite, Data, and Information Service
Dr. Roman Jesien, Assistant Professor, Department of Natural Sciences
University of Maryland Eastern Shore

Panel Members:

Ms. Fara Guest on *Human Resources*
NOAA Student Employment Manager
Mr. Steven Drescher on *Grants/Cooperative Agreements*
NOAA Grants Management Specialist
Ms. Barbara Booker on *Procurement*
Chief, Acquisitions Management Division
NOAA Eastern Administrative Support Center
Dr. Steven Swartz on the *Client Perspective*
Chief, Protected Resources and Biodiversity Division
NOAA/National Marine Fisheries Service, Southeast Fisheries Science Center
Ms. Essie Coleman-Duffie on the *Client Perspective*
Fishery Management Specialist
NOAA/National Marine Fisheries Service, Southeast Fisheries Science Center

This panel discussed the pragmatics involved in doing business with NOAA.

Guiding Questions

- What are the administrative procedures related to the following: (a) grants/cooperative agreements/MOUs; (b) human resources/employment; and (c) procurement/contracts?
- How are priorities established in the above areas and who is responsible for setting priorities?
- How does one find out about opportunities at NOAA?
- What are some of the basic requirements for doing business with NOAA?
- What level of participation has there been by HBMSCUs in NOAA's programs in the last five years?

Grants and Financial Assistance for Universities

Mr. Stephen Drescher outlined the mission of his office, the NOAA Grants and Cooperative Agreements Office: "To award and administer NOAA financial assistance to facilitate achieving NOAA's scientific research and resource management mission." The office awards 1,000 grants with approximately 500 awards going to universities. NOAA administers grants totaling approximately $405 million.

The vision of the NOAA Grants Management Division (GMD) includes: develop and implement a seamless, electronic processing of grants from application to closeout; fully implement an interactive NOAA Grants website; develop partnerships with NOAA and grantee customers; assure complete compliance with the Chief Financial Act (CFO) audit requirements. The CFO audit strengthens audit requirements. All funds must be properly accounted for and work progress monitored. Improved processes for customer services abilities, and computer processes have been strengthened through the use of the NOAA web page at www.rdc.noaa.gov/. NOAA must also comply with the paperwork elimination act passed by Congress. Through the automatic grant system, the NOAA homepage lists solicitations, provides for receiving on-line electronic clearances and processes electronic fund deposits.

In the spirit of working effectively, NOAA GMD is striving to reduce the amount of time it takes to make grant awards by improving the administrative quality of grant applications through continued client outreach and developing true partnerships with states, universities, and non-profit organizations. Dialogue with NOAA partners enhances communication, shares information and provides for alternative dispute resolution. NOAA conducts periodic workshops for recipients which enhance the quality of applications and reports by establishing dialogue and camaraderie, educating prospective applicants, and providing training on administrative and regulatory requirements for grant awards.

NOAA Student Employment Programs

Ms. Guest stated that NOAA has made a commitment of 100 full-time equivalents (FTEs) to the Student Career Experience Program (SCEP), which replaced the co-op program, and she described the program's requirements. The student must be in school at least half-time at an accredited academic institution. An agreement must be set up with institutions on a case-by-case basis to participate in the Student Career Experience Program. These agreements can be made at anytime during the year and count against NOAA's FTEs. NOAA line offices must commit funds for the program through Standard Form (SF)-52s. A student can participate anytime during the year; it is no longer just for summer positions. There are no financial limitations, but U.S. citizenship is required. Those students who complete 640 hours and obtain their degrees can be converted non-competitively to a full-time position.

The Presidential Management Intern (PMI) is a graduate level program for those interested in public service. Candidates are hired at GS-9 and promoted to GS-11. Upon completion of the assignment, the candidate can be non-competitively converted to a permanent position.

These two programs are a great way to bring students into the workplace. Ms. Guest offered the following as ways, for managers, to increase the use of cooperative work assignments:

- Use local career fairs.
- Increase use of mentoring which is important for retention. This will lessen the constant turnover problem.
- Involve faculty. Exchange of faculty is key.
- Establish a cadre of experts who will give the students the necessary information to sell the mission.
- Utilize mentoring objectives.

NOAA vacancies are listed on NOAA's homepage: www.rdc.gov. Salary requirements are listed on vacancy announcements. A general website is www.usajobs.opm.gov.

Acquisition Management Division

Ms. Booker emphasized that the White House Executive Order #12928 of September 16, 1994 requires that federal personnel commit to the letter and spirit of all laws promoting participation of HBCUs and Minority-Serving Institutions (MSIs) in federal procurement. Therefore, we should seize the opportunity to use this as a vehicle for NOAA to increase access and support to HBMSCUs. Contracts, not just full-time employment, are a way for NOAA to increase diversity in its workforce. The contractors can be from HBCUs, through contracting with research faculty, from a minority-owned business, or simply minority individuals who can provide a needed and specialized skill. The Department of Commerce (DOC) issues a forecast of opportunities which helps locate these new contract markets. The new forecast includes points of contact and proposed performance periods.

NOAA spends a great deal of money on the contract side, but only a small percentage goes to HBCUs. NOAA also falls short in the percentage of funding given to minority- and women-owned businesses.

The Department of Commerce has established the SBIR (Small Business Innovative Research), a three-phase program where a percentage of dollars is set aside to award funds to small businesses for innovative research. Phase 2 allows small businesses to partner with HBCUs in scientific research and engineering. There are 10 federal agencies, including DOC, which participate with the SBIR program. The SBIR listings include a generic listing of types of topics DOC is interested in, i.e., living marine resources, cartography and photogrammetry, and environmental factors affecting feeding, and growth of sea turtles.

The NOAA Acquisition Office plans to improve outreach. Outreach will include visiting campuses, monitoring performance, monitoring principal investigators, and allowing HBCUs access to PRO-Net, a database which allows one to search for partners on any given project.

The internet addresses and various points of contact are the following:

www.doc.gov/oam
www.doc.gov/osdbu/geninfo/about.htm
www.doc.gov/oam/conops/
www.sh.nmfs.gov
www.wh.whoi.edu
www.rdc.noaa.gov/~and/sbir.html
www.sbaonline.gov/SBIR/Sbir.html
www.pro-net.sba.gov
www.doc.gov/ocbam/intern.htm

NMFS Office of Protected Resources

This office keeps track of protected resources not targeted for utilization, such as marine sea turtles, marine mammals, and reef fish. This office implements three legal mandates: Magnuson Fisheries Act, Endangered Species Act, and the Marine Mammal Protection Act.

Dr. Swartz works in concert with the regional office in St. Petersburg, Florida. He reminded us that there is a price to be paid for commerce and development. The optimists think that the protection of all species can be compatible with commercial development. The office monitors the status of those marine species that have been over-harvested, reduced in numbers below sustainable levels, or that require specific habitats and thus are vulnerable to development.

The Office of Protected Resources has a need for expertise in almost all disciplines, ranging from natural history to the highest levels of mathematics. Mathematics, biology, statistical sciences, visual surveys, genetics, passive acoustics, radio and satellite tracking, and aerial surveys are all used to assess the status of marine species. The use of "photographic identification," for example, utilizes individual characteristics obtained from photographs to document the presence and seasonal movements of individual whales. This information then serves as the basis for developing conceptual mathematical models to examine stock structure and population dynamics. A broad range of expertise is required; the Office looks for people with high technical skills who can understand basic scientific principles.

Dr. Swartz recommended that interested students participate in Internet discussion lists and interactive sessions. He also suggested that students join professional societies; student chapters of professional societies usually offer reduced rates. For example, professional meetings sponsored by the Society for Marine Mammalogy and the Minerals Management Service feature symposia and public information meetings. NMFS convenes periodic meetings, including workshops on careers.

NOAA and the Minority Community

Ms. Essie Coleman-Duffie stated that "NOAA is a service provider." Procurements, contracts, grants, human resources and personnel opportunities for minorities are all part of NOAA's

service requirements. NOAA has internal as well as external users. Examples of external users include academia, other agencies, students, contractors and the like. It is important that HBCUs and Minority-Serving Colleges and Universities (MSCUs) become part of this process.

NMFS has a long history working with HBCUs. Many students have come into the organization through co-op programs. The co-op program remains the best mechanism for getting people into the pipeline and into the agency. Partnerships with elementary and middle schools are also helpful, and partnership programs should be considered with marine science high schools and magnet schools. The existing Student Educational Employment Program (SEEP) is a great opportunity to attract minority candidates and can be initiated at various levels from high school to graduate school. Faculty appointments with faculty from HBMSCUs and majority institutions also provide excellent opportunities to establish cooperative relationships and ensure participation and representation by minorities in NOAA programs.

NMFS's SEFSC has developed a working relationship with several HBCUs which include Florida A&M University, Florida Memorial College, South Carolina State University, University of Maryland Eastern Shore, Elizabeth City State University, and Winston Salem State University. It has signed MOUs with Savannah State University, Jackson State University, and the University of Puerto Rico.

It is critical to have ongoing efforts to increase the diversity of the NOAA work force. Some of these initiatives will be short-term as well as long-term efforts. There are many examples of successful collaborative partnerships, projects, and efforts: NMFS Minorities At Sea Program provides hands-on work experience and career exposure to minority students and faculty aboard NMFS research cruises; the Gulf of Mexico Minority Alliance is a consortium of HBCUs and MSCUs in the five Gulf states; the Florida Bay Outreach and Educational Project is an initiative that expands involvement of HBCUs and MSCUs into major ongoing research in the expanding South Florida Everglades Restoration Program; and the NMFS human resources internal and external grant program, which are special projects/initiatives aimed at increasing the diversity of the workforce while contributing to the overall mission of the agency.

Additionally, NOAA has worked closely with scientific organizations to provide funding and support to increase minority faculty and student participation at scientific meetings and conferences. These include the American Fishery Society (AFS), the American Society of Limnology and Oceanography (ASLO), Minorities in Natural Resources Committee (MINRC), and Gulf Estuarine Research Society (GERS).

Tips for students and faculty interested in opportunities in NOAA include the following:

- Check the NOAA website for financial and research opportunities.
- Check vacancy announcements for available job listings.
- Check the federal register for grants. Pay close attention to deadlines—timing is crucial.
- Make personal contacts.
- Utilize word of mouth.

- Attend scientific conferences and meetings and become members.
- Form partnerships with agencies and organizations.
- Participate in special programs and projects (American Indians in Science and Education Society (AISES), HACU, ORISE, Metropolitan Consortium for Minorities in Science and Engineering (METCON).
- Become a volunteer.
- Establish role models.
- Develop mentoring relationships.
- Follow up and follow through.
- Persistence! Persistence! Persistence!

Despite these efforts, minority populations are still being left out. They need to be part of the process, and NOAA needs to bring them in by partnering with academia as well as community organizations and Black churches. As more minorities become exposed to the marine and atmospheric sciences and as more minority students receive their doctorates, more established diversity will be achieved in NOAA.

F. Concurrent Panel Sessions

Panel Six: ***Sustained Research Funding: Opportunities at NOAA for HBCUs***

Moderators:

Dr. Livingston Marshall, Associate Professor, Department of Biological Science
Morgan State University
Dr. Larry L. Stowe, Research Scientist
NOAA/National Environmental Satellite, Data, and Information Service

Panel Members:

Dr. James Arrington, Vice President of Academic Affairs
South Carolina State University
Dr. John Boreman, Deputy Director, Northeast Fisheries Science Center
NOAA/National Marine Fisheries Service
Dr. W. Stanley Wilson, Deputy Chief Scientist
National Oceanic and Atmospheric Administration
Dr. Paul Croft, Coordinator of the Meteorology Program
Jackson State University
Mr. Justin Ahanhanzo, United Nations Educational, Scientific, and Cultural Organization (UNESCO)

This panel was charged with providing the audience with summarized information on the types of sustained research opportunities (past, present, future) at NOAA.

Guiding Questions

- What is the selection and funding process for Joint Institutes and Cooperative Research Programs?
- What is the role of legislators in the identification, selection, and award process?
- How do we scale the Joint Institutes and Cooperative Research Programs to include HBMSCUs?
- What is a realistic time frame within which these programs can be awarded to HBMSCUs?
- Is there a role for the private sector in establishing the Joint Institutes and Cooperative Research Programs at HBMSCUs?

NOAA/NESDIS's Relationship with HBMSCUs

Dr. Stowe's presentation focused on the NOAA/NESDIS relationship with HBMSCUs, beginning with a brief introduction of NESDIS' role and functions. He indicated that several of

the programs within NESDIS were planned for three to five years and often included collaborations with OAR, NMFS, Coastal Ocean Programs, and others. NESDIS's charge is to manage and operate the nation's satellites. These include two polar orbiting satellites, two Geostationary Operational Environmental Satellites (GOES), and one Defense Meteorological Satellite Program (DMSP) satellite for sharing data and meeting strategic needs of the military. NESDIS has an end-to-end responsibility to manage and operate the nation's satellites, ranging from launch to data processing and analysis. NESDIS is also very active in the educational community, participating in career fairs, supporting NOAA student programs, developing in-house full-time programs, supporting teacher programs, conducting educational conferences, supporting space grant consortium, and supporting the Clark-Atlanta University Earth Science Program. NESDIS's future goals include continued support for several educational programs, such as established and future NOAA programs, development of MOUs and establishment of Cooperative programs within NESDIS, continued support for the American Meteorological Society (AMS) Educator initiative, and continued sponsorship of Educator workshops.

Dr. Stowe also provided an overview of the University/Cooperative Institute Programs within NOAA/NESDIS. These collaborative arrangements exist for the purposes of pursuing mutually interesting and beneficial research between NESDIS and universities, and in some cases actually include the physical location of NESDIS employees at universities. Additional information on these cooperative institutes can be found on NOAA's web page.

Dr. Stowe responded specifically to the five panel questions as followings:

1. *What is the selection and finding process for Joint Institutes and Cooperative Programs?* NOAA is aware of Centers of Excellence; they are pursued and provide support for research. For example, other federal agencies such as NASA quite often share the cost of supporting the centers. Establish MOUs with the interested institute to provide mechanisms for research. This approach does not guarantee funding for a Cooperative Joint Institute.
2. *What is the role of legislators in the identification, selection and award process?* The legislative side of government is not involved.
3. *How do we scale the Joint Institutes and Cooperative Research Programs to include HBMSCUs?* One potential starting place: establish Internet short courses based on NOAA research, similar to the approach taken by the University of Wisconsin. Build upon the existing arrangements, plus establish consortium arrangements such as those between NOAA and the Atlanta University complex (Clark-Atlanta University, Spelman, Morehouse, etc.). Submit small proposals that could potentially evolve into MOUs.
4. *What is the realistic time frame within which these programs can be awarded to HBMSCUs?* Approximately two years: one year for proposal development, and one year for establishment of the Institute.
5. *Is there a role for the private sector in establishing the Joint Institutes and Cooperative Research Programs at HBMSCUs?* There is no private support right now. However, if private sector entities can benefit from government/university cooperative research, they may be willing to provide support.

National Sea Grant Review Panel

Dr. Arrington's presentation provided information from two perspectives: the NOAA National Sea Grant Review Panel, and an HBMSCU setting. Of the 29 existing Sea Grant colleges, many have programs serving minorities. One problem is getting minority institutions involved in such programs, in spite of the fact that HBMSCUs have a wealth of knowledge and success from which to build. In recognition of this situation, NOAA Sea Grant provided five HBCUs with awards of $150,000 over three years to enhance their capabilities in competing for Sea Grant research funds. The initial expectations of the program are: to increase exposure of students to marine science; increase the quality of students completing studies at HBMSCUs; accelerate partnerships between state and national marine programs; and to support and enhance other sea grant programs.

Five HBCUs—Clark-Atlanta University, Delaware State University, Hampton University, Savannah State University and the University of Maryland Eastern Shore—were selected based on their existing capabilities in areas of marine, atmospheric, and environmental sciences. These institutions are in their last year of the three-year funding period. The National Sea Grant Office has indicated that the program will be continued. Dr. Arrington recently had the opportunity to visit each of the five campuses participating in this enhancement award, and concluded that most of the five institutions have done well with the allocated funds. In some cases, some of the Principal Investigators (PIs) have been successful in leveraging program funds to enhance their institutional programs; others have been successful in focusing on their basic program needs. With all of the PIs present at the conference (along with students being supported by the program from the five respective campuses), Dr. Arrington asked that persons interested in more details should speak with the respective Principal Investigators. He also noted that a task force had recently been established to oversee and review the activities of the five HBCUs participating in the program, and echoed a call for additional persons to serve on the task force.

In a recent review of the performance of the enhancement program, the following recommendations were made to the National Sea Grant panel and National Sea Grant Office:

1. Develop a Response for Proposals (RFP) for the next comprehensive round of HBCU enhancement awards. This RFP should be available for release by early fall (around September/October 1999). Once the RFP is disseminated and proposals received, the applications will undergo a peer review process consistent with needs and interest of the program.
2. Conduct periodic meetings between PIs and State Sea Grant directors. This activity would meet the challenge of the HBCUs in reporting their progress to the state, address the much-needed improvement in communications between the two entities, and also enhance the overall collaborations of the partnership.
3. Continue to pursue additional funding to extend the base funding now provided by the enhancement program. This activity may include pursuit of additional appropriations for the Sea Grant program as well as other funding from other federal agencies (such as Department of Defense (DOD), NASA, and others).

Cooperative Marine Education and Research Program (CMER)

Dr. Boreman spoke in his capacity as Deputy Director, NOAA/NMFS/NEFSC, and past Director, CMER Program, with the University of Massachusetts. He explained that the purpose of the CMER programs is to expand the range of expertise in marine science covering a variety of scientific disciplines (anthropology to zoology). Other purposes of the program are to gain access to university facilities and equipment, and to take advantage of the intellectual resources on university campuses. Originally, the primary goal of the program was to train graduate students.

The program is the brainchild of Mr. Allen Peterson, whose main goal was to raise the quality of graduate students in marine science while simultaneously providing funding to universities and training potential employees for NOAA in the future. The program has gained importance in times of shrinking budgets, addressing the need to tap into student and faculty resources. The program began in 1989 at the University of Rhode Island and the University of Massachusetts, Amherst. It expanded to Rutgers University (1993), and the last program unit was established in 1999 at Southampton College, an undergraduate institution.

The CMER programs are supported with base funding provided by the Northeast Fisheries Science Center and by additional funds from other related programs. Typically, there is a cooperative agreement between NOAA/NMFS and the university established via Memoranda of Agreement (MOA). The MOAs are not written as outright grants to the universities. NOAA/NMFS scientists play a key role in the development of CMER projects. Project ideas and initiatives originate within NOAA with emphasis on their utility and potential for involvement by graduate students. The program places NOAA personnel on campus in a field station-like arrangement. These NOAA personnel are expected to teach at the graduate level, advise students, function as members of the graduate faculty, and serve on graduate student committees. In return, the university provides the NOAA personnel with facilities, administrative support, and other related items. NOAA/NMFS spends approximately $2-300,000 per year for each program operation. These funds contribute to the base funding needed to support the individual programs, as well as the NOAA scientist assigned to the program campus.

Dr. Boreman noted that one strength of the program is the targeted partnership between NOAA/NMFS and particular universities. However, he also noted several constraints:

1. Program support, particularly start-up funds: Each program costs $2-$300,000 annually to operate, which is a sizeable amount in times of continually shrinking budgets.
2. Selection of graduate students can also be problematic, especially when or if minority students are not targeted in a formal sense. A possible solution to this problem is to locate CMER units at an HBCUs.
3. Sustained relationship with universities: The long-term relationship between NOAA/NMFS and individual universities is being questioned on a number of fronts (including within NOAA). Given budget constraints and typical NOAA grant process constraints, questions

are being asked why certain universities should receive directed funding without full participation in a more open competitive processes.

4. Too many ready-made excuses not to do what is really needed to be done regarding involvement and inclusion of HBCUs in CMER type programs. There is a need to address various issues here, including selection of graduate students, dissemination of RFPs, etc.

Dr. Boreman concluded by noting that there is pressure to move the CMER program into an open solicitation process. However, this can be viewed as a catch-22. On one hand, there is an expectation to develop a program within HBCUs; on the other hand, these institutions would be expected to compete with larger, established programs, thereby lessening the chance of a HBCU being awarded a CMER program. All of these issues require frank and open discussions in order to further involve HBCUs in NOAA and NMFS funding opportunities.

Atmospheric Sciences

Dr. Croft's presentation focused on issues relevant to the meteorology program at Jackson State University and other NOAA related activities. He pointed to the problem: a lack of diversity in the atmospheric sciences at the professional, graduate, and undergraduate levels. He discussed various approaches to address this problem. In order to fully grasp the likelihood for success in addressing diversity issues, the components of success need to be defined. These components are a combination of recruitment, retention, education/training, and research effort. Some of the efforts shown to be effective include mentoring and involving students in various academic and professional activities. Hurdles to achieving success include: lack of adequate time provided for faculty involvement in such programs by the university; lack of physical and human resources to support activities; difficulty in maintaining long-term involvement of good students in activities and programs; and the small number of students impacted by programs. The maturity and independence of students in the program, as well as educational dilemma (technological advances and accompanying tools) and pedagogy (e.g., converting to electronic classrooms and use of other multimedia tools), were also noted to have adverse effects on potential program success.

Dr. Croft offered the following as potential solutions to the above problems and issues: pre-college initiatives; full-time mentoring; long-term sustained funding; full-time student internships (avoid interrupt and disconnects); and provision of support resources. The benefits of these approaches include increases in the numbers of minority students successfully completing degrees in the atmospheric sciences, and thus an increase in the numbers pursuing graduate degrees; research deliverables; and sustained research and academic programs. The timeframe to establish all of the above would be approximately five years to achieve program objectives and see the full impact of those efforts. The first two years would mainly involve set-up of the program and demonstration of the program's initial effects.

Dr. Croft proposed that a Joint Institutional and Cooperative Program be established with partnership arrangements and involvement of federal agencies, HBCUs, the larger academic and research universities, the private sector, and the technical and virtual community. This program would include base funding for student internships, provide a satellite center for research

activities, and focus on important diversity issues as they relate to involvement of minorities in the atmospheric sciences. Without community-building at all levels—in particular for undergraduates—and appropriate "socialization" into the atmospheric science community, greater diversity will not be achieved.

Funding Sources within NOAA

Dr. Stan Wilson focused on potential sources of funding within NOAA:

1. Joint Institutes. These started small and have grown over time. These are typically co-located with NOAA laboratories. Over $30 million per year is spent at the Joint Institutes, with the funds coming from NOAA as well as other entities. Primary NOAA funding sources are the Office of Global Programs (OGP), Oceans and Atmospheric Research (OAR), and NESDIS. It is possible that HBCUs might affiliate with an existing Joint Institute. The feasibility of this idea should be explored. Dr. Wilson volunteered himself as a conduit for this initiative and indicated his willingness to work with any interested parties.
2. Sea Grant. Approximately $52 million is provided by Sea Grant to universities with a two-to-one match: for every two dollars Sea Grant provides, the university must raise an additional dollar. Only a small percentage of Sea Grant funds go to HBCUs. He also noted that Dr. Arrington's example of the NOAA's Sea Grant effort to work directly with five HBCUs was an excellent initiative that NOAA should consider pursuing with HBCUs. This is an example of an area in which there is a strong need to expand the current NOAA and HBCU interactions and partnerships.
3. NOS Centers for Sponsored Coastal Ocean Research. These are funded via an $18 million competitive grant program. However, it should be noted that these programs have involved only small participation for HBCUs. There is a GLOBEC solicitation currently in circulation which HBCUs may wish to examine for possible involvement.
4. Office of Global Programs. Approximately $67 million per year is spent to support this program. Of this amount, about half is spent in academic institutions. The next solicitation (May 2000) is expected to have a variety of program elements to be addressed by universities including HBCUs. There is also expectation that at least one other federal agency (NASA) will issue a similar solicitation.

In his capacity as NOAA Deputy Chief Scientist, Dr. Wilson is currently working on several initiatives which may hold future opportunities for HBCUs. These include planning for and development of an Integrated Ocean Observing System, working via the National Ocean Partnership Program (NOPP). Dr. Wilson provided his email address (stan.wilson@noaa.gov) and reiterated the views of DOC Deputy Secretary Mallet that there is much to be done in terms of enhancing the partnership between NOAA and HBMSCUs. He again expressed his willingness to serve as a facilitator in linking HBMSCUs with NOAA.

The Intergovernmental Oceanographic Commission of the United Nations Educational Scientific and Cultural Organization (IOC/UNESCO) and Capacity-Building in Marine Sciences

Mr. Justin Ahanhanzo, Consultant and Assistant to the IOC/UNESCO Executive Secretary for implementation of the IOC activities in Africa, responded positively to a special invitation to sit on the panel. His brief address to the conference focussed on global ocean issues, particularly the role and activities of IOC/UNESCO, and on the two major initiatives undertaken by the African continent during the 1998 International Year of the Ocean: The Pan-African Conference on Sustainable Integrated Coastal Management (PACSICOM) and the African Ocean Days (AOD'98).

IOC/UNESCO coordinates extensive global oceanic research programs, among which are Global Ocean Observing System (GOOS), Marine Pollution Research and Monitoring, Ocean Science in Relation to Living and Non-Living Marine Resources (OSLR & OSNLR) and the International Ocean Data Exchange (IODE). A complete list can be found on the IOC/UNESCO web page (http://www.unesco.org/ioc).

The AOD'98 and PACSICOM conferences were convened to provide greater impetus to the management of seas and coasts in Africa. It brought together senior officials from all over Africa, as well as from international agencies, non-governmental organizations and bilateral financial institutions. The Chairman of the present conference, Expanding Opportunities in Oceanic and Atmospheric Sciences, Dr. Ambrose Jearld, Jr., was a member of the U.S. delegation to the PACSICOM Conference. These conferences offered a unique opportunity for discussing the state of the coastal and marine environment in Africa, with special focus on the need for concerted intergovernmental dialogue.

In particular, the PACSICOM Conference provided a framework to assess and review the efforts and experiences in Sustainable Integrated Coastal Management (SICOM) in Africa over the last two decades; to strengthen sustainable development in coastal zones and areas otherwise affected by marine processes in Africa; to raise awareness about the urgent need for well-coordinated global actions, and to help establish a strategic and integrated plan of action for the coastal management of Africa.

Finally, Mr. Ahanhanzo stressed the need to be globally aware, to see opportunities for expanding diversity in the marine and oceanic sciences within the global community. UNESCO and NOAA can cooperate towards capacity-building in Africa through research and teaching of marine and environmental sciences in the universities. He listed three specific contacts through UNESCO Chairs for capacity-building: UNESCO Chair in Sciences, Technologies and Environment at the National University of Benin, Campus of Abomey-Calavi; UNESCO Chair in Coastal Integrated Management at the University Cheick Anta Diop of Dakar, Senegal; UNESCO Chair in Marine Sciences and Oceanographic Issues at the University Eduardo Mondlane of Maputo, Mozambique.

Additional Opportunities

Dr. Marshall pointed out that in addition to the information presented by the panelists, there were other NOAA-related programs not discussed in detail in the session which constituted programs that the audience should be aware of and explore. For instance, the Office of Global Programs (OGP) has a partnership in which universities share in more than half of the funding. Additionally, under the reorganization of the National Ocean Sciences (NOS), centers for coastal ocean science have been established. Some of these science centers were former OAR, NMFS and Coastal Ocean Programs (COP) and facilities. NOS is looking to broaden the scope of the lab research, and hopes to bring managers and scientists together. These two initiatives as well as the information presented in the discussions describe opportunities for partnerships between NOAA and HBMSCUs.

Panel Seven: ***Student Networking and Discussion***

Moderators:

Dr. Kelly Mack, Assistant Professor, Department of Natural Sciences
University of Maryland Eastern Shore
Jan Kucklick, Coastal Management Specialist
NOAA/National Ocean Service

Panel Members:

Dionne L. Hoskins, PhD Candidate, Marine Science Program
University of South Carolina
Andrea Rocha, Junior, Marine Biology
Texas A&M, Corpus Christi
Maronda Brown, PhD Candidate, Molecular and Cell Biology
University of Connecticut
Dr. George B. Brooks, Aquatic Scientist and Environmental Planner
University of Arizona

This panel focused on how students got to and stayed in graduate school.

Guiding Questions

- Which of the educational, employment and funding opportunities discussed during the conference are of interest to me?
- How should I prepare myself to take advantage of these opportunities in the oceanic/marine, environmental, and atmospheric professions?
- What types of skills are required to compete for these opportunities?
- What can I learn from other students about improving my skills?
- How do I make the transition from (a) undergraduate to graduate school; (b) a HBMSCU to a Traditionally White Institution (TWI)?
- Are there fundamental issues that I need to address in order for me to be successful?
- What do successful people have in common?

Important Factors for Getting into Graduate School

Panelists listed a number of different strategies to prepare for graduate school:

1. Learn how to learn.
2. Learn from other students.
3. Attend conferences to network.
4. Make professional contacts.
5. Get good grades and GRE scores.

6. Demonstrate maturity, research experience, and interdisciplinary strengths.
7. Take advantage of REUs.
8. Use as a guide the first Expanding Opportunities Report on Student Concerns held in 1995 at Hampton University.

Important Factors for Staying in Graduate School

Panelists all emphasized the need for an advocate, someone who will mentor and promote students. They also mentioned that students need to be aggressive, to develop a culture of success, and a network of peer and administrative support. Students should investigate their potential advisor's research record and the success of their former students as an indicator of their ability to mentor or assist graduate students effectively. They advocated that students stay in touch with their mentors, learn to use all support systems, and develop excellent communication skills. There was general agreement that students use internships/fellowships during or after school to help strengthen their experience and professional development as well as to help build networks/contacts.

Panelists and participants all agreed that consistent financial support is critical for a student to complete a graduate degree successfully. This factor can not be underestimated in how influential "money worries" are on the success one achieves in his or her course work, research, and overall participation in relationship to peers and mentors.

Specific Recommendations:

- Consistent and adequate financial support.
- Faculty mentorship.
- Support Groups; especially peer support.

G. Panel Eight: *Building and Expanding Sustainable Alliances Between HBMSCUs and NOAA*

Moderators:

Dr. Sharon H. Walker, Program Director for Education
National Sea Grant College Program
NOAA/Office of Atmospheric Research
Dr. Reginald Lawrence, Physical Scientist
NOAA/National Environmental Satellite, Data, and Information Service

Reporters:

Dr. Benjamin Cuker, Associate Professor of Marine Science
Hampton University
Dr. Denise Stephenson-Hawk, Chair, Department of Physics
Clark-Atlanta University
Member, NOAA Science Advisory Board
Dr. Matt Gilligan, Director, Marine Science Laboratory
Savannah State University
Dr. Roman Jesien, Assistant Professor, Department of Natural Sciences
University of Maryland Eastern Shore
Dr. Livingston S. Marshall, Associate Professor
Morgan State University
Mr. Paul S. Trotter, Meteorologist
NOAA/National Weather Service
Mr. Benjamin Watkins
Chief, Satellite Services Division
NOAA/National Environmental Satellite, Data, and Information Service

This panel reported on the recommendations that emerged from panels and the working groups. It gave all the conference participants a chance to reflect on what had taken place at the conference and to pool their information. In this report, these discussions are included in the specific panel and working group presentations as well as the overall recommendation section.

Guiding Questions

- What are the recommendations from the conference's working groups?
- What actions are required and agreed on?
- How will we follow-up on the recommendations and commitments?

VII. WORKING GROUPS

Assessment and Review of NOAA's and Academic Institutions' Education and Research Programs

Each working group focused on a different aspect of NOAA's and HBMSCUs programs. They sought to address, within that area, the following questions:

Guiding Questions

- What is the current capacity of HBMSCUs and NOAA to increase access to educational and employment opportunities for minorities in the oceanic/marine, environmental, and atmospheric professions?
- How can the resources of HBMSCUs and NOAA be leveraged in order to expand and sustain the capacity of both organizations to increase minority participation at all levels?
- What academic fields/disciplines at HBMSCUs have the potential to enhance NOAA's mission, but remain untapped?
- How can HBMSCUs and NOAA work together to ensure that minorities have full access to education and employment opportunities in higher education, government, and private industry?

A. Working Group: *Atmospheric*

Consensus

The public must be informed of and educated about NOAA's science programs and initiatives. NOAA must actually market itself, publicizing what it has done and what it needs to continue expanding diversity within its line offices.

But words are not enough. NOAA must make sure that its diversity issues take action and follow the letter of the law. The important work of changing the culture at NOAA must be done in step with public law to ensure fairness and accountability.

Responses to the Keynote Address:

- Advocate and agitate as taxpaying constituents for congressional coordination.
- HBMSCUs must demonstrate commitment and find state/local/community funding.
- HBMSCUs must demonstrate stewardship and accountability relative to funds.
- HBMSCUs must be willing to be mentored by larger, more fiscally successful universities.

Responses to NOAA's Strategic Plans:

- Create and disseminate reliable assessments and predictions of weather, climate, space environment, marine resources, nautical, aeronautical, and geodetic phenomena.
- Implement integrated approaches to environmental management and ocean and coastal resources development for economic health.
- Ensure continuous operational observing capabilities—from satellites to ships to radar.
- Build and use new information networks.
- Develop public-private and international partnerships, and expansion and transfer of environmental knowledge and technologies.
- Invest in scientific research and the development of new technologies to improve current operations and prepare for the future.
- Improve NOAA's abilities to serve customers and forge stronger ties with its partners and stakeholders.

Responses to Concerns

Current programs do exist, including ORISE (Oak Ridge Institute for Science and Education), (Practical Hands-On Application to Science Education (PHASE), and SCEP. However, not enough money is available to run these programs. NOAA needs to commit and plan for long-term partnership and long-run benefit.

HBMSCUs should develop affiliations that include partnerships with the larger successful institutions that have long-term commitments in place, such as Cooperative Operational Meteorological Education and Training (COMET)/University Corporation for Atmospheric Research (UCAR)/National Center for Atmospheric Research (NCAR). NOAA needs to use the Internet to advertise resources and tools. Look at programs that work and consider bringing back the Graduate Scientist Program or similar programs. Look at partnering with outside private sources and other countries within Africa, Asia, Central and South American (World Meteorological Organization [WMO]) for examples of win-win situations.

Most, if not all, HBMSCUs have excellent mathematics, computer science, physics, engineering, business, biology, and chemistry programs ready and able to serve students. HBMSCUs can also offer continuing education for current employees to enhance their skills.

A national clearinghouse is needed to list all programs. In addition to placing information on the Internet, human connections are still needed to respond to questions.

Atmospheric Working Group Recommendations:

- Create a centralized clearinghouse for NOAA backed up by real people .
- Form partnerships between minority and majority schools.
- Make programs of financial assistance to include competitive, multi-year grants available to HBMSCUs.

- Implement best practices based upon successful programs.
- Sensitize NOAA on the need for diversity.
- Use HBMSCU graduates already employed at NOAA and DOC to network and assist with recruitment of greater numbers of minorities to increase their numbers hired across DOC.
- Have HBMSCUs serve as continuing research and education partners.

B. Working Group: *Oceanic and Marine*

Consensus

1. Of greatest importance is to establish NOAA line office program links with HBMSCUs capabilities.
2. A dedicated central web page designed to provide a forum to promote diversity in the sciences could form the nucleus of an extended network to exchange information and to make contacts. The web page must be updated regularly showing the progress of efforts and activities.
3. Recommendations should not be restricted to HBMSCUs. Since many majority institutions have made significant contributions to increasing diversity in the marine and atmospheric sciences, there is no reason for excluding them.

Oceanic and Marine Working Group Recommendations:

- Promote expanded use of co-op agreements at both the graduate and undergraduate level.
- Encourage and reward NOAA researchers for adjunct faculty appointments at HBCUs.
- Review procurement procedures with the intent to increase contract awards with HBMSCUs.
- Establish HBCU Sea Grant Colleges.
- Seek HBMSCUs to partner in Joint Institutes.
- Establish consistent policies among the NOAA line offices.
- Provide sufficient entry level positions to undertake a coordinated and comprehensive effort to recruit, retain and develop minorities.
- NOAA must invest in year-round on-site marketing and recruitment if it is to compete for the best and brightest.
- Improve retention through mentoring and following up with on-the-job support for new minority recruits.
- HBMSCUs must encourage multidisciplinary and interdisciplinary collaboration on campuses to help meet NOAA's growing needs in areas such as resource economics, social sciences, and experts in fishery population dynamics.
- Establish policies to ensure that NOAA contract and subcontract hires include recruits from HBMSCUs.
- HBMSCUs must promote curricula and curriculum development in areas of expertise needed by NOAA.
- Improve the flow of information and communication between NOAA and HBMSCUs.

C. Working Group: *Coastal and Limnological*

Consensus

Widespread awareness of existing and potential partnerships is absolutely vital. A central listing of partnerships, programs and initiatives must be developed. We must be flexible when thinking of potential partnerships—kindergarten through graduate schools, private and public sectors, full-time employees and contract workers, majority and minority institutions, museums and industry. Only if we are open-minded ourselves about who can help us, can true diversity be promoted.

A central listing of partnerships, programs and initiatives should be carried on the web page, as well as in more traditional outlets.

Focus on Coastal Zone Management

The Coastal/Limnological Working Group chose to focus on interactions between HBMSCUs and NOAA in the area of Coastal Zone Management. That focus was chosen because many of the HBMSCUs are located in coastal areas and have a tradition of strong programs which are relevant to this particular issue: basic science, sociology, history, planning, and policy. In terms of special attention for follow-up endeavors, most participants agreed with a suggestion that Chesapeake Bay be selected first, with University of Maryland Eastern Shore, Morgan State University and Hampton University serving as lead institutions, but these interactions should involve other HBMSCUs.

HBMSCU's Potential for Partnership

The group noted that HBMSCUs bring many important resources, including basic science training, students open to new ideas, historic strength in the social sciences, access to business schools, and emerging environmental policy programs to potential partnerships. Some HBMSCUs, such as University of Maryland Eastern Shore, Hampton University and Savannah State University, also have established marine science programs ready for truly active, participatory partnerships, which could engage programs in other HBMSCUs. Many of the other HBMSCUs have strong programs in physics, engineering, economics, nutrition, chemistry, and computer science that could greatly enhance the partnerships with NOAA. For instance, Tribal colleges' strong emphases on natural resources have been untapped.

NOAA Potentials for Partnership

NOAA could bring a variety of resources to partnerships, including an increase in their cooperative research and extension activities and associated grant programs administered by the various line offices; their extensive on-line computer capacities, assignments for both faculty and NOAA personnel through Intergovernmental Personnel Act (IPA) assignments, defined needs

for scientific work to be undertaken, established student internships, available technology and ships, focused research laboratories with their recognized staffs, and jobs with NOAA for students.

Third Party Potentials for Partnership

In addition to HBMSCUs and NOAA, several "third partners" were proposed. These include major research universities, other federal agencies such as NSF, state and local agencies, Tribal governments, non-governmental organizations, other private sector groups to include scientific, technical and other professional organizations, HBMSCU alumni, special governmental industry combinations, web links to opportunities, shadowing programs for students, aquaria, museums, co-op units, CMER, ties to K-12 education, and minority, scientific and technical societies.

Coastal and Limnological Working Group's Other Recommendations:

In addition to creating a NOAA-HBMSCU partnership for study of Chesapeake Bay, other concrete steps were advocated. These include a dedicated web site with detailed information from both NOAA and HBMSCUs that lists job and internship opportunities, cooperative agreement opportunities, grants and contract announcements, and other programs of mutual concern. Participants concurred that a single point of contact or liaison office for NOAA to deal with minority issues, both from the program-related perspective and the human resource related perspective, would be of mutual benefit to NOAA and HBMSCUs.

- Sustained funding is necessary for program continuity.
- Implement the recommendation to establish a HBCU Chesapeake Bay Consortium, and a Clark-Atlanta/Atlanta Universities and Colleges and Jackson State University Consortium.
- Establish CMER programs on HBCU campuses.
- The five HBCUs with fiscal support from Sea Grant should take proactive steps in leveraging funds in the upcoming Sea Grant proposal process.
- Establish partnerships with Tribal schools and communities.
- Know and dovetail with existing programs in the Chesapeake Bay area to avoid duplication.
- Develop two to three proposals or white papers to outline strategies for accomplishment of outlined objectives.
- Provide the email address of all conference participants in the proceedings.
- Look for international opportunities such as through the U.S./South African Education Partnership and IOC/UNESCO.

VIII. POSTER SESSION

The poster session afforded conference attendees an important opportunity to present, exchange and discuss information of a technical nature presented in a simple, concise and graphic manner within limited time and space. Abstracts and handouts were available for conference attendees to take with them. Poster presenters had the advantage of professional interaction and immediate responses to their presentations. There were 52 poster presentations in total. About half of these posters and exhibits were from NOAA participants and represented overviews of programs and research in NOAA. The remaining posters were from student participants, both graduate and undergraduate, whose displays were available for judging.

Student displays encompassed a wide range of professionally prepared posters. Work ranged from testing hypotheses through laboratory experimentation to observations and research conducted in the field. The judges divided the groups into two categories: Environmental Science and Fisheries/Marine/Oceanic Science. First and second place winners of student poster presentations were selected in each category and received cash awards of $250 and $150, respectively. The judging process was both difficult and stimulating. The winners and the judging panel are listed here; for a complete list of poster presentations, see Appendix H.

Poster Presentation Winners

Environmental Science

First Prize: Influence of EDTA on Lead Accumulation in Two Weed Species, *Sesbania* and *Ipomoea*, in Hydroponic Culture
Presenter: Susmita Ghosh
Co-author: Charles Rhyne
Jackson State University, Jackson, MS

Second Prize: The Effects of Tetrachloroethylene on the Early Life Stages of the Japanese Medaka (*Oryzias latipes*)
Presenter: Hattie Spencer
Co-author: Wedad R. Hussein
Jackson State University, Jackson, MS

Fisheries/Marine/Oceanic Sciences

First Prize Methodology for the Generation of Polymorphic Molecular Tags in the Bay Scallop, *Argopecten irradians*
Presenter: Maronda Brown
Co-authors: Jeff Southworth, Sheila Stiles and Linda Strausbaugh
University of Connecticut, Storrs, CT

Second Prize: Reproduction and Juvenile Production of the Eastern White River Crayfish *Procambarus acutus* as influenced by Temperature and Photoperoid
Presenter: Bradley McAbee
Co-authors: William H. Daniels, Dorene L. Petrosky, and Grant Blank
Delaware State University, Dover, DE

Judges

Dr. Carolyn Brown
Ms. Donna Johnson
Dr. Mack Felton
Mr. Harold Foster
Mr. Dennis Hansford
Dr. Sheila Stiles

IX. CLOSING REMARKS: *Promises Yet to Keep*

Dr. Andrew Rosenberg, Deputy Assistant Administrator for Fisheries
NOAA/NMFS

Dr. Ambrose Jearld, Jr., thanked all those who made the conference possible, and then graciously turned the stage over to Dr. Andrew Rosenberg, who gave the closing remarks.

Dr. Rosenberg emphasized what NOAA could and could not do. He urged everyone involved in the diversity process to make their concerns known to Congress, but he reminded participants that "NOAA, as a federal agency, cannot lobby and we cannot tell you to lobby. What we can do is to provide you information should you want to inform members of Congress . . . and we can respond to questions from members of Congress."

Dr. Rosenberg stressed that NOAA professionals need to be recognized for research and teaching roles within HBMSCUs, and he pledged to make this a priority within NMFS. Many NOAA employees are alumni of HBMSCUs, and "we must allow opportunities for HBMSCU alumni to return and actively participate in mentoring." Even more, he promised to "make sure that anyone who wants to participate in the mentoring program will be given an opportunity."

Likewise, NMFS will ensure that opportunities exist for HBMSCU faculty and students to work at NMFS facilities. Student opportunities, he said, will not be limited to fisheries but opened in all areas. Funding cannot be a barrier for co-op and summer students and faculty.

He agreed with the many participants who urged that a web site be developed to follow up on the suggestions made from this conference. He closed by suggesting a number of ways recruitment efforts could be made more effective, including CMER and co-op agreements, retention support, and structuring grants and contracts to include HBMSCUs.

X. RECOMMENDATIONS

At the first *Expanding Opportunities in Oceanic and Atmospheric* Conference held in June of 1995, the recommendations focused on creating links between NOAA and HBMSCUs. While some of these recommendations have been put in place and others are still waiting to be enacted, it is useful to look at how the focus of the recommendations has changed following the second conference. In addition to the specific recommendations targeted to the academic and government sectors, there are seven overriding recommendations that emphasize the need to consider increasing diversity as a long-term, institutional and societal issue requiring systemic change and flexible thinking.

The seven overriding recommendations are as follows:

1. Recognize and emphasize the moral agency behind increased diversity.

Education rates for minorities have remained stagnant for twenty-five years even as the percentage of minorities in the total population has increased steadily. Education levels are directly linked with income. Increasing diversity in the oceanic and atmospheric sciences increases the quality of life among minorities. It has larger effects as well; increased diversity more accurately reflects the nation's population, it taps into the nation's potential, and it provides genuine support for democracy.

2. Implement systemic and long-term change.

True diversity cannot be achieved through short-term, individual progress. It requires entire systems to change, and to change for the long haul. There are three specific areas that need systemic change:

1. Infrastructure at the corporate, government, and academic levels.
   - Government agencies such as NOAA need to provide opportunities beyond summer programs and internships, such as internships that turn into full-time employment upon graduation and higher-level openings for scientists. NOAA must maintain up-to-date research technology to attract minorities who might go to the private sector.
   - Corporations must, when developing business alliances with NOAA, consider how these alliances create and sustain diversity.
   - HBMSCUs must develop and maintain top-notch research facilities.
   - Government, corporate, and academic sectors alike must have minorities at all levels of decision-making.

2. Cultural change.
   It is difficult, if not impossible, to attract and retain minorities if their working environment is inimical or insensitive. NOAA needs to take an honest look at its cultural climate, working particularly to overcome unconscious or tacit expectations that

minorities will adapt to the dominate culture. Promoting an atmosphere that honors diversity goes beyond simply adding minority employees.

3. Financial change.
   Federal monies need to be allocated to HBMSCUs to develop and sustain quality research institutions that can train quality scientists. Programs to attract and maintain minority employees that NOAA and the corporate sector develop must be given adequate and long-range funding.

3. Create flexible approaches to attract and retain minorities.

NOAA needs to understand an expanded and public sense of its projects. For instance, NOAA might draw from computer science undergraduate and graduate students to work on its robotic projects and to publicize NOAA's work through the Internet. English majors may be interested in writing for various NOAA publications. In short, NOAA needs to market itself, to show the range of its accomplishments—from its environmental work to its submersible diving units (seen in the movie *Titanic*).

4. More emphasis needs to be placed on PhD research at HBMSCUs.

There are already a number of programs for K-12 designed to introduce students to the career opportunities within the oceanic and atmospheric sciences. The first conference suggested a number of ways to support minority undergraduates in their choices of science and engineering fields. Now there must be an emphasis on minority PhDs working within the oceanic and atmospheric sciences. This can be achieved by finding sustained funding for graduate research programs at HBMSCUs, keeping top-notch research facilities at NOAA agencies, and exchanging HBMSCUs graduate faculty and NOAA research scientists to keep both parties current with academia and NOAA research.

5. HBMSCUs must have a political presence in Washington, D.C.

HBMSCUs must educate Congress as to the value and importance of increasing diversity within NOAA. Little can be done on a national level without sustained federal support and funding. A larger political presence can guide HBMSCUs in two ways: by insisting that the issue of diversity is a national one and by demanding that NOAA be accountable for its financial spending and policy actions. Finally, a national level task force must be created to keep at the forefront the issue of diversity in the marine, oceanic and atmospheric sciences.

6. Partnerships must be mutual, equal in responsibility, and must involve three-way links between the private, academic, and government sectors.

Corporations, NOAA, and HBMSCUs must play equal roles in whatever partnerships are established. For instance, the hiring of minority PhD scientists must be sustained by continued development of top-notch research facilities at HBMSCUs. These partnerships should be mutually beneficial and mutually responsible in creating a diverse workplace culture. For instance, the growing field of aquaculture is ideally suited for three-way partnerships: NOAA

scientists consulting at for-profit fish farms in exchange for data, students working as research interns and liaisons between NOAA and for-profit corporations.

7. Create a paradigm shift.

Over the past ten to fifteen years, special programs and efforts by NOAA and its partners, including other agencies, universities, and scientific societies, have made a significant impact on increasing the number of individuals from underrepresented groups who have been trained and are pursuing careers in aquatic, environmental, atmospheric and fisheries sciences. This success is evident in relation to the number of people entering these career prior to such efforts; however, in relation to the total number of people that exist in NOAA, its partners and especially in the colleges and universities from which NOAA staff has traditionally come, the number is still small and has not reached the self-sustaining critical mass.

What needs to happen is a shift in the paradigm of employment, and there are historical precedents for mechanisms by which a new, permanent pool of quality minority talent can be established. For instance, after WWII skilled employment in the oceanography field rose significantly following a large infusion of support from the Defense Department, and resulting in the Joint Oceanographic Institutions. We need to apply these successful historical strategies to change the national culture and create a sustainable group of talented and diverse people for the oceanic and atmospheric sciences.

Specific Recommendations Proposed by the Working Groups and Panel Sessions.

For NOAA:

- Coordinate, on a national level, all of NOAA's opportunities for minorities by creating an electronic national clearinghouse for program information with staffing to insure response to questions, concerns, and requests for information.
- Find competitive and centralized multi-year funding.
- Tap into the strong history of African-American faith by creating links between Black churches and NOAA. Follow the model set up by the American Association for the Advancement of Science (AAAS) and the Black Church and Faith Communities Initiative.
- Remember that diversity efforts can occur in a variety of ways, not just through full-time employment, but by hiring minority contractors and supporting minority-owned businesses for the procurement of goods and services.
- Implement the best practices that link minority students with NOAA. Keep assessing programs, making sure they are properly funded to ensure maximum success.
- Be aware of legal ramifications and legislative efforts. Evaluate the use of "science" language around diversity versus the use of legal language from the EEO/Diversity Initiative. Note that the most positive changes have come as the result of legal action.
- Market NOAA to a wider and younger audience.
- Create new programs of study (e.g. Coastal Zone Management) at HBMSCUs that address issues specific to NOAA and draw upon a number of already strong fields, such as history,

basic science, public planning and policy and sociology.

- Establish partnerships with Tribal Colleges.
- Take advantage of the current favorable NOAA climate.
- Form Joint Institutes—two potential projects in aquatic and atmospheric sciences.
- Establish an organizational structure to oversee the implementation of recommendations.
- Provide immediate support for NOAA/HBCU Education Partnership Initiative.
- Encourage and support mechanisms for NOAA staff researchers to become adjunct faculty at HBMSCUs, using the Intergovernmental Personnel Act.
- Promote the use of cooperative agreements with HBMSCUs by sharing information and assisting in establishing them.
- Modify NOAA procurement procedures to permit direction of contracts to HBMSCUs.
- Identify key persons at HBMSCUs with which to interact in targeted recruiting efforts.
- Provide a sufficient number of entry-level positions at lower grade levels.
- Establish NOAA-level policy to have consistent goals and expectations across line offices.
- Improve retention by mentoring and follow-up of new minority recruits.
- Establish policies to ensure that contractors reflect NOAA's resolve for diversity and assist them in establishing links with HBMSCUs.

For HBMSCUs:

- Promote curricula development in areas recognized as NOAA growth areas.
- Encourage interdisciplinary collaboration on campuses to help meet needs in stock assessment, economics/social sciences, and fishery observer training.
- Develop a national K-12 program to get students interested in marine and atmospheric sciences.
- Develop a strong Washington presence to lobby for increased federal funding. Become more pro-active in obtaining funding and Congressional support.
- Use larger majority institutions as mentors, learning from them how to obtain and utilize larger grants of federal funding.
- Create cooperative programs with majority institutions and NOAA.
- Keep research facilities and faculty excellent so as to attract both students and funding.

For the Third Conference:

- Have a workshop on retention and recruitment.
- Invite students who have been to the two previous conferences to speak on their experiences.

XI. AFTERWORD: *The Need for Institutional Change*

The excitement generated by the conference cannot be underestimated. We hope these proceedings reflect the piercing message to bring about radical change. Change not just for NOAA but for the entire populace—our academic, business, and government communities. In the months following the conference, discussion has continued, change has taken place, and new recommendations have been made. This would not have occurred without the momentum built by the conference. In light of this, it seems important, at this time, to reflect on the issues and actions that have taken place since the conference and to stress, once again, the urgency we feel in effecting diversity within the oceanic and atmospheric sciences.

Fourteen individuals (Ambrose Jearld, NOAA NMFS; Emorcia Hill, Abt Associates; Robert Stockman, DOC Budget Office; Eddie L. Whitehead, NOAA NWS; Paul S. Trotter, NOAA NWS; Mildred Ofosu, Delaware State University; Percy Robinson, DOC Office of General Council; Maurice K. Crawford, NOAA NOS; Denise Stephenson-Hawk, Provost, Spelman College; Joseph M. Okoh, UMES; Sheila Stiles, NOAA NMFS; Benjamin Watkins, NESDIS; Livingston S. Marshall, Morgan State University; and Justin Ahanhanzo, IOC UNESCO) met prior to and immediately following the formal adjourning of the conference. The group met to discuss what transpired during the conference with particular attention to the concerns and recommendations of participants. The group was concerned with how to keep the momentum of the conference going, what actions to take, and what medium would be most expeditious in seeing that these recommendations were delivered to the decision makers in NOAA or the Commerce Department for implementation.

There was consensus among the group that the Post-Conference Implementation Committee's primary goal is to increase the number of minority individuals who participate, educationally and occupationally, at all levels in the atmospheric, oceanic/marine and environmental sciences throughout the government and private sectors. Consequently, the group decided that all actions must be directed at achieving this goal. Three short-term actions towards this larger goal were outlined.

First, the group recognized that traditionally federal agencies have directed their attention and resources to students, primarily at their undergraduate level of study, believing that in doing so they have met their commitment to diversity. However, the group emphasized that attention must be brought to the compelling issue of infrastructure and capacity-building within the HBMSCUs. Strong programs and adequate resources are essential to win research dollars and to attract students and faculty. While the universities, students, and faculty are the short-term beneficiaries of this infrastructure building, the nation benefits overall.

Second, the group advocated for developing a fact sheet which describes the problems and concerns surrounding minority participation in the atmospheric, oceanic, and marine sciences in the complex public/private institutional settings that are active in these fields. A statement about why this issue is a national imperative should be included. This document would outline issues in a concise manner for NOAA and other government institutions, HBMSCUs and other educational institutions, industry, and Congressional Representatives.

Third, the group stressed that all proposals generated from the conference should be both specific and realistic in order to continue momentum and support. Every proposal should clearly specify its short-, intermediate-, and long-term objectives and should be developed around well-focused themes that link to key programs in NOAA's missions. This focus and specificity will help expedite approval and execution of proposals. Moreover, the focus should not be limited to the goal of producing higher qualified minority graduates without regard for employment opportunities. Rather, the context should include paths and linkages to cover development, at least at the entry level of employment.

In short, the Post-Conference Implementation Committee urged that focus be kept on the conference's central theme: "Too Few to Count." Although the number of minorities has increased within the oceanic and atmospheric sciences, minority representation is not presently at levels significant enough to sustain a network of fiscal, professional, and educational support. To achieve true, sustainable diversity, all actions must be targeted to developing full representation for minorities—not just within every level of the educational and occupational fields of the oceanic and atmospheric sciences, but also in numbers large enough to effect permanent, continuous change in the cultural, fiscal, academic, governmental, and professional infrastructures that support the oceanic and atmospheric sciences.

The awareness of the need to increase diversity was reflected in the large number of people who attended the conference—far greater then expected—and the interest and actions of the attendees in following up on connections made at the meeting has been outstanding. The enthusiasm shown for making connections and building interactions between NOAA personnel and academicians has resulted in students being offered summer internships and employment, contracts awarded to several institutions, and a full-day grants conference targeting Institutions of Higher Education, with particular interest in Minority-Serving Institutions, held at the U.S. Department of Commerce.

Much excitement and great anticipation have been generated by the personal interest and commitment shown by U.S. Dept. of Commerce Deputy Secretary Robert B. Mallett who gave keynote addresses at both the UMES Expanding Opportunities and the Grants Conference held in September. Moreover, there is great anticipation for a potential MSIs Initiative to be championed by the Deputy Secretary. The hope is that it will be significant and that it will make a difference in the level of participation in NOAA mission work as well as across Commerce. In the long run, any significant and sustained funding support to HBMSCUs should go far in raising the numbers of minorities in NOAA's occupational and academia's educational fields of research and development, public service, and resource management. This minority participation will ultimately extend to the public and private organizations which are partners and customers for NOAA's work.

Following the conference, a list of research opportunities that HBCUs could partake in has been compiled and placed on the web. A symposium discussing these opportunities took place in Annapolis, Maryland at the end of September. Also in September, the Department of Commerce held its first comprehensive financial assistance opportunities conference. In addition, NOAA has worked to reinstate a Graduate Research Fellows Program under the leadership of Mr. Scott

Gudes, Deputy Under Secretary for Oceans and Atmosphere. NOAA leaders, in collaboration with its academic, private sector and other federal government partners formed during the conference, met to participate in a two-day National Science Foundation/Geo-sciences Workshop. The workshop was in the spirit of building stronger federal relations to reflect and focus on the concerns brought to the table by participants.

All of these immediate responses to the urgent nature of the conference focuses attention on how NOAA works to develop diversity. All too frequently, NOAA's support for HBMSCUs has been on an ad-hoc basis, underfunded and more concerned with outreach activities than with a logical and reasonably balanced involvement in mission program areas. This approach is not unique to NOAA and many federal agencies in the earth sciences have operated in a similar manner.

NOAA leadership must identify and implement the mechanism for systemic and dedicated coordination across the Agency and Commerce. Only a long-range, strategic plan can provide the fiscal, cultural, and professional support needed to sustain true diversity. The intent of this long-range planning is to aid HBMSCUs to become vested partners of NOAA and, thus, contribute to the efficiency of the Agency, carrying out its mission and honoring the public trust. Such critical and regular involvement would go a long way to contribute to and ensure HBCU leveraging power for funds from other federal, state, and private sources to continue building and strengthening institutional capacity in NOAA core and related science, engineering, and technology areas. Such real partnership support is thought to have far-reaching effects in under-girding the HBMSCU capacity to be stronger competitors for research grants, cooperative agreements, procurement contracts, and the like. Finally, a long-term, unified approach to solving the problem of "too few to count" will allow for a permanent, integrated change.

The need for a unified strategy does not eliminate the need for spontaneous and immediate response. All mechanisms—long-term and short-term, ad-hoc and systematic, spontaneous and integrated, bottom-up and top-down—must be employed. We cannot postpone the immediate needs of the minority community while we develop a thoughtful long-range plan, but neither can we continue to apply short-term fixes to a long-term problem. We must make the infrastructure changes necessary to integrate minorities within all levels of the oceanic and atmospheric profession, most importantly in positions of true power, affecting finances, research, organizational structure, and academia. In doing so, we should emphasize the particular strengths and opportunities offered by HBMSCUs.

To ensure the coordination of policy and action on both the ad-hoc and long-term levels, we would urge that a committee, or some other mechanism, be established so there could be a continual process of oversight and dialogue. Such a committee can help NOAA, the HBMSCUs, and the private sector in setting clear agenda and priorities and in presenting a unified position by which to gain Congressional support.

One way to initiate long-term change, is for NOAA, through partnerships grants and contracts with HBMSCUs, to conduct and, where possible relocate, NOAA research on the campuses of these institutions. Sustaining year-round research alleviates several problems. Currently, faculty

and students are farmed out for the summer to work at other institutions, while their state-of-the-art laboratories go unused. Remaining on their own campuses to conduct research year round builds the capacity to do competitive research, brings in much need research dollars toward overall research capability, promotes a climate of research excellence, and effectively utilizes equipment and resources. There is a tremendous need to build solid and continuous fiscal support to aid world class fellowships, scholarships, teaching assistantship, internships, all of which contribute to a healthy and sustained campus research environment. A recent development illustrates this promise—The University of Maryland Eastern Shore, The National Park Service and the Maryland Department of Natural Resources, through a $1.5 million Economic Development Initiative grant from the federal government, have joined forces to establish a Coastal Ecology Teaching and Research Center at Assateague Island.

There are many advantages in collaborating with HBMSCUs research facilities. These partnerships ensure the involvement of students in the research enterprise, keep academia and NOAA on the same track in regards to research, and encourage state and private investment in university infrastructure. In addition, collaboration offers the flexibility of university investment, where funds can be reallocated to meet emerging needs and new faculty once goals are met, and the decentralized nature of universities which can lead to new directions in research long before the federal administrative structure can recognize potential opportunities.

It is important to review the research capabilities of HBMSCUs in a fair manner. Too often, the peer review system allows large, majority, research institutions to judge the capacity of the smaller, minority institutions. Large research universities are an important source of information and assistance, but they may not be fully aware of how to effectively use the smaller resources of HBMSCUs. This is especially the case in the earth sciences where regionally, local geography provides unique research opportunities in the surrounding ecological/environmental setting of the institution. We advocate that the peer review system be modified to allow HBMSCUs to be judged by other, smaller research institutions, which have had the same level of funding as the HBMSCUs.

Conference participants also stressed the crucial nature of redefining "science" to become more interdisciplinary. Why do this? There is an emerging consensus in the earth and environmental science community that we must move in this direction. Nature does not divide itself into neat disciplinary compartments. Plans to increase diversity should cross the disciplines and should include management, particularly professionals in the management of natural resources such as the fisheries, as well as station management personnel as in weather. In so doing, NOAA would look broadly to see opportunities for "partnering" and must communicate this interdisciplinary stance through effective public relations. We should take the opportunity to develop access as we move to the new millennium since "interdisciplinary fields" are the wave of the future.

All of these actions need the support of the federal government. Because there are "too few to count"—even within Congress—it is crucial to educate Congress on the extent of the problem and the need for federal involvement. We need to attract the interest and support of members of Congress so they will advocate for increasing diversity within the oceanic and atmospheric sciences. Engaging legitimate bipartisan Congressional support is essential. A concept paper

needs to be developed that could be distributed to legislators and their staff, and members in both the House and Senate that makes the case in terms of the national interest in increased minority participation in the oceanic and atmospheric sciences. With commitment and advocacy from HBMSCUs, broad coalitions of support can be generated for the investments and initiatives necessary.

Emphasis was also placed on the need to make full and wise use of one of NOAA's own natural resources—NOAA employees who are graduates of HBMSCUs—to follow through on conference promises yet to keep. Too often employees with this distinction are overlooked, not called on for their decision-making ability. This is especially when the decisions are managerial—whether to resolve problems in human resource management, mission program management or when building relationships with the Agencies' constituents, including academia. In short , NOAA must empower its minority employees in addressing the critical issues and problems raised during the very productive two days at UMES.

One step in encouraging minority employees to speak up is for the leadership of NOAA to actively engage in changing the way NOAA does business. The new thinking on promoting diversity must be accompanied by action, changing the corporate culture to allow for full representation of minorities at all levels, in significant numbers, and in positions of fiscal responsibility, strategic planning, and other positions of power.

Finally, as we plan for the next decade, the members of the Post-Conference Implementation Committee suggested that NASULGC work with NOAA to build a sustainable relationship so that diversity goals can be accomplished in tandem. For example, institutions' curricula can be better matched to NOAA's needs. Before a ten-year plan is established, the group recommended that NOAA, over the next year, examine where NOAA currently stands in its program to increase minority participation. After the baseline is established, NOAA can improve the situation over the next decade with clearly agreed upon measures of success. Since the members of the group itself represent only NOAA line offices, it was suggested that an intermediary could be appointed to interact between NOAA and the institutions, thus ensuring a closer working relationship and more likely success of implementing goals. We support the work NASULGC has done to promote diversity within their own institutions; we wish to continue the dialogue between the two agencies; and we acknowledge that the effectiveness of NASULGC in working with Congress provides a model for our own work.

It is our fervent desire that by implementing sustained, thoughtful change throughout NOAA and the institutions partnered with NOAA, we can institute and maintain true diversity, full representation for all Americans, within the oceanic and atmospheric sciences. This goal—the goal of long-term racial, ethnic, and gender equality—underpins the very nature of democracy.

There is no other way to succeed.

Ambrose Jearld, Jr., PhD
Chairman, Steering and Conference Committees

XII. APPENDICES

Appendix A: Steering Committee Roster

Dr. James H. Arrington
Vice President for Academic Affairs
South Carolina State University
Member, National Sea Grant Review Panel
P.O. Box 7307 (300 College St., NE)
Orangeburg, SC 29117
ZF_Arrington@scsu.edu
Tel: 803/536-7180 Fax: 803/533-3775

Dr. Brian Bingham
Assistant Professor
Huxley College of Environmental Studies
Western Washington University
1900 Shannon Point Rd.
Anacortes, WA 98221
Bingham@cc.wwu.edu
Tel: 360/650-7400 Fax: 360/293-1083

Dr. Carolyn Brown
(DOC/NOAA/NMFS-Retired)
1844 Lake Dr.
Orangeburg, SC 29115
Fdavis15@bellsouth.net
Tel: 803/536-1076 Fax: 803/536-6671

Dr. Susan B. Cook
Director, J. Seward Johnson Marine
Education and Conference Center
Harbor Branch Oceanographic Inst., Inc.
5600 U.S. 1 North
Fort Pierce, FL 34946
Scook@hboi.edu
Tel: 561/465-2400 Fax: 561/465-5743

Dr. Benjamin E. Cuker
Associate Professor of Marine Science
Marine Science Department
Hampton University
Hampton, VA23668
Cuker@hamptonu.edu
Tel: 757/727-5884 Fax: 757/727-5740

Dr. Matthew R. Gilligan
Director, Marine Science Laboratory
Savannah State University
P.O. Box 20325
Savannah, GA 31404-9702
Gillganm@tigerpaw.savstate.edu
Tel: 912/356-2809 Fax: 912/356-2808

Natalie Huff
Manager of Diversity
NOAA, National Marine Fisheries Service
SSMC3, Rm. 14101
1315 East-West Hwy.
Silver Spring, MD 20910
Natalie.Huff@noaa.gov
Tel: 301/713-2252 Fax: 301/713-1748

Dr. Ambrose Jearld, Jr.
Conference Chairman
Chief, Research Planning and Coordination
NOAA/National Marine Fisheries Service
Northeast Fisheries Science Center
166 Water St.
Woods Hole, MA 02543
Ambrose.Jearld@noaa.gov
Tel: 508/495-2318 Fax: 508/495-2258

Dr. Roman Jesien
Assistant Professor
Department of Natural Sciences
University of Maryland Eastern Shore
Princess Anne, MD 21853-1299
Rjesien@mail.umes.edu
Tel: 401/651-6249

Dr. Darryl Keith
U.S. Environmental Protection Agency
Environmental Research Laboratory
27 Tarwell Dr.
Narragansett, RI 02882
Keith.darryl@epamail.epa.gov
Tel: 401/782-3135 Fax: 401/782-3030

Dr. Margaret S. Leinen
Dean, Graduate School of Oceanography
Vice Provost for Marine Programs
University of Rhode Island
Bay Campus, Fish Bldg.
Narragansett, RI 02882
Mleinen@gso.uri.edu
Tel: 401/874-6222 Fax: 401/874-6889

Dr. Kelly Mack
Assistant Professor
Department of Natural Sciences
University of Maryland Eastern Shore
G.W. Carver Science Building
Backbone Rd.
Princess Anne, MD 21853-1299
Kmmack@mail.umes.edu
Tel: 410/651-6039

Dr. Livingston S. Marshall, Jr.
Associate Professor
Department of Biological Sciences
Morgan State University, 166 Key Hall
1700 East Cold Spring Lane
Baltimore, MD 21251
lmarshall@moa.morgan.edu
Tel: 443/885-4468 Fax: 410/426-4732

Helen Mustafa
NOAA, National Marine Fisheries Service
Northeast Fisheries Science Center
166 Water St.
Woods Hole, MA 02543
Helen.Mustafa@noaa.gov
Tel: 508/495-2244 Fax: 508/495-2258

Dr. Mildred D. Ofosu
Associate Dean of Research
Director, Office of Sponsored Programs
Delaware State University
1200 N. Dupont Hwy.
Dover, DE 19901-2277
mofosu@dsc.edu
Tel: 302/857-6521 Fax: 302/857-4294

Dr. Joseph Okoh
Chairman, Department of Natural Sciences
University of Maryland Eastern Shore
Backbone Rd.
Princess Anne, MD 21853-1299
Jokoh@umes-bird.umd.edu
Tel: 410/651-6014 Fax: 410/651-7739

Dr. N. Joyce Payne
Director, Office for the Advancement
of Public Black Colleges
National Association of State Universities
and Land-Grant Colleges
1307 New York Ave., NW, Suite 400
Washington, DC 20005
jpayne@nasulgc.org
Tel: 202/478-6049 Fax: 202/478-6046

Marlin O. Perkins
GOES DSC Program Manager
NOAA, NESDIS
5200 Auth Rd., 3320 -FB4
Suitland, MD 20746
Marlin.O.Perkins@noaa.gov
Tel: 301/457-5681 Fax: 301/568-8649

Dr. Carlos Robles
Professor
Department of Biology and Microbiology
Director, CEA-CREST
California State University, Los Angeles
5151 State University Dr.
Los Angeles, CA 90032
crobles@hitide.calstate.edu
Tel: 323/343-2067 Fax: 323/343-5795

Harold M. (Hal) Stanford
Deputy Director
Center for Coastal Monitoring and Assessment
National Centers For Coastal Ocean Science
NOAA, National Ocean Service
SSMC4, Rm. 9320
1305 East-West Hwy.
Silver Spring, MD 20910
Hal.Stanford@noaa.gov
Tel: 301/713-2989 x141 Fax: 301/713-4389

Dr. Denise Stephenson-Hawk
NOAA Science Advisory Board
Provost, VP for Academic Affairs
Spelman College
350 Spelman Lane, Box 209
Atlanta, GA 30314-4399
Dhawk@spelman.edu
Tel: 404/223-1416 Fax: 404/215-7918

Robert H. Stockman
DOC, Office of Budget
Systems and Policies Division, Rm. 5821
1401 Constitution Ave., NW
Washington, DC 20230
Bstockman@doc.gov
Tel: 202/482-5976 Fax: 202/482-3361

Dr. Sharon H. Walker
Program Director for Education
NOAA, Office of Oceanic and Atmospheric Research
National Sea Grant College Program
SSMC3, Rm. 11839
1315 East-West Hwy.
Silver Spring, MD 20910
Sharonw@oar31.oar.noaa.gov
Tel: 301/713-2431 x148 Fax: 301/713-0799

Benjamin Watkins
Chief, Satellite Service Division
NOAA/National Environmental Satellite, Data, and Information Service
5200 Auth Rd., WWBG, Rm. 607
Camp Springs, MD 20746
Benjamin.Watkins@noaa.gov
Tel: 301/763-8051 Fax: 301/763-8131

Julian M. "Skip" Wright
Senior Advisor
NOAA, National Weather Service
SSMC2, Rm. 11399
1325 East-West Hwy.
Silver Spring, MD 20910
Julian.Wright@noaa.gov
Tel: 301/713-3095 Fax: 301/713-1002

Appendix B: NOAA and UMES Conference Planning Committees Roster

NOAA

Ms. Ann Georgilas
Diversity Program Manager
NOAA/Office of Oceanic and Atmospheric Research
Silver Spring, MD

Ms. Natalie Huff
Diversity Manager
NOAA/National Marine Fisheries Service
Silver Spring, MD

Ms. Nina Jackson
Education and Diversity Coordinator
NOAA/National Environmental Satellite, Data, and Information Service
Suitland, MD

Dr. Ambrose Jearld, Jr.
Conference Chairman
NOAA/National Marine Fisheries Service
Northeast Fisheries Science Center
Woods Hole, MA

Ms. Jocelyn B. Martin
EEO Program Manager
NOAA/National Ocean Service
Silver Spring, MD

Ms. Ruth C. Moore
Management Analyst
NOAA/National Ocean Service
Silver Spring, MD

Ms. Helen Mustafa
Program Analyst
NOAA/National Marine Fisheries Service
Northeast Fisheries Science Center
Woods Hole, MA

Mr. Harold M. (Hal) Stanford
Deputy Director, Center for Coastal Monitoring and Assessment
National Centers for Coastal Ocean Science
NOAA/National Ocean Service
Silver Spring, MD

Ms. Carolyn Stiles
EEO Program Manager
NOAA/National Marine Fisheries Service
Silver Spring, MD

Mr. Robert H. Stockman
DOC, Office of Budget
Systems and Policies Division
Washington, DC

Ms. Gloria Walker
EEO Manager
NOAA/National Weather Service
Silver Spring, MD

Mr. Benjamin Watkins
Chief, Satellite Services Division
NOAA/National Environmental Satellite, Data, and Information Service
Camp Springs, MD

Mr. George White
Special Assistant to the Deputy Assistant Administrator
NOAA/National Marine Fisheries Service
Silver Spring, MD

UMES, Princess Anne, MD

Dr. Arthur Allen
Chairman
Department of Agriculture

Dr. Allen Williams
Assistant Professor
Department of Natural Sciences

Ms. Tina Dube
Lecturer
Department of Math and Computer Sciences

Mrs. Gretchen Givens
Coordinator
Continuing Education

Mr. Phillip Jones
Graduate Student
Department of Natural Sciences

Dr. Missale Kumulachew
Assistant Professor
Department of Human Ecology

Dr. Kelly Mack
Assistant Professor
Department of Natural Sciences

Dr. Joseph Okoh
Chairman
Department of Natural Sciences

Mrs. Clytrice Watson
Lecturer
Department of Natural Sciences

Dr. Yan Waguespack
Associate Professor
Department of Natural Sciences

Appendix C: Conference Participants

Sharon Abbas
Undergraduate student
Penn State University
Department of Meteorology
503 Walker Building
University Park, PA 16802
sia101@psu.edu
Tel: 814/865-5471 Fax: 814/865-3663

Justin Ahanhanzo
Consultant
IOC/UNESCO
1, rue Miollis
75732 Paris Cedex 15
FRANCE
j.ahanhanzo@unesco.org
Tel: +33 (0) 45 68 36 41
Fax: +33 (1) 45 68 58 12

Mohamed Ahmed

Giovannie Alexander
Intern/trainee
NOAA, NESDIS
10750 SW 11th St., Apt. E-101
Miami, FL 33174
Gio14@hotmail.com
Tel: 305/348-9225 or 305/348-6560

Dr. Arthur Allen
Chair, Department of Agriculture
University of Maryland Eastern Shore
Backbone Rd., Trigg Hall 1107
Princess Anne, MD 21853
alallen@mail.umes.edu
Tel: 410/651-6168

Brenda Anderson
Dean, School of Arts and Professions
University of Maryland Eastern Shore
Early Childhood Research, C1110
Backbone Rd.
Princess Anne, MD 21853
boanderson@mail.umes.edu
Tel: 410/651-6083

Nicholas Anderson
Planning Officer
Northeast Regional Office
NOAA, National Marine Fisheries Service
One Blackburn Dr.
Gloucester, MA 01930
Nick.Anderson@noaa.gov
Tel: 978/281-9383 Fax: 978/281-9371

Dr. James H. Arrington
Vice President for Academic Affairs
South Carolina State University
P.O. Box 7307 (300 College St., NE)
Orangeburg, SC 29117
ZF_arrington@scsu.edu
Tel: 803/536-7180 Fax: 803/533-3775

Marcus Babaoye
Research Associate
Southern University
G. Leon Netherville Dr.
Baton Rouge, LA 70813
Marcusb@sus.edu
Tel: 225/771-4030 Fax: 225/771-2807

Dr. Ronald C. Baird
Director, National Sea Grant College Prog.
NOAA, Office of Oceanic and Atmospheric Research
SSMC3, Rm. 11716
1315 East-West Hwy.
Silver Spring, MD 20910-3282
Ronald.Baird@noaa.gov
Tel: 301/713-2248 Fax: 301/713-0799

Sheekela Baker
University of Rhode Island
GSO, Oceanography
Bay Campus
Narragansett, RI 02882-1199
Tel: 401/874-6272

Carolyn S. Ballew
Deputy Regional Administrator
Southeast Region
NOAA, National Marine Fisheries Service
9721 Executive Center Dr., N.
St. Petersburg, FL 33702
Carol.Ballew@noaa.gov
Tel: 813/570-5301 Fax: 813/570-5300

Barbara A. Banks
Product Systems Branch Chief
NOAA, NESDIS
5200 Auth Rd., FB4, Rm. 2039
Suitland, MD 20746
Barbara.Banks@noaa.gov
Tel: 301/457-5195 Fax: 301/457-5199

Kenneth L. Beal
Assistant Office Director
NOAA, National Marine Fisheries Service
Northeast Regional Office
One Blackburn Dr.
Gloucester, MA 01930
Ken.Beal@noaa.gov
Tel: 978/281-9267 Fax: 978/281-9117

Wayne H. Bell
Vice President for External Affairs
University of Maryland
Center for Environmental Science
P.O. Box 775
Cambridge, MD 21613
bell@ca.umces.edu
Tel: 410/228-9250 Fax: 410/228-3843

Dr. Brian Bingham
Assistant Professor
Huxley College of Environmental Studies
Western Washington University
1900 Shannon Point Rd.
Anacortes, WA 98221
bingham@cc.wwu.edu
Tel: 360/650-7400 Fax: 360/293-1083

Cedric Blair
University of Maryland Eastern Shore
Backbone Rd.
Princess Anne, MD 21853
Tel: 410/651-6327

Dr. Glyen Bledsoe
Associate Dean for Math and Science Dept.
Northwest Indian College
2522 Kwina Rd.
Bellingham, WA 98226
gbledsoe@nwic.edu
Tel: 360/676-2772 Fax: 360/738-0136

Kerry D. Bolognese
Assistant Director, Federal Relations
Marine and Environmental Affairs
NASULGC
1307 New York Ave., NW, Suite 400
Washington, DC 20005
kbolognese@nasulgc.org
Tel: 202/478-6048 Fax: 202/478-6046

Barbara T. Booker
Chief, Acquisition Management Division
Eastern Administrative Support Center
U.S. Dept. of Commerce, NOAA
200 World Trade Center
Norfolk, VA 23510
Barbara.T.Booker@noaa.gov
Tel: 757/441-6894 Fax: 757/441-3786

Dr. John Boreman
Deputy Center Director
Northeast Fisheries Science Center
NOAA, National Marine Fisheries Service
166 Water St.
Woods Hole, MA 02543
John.Boreman@noaa.gov
Tel: 508/495-2233 Fax: 508/495-2258

Dr. Eddie Boyd
Dean, Business and Technology
University of Maryland Eastern Shore
Backbone Rd.
Princess Anne, MD 21853
Tel: 410/651-6327

Kandis Y. Boyd
Meteorologist
NOAA, National Weather Service
9050 Harrison St.
Davenport, IA 52806-7326
Kandis.Boyd@noaa.gov
Tel: 319/391-7094 Fax: 319/386-3976

Philip Branch
Student
Clark-Atlanta University
Physics/ESSP/EDMAC
(P.O. Box 241)
223 James P. Brawley Dr., SW
Atlanta, GA 30314
Tel: 508/793-7711

Robin Bridges
Student, undergraduate
Jackson State University
P.O. Box 7660
(c/o D. Croft)
Jackson, MS 39217
Tel: 601/968-2586

Dr. Carolyn B. Brooks
Dean
School of Agriculture and Natural Sciences
University of Maryland Eastern Shore
Backbone Rd.
Princess Anne, MD 21853
cbrooks@mail.umes.edu
Tel: 410/651-6072

Dr. George B. Brooks, Jr.
Adjunct Assistant Professor
Aquatic Scientist/Environmental Planner
Pima-Maricopa Irrigation Project
University of Arizona
Tucson, AZ 85040
Gbbrooks@gilariver.com
Tel: 520/562-3301 Fax: 520/562-4008

Dr. Bradford E. Brown
Science and Research Director
Southeast Fisheries Science Center
NOAA, National Marine Fisheries Service
75 Virginia Beach Dr., Rm. 207
Miami, FL 33149
Brad.Brown@noaa.gov
Tel: 305/361-4285 Fax: 305/361-4219

Dr. Carolyn Brown
(DOC/NOAA/NMFS-Retired)
1844 Lake Dr.
Orangeburg, SC 29115
fdavis15@bellsouth.net
Tel: 803/536-1076 Fax: 803/536-6671

Maronda Brown
Graduate Research Assistant
Dept. of Molecular and Cellular Biology
University of Connecticut (Storrs)
U-131 Beach Hall, Rm. 346
Storrs, CT 06269
mvb96001@uconnvm.uconn.edu
Tel: 860/427-7429

Pamela Brown-Eyo
Biologist/Fisheries Reporting Specialist
Southeast Fisheries Science Center
NOAA, National Marine Fisheries Service
75 Virginia Beach Dr., Bldg. 2
Miami, FL 33149
Pamela.Brown-Eyo@noaa.gov
Tel: 305/361-4565 Fax: 305/361-4460

Crystal Brownlee
Graduate student
University of South Carolina
1329 Hibiscus St.
Columbus, SC 29205
c-brown@sc.edu
Tel: 803/787-7019

Lori Budbill
Executive Officer
Alaska Fisheries Science Center
NOAA, National Marine Fisheries Service
7600 Sand Point Way, NE
Bin C15700, Rm. 2144
Seattle, WA 98115
Lori.Budbill@noaa.gov
Tel: 206/526-4005 Fax: 206/526-4004

Dr. George Burbank
Chairman, Dept. of Marine and
Environmental Science
Hampton University
Hampton, VA 23668
Tel: 757/727-5783 Fax: 757/727-5740

Margarette Butler
Graduate student
Department of Biology
P.O. Box 18540
Jackson State University
Jackson, MS 39217
Tel: 601/968-2586

David B. Caldwell
Chief Operations Officer
NOAA, National Weather Service
5200 Auth Rd., WWBG - 101
Camp Springs, MD 20746
David.Caldwell@noaa.org
Tel: 301/763-8000 Fax: 301/763-8434

Charles W. Challstrom
Director, National Geodetic Survey
NOAA, National Ocean Service
SSMC3, Rm. 8657
1315 East-West. Hwy.
Silver Spring, MD 20910
Charlie.Challstrom@noaa.gov
Tel: 301/713-3222 Fax: 301/713-4315

Sue Ann Chaplin
Panelist
Savannah State University
211 Ferrill St.
Savannah, GA 31415
Chaplins@tigerpaw.ssu.peachnet.edu
Tel: 912/234-1072

Ashley M. Chappell
Cartographer
NOAA, National Ocean Service
Coast Survey, HCHB, Rm. 6117
14th and Constitution Ave., NW
Washington, DC 20230
Ashley.M.Chapell@noaa.gov
Tel: 202/482-2152 Fax: 202/501-3024

Ressa Chee-Wah
Student
Clark-Atlanta University
P.O. Box 241
223 James P. Brawley Dr., SW
Atlanta, GA 30314
Ressinga@yahoo.com
Tel: 404/880-8964 Fax: 404/880-8499

Dr. Paulinus Chigbu
Assistant Professor
Jackson State University
Department of Biology
P.O. Box 18540
Jackson, MS 39217
Pchigbu@stallion.jsu.edu
Tel: 601/968-2586 Fax: 601/974-5853

Kelton Clark
Smithsonian Institution
University of Maryland College Park
P.O. Box 28
Edgewater, MD 21037
KC99@umall.umd.edu
Tel: 410/269-1412 Fax: 301/261-7954

Alfreda Cole
P.O. Box 20450
Savannah State University
Savannah, GA 31404
Bunnyboodah@hotmail.com
Tel: 912/691-4600

Essie Coleman-Duffie
Fishery Management Specialist
Southeast Fisheries Science Center
NOAA, National Marine Fisheries Service
75 Virginia Beach Dr., Rm. 205
Miami, FL 33149
Essie.C.Duffie@noaa.gov
Tel: 305/361-4237 Fax: 305/361-4219

Ralph P. Conlin
Director, Management Operations and
Analysis Office
NOAA, NESDIS
E/MO, FB4, Rm. 0206
5200 Auth Rd.
Suitland, MD 20746-4304
Ralph.Conlin@noaa.gov
Tel: 301/457-5200 Fax: 301/457-5400

Karega Cooper
Student
Clark-Atlanta University
Physics/ESSP/EDMAC
P.O. Box 241
223 James P. Brawley Dr., SW
Atlanta, GA 30314
Karegacooper@hotmail.com
Tel: 404/880-8964 Fax: 404/880-8499

Alfred A. Corea
Director, Civil Rights Office
NOAA/HDQ
SSMC3, Rm. 14635
1315 East-West Hwy.
Silver Spring, MD 20910
Alfred.A.Corea@noaa.gov
Tel: 301/713-9084 Fax: 301/713-0983

Angela Coyner
Student
University of Maryland Eastern Shore
Backbone Rd., GX Carver Bldg.
Princess Anne, MD 21853
acoyner@umes-bird.umd.edu
Tel: 410/651-6035

Dr. Maurice K. Crawford
Consultant
2212 40th St., NW #4
Washington, DC 20007
Maurice.Crawford@noaa.gov
Tel: 202-338-7559

Dr. Paul J. Croft
Meteorology Program Coordinator
Dept. of Physics/Atmospheric Sciences
Jackson State University
P.O. Box 17660 (1400 J.R. Lynch St.)
Jackson, MS 39217
pcroft@stallion..jsums.edu
Tel: 601/968-7012 Fax: 601/968-3630

CDR Miles M. Croom
NMFS/ONCO
777 Sonoma Ave., Rm. 325
Santa Rosa, CA 95404-6515
Miles.Croom@noaa.gov
Tel: 707/575-6068 Fax: 707/578-3435

Randolph S. Cross
Management and Program Analyst
NOAA, National Marine Fisheries Service
Northwest Regional Office
Bin C15700
7600 Sand Point Way, NE, Bldg. 1
Seattle, WA 98115-0070
Randolph.Cross@noaa.gov
Tel: 206/526-6152 Fax: 206/526-6426

Dr. Richard Crouthamel
NOAA, National Weather Service
SSMC2, Rm. 13348
1325 East-West Hwy.
Silver Spring, MD 20910-3283
Richard.Crouthamel@noaa.gov
Tel: 301/713-0647 Fax: 301/587-4524

Dr. Benjamin E. Cuker
Associate Professor
Marine and Environmental Science Dept.
Hampton University
Hampton, VA 23668
Cuker@hamptonu.edu
Tel: 757/727-5783 Fax: 757/727-5740

Dr. Gregory A. Cutter
Professor of Oceanography
Dept. Ocean, Earth and Atmospheric Science
Old Dominion University
Norfolk, VA 23529-0276
gcutter@odu.edu
Tel: 757/683-4929 Fax: 757/683-5303

William H. Daniels
Dept. of Agriculture and Natural Resources
Delaware State University
1200 N. Dupont Hwy.
Dover, DE 23668-0099
wdaniels@dsc.edu

Aimee David
South Carolina Sea Grant Intern
NOAA, National Ocean Service
2234 South Hobson Ave.
Charleston, SC 29405
ADavid@csc.noaa.gov
Tel: 843/740-1246 Fax: 843/740-1313

Kenneth D. Davidson
Deputy Director, National Climatic Data Center
NOAA, NESDIS
151 Patton Ave., FED – 557A
Asheville, NC 28801
Kenneth.D.Davidson@noaa.gov
Tel: 828/271-4848 Fax: 828/271-4246

Margaret A. Davidson
Director, Coastal Services Center
NOAA, National Ocean Service
2234 South Hobson Ave.
Charleston, SC 29405-2413
Margaret.Davidson@noaa.gov
Tel: 843/740-1220 Fax: 843/740-1297

Steven Dixon
Network Engineer
NOAA, Office of Oceanic and Atmospheric Research
SSMC3, Rm. 11104
1315 East-West. Hwy.
Silver Spring, MD 20910
Steven.Dixon@noaa.gov
Tel: 301/713-2458 Fax: 301/713-0163

Octavia Dozier
Student
South Carolina State University
300 College St., NE
Orangeburg, SC 29117
Tel: 803/536-7186

Steve T. Drescher
Grants Management Team Leader
NOAA/HDQ
SSMC2, Rm. 9384
1325 East-West Hwy.
Silver Spring, MD 20910
Steve.J.Drescher@noaa.gov
Tel: 301/713-0946 Fax: 301/713-0947

Tina Dube
Instructor, Math and Science
University of Maryland Eastern Shore
Backbone Rd., Kiah Hall 1122
Princess Anne, MD 21853
tdube@mcs.umes.umd.edu
Tel: 410/651-7748

Dr. Larry Earvin
Dean, School of Arts and Sciences
Clark-Atlanta University
223 James P. Brawley Dr., SW, #103
Atlanta, GA 30314
learvine@cau.edu
Tel: 404/880-6770 Fax: 404/880-6771

Dr. Ruth Y. Ewing
Veterinary Medical Officer
Southeast Fisheries Science Center
NOAA, National Marine Fisheries Service
75 Virginia Beach Dr.
Miami, FL 33149
Ruth.Ewing@noaa.gov
Tel: 305/361-4588 Fax: 305/361-4219

Dr. Mack Felton
Research Microbiologist
Dillard University
7210 Fairwood Dr.
New Orleans, LA 70126-3238
Fnormack@mindspring.com
Tel: 504/286-4732 Fax: 504/286-4724

RADM Evelyn J. Fields
Director, Office of NOAA Corps Operations
U.S. Dept. of Commerce
SSMC3, Rm. 12837
1315 East-West. Hwy.
Silver Spring, MD 20910
evelyn.fields@noaa.gov
Tel: 301/713-1045 Fax: 301/713-1541

Crystal Floyd
Student
South Carolina State University
300 College St., NE
Orangeburg, SC 29117
Tel: 803/536-7186

Harold A. Foster
Statistician Biology
Northeast Fisheries Science Center
NOAA, National Marine Fisheries Service
166 Water St.
Woods Hole, MA 02543
Harold.Foster@noaa.gov
Tel: 508/495-2212 Fax: 508/495-2258

Dr. William W. Fox, Jr.
Director, Office of Science and Technology
NOAA, National Marine Fisheries Service
SSMC3, Rm. 14350
1315 East-West. Hwy.
Silver Spring, MD 20910
william.fox@noaa.gov
Tel: 301/713-2367 Fax: 301/713-1875

Dr. Danny L. Fread
Director, Office of Hydrology
NOAA, National Weather Service
SSMC2, Rm. 8212
1325 East-West Hwy.
Silver Spring, MD 20910
Danny.Fread@noaa.gov
Tel: 301/713-1658 Fax: 301/713-0963

Judith F. Freeman
Chief
NOAA, Chesapeake Bay Program Office
410 Severn Ave., Rm. 107A
Annapolis, MD 21403
Judith.Freeman@noaa.gov
Tel: 410/267-5660 Fax: 410/267-5666

Albert George
Savannah State University
2113 East 65th St.
Savannah, GA 31404
georgea@tigerpaw.savstate.edu
Tel: 912/355-5913

Ann H. Georgilas
Program Analyst
Diversity Program Manager
NOAA, Office of Oceanic and Atmospheric Research
SSMC3, Rm. 11605
1315 East-West Hwy.
Silver Spring, MD 20910
Ann.Georgilas@noaa.gov
Tel: 301/713-2469 Fax: 301/713-1469

Susmita Ghosh
Graduate student
Dept. of Biology
Jackson State University
P.O. Box 18540
Jackson, MS 39217
Ghsu0597@stallion.jsums.edu
Tel: 601/924-2987

Jannie L. Gibson
NOAA, National Weather Service
SSMC2, Rm. 14442
1325 East-West. Hwy.
Silver Spring, MD 20910
Jannie.Gibson@noaa.gov
Tel: 301/713-1726 Fax: 301/713-1598

Dr. Matthew R. Gilligan
Professor
Dept. of Biology and Life Sciences
Savannah State University
P.O. Box 20325
Savannah, GA 31404
gillganm@tigerpaw.savstate.edu
Tel: 912/356-2809 Fax: 912/356-2808

Gretchen Givans
Coordinator of Continuing Education
University of Maryland Eastern Shore
Backbone Rd.
Princess Anne, MD 21853
Contedoc@ezy.net
Tel: 410/250-1088 Fax: 410/250-5727

Robert M. Gladman
Research Assistant
Clark-Atlanta University
4586 Roswell Rd., Apt. D-2
Atlanta, GA 30342
Rg09@student.cau.edu
Tel: 404/880-6757 Fax: 404/880-6756

John R. Green
Research Fishery Biology
Northeast Fisheries Science Center
NOAA, National Marine Fisheries Service
Narragansett Laboratory
28 Tarzwell Dr.
Narragansett, RI 02882
John.R.Green@noaa.gov
Tel: 401/787-3240 Fax: 401/787-3292

LaTongia Groce
Student
South Carolina State University
300 College St., NE
Orangeburg, SC 29117
Tel: 803/536-7186

Joyce W. Gross
Constituent Specialist
U.S. Dept. of Commerce/NOAA/HDQ
HCHB, Rm. 6013
14th and Constitution Ave., NW
Washington, DC 20230
Joyce.W.Gross@noaa.gov
Tel: 202/482-8360 Fax: 202/501-2953

Deborah Grossman-Garber
Coordinator
Partnership for the Coastal Environment
University of Rhode Island
Woodward Hall, Rm. 210B
Kingston, RI 02881
dggarber@uri.edu
Tel: 401/874-5401 Fax: 401/874-4561

Scott B. Gudes
Deputy Under Secretary for Oceans and Atmosphere
U.S. Dept. of Commerce/NOAA/HDQ
HCHB, Rm. 5810
14th and Constitution Ave., NW
Washington, DC 20230-0001
scott.b.gudes@noaa.gov
Tel: 202/482-4569 Fax: 202/482-1041

Fara-Denise Guest
Special Employment Program Manager
NOAA, Human Resources Management Office
SSMC4, Rm. 12610
1305 East-West Hwy.
Silver Spring, MD 20910
Farer.d.guest@noaa.gov
Tel: 301/713-0534 Fax: 301/713-1979

Mia Gundy
Student
Clark-Atlanta University
Physics/ESSP/EDMAC
P.O. Box 241
223 James P. Brawley Dr., SW
Atlanta, GA 30314
Bliz546@hotmail.com
Tel: 404/880-8964 Fax: 404/880-8499

Dr. Gian Gupta
Professor
Department of Natural Sciences
University of Maryland Eastern Shore
Backbone Rd., GW Carver Bldg. 3111
Princess Anne, MD 21853
ggupta@umes-bird.umd.edu
Tel: 410/651-6030

Ida M. Hakkarinen
Director, Environmental Information Services Program
NOAA, NESDIS
SSMC3, Rm. 15546
1325 East-West Hwy.
Silver Spring, MD 20910
Ida.Hakkarinen@noaa.gov
Tel: 301/713-1260 Fax: 301/713-1249

Alonzo Hamilton
Fishery Biologist Research
Southeast Fisheries Science Center
NOAA, National Marine Fisheries Service
Pascagoula Laboratory
3209 Frederick St., Rm. 104
Pascagoula, MS 39567
alnzo.hamilton@noaa.gov
Tel: 228/762-4591 x279

Dennis C. Hansford
Fishery Biologist
Northeast Fisheries Science Center
NOAA, National Marine Fisheries Service
166 Water St.
Woods Hole, MA 02543
Dennis.Hansford@noaa.gov
Tel: 508/495-2383 Fax: 508/495-2258

Dr. James L. Harrington, Jr.
Computer Scientist
NASA, Goddard Space Flight Center
Bldg. 28, Rm. W138, Mail Stop 933.0
Greenbelt, MD 20771
James@muspin.gsfc.nasa.gov
Tel: 301/286-4063 Fax: 301/286-1775

Iris Harris
Photographer
DOC, PAO
14th and Constitution Ave., NW, Rm. 1812
Washington, DC 02030
Iharris@doc.gov
Tel: 202/482-2021 Fax: 202/482-2888

Emily D. Harrod
Mathematician
NOAA, NESDIS
FB4, Rm. 0308
5200 Auth Rd.
Suitland, MD 20746-4304
Emily.Harrod@noaa.gov
Tel: 301/457-5244 Fax: 301/457-5199

Natasha Hatten
Student, Marine Science
Hampton University
Hampton, VA 23661
Tel: 757/727-5884 Fax: 757-727-5740

Shardell Hawkins
University of Maryland Eastern Shore
Backbone Rd.
Princess Anne, MD 21853

Margaret F. Hayes
Asst. General Counsel for Fisheries
DOC/NOAA/HDQ
SSMC2, Rm. 11301
1315 East-West. Hwy.
Silver Spring, MD 20910
Margret.F.Hayes@noaa.gov
Tel: 301/713-2231 Fax: 301/713-0658

Bennie L. Haynes
Physical Science Technician
NOAA, National Marine Fisheries Service
219 Ft. Johnson Rd.
Charleston, SC 29412-9110
Bennie.haynes@noaa.gov
Tel: 843/762-8578 Fax: 843/762-8700

Sekeenia Haynes
Graduate Research Assistant
Florida A&M University
203 BGEC
Tallahassee, Fl 32307-3100
s-haynes@msn.com
Tel: 850/671-3582 Fax: 850/561-2248

Dr. Thelma Hedgepeth
Acting Chair, Math and Computer Sciences
University of Maryland Eastern Shore
Backbone Rd., Kiah Hall 1104
Princess Anne, MD 21853
thedgepeth@mcs.umes.umd.edu
Tel: 410/651-7740

Dr. Chester Hedgepeth
Director, African Language Project
University of Maryland Eastern Shore
Backbone Rd., Trigg Hall
Princess Anne, MD 21853
chedgepeth@umes-bird.umd.edu
Tel: 410/651-6909

Avery Henry
Student, Computer Science
University of Maryland Eastern Shore
Backbone Rd.
Princess Anne, MD 21853
Tel: 401/651-2200

Richard Hibpshman, III
Student
Western Washington University
Shannon Point Marine Center
1900 Shannon Pt. Rd.
Anacortes, WA 98221
n9440285@cc.wwu.edu
Tel: 360/675-1056 Fax: 360/293-1083

Dr. Emorcia V. Hill
Senior Analyst
Abt Associates Inc.
55 Wheeler St.
Cambridge, MA 02138
Emorcia_hill@abtassoc.com
Tel: 617/394-2664 Fax: 617/520-2954

Dr. Ronnie Holden
Vice President, Administrative Affairs
University of Maryland Eastern Shore
Backbone Rd., J.T. William Hall
Princess Anne, MD 21853
rholden@mail.umes.edu
Tel: 410/651-6230

Tameca Holmes
Undergraduate student
Dept. of Meteorology
Penn State University
503 Walker Building
University Park, PA 16802
tdh133@psu.edu
Tel: 814/865-0479 Fax: 814/865-3663

Dionne L. Hoskins
Student, Ph.D Candidate
University of South Carolina
2812 Grace St.
Columbia, SC 29201
hoskins@sc.edu
Tel: 803/254-4494 Fax: 803/777-3935

Natalie Huff
Manager of Diversity
NOAA, National Marine Fisheries Service
SSMC3, Rm. 14101
1315 East-West Hwy.
Silver Spring, MD 20910
Natalie.Huff@noaa.gov
Tel: 301/713-2252 Fax: 301/713-1748

Andrew Humphrey
Meteorologist
WRC-TV/NBC4
4001 Nebraska Ave., NW
Washington, DC 20016

Dr. Shirley Hymon-Parker
Department Chair
Human Ecology
University of Maryland Eastern Shore
Backbone Rd.
Princess Anne, MD 21853
Tel: 410/651-6056

Dr. William Hytche
President Emeritus
University of Maryland Eastern Shore
Backbone Rd.
Princess Anne, MD 21853
Tel: 410/651-2000

Dr. Dennis Ignasias
Dean, Graduate Studies and Research
University of Maryland Eastern Shore
Early Childhood Research, C2106
Backbone Rd.
Princess Anne, MD 21853
ignasias@umes-bird.umd.edu

Nina L. Jackson
Education and Diversity Coordinator
NOAA, NESDIS
5200 Auth Rd., FB4, Rm. 2057
Suitland, MD 20746
Nina.Jackson@noaa.gov
Tel: 301/457-5113 Fax: 301/457-5276

Otis F. Jackson
Computer Specialist
Northeast Fisheries Science Center
NOAA, National Marine Fisheries Service
166 Water St..
Woods Hole, MA 02543
Otis.Jackson@noaa.gov
Tel: 508/495-2209 Fax: 508/495-2258

Dr. Ambrose Jearld, Jr.
Conference Chair
NOAA, National Marine Fisheries Service
Northeast Fisheries Science Center
166 Water St.
Woods Hole, MA 02543
ambrose.jearld@noaa.gov
Tel: 508/495-2318 Fax: 508/495-2258

Wayne Jearld
Liaison for Corporate Relations
Morgan State University
Clarence Mitchell School of Engineering
5200 Perring Parkway
Baltimore, MD 21251
Tel: 443/885-3621

Dr. Gregory S. Jenkins
Assistant Professor
Penn State University
503 Walker Building
University Park, PA 16802
Gsj1@psu.edu
Tel: 814/865-0479 Fax: 814/865-3663

Dr. Roman Jesien
Assistant Professor
Department of Natural Sciences
University of Maryland Eastern Shore
Backbone Rd., GW Carver Bldg. 2105
Princess Anne, MD 21853
rjesien@mail.umes.edu
Tel: 410/651-6249

Donna L. Johnson
Research Fishery Biologist
Northeast Fisheries Science Center
NOAA, National Marine Fisheries Service
James J. Howard Laboratory
74 Magruder Rd.
Highlands, NJ 07732
donna.johnson@noaa.gov
Tel: 732/872-3092 Fax: 732/872-3088

Dr. Keith Johnson (Ret.)
NOAA, National Weather Service
Jackson State University
77 Lookout Point
Berlin, MD 21811
Tel: 410/641-7087

Dr. Robert Johnson
Executive Vice President
University of Maryland Eastern Shore
Backbone Rd., JT William Hall
Princess Anne, MD 21853
rajohnson@mail.umes.edu
Tel: 410/651-6400

Ashanti Johnson-Pyrtle
Graduate student
Texas A&M University
2315 Auburn Court
College Station, TX 77840
ashanti@tamu.edu
Tel: 409/845-5752 Fax: 409/845-6331

Phillip Jones
Graduate Student
Department of Natural Sciences
University of Maryland Eastern Shore
Backbone Rd., Lida Brown Hall
Princess Anne, MD 21853
Tel: 410/651-6217

Wanda Jones
Student
Southeast Fisheries Science Center
NOAA, National Marine Fisheries Service
Panama City Laboratory
3500 Delwood Beach Rd.
Panama City, FL 32407
Tel: 850/234-6544 Fax: 850/235-3559

Dr. Robert A. Jordan
Associate Professor
Dept. of Marine and Environmental Science
Hampton University
Hampton, VA 23668
Rjordan@cs.hamptonu.edu
Tel: 757/727-5742 Fax: 757/727-5740

Dr. Darryl Keith
Oceanographer
US-EPA
27 Tarzwell Dr.
Narragansett, RI 02882
keith.darryl@epamail.epa.gov
Tel: 401/782-3135 Fax: 401/782-3030

Gen. John J. Kelly, Jr.
USAF, Retired
Assistant Administrator
NOAA, National Weather Service
SSMC2, Rm. 18150
1325 East-West. Hwy.
Silver Spring, MD 20910
Tel: 301/713-0689 Fax: 301/713-0610

Dr. Andrew J. Kemmerer
Director
NOAA, Office of Habitat Conservation
SSMC3, Rm. 12752
1315 East-West Hwy.
Silver Spring, MD 20910
Andrew.Kemmerer@noaa.gov
Tel: 301/713-2325 Fax: 301/713-1043

Jan Kucklick
Coastal Management Specialist
NOAA, National Ocean Service
2234 South Hobson Ave.
Charleston, SC 29405-2413
Janet.Kucklick@noaa.gov
Tel: 843/740-1279 Fax: 843/740-1313

Dr. Missale Kumelachew
Assistant Professor
Human Ecology
University of Maryland Eastern Shore
Richard A.Henson Center, #2109
Backbone Rd.
Princess Anne, MD 21853
mkamuelachew@mail.umes.edu
Tel: 410/651-6060

Marilyn S. Land
NOAA, National Weather Service
SSMC2, Rm. 18410
1325 East-West. Hwy.
Silver Spring, MD 20910
Marilyn.Land@noaa.gov
Tel: 301/713-0420

Meka E. Laster
NOAA, National Weather Service
SSMC2, Rm. 4332
1325 East-West. Hwy.
Silver Spring, MD 20910
Meka.laster@noaa.gov
Tel: 301/713-2093 Fax: 301/713-2099

Dr. Reginald B. Lawrence
Physical Scientist
NOAA, NESDIS
8455 Colesville Rd., Suite 1450
Silver Spring, MD 20910
reginald.lawrence@noaa.gov
Tel: 301/427-2077 Fax: 301/427-2164

Mary L. Leach
Policy, Management and Information Officer
NOAA, National Ocean Service
SSMC4, Rm. 13126
1305 East-West. Hwy.
Silver Spring, MD 20910
Mary.Leach@noaa.gov
Tel: 301/713-3070 Fax: 301/713-4292

Dr. Margaret S. Leinen
Dean
Graduate School of Oceanography
University of Rhode Island, Fish Building
Narragansett, RI 02882-1197
Mleinen@gso.uri.edu
Tel: 401/874-6222 Fax: 401/874-6889

Capt.Ted I. Lillestolen
Deputy Assistant Administrator
NOAA, National Ocean Service
SSMC4, Rm. 13154
1305 East-West Hwy.
Silver Spring, MD 20910
Ted.Lillestolen@noaa.gov
Tel: 301/713-3074 Fax: 301/713-4269

Levi Lipscomb
Director
University Technical Assistance Center
Morgan State University
School of Engineering
5200 Perring Parkway
Baltimore, MD 21251
llipsco@eng.morgan.edu
Tel: 443/885-4312 Fax: 410/319-3843

Ricardo Lopez
Student
University of Alaska
17414 Palos Verdes
Fairbanks, AK 99701
fsrjl@aurora.alaska.edu

Dr. Robert Lorence
President
Northwest Indian College
2522 Kwina Rd.
Bellingham WA 98226
blorence@nwic.edu
Tel: 360/384-0373 Fax: 360/738-0136

Dr. Kamazima Lwiza
Associate Professor
Marine Sciences Research Center
State University of New York
Stony Brook, NY 11794-5000
klwiza@notes.cc.sunysb.edu
Tel: 516/632-7309 Fax: 516/632-8820

Ian MacGregor
Senior Science Associate
National Science Foundation
Directorate of Geosciences
4201 Wilson Blvd.
Arlington, VA 22230
Imacgreg@nsf.gov
Tel: 703/306-0891 Fax: 703/306-0382

Dr. Kelly Mack
Assistant Professor
Department of Natural Sciences
University of Maryland Eastern Shore
GW Carver Science Bldg. 1106
Backbone Rd.
Princess Anne, MD 21853
kmmack@mail.umes.edu
Tel: 410/651-6039

Colette M. Magwood
Human Resource Advisor
NOAA/HDQ
SSMC3, Rm. 11315
1315 East-West. Hwy.
Silver Spring, MD 20910
Colette.M.Magwood@noaa.gov
Tel: 301/713-0524 Fax: 301/713-1396

Rafael Mahecha
Student
Jackson State University
P.O. Box 7660
Jackson, MS 39217
Tel: 601/968-2455

Robert L. Mallett
Deputy Secretary
U.S. Dept. of Commerce
HCHB, Rm. 5838
14th and Constitution Ave., NW
Washington, DC 20230
RMallet@doc.gov
Tel: 202/482-8376

Michael J. Marcheselli
CEO
Electronic Innovators, Inc.
Arlington, VA 22210
Tel: 703/415-0220

Dr. Livingston S. Marshall, Jr.
Associate Professor
Morgan State University
Biology Department, 166 Key Hall
1700 East Cold Spring Lane
Baltimore, MD 21251
LMarshall@Moa.morgan.edu
Tel: 443/885-4468 Fax: 410/426-4732

Jocelyn B. Martin
EEO Program Manager
NOAA, National Ocean Service
SSMC4, Rm. 13636
1305 East-West Hwy.
Silver Spring, MD 20910
Jocelyn.Martin@noaa.gov
Tel: 301/713-3074 Fax: 301/713-4269

Gary Matlock
Director
Office of Sustainable Fisheries
NOAA, National Marine Fisheries Service
SSMC3, Rm. 13362
1315 East-West Hwy.
Silver Spring, MD 20910
Gary.C.Matlock@noaa.gov
Tel: 301/713-2234 Fax: 301/713-0596

Brad McAbee
Dept. of Agriculture and Natural Resources
Delaware State University
Dover, DE 19901
Tel: 302/739-4900

Kevin McCarthy
Vice President, Marketing and Sales
Benthos, Inc.
49 Edgerton Dr.
North Falmouth, MA 02556-2826
Tel: 508/563-1000 Fax: 508/563-6444

Kevin C. McCarthy
Deputy Director
NOAA, National Weather Service
5200 Auth Rd., 410C, WWBG
Camp Spring, MD 20746
kevin.mccarthy@noaa.gov
Tel: 301/763-8000 Fax: 301/763-8085

Ayanna McCoy
Savannah State University
P.O. Box 21028
Savannah, GA 31404
Tel: 912/356-2186

Carolyn E. McDonald
Program Assistant
NOAA, Office of Oceanic and Atmospheric Research
SSMC3, 11th Fl., Rm. 11424
1315 East-West. Hwy.
Silver Spring, MD 20910
carolyn.mcdonald@noaa.gov
Tel: 301/713-2468 Fax: 301/713-1459

John V. Merriner
Southeast Fisheries Science Center
NOAA, National Marine Fisheries Service
Beaufort Laboratory
101 Pivers Island Rd.
Beaufort, NC 28516
John.Merriner@noaa.gov
Tel: 252/728-8708 Fax: 252/728-8784

Amy A. Merten
Environmental Scientist
NOAA, National Ocean Service
Office of Response and Restoration
SSMC4, Rm. 10611
1305 East-West Hwy.
Silver Spring, MD 20910
Amy.Merten@noaa.gov
Tel: 301/713-2989 Fax: 301/713-4387

Syretta Montgomery
Student
Florida A&M University
1520 South Bronough St.
Science Research Center
Tallahassee, FL 32307

J. Frank Morado
Fisheries Research Biologist
NMFS, Alaska Fisheries Science Center
7600 Sand Point Way, NE, Bldg.1, Rm.2081
Seattle, WA 98115-0070
frank.morado@noaa.gov
Tel: 206/526-6572 Fax: 206/526-6723

Melanie L. Moore
Student, Marine Science
Hampton University
Hampton, VA 23661
Tel: 757/727-5884 Fax: 757/727-5740

Aaron O. Morgan
President
21st Century Aquaculture Inc.
218 St. Andrews Way
Baltimore, MD 21239
Tel: 410/825-8952

Dr. Vernon R. Morris
Associate Professor
Howard University
Department of Chemistry and Program in Atmospheric Sciences
Washington, DC 20059
vmorris@fac.howard.edu
Tel: 301/419-9030

Dr. David G. Mountain
Research Oceanographer
Northeast Fisheries Science Center
NOAA, National Marine Fisheries Service
166 Water St.
Woods Hole, MA 02543
david.mountain@noaa.gov
Tel: 508/495-2271 Fax: 508/495-2258

Nancy J. Munroe
Biological Science Lab Technician
Northeast Fisheries Science Center
NOAA, National Marine Fisheries Service
166 Water St.
Woods Hole, MA 02543
nancy.munroe@noaa.gov
Tel: 508/495-2332 Fax: 508/495-2258

Dr. Steven A. Murawski
Research Fishery Biologist
Northeast Fisheries Science Center
NOAA, National Marine Fisheries Service
166 Water St.
Woods Hole, MA 02543
Steve.Murawski@noaa.gov
Tel: 508/495-2303 Fax: 508/495-2258

Louisa Nakanuku
Student
University of Maryland Eastern Shore
Backbone Rd.
Princess Anne, MD 21853
Tel: 410/651-2200

Dr. Scott Nichols
Director, Mississippi Laboratory
Southeast Fisheries Science Center
NOAA, National Marine Fisheries Service
3209 Frederic St. (P.O. Drawer 1207)
Pascagoula, MS 39567
Scott.Nichols@noaa.gov
Tel: 228/762-4591 Fax: 228/769-9200

Dr. Eucharia E. Nnadi
Vice President for Academic Affairs
University of Maryland Eastern Shore
J. T. Williams Hall, Rm. 2104
Princess Anne, MD 21853
eennadi@mail.umes.edu
Tel: 410/651-6508 Fax: 410/651-6085

Sandy A. O'Brien
U.S. Dept. of Commerce/NOAA/HOQ
SSMC3, Rm. 11342
1315 East-West Hwy.
Silver Spring, MD 20910
Sandra.A.Obrien@noaa.gov
Tel: 301/713-0524 Fax: 301/713-1979

Dr. Mildred D. Ofosu
Associate Dean of Research
Director. Office of Sponsored Programs
Delaware State University
1200 N. Dupont Hwy.
Dover, DE 19901
mofosu@dsc.edu
Tel: 302/857-6521 Fax: 302/857-4294

Dr. Mark D. Ohman
Professor
Scripps Institute of Oceanography
University of California-San Diego, 0227
9500 Gilman Dr.
La Jolla, CA 92093-0227
mohman@ucsd.edu
Tel: 619/534-2754 Fax: 619/534-6500

Dr. Joseph Okoh
Chairman
Department of Natural Sciences
University of Maryland Eastern Shore
Backbone Rd., GW Carver Bldg. 1103
Princess Anne, MD 21853
Jokoh@umes-bird.umd.edu
Tel: 410/651-6014 Fax: 410/651-7739

Vanessa Olivera
Savannah State University
P.O. Box 40064
Savannah, GA 31404
Vropr76@hotmail.com
Tel: 912/691-0527

Ali Omar
Department of Physics
Hampton University
Hampton, VA 23668
Tel: 757/727-5239

Gwyneth Packard
Research Associate
Woods Hole Oceanographic Institution
MS#21, 344A Clark Building
Woods Hole, MA 02543
gpackard@whoi.edu
Tel: 508/289-3507 Fax: 508/457-2181

Joan A. Palmer
Chief, Computer Specialist
Northeast Fisheries Science Center
NOAA, National Marine Fisheries Service
Data Management Systems Staff
166 Water St.
Woods Hole, MA 02543
joan.palmer@noaa.gov
Tel: 508/495-2247 Fax: 508/495-2258

Dr. N. Joyce Payne
Director
Office for the Advancement
of Public Black Colleges
NASULC
1307 New York Ave., NW, Ste. 400
Washington, DC 20005-4701
jpayne@nasulgc.org
Tel: 202/478-6040 Fax: 202/478-6046

James W. Peaco, Jr.
U.S. Dept. of Commerce/NOAA/HDQ
SSMC3, Rm. 15602
1315 East-West Hwy.
Silver Spring, MD 20910
James.W.Peaco@noaa.gov
Tel: 301/713-2231 Fax: 301/713-0658

Marlin O. Perkins
Meteorologist
Direct Services Division
NOAA, NESDIS
5200 Auth Rd., FB4, Rm. 3320
Suitland, MD 20746
Marlin.O.Perkins@noaa.gov
Tel: 301/457-5681 Fax: 301/568-8649

Bernard Petrosky
Department of Agriculture and Natural Resources
Delaware State University
1200 N. Dupont Hwy.
Dover, DE 19901
bpetrosk@dsu.edu
Tel: 302/739-5178

Dr. DeLois Powell
Assistant Professor
Dept. of Natural Sciences
University of Maryland Eastern Shore
2101 Carver Hall
Princess Anne, MD 21853
dmpowell@mail.umes.edu
Tel: 410/651-6023

Dr. Kent S. Price
Director, Sea Grant Advisory Service
University of Delaware
700 Pilottown Rd.
Lewes, DE 19958
ksprice@udel.edu
Tel: 302/645-4256 Fax: 302/645-4213

Dr. Lita M. Proctor
Assistant Professor
Dept. of Oceanography
Florida State University
Tallahassee, FL 32306
proctor@ocean.fsu.edu
Tel: 850/644-4951 Fax: 850/644-2581

X. William Proenza
Director, Southern Region
NOAA, National Weather Service
819 Taylor St., Rm. 10A26
Fort Worth, TX 76102
Bill.Proenza@noaa.gov
Tel: 817/978-2651 Fax: 817/978-4187

James E. Randolph
Research Fishery Biologist
NOAA, National Marine Fisheries Service
4700 Ave. U
Galveston, TX 77058
James.Randolph@noaa.gov
Tel: 409/766-3505 Fax: 409/766-3508

Aisha Rawlinson
University of Maryland Eastern Shore
Backbone Rd.
Princess Anne, MD 21853

Aisha Reed
Student
Jackson State University
P.O. Box 7660
Jackson, MS 39217
Tel: 601/968-2455

Lamar Reed
Graduate student
Jackson State University
P.O. Box 18540
Jackson, MS 39217
Tel: 601/968-2455

Gladys B. Reese
Fishery Biologist Research
Southeast Fisheries Science Center
NOAA, National Marine Fisheries Service
3209 Frederic St.
Pascagoula, MS 39567-4112
Gladys.Reese@noaa.gov
Tel: 228/762-4591 Fax: 228/769-9200

Dr. Earl S. Richardson
President
Morgan State University
1700 East Cold Spring Lane
Baltimore, MD 21251
earlsr@morgan.edu
Tel: 443/885-3200 Fax: 410/319-3107

Dr. Joseph P. Richardson
Professor, Marine Sciences
Savannah State University
P.O. Box 20583
Savannah, GA 31404
richards@savstate.edu
Tel: 912/356-2809 Fax: 912/356-2395

Dr. Irelene P. Ricks
Grants Administrator
Howard University
Graduate School of Arts and Sciences
Office of the Dean
Washington, DC 20059
iricks@howard.edu
Tel: 202/806-4668 Fax: 202/806-4664

Percy Robinson
Attorney
Office of General Counsel
U.S. Dept. of Commerce
HCHB, Rm. 5099C
14th and Constitution Ave., NW
Washington, DC 20230
PRobinso@doc.gov
Tel: 202/482-4743 Fax: 202/501-8005

Dr. Richard A. Robohm
Chief, Biotechnology Branch
Northeast Fisheries Science Center
NOAA, National Marine Fisheries Service
Milford Laboratory
212 Rogers Ave.
Milford, CT 06460
richard.robohm@noaa.gov
Tel: 203/579-7037 Fax: 203/579-7017

Andrea Rocha
Student, Marine Biology
Texas A&M University
4224 Ocean Dr., #138
Corpus Christi, TX 78411
Tel: 512/814-8311

Dr. Andrew A. Rosenberg
Deputy Assistant Administrator for Fisheries
U.S. Dept. of Commerce, NOAA
National Marine Fisheries Service
SSMC3, Rm. 14564
1315 East-West. Hwy.
Silver Spring, MD 20910
Andy.Rosenberg@noaa.gov
Tel: 301/713-2239 Fax: 301/713-2258

James Russell IV
Department of Physics
Hampton University
Hampton, VA 23668
Tel: 757/727-5239

Dr. Sergio Sañudo-Wilhelmy
Assistant Professor
State University of New York
MSRC SUNY Stony Brook
Stony Brook, NJ 11794-5000
sergio.sanudo-wilhelmy@suny.sb.edu
Tel: 516/632-8615 Fax: 516/632-8820

Al Senauer
Program Analyst
NOAA, Office of Response and Restoration
1305 East-West. Hwy.
Silver Spring, MD 20910
Ali.Senauer@noaa.gov
Tel: 301/713-2989 Fax: 301/713-4387

John Shadid
Visual Information
NOAA, NESDIS
5200 Auth Rd., WWBG, 703
Camp Spring, MD 20746
John.Shadid@noaa.gov
Tel: 301/763-8282 Fax: 301/763-8108

Alicia Sievert
NOAA Coastal Services Center
SC Sea Grant Intern
22345 Hobson Ave., 154
Charleston, SC 29405
Alicia.Sievert@noaa.gov
Tel: 843/740-1317 Fax: 843/740-1224

Mary Jane Smith
Program Coordinator
Northeast Fisheries Science Center
NOAA, National Marine Fisheries Service
166 Water St.
Woods Hole, MA 02543
Pie.Smith@noaa.gov
Tel: 508/495-2370 Fax: 508/495-2258

Dr. Stephan B. Smith
NOAA, National Marine Fisheries Service
SSMC2, Rm. 10406
1325 East-West. Hwy.
Silver Spring, MD 20910
Stephan.Smith@noaa.gov
Tel: 301/713-1774 Fax: 301/713-0003

Dr. Hattie B. Spencer
Dept. of Biology
Jackson State University
1400 Lynch St. (P.O. Box 18540)
Jackson, MS 39217
Tel: 601/352-6127

Dr. Dolores R. Spikes
President
University of Maryland Eastern Shore
Backbone Rd.
Princess Anne, MD 21853
drspikes@mail.umes.edu
Tel: 410/651-6101 Fax: 410/651-6300

Harold M. "Hal" Stanford
Deputy Director
Center for Coastal Monitoring
and Assessment
NOAA, National Ocean Service
SSMC4, Rm. 9320
1305 East-West. Hwy.
Silver Spring, MD 0910-3281
Hal.Stanford@noaa.gov
Tel: 301/713-2989 Fax: 301/713-4389

Danica Rachele Starks
Foreign Affairs Research Assistant
U.S. Dept. of Commerce, USEC
14th and Constitution Ave., NW, 5224
Washington, DC 20230-0001
danica.r.starks@noaa.gov
Tel: 202/482-3385 Fax: 202/482-5231

Dr. Denise Stephenson-Hawk
NOAA Science Advisory Board
Provost/VP for Academic Affairs
Spelman College
350 Spelman Lane, Box 209
Atlanta, GA 30314-4399
Dhawk@spelman.edu
Tel: 404/223-1416 Fax: 404/215-7918

Dr. Juarine Stewart
Biological Sciences Department
Clark-Atlanta University
223 James P. Brawley Dr.
Atlanta, GA 30314
jstewart@cau.edu
Tel: 508/793-7711

Wendy Stewart
Dept. of Agriculture and Natural Resources
Delaware State University
Dover, DE 19901

Carolyn Stiles
EEO Manager
NOAA, National Marine Fisheries Service
SSMC3, Rm. 14470
1315 East-West Hwy.
Silver Spring, MD 20910
Carolyn.Stile@noaa.gov
Tel: 301/713-1456 Fax: 301/713-2258

Dr. Sheila Stiles
Research Geneticist
Northeast Fisheries Science Center
NOAA, National Marine Fisheries Service
Milford Laboratory
212 Rogers Ave.
Milford, CT 06460
Shelia.Stiles@noaa.gov
Tel: 203/579-7024 Fax: 203/579-7217

Robert H. Stockman
DOC, Office of Budget
Systems and Policies Division, Rm. 5821
1401 Constitution Ave., NW
Washington, DC 20230
Bstockman@doc.gov
Tel: 202/482-5976 Fax: 202/482-3361

Dr. Larry L. Stowe
Research Scientist
NOAA, NESDIS
5200 Auth Rd., WWGg, Rm. 711
Camp Springs, MD 20746
Larry.L.Stowe@noaa.gov
Tel: 301/763-8053 Fax: 301/763-8108

Donatto Surratt
FAMU
1508 Kingsgate St.
Mitchellville, MD 20721

Dr. Steven L. Swartz
Director, Protected Resources and
Biodiversity Division
Southeast Fisheries Science Center
NOAA, National Marine Fisheries Service
75 Virginia Beach Dr., 321A
Miami, FL 33149
Steve.Swartz@noaa.gov
Tel: 305/361-4487 Fax: 305/361-4499

Anthony J. L. Tafoya
EEO Program Manager
NOAA, Office of Oceanic and Atmospheric
Research
325 Broadway, 1110, B84-22
Boulder, CO 80303
Anthony.J.TaFoya@noaa.gov
Tel: 303/497-6731

Jason Taylor
Meteorologist/Engineer
Litton/PRC Inc.
1500 PRC Dr.
McLean, VA 22102
Taylor_jason@prc.com
Tel: 800/441-9781

Dr. Orlando L. Taylor
Dean, Graduate School
Howard University
Washington, DC 20059
otaylor@howard.edu
Tel: 202/806-6800 Fax: 202/462-4053

Dr. Kenneth R. Tenore
Professor and Director
Chesapeake Biological Laboratory UMCES
P.O. Box 38
Solomons, MD 20688-0038
tenore@cbl.umes.edu
Tel: 410/326-7241 Fax: 410/326-7302

Frederick J. Thompson
Senior Environmental Protection Specialist
Emissions, Monitoring, and Analysis Div.
US-EPA MD 19
Research Triangle Park, NC 27711
thompson.fred@epa.gov

Dr. Frederick P. Thurberg
Supervisory Physiologist
Northeast Fisheries Science Center
NOAA, National Marine Fisheries Service
Milford Laboratory
212 Rogers Ave.
Milford, CT 06460
Frederick.Thurberg@noaa.gov
Tel: 203/579-7044 Fax: 203/579-7070

Paul S. Trotter
NOAA, National Weather Service
62300 Airport Rd.
Slidell, LA 70460-5243
Paul.Trotter.@noaa.gov
Tel: 504/645-0984

Blaine K. Tsugawa
Meteorological Systems
Office of the Federal Coordinator for
Meteorological Services and Research
U.S. Dept. of Commerce/NOAA/HDQ
8455 Colesville Rd., Suite 1500
Silver Spring, MD 20910
blaine.tsugawa@noaa.gov
Tel: 301/427-2002 Fax: 301/427-2007

Guy E. Tucker
NOAA, National Weather Service
587 Areo Dr.
Buffalo, NY 14225
guy.tucker@noaa.gov
Tel: 716/565-0103 Fax: 716/565-9002

Dr. Usha S. Varanasi
Science and Research Director
Northwest Fisheries Science Center
NOAA, National Marine Fisheries Service
2725 Montlake Boulevard, E.
Seattle, WA 98112-2097
Usha.Varanasi@noaa.gov
Tel: 206/860-3200 Fax: 206/860-3217

Joe L. Wade
Physical Science Technician
NOAA, National Ocean Service
219 Ft. Johnson Rd.
Charleston, SC 29412
Joe.Wade@noaa.gov
Tel: 843/762-8594 Fax: 803/762-8700

Dr. Yan Waguespack
Associate Professor
Department of Natural Sciences
University of Maryland Eastern Shore
GW Carver Science Bldg. 3116
Backbone Rd.
Princess Anne, MD 21853
yan@umes-bird.umd.edu
Tel: 410/651-6052

Gloria J. Walker
EEO Manager
NOAA, National Weather Service
SSMC2, Rm. 11348
1325 East-West. Hwy.
Silver Spring, MD 20910
Gloria.Walker@noaa.gov
Tel: 301/713-0692 Fax: 301/713-0662

Robert K. Walker
Computer Analyst
Southeast Fisheries Science Center
NOAA, National Marine Fisheries Service
75 Virginia Beach Dr., Rm.203
Miami, FL 33145
Bob.Walker@noaa.gov
Tel: 305/361-4213 Fax: 305/361-4219

Dr. Sharon H. Walker
Program Director for Education
National Sea Grant Program
NOAA, Office of Oceanic and Atmospheric
Research
SSMC3, 11th floor, Rm. 118
1315 East-West Hwy.
Silver Spring, MD 20910
SharonW@oar31.oar.noaa.gov
Tel: 301/713-2431 Fax: 301/713-0799

Kina Wallace
Physical Scientist
NOAA, National Weather Service
1325 East-West. Hwy., Rm. 14415
Silver Spring, MD 20910
Kina.Wallace@noaa.gov
Tel: 301/713-0090 Fax: 301/713-1598

Benjamin Watkins
Chief, Satellite Services Division
NOAA, NESDIS
5200 Auth Rd., WWBg, Rm. 607
Camp Springs, MD 20746
Benjamin.Watkins@noaa.gov
Tel: 301/763-8051 Fax: 301/763-8131

Carmella Davis Watkins
Meteorologist
NOAA, NESDIS/HDQ
Code 480, NOAA Liaison Office
Rm. 250, GSFC
Greenbelt, MD 20771
Carmella.Watkins@noaa.gov
Tel: 301/286-5320 Fax: 301/286-1744

Judith Weaver
Student
Florida A&M University
4016 Elder Lane
Tallahassee, FL 32303
j.weaver@famu.edu
Tel: 850/599-3550 Fax: 850/561-2248

Lashawn A. Weaver
Biologist
NOAA, National Ocean Service
291 Ft. Johnson Rd.
Charleston, SC 29412
LaShawn.Weaver@noaa.gov
Tel: 843/762-8622 Fax: 843/762-8700

Dennis Weidner
Foreign Affairs Officer
NOAA, National Marine Fisheries Service
SSMC3, Rm. 12635
1315 East- West Hwy.
Silver Spring, MD 20910
Dennis.Weidner@noaa.gov
Tel: 301/713-2286 Fax: 301/713-4057

Dr. Allen Williams
University of Maryland Eastern Shore
GW Carver Science Bldg.
Backbone Rd.
Princess Anne, MD 21853
abwilliams@mail.umes.edu
Tel: 410/651-6021

Dr. Henry N. Williams
Assistant Vice President
Morgan State University
1700 East Cold Spring Lane
Baltimore, MD 21251
Bwilliams@moac.morgan.edu
Tel: 443/885-3447 Fax: 443/319-3818

Rebecca A. Williams
Human Resources Advisors
U.S. Dept. of Commerce, NOAA/HDQ
SSMC3, Rm. 11253
1315 East- West Hwy.
Silver Spring, MD 20910
Rebecca.A.Williams@noaa.gov
Tel: 301/713-0524 Fax: 301/713-1396

Dr. Jonathan Wilson
Director Baltimore Urban Systemic
Initiative
Morgan State University
1700 East Cold Spring Lane
Montebello C-108
Baltimore, MD 21251
Jwilson@morgan.edu
Tel: 443/885-3304 Fax: 410/319-3324

Dr. W. Stanley Wilson
Deputy Chief Scientist
U.S. Dept. of Commerce, NOAA
HCHB, Rm. 5224
14th and Constitution Ave., NW
Washington, DC 20230
Stan.Wilson@noaa.gov
Tel: 202/482-3385 Fax: 202/482-5231

Robert Winokur
Assistant Administrator for Satellite
and Information Service
NOAA, NESDIS
FB4, Rm. 2069
5200 Auth Rd.
Suitland, MD 20746-4304
Robert.Winokur@noaa.gov
Tel: 301/457-5115 Fax: 301/457-5276

Gregory W. Withee
Assistant Administrator for Satellite and
Information Services
NOAA, NESDIS
FB4, Stop 9909, Rm. 2069
5200 Auth Rd.
Suitland, MD 20746-4304
Greg.Withee@noaa.gov
Tel: 301/457-5115 Fax: 301/457-5276

Vernell M. Woldu
Chief, Customer Services Branch
National Climatic Data Center
NOAA, NESDIS
151 Patton Ave., Rm. 468C
Asheville, NC 28801-5001
Vernell.M.Woldu@noaa.gov
Tel: 828/271-4248 Fax: 828/271-4876

Julian M. "Skip" Wright, Jr.
Senior Advisor
NOAA, National Weather Service
SSMC2, Rm. 11394
1325 East-West. Hwy.
Silver Spring, MD 20910
Julian.Wright@noaa.gov
Tel: 301/713-3095 Fax: 301/713-1002

Dr. Roger J. Zimmerman
Director, Galveston Laboratory
Southeast Fisheries Science Center
NOAA, National Marine Fisheries Service
4700 Ave. U
Galveston, TX 77551
Roger.Zimmerman@noaa.gov
Tel: 409/766-3500 Fax: 409/766-3508

Appendix D: Biographies of Featured Speakers

Scott B. Gudes is the Deputy Under Secretary for Oceans and Atmosphere, and second in command of the National Oceanic and Atmospheric Administration, one of the country's top scientific agencies. Mr. Gudes has more than 20 years of varied experience as a public administration professional at both the state and federal levels, including tenures with the Department of Defense, the Office of Management and Budget, and as a Congressional staffer for various related committees. He attended San Diego State University and the University of Liverpool, United Kingdom as an undergraduate and obtained his master's degree in public administration from California State University at Fullerton.

Dr. Earl S. Richardson is currently serving as the 11th president of Morgan State University in Baltimore, Maryland. A native of Maryland, he earned his undergraduate degree in social science from the University of Maryland Eastern Shore, and his MS, and EdD. from the University of Pennsylvania. He came to Morgan State following a distinguished career as an administrator and teacher at the University of Maryland. As president, Dr. Richardson has strengthened academics programs, improved fiscal management and stability, and presided over $150 million in capital improvements as well as expanding programs of study. Morgan State now leads Maryland colleges and universities in overall baccalaureates awarded to African-American students and in the number of undergraduates in mathematics, science, and engineering. Dr. Richardson is also active in numerous civic organizations and boards, including serving as chair of the President's White House Initiative Advisory Board on HBCUs.

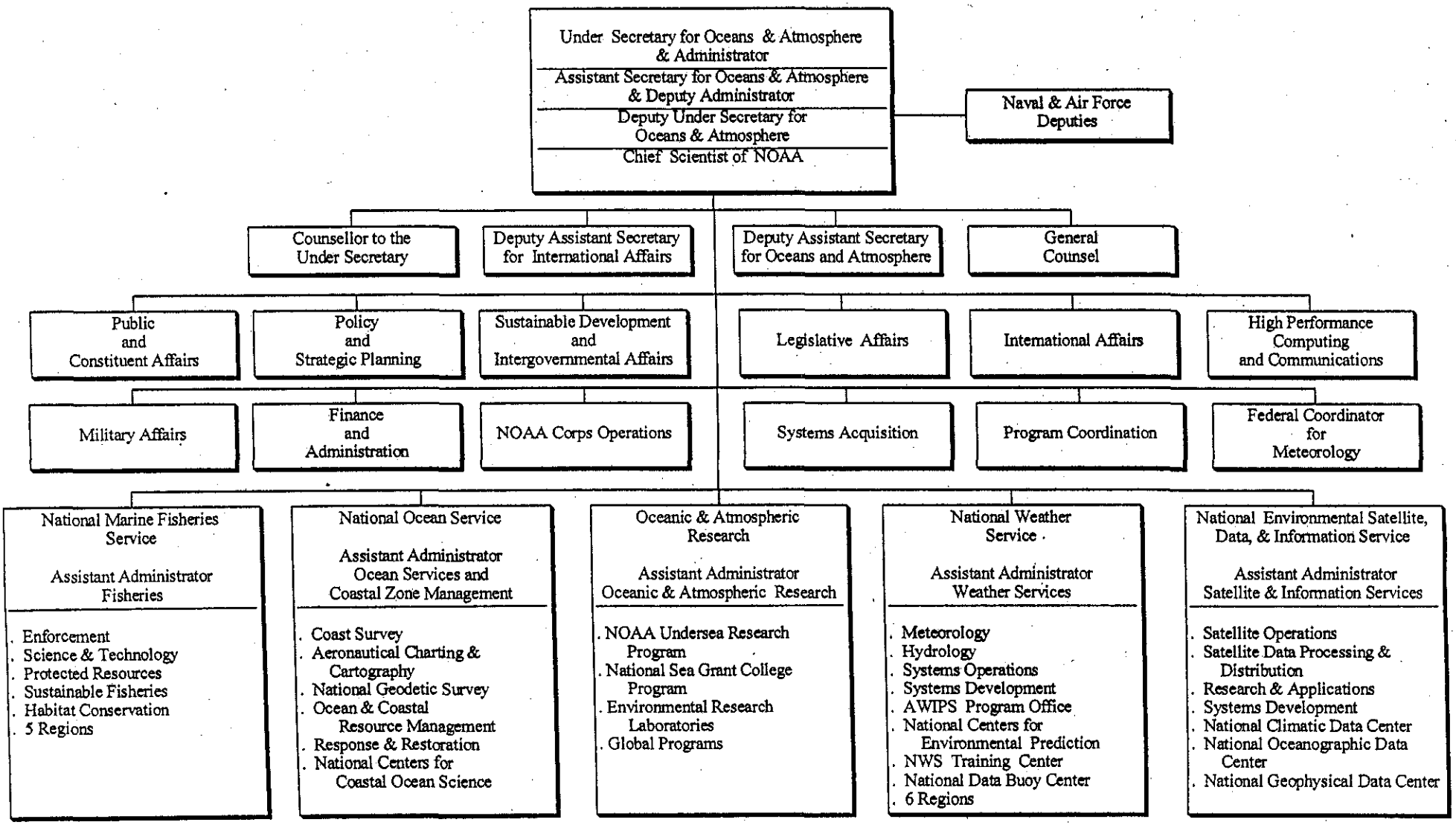
Dr. Dolores Margaret Richard Spikes was appointed to serve as the 11th Chief Executive Officer of the University of Maryland Eastern Shore effective January 13, 1997. Dr. Spikes received her B.Sc., MS, and Ph.D. degrees in mathematics from Southern University, University of Illinois, and Louisiana State University, respectively. She came to UMES with an impressive wealth of knowledge that emanated from her experiences as a public school teacher, and then as a faculty member who scholastically earned her way through the ranks to full professor and subsequently to top administrative positions in the Southern University A&M System. President Spikes is devoted to the land-grant philosophy that embraces the ethic of educational access as well as contributions of applied research and service to the public. Dr. Spikes serves, or has served, on numerous boards and commissions and has received numerous honors, including, most recently, the 1997 award for excellence in government service given by the Maryland Coalition of Women for Responsive Government. She is the Vice Chair of the Kellogg Commission on the Future of State and Land-Grant Universities.

Robert L. Mallett is Deputy Secretary, U.S. Department of Commerce, the second-highest position in the Department. He is responsible for the day-to-day operations of a diversified cabinet-level Department comprising nine agencies, 40,000 employees, and a $5 billion budget. Prior to his appointment, Mr. Mallett practiced law, and served as City Administrator and Deputy Mayor for the nation's capital under Mayor Sharon Pratt Kelly. Mr. Mallett is involved in many civic activities, including serving on the board of directors of the Overseas Private Investment Corporation, a federal agency that helps less developed nations expand their economies; and serving as Chairman of the Board of Governors of the Wesley Theological Seminary. A member of Phi Beta Kappa and 1979 magna cum laude graduate of Morehouse College, Deputy Secretary Mallet studied law at Harvard Law School, where he served as project director for the Harvard Civil Rights-Civil Liberties Law Review. For several years, Mr. Mallet served as an adjunct professor of law at the Georgetown Law Center and the Georgetown Graduate Public Policy Program.

APPENDIX E: NOAA's Organizational Chart

U. S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC & ATMOSPHERIC ADMINISTRATION

Exhibit 1 to
DOO 25-5



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Amendment 3
March 31, 1999
(corrected 6/99)

Appendix F: Maya Angelou's Poem "Equality"

Equality

You declare you see me dimly
through a glass which will not shine,
though I stand before you boldly,
trim in rank and marking time.

You do own to hear me faintly
as a whisper out of range,
while my drums beat out the message
and the rhythms never change.

Equality, and I will be free.
Equality, and I will be free.

You announce my ways are wanton,
that I fly from man to man,
but if I'm just a shadow to you,
could you ever understand?

We have lived a painful history,
we know the shameful past,
but I keep on marching forward,
and you keep on coming last.

Equality, and I will be free.
Equality, and I will be free.

Take the blinders from your vision,
take the padding from your ears,
and confess you've heard me crying,
and admit you've seen my tears.

Hear the tempo so compelling,
hear the blood throb in my veins.
Yes, my drums are beating nightly,
and the rhythms never change.

Equality, and I will be free.
Equality, and I will be free.

Appendix G: Program Guide

March 29, 1999

6:00-8:00 *Pre-Conference Reception*
Concurrent: *Steering Committee Members Coordination/Facilitation Meeting*

March 30, 1999

7:45-8:30 *Registration*

8:30-8:45 *Welcome*
Dr. Eucharia E. Nnadi, Vice President of Academic Affairs
University of Maryland Eastern Shore

8:45-9:15 *Charge to the Conference*
Dr. N. Joyce Payne, Director,
Office for the Advancement of Public Black Colleges, NASULGC
Scott B. Gudes, Deputy Under Secretary for Oceans and Atmosphere, NOAA
Dr. Earl S. Richardson, Chairman,
President's White House Initiative Advisory Board on HBCUs
President, Morgan State University

9:15-10:30 *Panel 1: Opportunities in Marine and Atmospheric Sciences—Then, Now, and Beyond Y2K*
Moderator: Dr. Andrew Rosenberg, NOAA/National Marine Fisheries Service
Panel A: Perspectives from NOAA's Leadership
General John Kelly, Jr., National Weather Service
Gregory Withee, National Environmental Satellite, Data, and Information Service
Dr. Ronald Baird, Office of Oceanic and Atmospheric Research
Dr. Margaret Davidson, National Ocean Service
Panel B: Perspectives from Academia's Oceanic and Atmospheric Leaders
Dr. Margaret Leinen, University of Rhode Island
Dr. James Arrington, South Carolina State University
Dr. Larry Earvin, Clark-Atlanta University

10:30-10:45 COFFEE BREAK

10:45-11:45 *Panel 2: Student Perspectives—A Reflection on Institutional Culture*
Moderators: Dr. Brian Bingham, Western Washington University
Robert Stockman, NOAA/National Weather Service
Panelists: Danica R. Starks, American University
Ricardo Lopez, University of Alaska
Avery Henry, University of Maryland Eastern Shore
Rafael Mahecha, Jackson State University

Ashanti Johnson-Pyrtle, Texas A&M University
Kelly Clark, University of Maryland College Park

11:45-12:15 *Building Alliances Between HBMSCUs and the Department of Commerce*
Keynote Address: Robert Mallett
Deputy Secretary, U.S. Department of Commerce
Introducing Mr. Mallett:
Scott B. Gudes, Deputy Under Secretary for Oceans and Atmosphere
National Oceanic and Atmospheric Administration

12:15-1:00 LUNCH
Concurrent: *Stakeholder Executive Session*

1:00-2:00 *Panel 3: Agency Perspectives-Support for Programs in Marine and Atmospheric Sciences*
Moderators: Dr. Denise Stephenson-Hawk, Clark-Atlanta University
Dr. Brad Brown, NOAA/National Marine Fisheries Service
Panelists: Frederick J. Thompson, U.S. Environmental Protection Agency
Dr. Matthew Gilligan, Savannah State University
Dr. Ian MacGregor, National Science Foundation

2:10-4:00 WORKING GROUPS:
Assessment and Review of NOAA's and Academic Institutions' Education and Research Programs
Moderators: Dr. Emorcia V. Hill, Abt Associates, Inc.
Dr. Mildred Ofosu, Delaware State University

Atmospheric Working Group
Group Leaders: Paul S. Trotter, NOAA/National Weather Service
Dr. Denise Stephenson-Hawk, Clark-Atlanta University

Oceanic/Marine Working Group
Group Leaders: Dr. David Mountain, NOAA/NMFS/Northeast Fisheries Science Center
Dr. Jonathan Wilson, Morgan State University

Coastal/Limnological Working Group
Group Leaders: Dr. Benjamin Cuker, Hampton University
Harold M. (Hal) Stanford, NOAA/National Ocean Service

5:00-6:00 POSTER SESSION
Convener of Student Participants:
Dr. Kelly Mack, University of Maryland Eastern Shore
Convener of NOAA Participants:
Dr. Sheila Stiles, NOAA/NMFS/Northeast Fisheries Science Center

6:00-6:30 RECEPTION

6:30-8:00 CONFERENCE BANQUET
Speaker: Dr. Dolores Spikes
President, University of Maryland Eastern Shore
Introducing Dr. Spikes:
Dr. N. Joyce Payne, NASULGC

March 31, 1999

7:30-8:30 *Registration/Continental Breakfast*
Concurrent: *Stakeholder Executive Session*

8:30-9:30 *Panel 4: Enhancing Professional Partnerships with the Private Sector*
Moderators: Julian M. "Skip" Wright, NOAA/National Weather Service
Dr. Benjamin Cuker, Hampton University
Panelists: Jason Taylor, Litton/PRC Inc.
Andrew Humphrey, WRC-TV/NBC4
Aaron O. Morgan, Jr., 21st Century Aquaculture, Inc.
Michael J. Marcheselli, Electronic Innovators, Inc.
Kevin McCarthy, Benthos, Inc.

9:30-10:30 *Panel 5: Doing Business with NOAA*
Moderators: Benjamin Watkins, NOAA/National Environmental Satellite, Data and Information Service
Dr. Roman Jesien, University of Maryland Eastern Shore
Panelists: Human Resources—Fara Guest, NOAA
Grants/Cooperative Agreements—Steven Drescher, NOAA
Procurement—Barbara Booker, NOAA
Client Perspective—Dr. Steven Swartz, NOAA
Client Perspective—Essie Coleman-Duffie, NOAA

10:30-10:45 COFFEE BREAK

10:45-12:30 CONCURRENT PANEL SESSIONS
Panel 6: Sustained Research Funding: Opportunities at NOAA for HBMSCUs
Moderators: Dr. Livingston Marshall, Morgan State University
Gregory Withee, NOAA/National Environmental Satellite, Data, and Information Service
Panelists: Dr. James Arrington, South Carolina State University
Dr. John Boreman, NOAA/National Marine Fisheries Service
Dr. W. Stanley Wilson, NOAA
Dr. Paul Croft, Jackson State University
Panel 7: Student Networking and Discussion
Moderators: Dr. Kelly Mack, University of Maryland Eastern Shore
Jan Kucklick, NOAA/National Ocean Service
Panelists: Dionne L. Hoskins, University of South Carolina
Andrea Rocha, Texas A&M, Corpus Christi

Maronda Brown, University of Connecticut
Dr. George B. Brooks, Jr., University of Arizona

12:30-1:15 LUNCH
Concurrent: *Stakeholder Executive Session*

1:15-2:30 *Panel 8: Building and Expanding Sustainable Alliances Between HBMSCUs and NOAA*
Presentation of recommendations from the working groups

Moderators: Dr. Sharon H. Walker, NOAA/Office of Oceanic and Atmospheric Research
Dr. Reginald B. Lawrence, NOAA/National Environmental Satellite, Data, and Information Service
Reporters:
Dr. Denise Stephenson-Hawk, Clark-Atlanta University
Dr. Matt Gilligan, Savannah State University
Dr. Roman Jesien, University of Maryland Eastern Shore
Paul S. Trotter, NOAA/National Weather Service
Benjamin Watkins, NOAA/National Environmental Satellite, Data, and Information Service

2:30-3:00 *Closing Remarks—Promises Yet to Keep*
Dr. Ambrose Jearld, Jr., Conference Chairman, NOAA/NMFS
Dr. Andrew Rosenberg, NOAA/NMFS

3:00 *Adjournment and Tea*
Conference participants are invited to tour the University of Maryland Eastern Shore Science and Technology Facilities
4:00 Executive Session: Invited Stakeholders Meeting

Appendix H: Poster Session Exhibits

National Sea Grant College Program, Silver Spring
Sue Borda, National Sea grant College Program

Introduction to The National Centers for Environmental Prediction (NCEP)
David Caldwell
Kevin McCarthy
NOAA, National Weather Service Center for Environmental Prediction
Camp Springs, MD

NOS Coast Survey Exhibit
Ashley Chappell
NOAA, NOS Coast Survey, National Ocean Service
Office of Coast Survey
Silver Spring, MD

Use of the Global PositioningSystems (GPS)
Charles Challstrom
NOAA, National Ocean Service
National Geodetic Survey
Silver Spring, MD

Prevention, Preparedness, Response and Restoration Concerning Environmental Threats
Ali Senauer
NOAA, National Ocean Service
Office of Response and Restoration
Silver Spring, MD

NOAA Coastal Management Fellowship Program
Janet Kucklick
NOAA, National Ocean Service
Coastal Service Center
Charleston, SC

Office for Law Enforcement Exhibit
Linda Taylor
NOAA, Office for Law Enforcement
Silver Spring, MD

NOAA Fisheries Program Exhibit
Natalie Huff
Operations Management Information
NOAA, National Marine Fisheries Service
Silver Spring, MD

Overview of the Trip Information Program (TIP)

Pamela Brown-Eyo
Guy Davenport
Joshua Bennett
NOAA, National Marine Fisheries Service
Southeast Fisheries Science Center
Miami, FL

NMFS—South Florida Ecosystem Restoration, Information and Outreach Initiative

Essie Coleman-Duffie
Bradford E. Brown
Nancy B. Thompson
NOAA, National Marine Fisheries Service
Southeast Fisheries Science Center
Miami, FL

Cutaneous Viral Papillomatosis in a West Indian Manatee (Trichechus manatus Latirostris)

Ruth Ewing[1]
Gregory D. Bossart[2]
Mark Lowe[3]
[1] NOAA, NMFS, Southeast Fisheries Science Center
[2] University of Miami Division of Comparative Pathology and Miami Seaquarium
[3] Midway Animal Hospital
Miami, FL

Overview of the Programs at the Galveston Laboratory

James Randolph
Joanne Williams
NOAA, National Marine Fisheries Service
Southeast Fisheries Science Center
Galveston Laboratory
Galveston, TX

Bay Scallop Restoration Studies in the Niantic River

Ronald Goldberg/(F. Thurberg)
Jose Pereira
Paul Clark
NOAA, National Marine Fisheries Service
Northeast Fisheries Science Center
Milford Laboratory
Milford, CT

Seaweed Aquaculture

Ronald Goldberg[1] /(F. Thurberg)
Paul Clark[1]
Gary Wikfors[1]
Muki Shpigel[2]
[1] NOAA, NMFS, NEFSC, Milford Laboratory, Milford, CT
[2]Israel Oceanographic and Limnological Research
National Center for Mariculture, Eilat, Israel

The Base of the Food Chain: Microalgal Research at NMFS, Milford

Mark Dixon/(S. Stiles)
Gary Wikfors
Barry Smith
Jennifer Alix
NOAA, National Marine Fisheries Service
Northeast Fisheries Science Center
Milford Laboratory
Milford, CT

Genetic and Breeding Investigations of the Bay Scallops,(Argopecten Irradians)

Sheila Stiles[1]
Joseph Choromanski[1]
Christopher Cooper[1]
Qin-Zhao Xue [2]
[1]NOAA, NMFS, NEFSC, Milford Laboratory, Milford, CT
[2]Chinese Academy of Sciences, Qingdao, China

Growth of Bay Scallops (Argopecten Irradians Irradians) in Lantern Nets

James Widman/(S. Stiles)
NOAA, National Marine Fisheries Service
Northeast Fisheries Science Center
Milford Laboratory
Milford, CT

Organic Contaminants in Flesh of Four Species of Recreational Fish in the New York Bight

Ashok D. Deshpande/(D. Johnson)
Andrew Draxler
Thomas Finneran
Kathleen Corbo
NOAA, National Marine Fisheries Service
Howard Marine Sciences Laboratory
Highlands, NJ

Seasonal Patterns in Abundance of Calanus finmarchicus 1977- 1987

Carol J. Meise[1]/(D. Johnson)
Jay O'Reilly[2]
Joseph Kane[2]
[1] NOAA, National Marine Fisheries Service
Howard Marine Sciences Laboratory, Highlands, NJ
[2]NOAA, National Marine Fisheries Service
Narragansett Laboratory
Narragansett, RI

Habitat Use and Growth Patterns of Young-of-the-Year Winter Flounder in Three Northeastern U.S Estuaries.

Beth A. Phelan[1]/(D. Johnson)
Kenneth W. Able[2]
Anne L. Studholme[1]
[1] NOAA, National Marine Fisheries Service
Howard Marine Sciences Laboratory, Highlands, NJ
[2] Institute of Marine and Coastal Sciences
Rutgers University
800 Great Bay Blvd.
Tuckerton, NJ

Elemental Composition of Otoliths of Fish from the Northwest Atlantic and Gulf of Mexico

Vincent Zdanowicz[1]/(D. Johnson)
Peter J. Hanson[2]
David H. Secor[3]
[1] NOAA, National Marine Fisheries Service
Howard Marine Sciences Laboratory, Highlands, NJ
[2]NOAA, National Marine Fisheries Service
Beaufort Laboratory, Beaufort, NC
[3] University of Maryland,
Chesapeake Biological Laboratory, Solomons, MD

Water Property Variability During the U.S. GLOBEC Georges Bank Study

David Mountain
Maureen Taylor
Christina Bascunan
NOAA, National Marine Fisheries Service
Northeast Fisheries Science Center
Woods Hole, MA

Status of Fishery Resources Off the Northeast USA - 1999

Steve Murawski
Population Dynamics Branch
NOAA, National Marine Fisheries Service
Northeast Fisheries Science Center
Woods Hole, MA

Larval Cod And Haddock Distribution And Growth During The U.S. GLOBEC Georges Bank Study

Jack Green[1]
Rebecca Jones[1]
Stephen Brownell[1]
David Mountain[2]
[1]NOAA, NMFS, NEFSC, Narragansett Laboratory
Narragansett, RI
[2]NOAA, NMFS, NEFSC
Woods Hole, MA

Marine Biotoxins Program

John Ramsdell/(B. Haynes)
Elizabeth Fairey
National Ocean Service
Charleston, SC

NOAA Fisheries Human Resources Exhibit

Fara Guest
NOAA, NMFS, Human Resources
Silver Spring, MD

Pima/Maricopa Irrigation Project

George Brooks
Department of Land and
Water Resources
Gila River Indian Community
Sacaton, AZ

Appendix I: Conference Evaluations

Summary

The overwhelming majority of participants rated the conference as "excellent" or "very good" and as being "very useful and informative." The largest consensus of opinion was for the panel on Student Perspectives. Sixty-nine percent of responding participants said it was outstanding to hear the students' concerns and their strategies for entering into the oceanic and atmospheric sciences. Participants also were pleased with the opportunities to network with the various agencies, HBMSCUs, and private sector businesses. These, along with the evident commitment that NOAA and the Department of Commerce have made to diversity, were seen as the major strengths of the conference. There were two overriding concerns for the conference: 1) how can the recommendations be made into actions, when many of the recommendations from the 1995 conference were not followed up on , and 2) how can the conference more accurately represent the diversity of minorities within America. A number of lesser concerns, ranging from the length of panel presentations to the sound system, were also mentioned.

Tally

Fifty-two (52) evaluations were collected. There were four sections to the conference evaluation form. The first section collected data on the participants. The second section asked participants to rate each segment of the conference from *Excellent* to *Poor*. The third section asked participants to assess how much information was received from each segment from *A Lot* to *None*. For the second and third sections, the tally indicates both the number and percent of respondents to each rating. Respondents did not necessarily answer each question, so number totals are frequently less than 52 (the total number of evaluations collected) and percentages less than 100%. The answers with the greatest number of responses are listed in bold type. The fourth section asked for short answer comments. Responses suggested by more than one respondent are listed in bold type.

SECTION ONE: PARTICIPANT INFORMATION

What is your affiliation?

Academia:	Students 8	Administrators 2	Faculty 4
Government:	Federal 30		
Private Sector:	Non-Profit 2		
Combined:	Faculty/Federal 3	Student/Federal 1	Student/State 1

Did you attend the 1995 Expanding Opportunities Conference?

Yes	6
No	35

SECTION TWO: EVALUATION OF THE CONFERENCE

Please rate the following aspects of the conference from Excellent to Poor:

Tuesday	**EXCELLENT**	**VERY GOOD**	**GOOD**	**FAIR**	**POOR**
Charge	16 31%	**20** **38%**	6 12%	2 4%	0 0%
Panel 1 *Opportunities*	13 25%	**19** **36%**	12 23%	4 8%	0 0%
Panel 2 *Student Perspectives*	**36** **69%**	9 17%	6 12%	0 0%	0 0%
Panel 3 *Agency Perspectives*	14 27%	**19** **36%**	11 21%	6 12%	0 0%
Working Groups	8 15%	**14** **27%**	8 15%	2 4%	1 2%

Wednesday	**EXCELLENT**	**VERY GOOD**	**GOOD**	**FAIR**	**POOR**
Panel 4 *Private Sector*	11 21%	**19** **36%**	16 31%	1 2%	1 2%
Panel 5 *Business w/NOAA*	**18** **35%**	17 33%	9 17%	4 8%	0 0%
Panel 6 *Research Funding*	8 15%	**13** **25%**	8 15%	1 2%	0 0%
Panel 7 *Student Networking*	**14** **27%**	11 21%	2 4%	0 0%	0 0%
Panel 8 *Building Alliances*	**10** **19%**	**10** **19%**	4 8%	0 0%	0 0%

Wednesday *continued*	**EXCELLENT**	**VERY GOOD**	**GOOD**	**FAIR**	**POOR**
Closing	5 10%	**12** **23%**	1 2%	0 0%	0 0%
Networking *With students*	**22** **42%**	10 19%	6 12%	1 2%	0 0%
Networking *With professionals*	**24** **46%**	13 25%	5 10%	0 0%	0 0%
Overall	**21** **40%**	17 33%	4 8%	1 2%	0 0%

SECTION THREE: EVALUATION OF THE INFORMATION GAINED

How much information and understanding of issues related to increasing minority participation in the oceanic, marine, environmental, and atmospheric professions did you gain from the following conference activities?

Tuesday:	**A LOT**	**SOME**	**VERY LITTLE**	**NONE**
Charge	**28** **54%**	12 23%	1 2%	2 4%
Panel 1 *Opportunities* Panel 2 *Student Perspectives*	**27** **52%** **34** **65%**	18 **35%** 12 23%	5 10% 2 4%	2 4% 1 2%
Panel 3 *Agency Perspectives*	21 40%	**24** **46%**	0 0%	2 4%
Working Groups	**17** **33%**	14 27%	3 6%	0 0%

Wednesday	A LOT	SOME	VERY LITTLE	NONE
Panel 4	15	**23**	6	3
Private Sector	29%	**44%**	12%	6%
Panel 5	**20**	**20**	5	0
Business w/NOAA	**38%**	**38%**	10%	0%
Panel 6	15	**17**	3	1
Research Funding	29%	**33%**	6%	2%
Panel 7	**21**	6	0	0
Student Networking	**40%**	12%	0%	0%
Panel 8	**16**	15	2	1
Building Alliances	**31%**	29%	4%	2%

SECTION FOUR: ADDITIONAL COMMENTS

1. **What aspects of the conference were MOST HELPFUL?**

Networking with students, faculty, NOAA, and the private sector.
Hearing student perspectives.
The clear commitment NOAA and DOC made to the conference and HBMSCUs.
Learning concrete ways to acquire and increase funding and employment opportunities for minorities.
The in-depth working groups.
Knowledge of opportunities in the private sector.
The great setting—few distractions and a congenial atmosphere.
The interaction amongst the government, academic, and private business sectors.
Speaking with other minority students and hearing about their experiences.
Poster session for information and opportunity.
Realizing how poorly the government communicates its needs and opportunities to students and professors.
Dr. Richardson's knowledge and his ability to speak with NOAA.

2. **What aspects were LEAST HELPFUL?**

The long length of panel presentations.
Not having an agenda to look at prior to the conference.
The lack of time for questions in the panel sessions.
The "repetitive presentations of NOAA's inner workings".
The working groups could not accommodate all the participants.
Business and policy discussions.

The first stakeholders' luncheon.
Tuesday's conference banquet. "Coming at the end of a long day, I was too tired to focus."
Long way to drive.
Unclear future for this process.
Student perspectives.
Closing remarks.
Agency perspectives.
The redundancy of Panel 8.

3. What were the MOST IMPORTANT ISSUES discussed?

Student perspectives.
Finding out about employment opportunities inside and outside of government.
Finding out concrete information on what to do and who to contact within NOAA.
Presentation by Mr. Mallett.
Agency perspectives.
Variety and levels of networking opportunities.
Good opportunities for sustained discussion.
Hearing the details of existing links between NOAA and HBMSCUs.
Working groups.
Discussion of available funding .
Recognition of the need for sustained funding.
Discussing how to change the elementary and secondary school curriculum so as to attract more minorities into the sciences.
Partnerships with the private sector.
Interaction among the various agencies, academia, and the private sector.
The need for HBMSCUs to keep current of new science discoveries and of NOAA's employment needs.
The need to develop broader skills within science.
Presentation by Dr. Spikes.
Plenary sessions.
The theme of promoting diversity in our disciplines to parallel the diversity of America.
Poster Session.
The need to be more politically savvy and to lobby Congress.
Presentation by Dr. Richardson.
Views of professors and administrators at HBMSCUs.
Charge to the conference.

4. What were the LEAST IMPORTANT ISSUES discussed?

The internal workings of NOAA.
Business and policy discussions.
Role of private industry.
Working group discussions.
Budgetary problems—"solutions cannot be applied interchangeably".

Joint Institute Recommendations.
Student perspectives .

5. **As a result of your participation in this conference, what new ACTIONS will you take when you return to your work and community?**

Disseminate the information I received here.
Follow up on the contacts I made here.
Be more active in promoting conferences and getting students involved.
Keep pushing importance of diversity initiatives during challenging budget time.
Be more diligent in locating programs that provide me with interns.
Have more contact with the federal, state, and municipal governments.
Re-educate my office of the need to support efforts to increase minority employment.
Increase networking with students and potential employers and educational institutions.
Continue to develop my database for HBMSCUs.
Participate more in mentoring and career fairs.
Insist on being a part of the follow-up team to see actions followed through.
Increase involvement in alumni affairs.
Increase involvement in community affairs, particularly issues that affect students.
Rewrite my resume and indicate my strengths in advising institutions and programs on recruitment and cultivation of minority students as well as being an experienced teacher.
Contact criminal justice program at UMES.
Working directly with administrators at HBCUs to start seeking funding.
New opportunities to recruitment.
Try to ID sea grant partners for our university.
Try to hold a grant writing workshop on DOC and NOAA.
Liaisons with three HBMSCUs and URI.
Request we send posters out to HBMSCUs on our graduate program at the University of Charleston.
Explore opportunities for cooperation and collaboration.
Be aware of conference results.
Schedule visits to some HBMSCUs and attempt to convince colleagues to visit as well.
Call the New England Board of Higher Education (NEBHE) to become a mentor.
Attempt to establish MOU between our lab and several HBMSCUs.
Look into the possibility of changing existing priorities to provide support for HBMSCUs.
Write reports to brief managers and reach people.
Write articles for Highlights.
Write article for GAEA (a newsletter for women geo-scientists).
Keep myself informed of HBMSCUs students that come to work for NOAA.
Explore having academic faculty come into my government office to support research and development.
Actively work to recruit and retain graduate students.
Develop a good reward system for my staff that serves as mentors for students.
Implement more focussed outreach to HBMSCUs.

6. Are there ADDITIONAL COMMENTS you want to make?

About the Conference Facility and Organization

Please provide e-mail addresses and phone numbers of participants.
Please provide more activities for the students.
Please provide more opportunities for the students to speak.
Please provide the conference agenda prior to the conference.
Please stick to the timelines.
Too many panelists and moderators on one panel.
The panelists needed to stay focused on their topic.
Excellent conference accommodations and facilitation.
Planning group members were not acknowledged during the conference.
More participants need to utilize visual aids.
Platform too small for 6-7 panelists and 2 moderators.
Please have more breakfast meetings.
There should have been microphones for the audience.
There should have been more than coffee at the break.
We need more opportunities to interact with students as part of such a conference.
We need a more attentive sound support staff.
Poster sessions must be co-located with rest of conference.

About the Issues Addressed by the Conference

Excellent conference.
Have a follow-up conference in 2-3 years.
The conference needs a greater emphasis on all minorities. "The conference was focused only on African-Americans, making me wonder if this wasn't about diversity but about African-American success."
Make sure to establish mechanisms to implement these recommendations.
There seems to be little accomplished since the 1995 conference.
Oceanic and Atmospheric Sciences must not be treated separately from the Geosciences.
There should have been a speaker to represent the West Coast Division of NOAA.
The conference needs to develop a set of measure by which to gauge the success of implementing recommendations.
Create a web site exclusively for this conference.
All agencies should submit their names to Fara Guest for a need for summer interns.

Appendix J: A List of Historically Black and Minority-Serving Colleges and Institutions

Historically Black Institutions, listed by state

ALABAMA	
Alabama A&M University	Huntsville, AL 35762
Alabama State University	Montgomery, AL 36195
Bishop State Jr. College	Mobile, AL 36990
Concordia College	Selma, AL 36701
Fredd State Technical College	Tuscaloosa, AL 34501
Lawson State Community College	Birmingham, AL 35211
Miles College	Birmingham, AL 35208
Oakwood College	Huntsville, AL 35896
Selma University	Selma, AL 36701
J.F. Drake Technical College	Huntsville, AL 35811
Stillman College	Tuscaloosa, AL 35401
Talladega College	Talladega, AL 35160
Trenholm State Technical College	Montgomery, AL 36108
Tuskegee University	Tuskegee, AL 36088
ARKANSAS	
Arkansas Baptist College	Little Rock, AR 72202
Philander Smith College	North Little Rock, AR 72202
Shorter College	North Little Rock, AR 72114
University of Arkansas at Pine Bluff	Pine Bluff, AR 71601
DELAWARE	
Delaware State University	Dover, DE 19901
DISTRICT OF COLUMBIA	
Howard University	Washington, DC 20059
University of the District of Columbia	Washington, DC 20008
FLORIDA	
Bethune Cookman College	Daytona Beach, FL 32015
Edward Waters College	Jacksonville, FL 32209
Florida A&M University	Tallahassee, FL 32307
Florida Memorial College	Miami, FL 33054
GEORGIA	
Albany State College	Albany, GA 31705
Clark-Atlanta University	Atlanta, GA 30314
Fort Valley State College	Fort Valley, GA 31030
Interdenominational Theological Center	Atlanta, GA 30314
Morehouse College	Atlanta, GA 30314

Morehouse School of Medicine	Atlanta, GA 30310
Morris Brown College	Atlanta, GA 30314
Paine College	Augusta, GA 30910
Savannah State University	Savannah GA 31404
Spelman College	Atlanta, GA 30314

KENTUCKY

Kentucky State University	Frankfort, KY 40601

LOUISIANA

Dillard University	New Orleans, LA 70122
Grambling State University	Grambling, LA 71245
Southern University System	Baton Rouge, LA 70813
Southern University A&M College	Baton Rouge, LA 70813
Southern University at New Orleans	New Orleans, LA 70126
Southern University at Shreveport	Shreveport, LA 71107
Xavier University	New Orleans, LA 70125

MARYLAND

Bowie State University	Bowie, MD 20715
Coppin State College	Baltimore, MD 21239
Morgan State University	Baltimore, MD 21239
University of Maryland Eastern Shore	Princess Anne, MD 21853

MICHIGAN

Lewis College of Business	Detroit, MI 48235

MISSISSIPPI

Alcorn State University	Lorman, MS 39096
Coahoma Community College	Clarksdale, MS 38614
Hinda Community College	Utica, MS 39175
Jackson State University	Jackson, MS 39217
Mary Holmes College	West Point, MS 39773
Mississippi Valley State University	Itta Bena, MS 38941
Rust College	Holly Springs, MS 39174
Tougaloo College	Tougaloo, MS 39174

MISSOURI

Harris-Stowe State College	St. Louis, MO 63103
Lincoln University	Jefferson City, MO 63013

NORTH CAROLINA

Barber-Scotia College	Concord, NC 28025
Bennett College	Greensboro, NC 27401
Elizabeth City State University	Elizabeth City, NC 27909
Fayetteville State University	Fayetteville, NC 28301

Johnson C. Smith University	Charlotte, NC 28216
Livingstone College	Salisbury, NC 28144
North Carolina A&T State University	Greensboro, NC 27411
North Carolina Central University	Durham, NC 27707
St. Augustine's College	Raleigh, NC 27610-2298
Shaw University	Raleigh, NC 27611
Winston-Salem State University	Winston Salem, NC 27110

OHIO

Central State University	Wilberforce, OH 45384
Wilberforce University	Wilberforce, OH 45384

OKLAHOMA

Langston University	Langston, OK 73050

PENNSYLVANIA

Cheyney State University	Cheyney, PA 19319
Lincoln University	Lincoln, PA 19352

SOUTH CAROLINA

Allen University	Columbia, SC 29204
Benedict College	Columbia, SC 29204
Claflin College	Orangeburg, SC 29115
Clinton Junior College	Rock Hill, SC 29731
Denmark Technical College	Denmark, SC 29042
Morris College	Sumter, SC 29150
South Carolina State University	Orangeburg, SC 29117
Voorhees College	Denmark, SC 29042

TENNESSEE

Fisk University	Nashville, TN 37208
Knoxville College	Knoxville, TN 37921
Lane College	Jackson, TN 38301
Lemoyne-Owen College	Memphis, TN 38126
Meharry Medical College	Nashville, TN 37203
Tennessee State University	Nashville, TN 37209

TEXAS

Huston-Tillotson College	Austin, TX 78702
Jarvis Christian College	Hawkins, TX 75765
Paul Quinn College	Dallas, TX 75241
Prairie View A&M University	Prairie View, TX 77446
Saint Phillip's College	San Antonio, TX 75160
Southwestern Christian College	Terrell, TX 75160
Texas College	Tyler, TX 75702

Texas Southern University	Houston, TX 77004
Wiley College	Marshall, TX 75670

VIRGINIA

Hampton University	Hampton, VA 23668
Norfolk State University	Norfolk, VA 23504
Saint Paul's College	Lawrenceville, VA 23868
Virginia State University	Petersburg, VA 23806
Virginia Union University	Richmond, VA 23220

WEST VIRGINIA

Bluefield State College	Bluefield, WV 24701
West Virginia State University	Institute, WV 25112

U.S. VIRGIN ISLANDS

University of the Virgin Islands	St. Thomas, USVI 00802

Other Equal Opportunity Educational Colleges and Universities

Atlanta Junior College	Atlanta, GA 30310
Chicago State University	Chicago, IL 60628
Compton Community College	Compton, CA 90221
Cuyahoga Community College	Cleveland, OH 44115
Charles R. Drew University of Medicine and Science	Los Angeles, CA 90059
Highland Park Community College	Highland Park, MI 48209
Kennedy-King College	Chicago, IL 60621
Medgar Evers College	Brooklyn, NY 11225
Roxbury Community College	Boston, MA 02115
Sojourner-Douglass College	Baltimore, MD 21206
Wayne County Community College	Detroit, MI 48226

Members of the American Indian Higher Education Consortium

ARIZONA	
Navajo Community College	Tsaile, AZ 86556
CALIFORNIA	
D-Q University	Davis, CA 95617
KANSAS	
Haskell Indian Nations University	Lawrence, KS 66046
MICHIGAN	
Bay Mills Community College	Brimley, MI 49715
MINNESOTA	
Fond Du Lac Community College	Cloquet, MN 55720
Leech Lake Community College	Cass Lake, MN 56633
MONTANA	
Blackfeet Community College	Browning, MT 59417
Dull Knife Community College	Lame Deer, MT 59043
Fort Belknap Community College	Harlem, MT 59526
Fort Peck Community College	Poplar, MT 59255
Little Big Horn Community College	Crow Agency, MT 59022
Salish Kootenai College	Pablo, MT 59855
Stonechild Community College	Box Elder, MT 59521
NEBRASKA	
Nebraska Indian Community College	Winnebago, NE 68071
NEW MEXICO	
Crownpoint Institute of Technology	Crownpoint, NM 87313
Institute of American Indian Art	Santa Fe, NM 87504
Southwest Indian Polytechnic Institute	Albuquerque, NM 87184
NORTH CAROLINA	
Pembroke State University	Pembroke, NC 28372
NORTH DAKOTA	
Fort Berthold Community College	New Town, ND 58763
Little Hoop Community College	Fort Totten, ND 58335
Standing Rock Community College	Fort Yates, ND 58538
Turtle Mountain Community College	Belcourt, ND 58316
United Tribes Technical College	Bismark, ND 58504

SOUTH DAKOTA

Cheyenne River Community College	Eagle Butte, SD 57625
Oglala Lakota College	Kyle, SD 57752
Sinte Gleska University	Rosebud, SD 57570
Sisseton Wahpeton Community College	Sisseton, SD 57262

WASHINGTON

Northwest Indian College	Bellingham, WA 98226

WISCONSIN

College of the Menominee Nations	Keshena, WI 54135
Lac Courte Oreilles Community College	Hayward, WI 54843

Southeast Asian Studies Programs/Southeast Asian Resource Centers at Colleges and Universities

Southeast Asia Program
Cornell University
Ithaca, NY 14853

University of Wisconsin
Center for Southeast Asian Studies
Madison, WI 53706

Hispanic Association of Colleges and Universities (HACU)

ARIZONA
Arizona Western College
South Mountain Community College*

CALIFORNIA
California State University
  Bakersfield
  Fresno
  Los Angeles
Cerritos College
College of the Sequoias
Compton Community College
Don Bosco Technical Institute
East Los Angeles College
Gavilan College
Hartnell College
Imperial Valley College
Kings River Community College
Los Angeles City College
Los Angeles Harbor College
Los Angeles Mission College
Los Angeles Trade-Tech College
Mount Saint Mary's College
Mount San Antonio College
Oxnard College
Palo Verde College
Rancho Santiago Community College
Rio Hondo College
Saint John's Seminary College
San Bernardino Valley College
San Diego State University
  Imperial Valley Campus
Southwestern College
West Hills Community College

COLORADO
Community College of Denver
Otero Junior College
Pueblo Community College
Trinidad State Junior College

FLORIDA
Barry University
Florida International University
Miami-Dade Community College
  Homestead Campus
  Kendall Campus
  Medical Center Campus
  North Campus
  Wolfson Campus
Saint John Visnney College Seminary
St. Thomas University
St. Vincent de Paul
  Regional Seminary

ILLINOIS
Harry S. Truman College
MacCormac Junior College
Richard J. Daley College
Robert Morris College
St. Augustine College

NEW JERSEY
Hudson County Community College
Passaic County Community College

NEW MEXICO
Albuquerque Tech-Voc. Inst.
College of Santa Fe
Dona Ana Branch Community College
Eastern New Mexico University-
  Roswell
Luna Vocational Tech. Institute
New Mexico Highlands University
New Mexico State University-
  Grants Campus
  Main Campus
Northern New Mexico
  Community College
Sante Fe Community College
University of New Mexico
University of New Mexico-
  Valencia Campus
Western New Mexico University

NEW YORK
Bronx Community College
City Univ. of New York-City College
College of Aeronautics The City
University of New York
Herbert H. Lehman College
Hostos Community College
John Jay Coll. of Criminal Justice
LaGuardia Community College
Mercy College

TEXAS
Alamo Community. College
District
Bee County College
Del Mar College
El Paso Community. College District
Incarnate Word College
Laredo Community College
Our Lady of the Lake University
Palo Alto College
Saint Mary's University
San Antonio College
Southwest Texas Junior College
St. Edward's University
St. Philip's College
Sul Ross State University
Texas A&M International University
Texas A&M University- Kingsville
Corpus Christi
Texas State Tech. Coll.-Harlingen
Univ. of Texas at Brownsville in
Partnership w/Texas Southmost College
University of Houston-Downtown
University of Texas-Pan American
University of Texas at El Paso
at San Antonio

PUERTO RICO
American University of Puerto Rico
Antillian Adventist University
Bayamon Central University
Caribbean Center for Advanced Studies
Caribbean University College
Pontifical Catholic University
of Puerto Rico
Center for Advanced Studies on
Puerto Rico and the Caribbean
Colegio Universitario del Este
Conservatory of Music of Puerto Rico
InterAmerican University of Puerto Rico
Aguadilla Campus
Aracibo University College
Barranquitas Campus
Bayamon Campus
Central Administration
Fajardo Campus
Guayama Campus
Metropolitan Campus
Ponce Regional College
San German Campus
Technological College of the
Municipality of San Juan
Universidad Metropolitana
Universidad Politecnica
de Puerto Rico
Universidad del Turabo
University of Puerto Rico
Aguadilla Regional College
Aracibo Technological
University College
Bayamon Technological
University College
Carolina Regional College
Cayey University College
Central Administration Office
Humacao Univ. College
La Montana Regional College
Mayaguez Campus
Medical Sciences Campus
Ponce Technological
University College
Rio Piedras Campus
University of the Sacred Heart

Member of HACU Systems

TOTAL: 132

Colleges for Women Only

ALABAMA
Judson College

CALIFORNIA
Mills College
Mount St. Mary's College
Scripps College

CONNECTICUT
St. Joseph College

DISTRICT OF COLUMBIA
Mount Vernon College
Trinity College

GEORGIA
Agnes Scott College
Brenau University
Spelman College
Wesleyan College

ILLINOIS
Lexington Institute of Hospitality Careers

INDIANA
St. Mary-of-the-Woods College
St. Mary's College

KENTUCKY
Midway College

MARYLAND
College of Notre Dame of Maryland
Hood College

MASSACHUSETTS
Aquinas College at Milton
Aquinas College at Newton
Bay Path College
Elms College
Emmanuel College
Endicott College
Fisher College
Lasell College
Lesley College
Mount Holyoke College
Pine Manor College
Regis College
Simmons College
Smith College
Wellesley College

MINNESOTA
College of St. Benedict
College of St Catherine St. Catherine Campus

MISSOURI
Cottey College
Stephens College
William Woods College

NEBRASKA
College of St. Mary

NEW JERSEY
Assumption College for Sisters
College of St. Elizabeth
Georgian Court College
Rutgers-The State University of New Jersey: Douglas College

NEW YORK
Barnard College
College of New Rochelle
Russell Sage College
Wells College
William Smith College

NORTH CAROLINA
Bennett College
Meredith College
Peace College
St. Mary's College
Salem College

OHIO
Notre Dame College of Ohio
Ursuline College

PENNSYLVANIA
Bryn Mawr College
Carlow College
Cedar Crest College
Chatham College
Chestnut Hill College
Harcum Junior College
Immaculate College
Moore College of Art and Design
Rosemont College
Seton Hill College
Wilson College

SOUTH CAROLINA
Columbia College
Converse College

VERMONT
Trinity College of Vermont

VIRGINIA
Hollins College
Mary Baldwin College
Randolph-Macon Woman's College
Southern Virginia College for Women
Sweet Briar College

WISCONSIN
Alverno College
Mount Mary College

Appendix K: Members of the Joint Oceanographic Institutions Incorporated (JOI)

The Institute of Geophysics
The University of Texas at Austin

The Lamon-Doherty Geological Observatory
Columbia University

The Rosentiel School of Marine and Atmospheric Science
University of Miami

The College of Oceanography
Oregon State University

The Graduate School of Oceanography
University of Rhode Island

The College of Geosciences and Maritime Studies
Texas A&M University

The School of Ocean and Earth Science and Technology
University of Hawaii

The Woods Hole Oceanographic Institution

The Scripps Institution of Oceanography
University of California, San Diego

Appendix L: Members of the Consortium for Oceanographic Research and Education, Inc.

Institutions of the Board of Governors

University of Alaska
University of California, San Diego
University of California Consortium
- Irvine
- Los Angeles
- Santa Barbara
- Santa Cruz

Columbia University
University of Delaware
Harbor Branch Oceanographic Institution
University of Hawaii
University of Maryland
University of Miami
North Carolina State University
University of North Carolina at Wilmington
Oregon State University
University of Rhode Island
The University of Texas at Austin
Texas A&M University
University of Washington
The Woods Hole Oceanographic Institution

Other Institutions

Bigelow Laboratory for Ocean Sciences
University of Connecticut
University of Michigan
Monterey Bay Aquarium Research Institute
Moss Landing Marine Laboratories
Old Dominion University
College of William and Mary

Appendix M: Members of the National Association of Marine Laboratories (NAML)

Dr. Kenneth Able (NEAMGLL)
Inst. Marine and Coastal Sciences
Rutgers Univ., Marine Field Station
800 Great Bay Blvd.
Tuckerton, NJ 08087
(609)296-5260; -1024
able@arctic.rutgers.edu

Dr. James J. Alberts (SAML)
Univ. of Georgia, Marine Institute
Sapelo Island, GE 31327
(912)485-2221; FAX: 485-2133
jalberts@uga.cc.uga.edu

Dr. Robert van Aller (Bill Walker)
Gulf Coast Research Laboratory
703 East Beach Dr.
P.O. Box 7000
Ocean Springs, MS 39566-7000
(601)872-4211; FAX: 872-4204, -4279

Dr. Larry Atkinson (SAML)
Coastal Physics and Oceanography
Old Dominion University
Norfolk, VA 23529/0276
(804)683-4285/-4926; FAX:683-5550
atkinson@ccpo.odu.edu

Dr. Daniel Baden (SAML)
Rosenstiel School, Mar. Atmos. Sci.
University of Miami
4600 Rickenbacker Causeway
Miami, FL 33149/1098
(305)361-4738; FAX: 361-4001
dbaden@rsmas.miami.edu

Dr. Howard S. Barnes (SAML)
Smithsonian Tropical Res. Inst.
Panama, Unit 0948
APO AA 34002-0948, USA
(507)227-5211; FAX: 232-6197
stri.tivoli.forda@ic.si.edu
(Ana Maria Ford, Adm. Asst.)

Dr. David Bechler (SAML)
Center, Coastal and Marine Studies.
Lamar University
P.O. Box 10037
Beaumont, TX 77710-0037
(409) 880-8253; FAX: 880-8007
dlbechler@lub001.lamar.edu

Dr. Richard L. Benefield (SAML)
Seabrook Marine Laboratory
P.O. Box 8
Seabrook, TX 77586
(713)474-2881; FAX: 474-2812

Dr. Peter R. Betzer (SAML)
Department of Marine Sciences
University of South Florida
140 Seventh Ave., South
St. Petersburg, FL 33701
(813)893-9130; FAX: 893-9189

Dr. Paul Bienfang (WAML)
Center for Applied Aquaculture
Oceanic Institute
P.O. Box 25280
Honolulu, HI 96825
(808)259-7951; FAX: 259-5971
74763.2226@compuserve.com

Dr. Stephen B. Brandt (NEAMGLL)
Great Lakes Center
SUNY College at Buffalo
1300 Elmwood Ave.
Buffalo, NY 14222
(716)878-4329; FAX: 878-4009
brandtsb@snybufaa.cs.snybuf.edu

Dr. Peter Brewer (WAML)
Monterey Bay Aquarium Res. Inst.
160 Central Ave.
Monterey, CA 93940
(408)647-3700
brpe@mbari.org

Dr. Charles J. Brokaw (WAML)
Kerckhoff Marine Laboratory
California Institute of Technology
101 Dahlia St.
Corona Del Mar, CA 92625
(818)395-6294; FAX: (714) 675-1837

Dr. Arthur Brooks (NEAMGLL)
Center, Great Lakes Studies
University of Wisconsin
600 E. Greenfield Ave., Box 413
Milwaukee, WI 53204
(414)382-1704; FAX: 382-1705
abrooks@csd.uwm.edu

Dr. Richard Brusca (SAML)
Grice Marine Biological Lab
College/Univ. of Charleston
205 Fort Johnson
Charleston, SC 29412-6412
(803)762-5550; FAX: 762-5555
bruscar@cofc.edu

Dr. John E. Burris (NEAMGLL)
Marine Biological Laboratory (MBL)
Woods Hole, MA 02543
(508)289-7405; FAX: 457-1924
jburris@.mbl.edu

Dr. James S. Clegg (WAML)
Bodega Marine Laboratory
P.O. Box 247
Bodega Bay, CA 94923
(707)875-2211; FAX: 875-2009
jsclegg@ucdavis.edu

Dr. Kirk Cochran (NEAMGLL)
(Dr. William Wise)
Marine Sciences Research Center
State University of New York
Stony Brook, NY 11794
(516)632-8700: FAX: 632-8820
kcochran@ccmail.sunysb.edu

Dr. Patrick Colin (WAML)
Coral Reef Research Foundation
Chuuk Atoll Research Laboratory
P.O. Box 70
Weno, Chuuk State
Federated States of Micronesia
FAX: 011(691) 330-4413

Dr. David Correll (SAML)
Smithsonian Environ. Research Cntr.
647 Contees Wharf Rd.; P.O. Box 28
Edgewater, MD 21037-0028
(301)261-4190; FAX: 261-7954
correll@serc.si.edu

Dr. Benjamin Cuker (SAML)
Hampton University
School of Marine and Environmental Studies
Hampton, VA 23668
(804)727-5884; FAX: 727-5832

Dr. Michael Dagg (SAML)
Louisiana Universities
Marine Consortium (LUMCON)
8124 Hwy., 56
Chauvin, LA 70344
(504)851-2800; FAX: 851-2874
mdagg@coco.lumcon.edu

Dr. Randall Davis (SAML)
Texas A&M University – Galveston
Mitchell Campus
P.O. Box 1675
Galveston, TX 77553/1675
(409)740-4528; FAX: 740-5001

Dr. Kevin Eckelbarger (NEAMGLL)
Darling Marine Center
University of Maine
Walpole, ME 04573
(207)563-3146; FAX: 563-3119
kevine@maine.maine.edu

Dr. Charles Epifanio (NEAMGLL)
Graduate College of Marine Studies
University of Delaware
Lewes, DE 19958
(302)645-4262; FAX: 645-4007
epi@udel.edu

Dr. John Farrington (NEAMGLL)
Woods Hole Oceanographic Institution
Woods Hole, MA 02543
(508)289-2200, 2219; FAX: 289-2188
jfarrington@cliff.whio.edu

Dr. Madilyn Fletcher (SAML)
Center for Marine Biotechnology
Univ. of Maryland; Columbus Cntr.
701 E. Pratt St.
Baltimore, MD 21202
(410)234-8800; FAX: 234-8896
fletcher@umbi.umd.edu

Dr. Edward Frieman (WAML)
Scripps Institute of Oceanography
Univ. California, San Diego
9500 Gilman Dr.
La Jolla, CA 92093
(619)534-2826; FAX: 534-5306

Dr. Chris Garside (NEAMGLL)
Bigelow Lab for Ocean Sci.
McKown Point; P.O. Box 475
West Boothbay Harbor, ME 04575
(207)633-9600; FAX: 633-9641
garside@bigelow.org

Dr. Matthew R. Gilligan (SAML)
Marine Biology Program
Depart. of Biology and Life Sciences
Savannah State University
Savannah, GE 31404
(912) 356-2250; FAX: 356-2996

Dr. Frederick J. Grassle (NEAMGL)
Haskin Shellfish Research Lab.
Rutgers University
Marine Field Station
New Brunswick, NJ 08903/0231
(908) 932-6555 x509; FAX: 932-8578
grassle@ahab.rutgers.edu

Dr. Michael J. Greenberg (SAML)
The Whitney Laboratory
University of Florida
9505 Ocean Shore Blvd.
St. Augustine, FL 32086/8623
(904) 461-4000; FAX: 461-4008
michael@icbr.ifas.ufl.edu

Dr. Gary Greene (WAML)
Moss Landing Marine Laboratory
California State University
P.O. Box 450
Moss Landing, CA 95039/0450
(408) 755-8755; FAX: 753-2826
greene@mlml.calstate.edu

Dr. Gary B. Griggs (WAML)
Joseph M. Long Marine Laboratory
University of California, Santa Cruz
100 Shaffer Rd.
Santa Cruz, CA 95060
(408) 459-5006; FAX: 459-3383
griggs@cats.ucsc.edu

Dr. Clare Hachmuth (WAML)
Natural Energy Laboratory
P.O. Box 1749
Kailua-Kona, HI 96745/1749
(808) 329-7341; FAX: 326-3262

Dr. Ken Haddad (SAML)
Marine Research Institute
Florida Dept. of Natural Resources
100 Eighth Ave., SE
St. Petersburg, FL 33701-5095
(813)896-8626; FAX: 823-0166

Dr. Leon Hallacher (WAML)
Kalakaua Marine Education Cntr.
Univ., Hawaii – Hilo
523 W. Lanikaula St.
Hilo, HI 96720-4091
(808) 933-3383; FAX: 993-3693

Dr. Harlyn O. Halvorson (NEAMGLL)
Policy Cntr, Marine Biosc. and Technol.
Univ. of Massachusetts-Dartmouth
North Dartmouth, MA 02747-2330
(508) 999-8195; FAX: 999-8025
hhalvors@mbl.edu

Dr. Philip Helfrich (WAML/Treas)
Hawaii Institute of Marine Biology
University of Hawaii
P.O. Box 1346, Coconut Island
Kaneohe, HI 96744/1346
(808) 236-7418; FAX: 236-7443 (lab)
philhelfr@aol.com

Dr. Richard Herman (SAML)
Harbor Branch Oceanographic Inst.
5600 Old Dixie Hwy.
Fort Pierce, FL 34946
(407) 465-2400, x225; FAX: 465-5415

Dr. Raymond Highsmith (WAML)
School of Fisheries and Ocean Sci.
University of Alaska-Fairbanks
Fairbanks, AK 99775
(907) 474-7836; FAX: 416-1656
ffrch1@ialaska.edu

Dr. Don L. Hockaday (SAML)
Coastal Studies Laboratory
Univ. of Texas-Pan American
P.O. Box 2591
South Padre Island, TX 78597
(512) 761-2644; FAX: 761-2913
hockaday@panam.edu

Dr. Thomas C. Johnson (NEAMGLL)
Large Lakes Observatory
University of Minnesota
Duluth, MN 55812
(218) 726-8128; FAX: 726-6979
tcj@d.umn.edu

Dr. Donald Kent (WAML)
Hubbs-Sea World Research Institute
SDSU Marine Laboratory
1700 South Shores Rd.
San Diego, CA 92109
(619)226-3870; FAX: 226-3944

Dr. Barbara Kent (NEAMGLL)
Mount Desert Island Biol. Laboratory
P.O. Box 35
Salisbury Cove, ME 04672
(207)288-3605; FAX: 288-2130

Dr. George D. Klein (NEAMGLL)
N.J. Marine Sciences Consortium
Sandy Hook Field Station; Bldg. 22
Fort Hancock, NJ 07732
(908)872-1300; FAX: 291-4483
GDKlein@aol.com

Dr. Anthony H. Knap (SAML)
Bermuda Biol. Station for Res., Inc.
17 Biological Ln., Ferry Reach
St. Georges, GE-01, Bermuda
(809)297-1880; FAX: 297-8143/0860
biostation@bbsr.edu

Dr. John Kubaryk (SAML/Sec)
Department of Marine Sciences
University of Puerto Rico, Box 5000
Mayaguez, PR 00708-5000
(809)265-3838; FAX: 265-5408
j_kubaryk@rumac.upr.clu.edu

Dr. Alan M. Kuzirian (NAML/Sec-Trs)
Marine Biological Laboratory
Woods Hole, MA 02543
(508)289-7480; FAX: 540-6902
akuziria@mbl.edu

Dr. Phillip Lee (SAML)
Marine Biomedical Institute
University of Texas Medical Branch
Galveston, TX 7555/0803
(409)772-2133; FAX: 772-6993

Dr. Paul Levine (WAML)
Hopkins Marine Station
Stanford University
Pacific Grove, CA 93950
(408)655-6234; FAX: 375-0793

Dr. Kumar Mahadevan (SAML/Treas)
Mote Marine Laboratory
1600 Thompson Parkway
Sarasota, FL 34236
(813)388-4441; FAX: 388-4312
kumar@marinelab.sarasota.fl.us

Dr. Thomas Malone (SAML)
Horn Point Environmental Laboratory
University of Maryland; P.O. Box 775
Cambridge, MD 21613
(410)221-8406; FAX: 221-8473
malone@hpel.umd.edu

Dr. Nancy Marcus (SAML)
Marine Laboratory
Florida State University
Tallahassee, FL 32306
(904)644-5498; FAX: 644-3450
marcus@ocean.fsu.edu

Dr. Frank Maturo (SAML)
Marine Laboratory
University of Florida
313 Carr; P.O. Box 118525
Gainesville, FL 32611-8525
(904)392-1097, -1107; FAX: 392-3704
maturo@zoo.ufl.edu

Dr. Gene McCarthy (SAML)
Texas Parks and Wildlife Department
Coastal Fisheries Branch
4200 Smith School Rd.
Austin, TX 78744
(512)389-4650863; FAX: 389-4388

Dr. Lon McClanahan (WAML)
Ocean Studies Institute
California State University
Long Beach, CA 90840
(213)498-5343; FAX: 985-8887

Dr. L.R. McCloskey (WAML)
Walla Walla College Marine Station
174 Rosario Beach Rd.
Anacortes, WA 98221
(509)527-2481; FAX:
Mcclla@wwc.edu

Dr. John McConaugha (SAML)
Department of Oceanography
Old Dominion University
Norfolk, VA 23529/0276
(804)683-4285; FAX:683-5303
jrml00f@ludwick.naeco.odu.edu

Dr. Julian P. McCreary (SAML)
Oceanographic Center
NOVA University
8000 North Ocean Dr.
Dania, FL 33004

Dr. James F. Merritt (SAML)
Center, Marine Science Research
Univ. of North Carolina-Wilmington
7205 Wrightsville Ave.
Wilmington, NC 28403
(919)256-3721; FAX: 256-8856
merritj@vxc.ocis.uncwil.edu

Dr. Donald Wright (J-Milliman; SAML)
Virginia Institute of Marine Science (VIMS)
The College of William and Mary
P.O. Box 1346
Gloucester Point, VA 23062-1346
(804)642-7105; FAX: 642-7009
wright@viedu (milliman@viedu)

Dr. Daniel E. Morse (WAML)
Marine Science Institute
Marine Biotechnology Center
University of California
Santa Barbara, CA 93106
(805)893-3157; FAX: 893-8062
d_morse@lifesci.lscf.ucsb.edu

Dr. Steve Nelson (WAML)
Marine Laboratory
University of Guam
U.O.G. Station
Mangilao, Guam 96923
(671)735-2176; FAX:734-6767
snelson@uog9.uog.edu

Dr. Walter G. Nelson (SAML)
Indian River Mar. Science Res. Cntr.
Florida Institute of Technology
150 West University Blvd.
Melbourne, FL 32901-6988
(407)768-8000 x8096, x7454;
FAX: 984-8471; nelson@roo.fit.edu

Dr. Candace Oviatt (NEAMGLL)
Marine Ecosystem Research Lab.
Graduate School of Oceanography
University of Rhode Island
Narragansett, RI 02882-1197
(401)792-6132; FAX: 792-6160
coviatt@gsosun1.gso.uri.edu

Dr. Patrick L. Parker (SAML)
Marine Science Institute
University of Texas-Austin
P.O. Box 1267
Port Aransas, TX 78373
(512)749-6730, -7611; FAX: 749-6777

Dr. Joseph Ramus (SAML)
Duke University Marine Laboratory
Pivers Island
Beaufort, NC 28516-9721
(919)504-7500; FAX: 504-7648
jramus@mail.duke.edu

Dr. Jeffrey M. Reutter (NEAMGLL)
Franz Theodore Stone Laboratory
Center for Lake Erie Area Research
Ohio State University, Box 119
Put-in-Bay, OH 43456
(419)285-2341, 285-4754; FAX:
reutter.1@postbox.acs.ohio-state.edu

Dr. James G. Sanders (SAML)
Benedict Estuarine Laboratory
The Academy of Natural Sciences
10545 Mackall Rd.
St. Leonard, MD 20685
(410)586-9700; FAX: 586-9705
jsanders@acnatsci.org

Dr. Paul A. Sandifer (SAML)
Marine Resources Division
P.O. Box 12559
Charleston, SC 29412-2559
(803)795-6350; FAX: 762-5001

Dr. David J. Schmidly (SAML)
Texas A&M University-Galveston
Texas Institute of Oceanography
P.O. Box 1675
Galveston, TX 77553-1675
(409)740-4403; FAX: 740-4407
schmidly-d@tamug2.tamu.edu

Dr. Jerry R. Schubel (NEAMGLL)
New England Aquarium
Central Wharf
Boston, MA 02110
(617) 973-5220; FAX:
jschubel@tiac.net

Dr. Lynda Shapiro (WAML)
Oregon Institute of Marine Biology
University of Oregon
Charleston, OR 97420
(503)888-2581 x236; FAX: 888-3250
lshapiro@oimb.uoregon.edu

Dr. Ross F. Shaw (WAML)
T.B. Crowley Laboratory
Seattle Pacific University
Seattle, WA 98119
(206)281-2220; FAX: 281-2882
rshaw@spu.edu

Dr. Judy P. Stout (SAML)
Marine Environ. Sciences Consortium
Dauphin Island Sea Lab
P.O. Box 369-370
Dauphin Island, AL 36528
(334)861-2141; FAX: 861-7540
jstout@jaguar1.usouthal.edu

Dr. Stephen Strand (WAML)
Catalina Marine Science Center
Univ. of Southern California, LA
Los Angeles, CA 90089-0371
[P.O. Box 398; Avalon, CA 90704]
(213)743-6792; FAX: (310) 510-1364

Dr. Richard Strathmann (WAML)
Friday Harbor Laboratories
University of Washington
Friday Harbor, WA 98250
(206)378-2165; FAX: 543-1273
strath@fhl.washington.edu

Dr. Stephen D. Sulkin (WAML)
Shannon Point Marine Center
Western Washington University
1900 Shannon Point Rd.
Anacortes, WA 98221
(206)293-2188; FAX: 293-1083
sulkin@henson.cc.wwu.edu

Dr. Kenneth R. Tenore (SAML)
Chesapeake Biological Lab.; CEES
University of Maryland, Box 38
Solomons, MD 20688/6342
(410)326-7241; FAX: 326-7302
tenore@cbl.cees.edu

Dr. Gary L. Thomas (WAML)
Prince William Sound Science Center
P.O. Box 705
Cordova, AK 99574
(907)424-5800; FAX: 424-5820
ffglt@acad3.alaska.edu

Dr. John W. Tunnell (SAML)
Center for Coastal Studies
Texas A&M University-Corpus Christi
6300 Ocean Dr.
Corpus Christi, TX 78412
(512)994-2736; FAX: 994-2770
jtunnel@fakom.tamucc.edu

Dr. F. John Vernberg (SAML)
Baruch Inst. for Marine Biology
University of South Carolina
Columbia, SC 29208
(803)777-5288; FAX: 777-3935
vernberg@biol.scarolina.edu

Dr. Windsor Watson (NEAMGLL)
Center for Marine Biology
University of New Hampshire
Durham, NH 03824
(603)862-2100; FAX:
whw@christa.unh.edu

Dr. Lavern J. Weber (WAML)
Hatfield Marine Science Center
Oregon State University
2030 S. Marine Science Dr.
Newport, OR 97365/5296
(503)867-0211; FAX: 876-0138
weberl@ccmail.orst.edu

Dr. John T. Wells (SAML)
Institute of Marine Science
Univ. of No. Carolina-Chapel Hill
3431 Arendell St.
Morehead City, NC 28557
(919)726-6841; FAX: 726-2426
john_wells@unc.edu

Dr. Denis A. Wiesenburg (SAML)
Center for Marine Science
John C. Stennis Space Center
University of Southern Mississippi
Stennis Space Center, MS 39529-9904
(601)688-3177; FAX: 688-1121
denis@sunfish.st.usm.edu

Dr. Herbert Windom (SAML)
Skidaway Inst. of Oceanography
University System of Georgia
10 Ocean Science Circle
Savannah, GA 31411
(912)598-2490; FAX: 598-2310
herb@skio.peachnet.edu

Dr. William Wise (NEAMGLL)
Marine Sciences Research Center
State University of New York
Stony Brook, NY 11794
(516)632-8700: FAX: 632-8820

Dr. Millero (SAML)
Rosenstiel School, Marine and Atmospheric Science
University of Miami
4600 Rickenbacker Causeway
Miami, FL 33149/1098
(305)361-4001; FAX: 361-4711
fmillero@rsmas.miami.edu

Dr. John E. Reynolds-III (SAML)
Galbraith Marine Science Laboratory
Eckerd College
4200 54th Ave. South
St. Petersburg, FL 33711
reynolje@eckerd.edu

Dr. Lou Burnett
Department of Biology
College of Charleston
Charleston, SC
burnettl@cofc.edu

ASSOCIATE MEMBERS

Dr. Bradford E. Brown (SAML)
National Marine Fisheries Service
Southeast Fisheries Center
75 Virginia Beach Dr.
Miami, FL 33149
(305)361-4286; FAX: 361-4219

Dr. Ford Cross (SAML)
NMFS, Beaufort Laboratory
Pivers Island
Beaufort, NC 28516
(919)728-8724; FAX: 728-8784

Dr. Churchill Grimes (SAML)
NMFS, Panama City Laboratory
3500 Delwood Beach Rd.
Panama, FL 32407
(904)234-6541; FAX: 234-6543

Dr. Albert C. Jones (SAML)
NMFS, Southeast Fisheries Science Center
Research Management Division
75 Virginia Beach Dr.
Miami, FL 33149
(305)361-4259; FAX: 361-4219

Dr. Robert Kifer (SAML)
NMFS, Charleston Laboratory
P.O. Box 12607
Charleston, SC 29412
(803)762-1200; FAX: 762-1200

Dr. Robert E. Menzer (SAML)
U.S. Environ. Protection Agency
Environmental Research Laboratory
Gulf Breeze, FL 33149
(904)934-9208; FAX: 934-9201
menzer.robert@epamail.epa.gov

Dr. Scott Nichols (SAML)
NMFS, Pascagoula Laboratory
P.O. Box 1207
Pascagoula, MS 39567
(601)762-4591; FAX: 769-9200

Dr. John C. Ogden (SAML)
Florida Institute of Oceanography
830 First St., South
St. Petersburg, FL 33701
(813)893-9100; FAX: 893-9109

Dr. Len Pietrafesa (SAML)
North Carolina State University
Dept. of Marine, Earth and Atmospheric Science
P.O. Box 8208
Raleigh, NC 27695
(919)515-3711; FAX: 515-7802

Dr. Joseph Powers (SAML)
NMFS, Miami Laboratory
75 Virginia Beach Dr.
Miami, FL 33149
(305)361-4225; FAX: 361-4219

Dr. Michael F. Tillman (WAML)
NMFS, Southwest Fisheries Science Center
P.O. Box 271
LaJolla, CA 92038
(619)546-7067; FAX: 546-7003

Dr. Roger J. Zimmerman (SAML)
NMFS, Galveston Laboratory
4700 Ave. U
Galveston, TX 77551
(409)766-3500; FAX: 755-3508

ADDITIONAL INTERESTED INSTITUTIONS

Dr. Alfred Beeton (NEAMGLL)
NOAA Great Lakes Envir. Res. Lab.
2205 Commonwealth Blvd.
Ann Arbor, MI 48105-1593
(313)741-2244; FAX: 741-2003
beeton@glerl.noaa.gov

Dr. Edward Gilfillan (NEAMGLL)
Bowdoin College Marine Station
Bowdoin College
Cleveland Hall
Brunswick, ME 04011
(207)725-3166

Dr. Roger T. Hanlon (NEAMGLL)
Marine Resources Center
Marine Biological Laboratory
Woods Hole, MA 02543
(508)289-7710; FAX: 540-7371
rhanlon@mbl.edu

Dr. Anson H. Hines (SAML)
Smithsonian Environ. Research Cntr.
Smithsonian Institution
P.O. Box 28
Edgewater, MD 21037
(301)798-4424

Dr. Robert S. Jones (SAML)
Bermuda Biological Station for Res.
17 Biological Ln., Ferry Reach
St. Georges, GE-01, Bermuda
(809)297-1880; FAX: 297-8143
bob@bbsr.edu

Steve Jury (SAML)
NOAA SEA Division
N/ORCA 1, SSMC 4, 9th Floor
1305 East-West. Hwy
Silver Spring, MD 20910
(301)713-3000; FAX: 713-4384
sjury@seamail.nos.noaa.gov

Dr. John Lech (NEAMGLL)
Dept. of Pharmacol. and Toxicol.
Medical College of Wisconsin
8701 Watertown Plank Rd.
Milwaukee, WI 53226
(414)257-8612

Dr. Richard A. Lutz (NEAMGLL)
Rutgers Shell Fish Res. Laboratory
Rutgers University
P.O. Box 587
Port Norris, NJ 08349
(908)932-8959

Director, Northeast Fisheries Science Center
NOAA, National Marine Fisheries Service,
166 Water St.
Woods Hole, MA 02543
(508)548-2233

Dr. Brian R. Rivest (NEAMGLL)
Shoals Marine Laboratory
Cornell University
Stimson Hall
Ithaca, NY 14853
(607)255-3717; FAX: 255-0742
brr5@cornell.edu

Dr. Stephen Spotte (NEAMGLL)
Sea Research Foundation and
Marine Sciences Institute
University of Connecticut
Noank, CT 06340
(203)572-0202; FAX: 572-7700

Dr. Wesley Tiffney (NEAMGLL)
Nantucket Field Station
University of Massachusetts
180 Polpis Rd.
Nantucket, MA 02554
(508)228-5268
wtiffney@aol.com

Dr. Nancy M. Targett (NEAMGLL)
Graduate College of Marine Studies
University of Delaware
Lewes, DE 19958
(302)645-4262; FAX: 645-4007
ntargett@udel.edu

Director, (NEAMGLL)
Biological Sciences
Battelle Ocean Sciences
397 Washington St.
P.O. Drawer AH
Duxbury, MA 02332
(617)934-0571; FAX: 934-2124

Director (NEAMGLL)
Wells National Estuarine Res. Reserve
R.R. 2, Box 806
Wells, ME 04090
(207)646-1555; FAX: 646-6554

Director (NEAMGLL)
Sandy Hook Marine Laboratory
National Marine Fisheries Service
Fort Hancock, Bldg. 22
Sandy Hook, NJ 07732

Appendix N: Bibliography of Suggested Readings and Web Sites

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"Roles of Coastal Laboratories in the Implementation of the Nation's Emerging Priorities for Research in the Coastal Zone". Workshop Proceedings, Sarasota, Florida, October 24-27, 1995. University of Maryland Technical Report, 1995.

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Southern Association of Marine Laboratories. "Minorities in Marine Science Workshop III." Report of a workshop held April 22, 1989. National Science Foundation, 1989.

The Task Force on Women, Minorities, and the Handicapped in Science and Technology. Changing America: The New Face of Science and Engineering. I Interim Report. Washington, DC, 1988.

www.aaas.org
American Association for the Advancement of Sciences web site, including information on Science Linkages in the Community (SLIC) and its joint venture with the Black Church/Faith Communities Initiative.

www.ioc.unesco.org
Intergovernmental Oceanographic Commission web site.

www.nextwave.sciencemag.org/discussion/
click on "Big Debates"
Science magazine's discussion on affirmative action.

www.savstate.edu/scitech/MarineSci/MBI/htm
Savannah State University's Marine Science web site.

Appendix O: Notes and Statistical Tables

The demographic tables presented herein are a combination of tables from the National Science Foundation report, *Women, Minorities, and Persons With Disabilities in Science and Engineering: 1998,* (NSF 99-338), with noted sources, as well as those from the Proceedings of the 1995 Conference. As there are no readily available, more current sources of needed demographic information on minorities holding graduate degrees in science or engineering, it was not possible to include tables that would provide a more comprehensive summary. It is our hope, however, that the need for such information in the general effort to ensure equity and to reflect the diverse racial/ethnic composition of our nation in the scientific and engineering professions would inspire the continuous assemblage of the necessary data for the ongoing development of current comprehensive tables.

It is important to note that unprecedented shifts in federal policy and appropriations for graduate programs over the last five years forced higher education and states to take on greater fiscal responsibilities for graduate programs and student assistance. While Congress continues to cut financial aid for graduate studies, tuition has accelerated at more than twice the rate of inflation for the last fifteen years. Although President Clinton has proposed an increase for the Graduate Assistance in Areas of National Need (GAANN) program, Harris, Javits and faculty development fellowships were targeted to be eliminated in FY'97. In the face of severe budget cuts at the national and state levels, prospects become even dimmer for minorities and particularly minorities in the sciences. In 1994, the Department of Education allocated $65.1 million in graduate education. In 1996, the request was reduced substantially to $31 million.

The Bureau of the Census projects, " . . . by 2012 more Blacks than non-Hispanic Whites would be added to the population each year." "Around 2030, the total elementary school-aged cohort of the U.S. would be about equally divided between non-Hispanic Whites and all other racial/ethnic groups combined." (NSF. Women, Minorities, and Persons with Disabilities in Science and Engineering: 1994, p. 11. Arl. VA, 1994 (NSF 94-333). These demographic changes during the next century demand a major national commitment to diversify the small group of U.S. citizens who combine creativity and scientific training to:

--Determine national scientific policy and research priorities,
--Develop new products and solutions,
--Conduct research to improve the quality of life,
--Become faculty members to prepare future leaders in all fields, and
--Influence students as role models to advance scientific literacy.

One of the primary concerns of this conference was to address the national deficit of minorities in the sciences in the U.S. The term "deficit," is more than appropriate for two reasons:

(1) African Americans, Hispanics, and Native Americans received two percent or less of the 1994 doctorates earned in mathematics, environmental sciences, and engineering and no African American, Hispanics or Native Americans received doctorates in oceanography and marine sciences. (See the following Tables)

Table 1: 1994 Doctorates To U.S. Citizens By Race/Ethnicity—Mathematics

Mathematics	African American		Asian		Caucasian		Hispanic		Native American	
Applied Mathematics	1	1%	28	21%	99	76%	2	2%	0	_
Algebra	2	4%	2	4%	46	88%	0	_	0	_
Analysis and Functional Analysis	1	2%	11	19%	46	79%	0	_	0	_
Geometry	1	4%	7	30%	13	57%	2	9%	0	_
Logic	2	10%	0	_	17	85%	1	5%	0	_
Number Theory	0	_	4	16%	19	76%	2	8%	0	_
Mathematical Statistics	2	2%	36	32%	72	63%	1	1%	1	1%
Topology	0	_	6	24%	16	64%	1	4%	1	4%
Computing Theory and Practice	0	_	3	38%	5	63%	0	_	0	_
Operations Research	0	_	6	33%	10	56%	1	6%	0	_
Mathematics, General	2	2%	30	25%	85	70%	3	2%	0	_
Mathematics, Other	0	_	8	16%	43	84%	0	_	0	_
* TOTAL	11	2%	141	22%	471	73%	13	2%	2	.3%

Summary Report 1994 Doctorate Recipients from United States Universities (1995), Office of Scientific and Engineering Personnel, National Research Council (NRC). National Academy Press, Washington, DC.

* Percentages may not equal 100%, due to rounding.

Table 3: 1994 Doctorates To U.S. Citizens By Race/Ethnicity—Physics and Astronomy

Physics and Astronomy	African American		Asian		Caucasian		Hispanic		Native American	
Astronomy	0	_	5	10%	42	82%	1	2%	0	_
Astrophysics	0	_	5	8%	54	90%	1	2%	0	_
Acoustics	0	_	3	20%	12	80%	0	_	0	_
Chemical and Atomic/Molecular	1	1%	23	23%	73	72%	5	5%	0	_
Elementary Particles	1	1%	13	12%	92	84%	3	3%	0	_
Fluids	0	_	1	10%	9	90%	0	_	0	_
Nuclear	0	_	15	20%	60	79%	1	1%	0	_
Optics	1	1%	21	25%	58	70%	3	4%	0	_
Plasma and High-Temperature	1	2%	13	22%	44	73%	1	2%	1	2%
Polymer	1	6%	4	25%	9	56%	2	13%	0	_
Solid State and Low-Temperature	3	1%	84	33%	156	62%	7	3%	0	_
Physics, General	2	1%	50	25%	140	69%	4	2%	0	_
Physics, Other	1	1%	28	24%	83	70%	3	3%	1	1%
* TOTAL	11	1%	265	23%	832	72%	31	3%	2	.2%

Summary Report 1994 Doctorate Recipients from United States Universities (1995), Office of Scientific and Engineering Personnel, National Research Council (NRC). National Academy Press, Washington, DC.

* Percentages may not equal 100%, due to rounding.

Table 6: 1994 Doctorates To U.S. Citizens By Race/Ethnicity – Engineering										
Engineering	African American		Asian		Caucasian		Hispanic		Native American	
Aerospace, Aeronautic, Astronautic	1	1%	23	18%	100	77%	3	2%	1	1%
Agricultural	0	_	9	22%	28	68%	2	5%	1	2%
Bioengineering and Biomedical	0	_	22	17%	98	78%	3	2%	1	1%
Ceramic Sciences	0	_	3	14%	17	81%	0	_	0	_
Chemical	8	2%	79	24%	234	70%	5	1%	1	.3%
Civil	6	3%	57	24%	161	68%	12	5%	0	_
Communications	0	_	7	41%	8	47%	2	12%	0	_
Computer	1	1%	36	38%	58	60%	1	1%	0	_
Electrical, Electronics	16	2%	262	33%	481	61%	18	2%	1	.1%
Engineering Mechanics	0	_	26	41%	38	59%	0	_	0	_
Engineering Physics	0	_	3	25%	9	75%	0	_	0	_
Engineering Science	0	_	8	31%	17	65%	1	4%	0	_
Environmental Health Engineering	2	4%	12	22%	38	70%	2	4%	0	_
Industrial Manufacturing	6	5%	29	24%	83	70%	1	1%	0	_

* Percentages may not equal 100%, due to rounding.

Table 6: (Continued) 1994 Doctorates To U.S. Citizens By Race/Ethnicity—Engineering

Engineering	African American		Asian		Caucasian		Hispanic		Native American	
Industrial Manufacturing	6	5%	29	24%	83	70%	1	1%	0	_
Materials Science	2	1%	71	29%	161	67%	4	2%	1	.4%
Mechanical	7	1%	153	32%	296	63%	8	2%	0	_
Metallurgical	1	3%	8	23%	24	69%	0	_	0	_
Mining and Mineral	1	8%	6	46%	6	46%	0	_	0	_
Nuclear	0	_	8	19%	32	76%	1	2%	0	_
Ocean	0	_	4	36%	6	55%	0	_	0	_
Operations Research	2	8%	4	17%	18	75%	0	_	0	_
Petroleum	0	_	8	44%	9	50%	1	6%	0	_
Polymer/Plastics	0	_	9	33%	16	59%	1	4%	0	_
Systems	0	_	7	23%	23	74%	1	3%	0	_
Engineering, General	0	_	6	32%	12	63%	0	_	0	_
Engineering, Other	1	2%	8	15%	43	81%	0	_	0	_
* TOTAL	32	2%	535	29%	1249	68%	1	.1%	5	.3%

Summary Report 1994 Doctorate Recipients from United States Universities (1995), Office of Scientific and Engineering Personnel, National Research Council (NRC). National Academy Press, Washington, DC.

* Percentages may not equal 100%, due to rounding.

(2) A sizable percentage of PhDs in the sciences were awarded to non-U.S. citizens.

Text table 3-4 (Source: NSF 99-338)

Statistical Table A

Distribution of earned bachelor's degrees by field, race, ethnicity and gender: 1995

	Total	White males	Asian males	Black males	Hispanic males	American Indian males	White females	Asian females	Black females	Hispanic females	American Indian females
Field of degree:											
Total	1,110,512	407,155	28,348	30,998	27,875	2,669	485,630	30,947	54,289	38,816	3,785
Engineering	57,228	36,785	5,340	1,846	2,895	176	6,941	1,445	999	756	45
Physical science	18,231	10,006	784	495	437	66	4,946	563	539	363	32
Mathematical science	12,897	5,456	519	476	315	29	4,887	446	519	221	29
Computer science	21,812	11,793	1,583	1,241	876	73	3,739	782	1,257	431	37
Biological science	54,277	19,790	3,467	981	1,340	128	20,838	3,576	2,250	1,750	157
Agricultural science	14,180	8,152	130	121	228	82	4,968	157	142	158	42
Social science	127,184	54,508	3,247	4,565	3,774	403	46,050	3,758	6,356	4,103	420
Psychology	69,936	15,241	969	1,402	1,166	120	40,673	2,362	4,339	3,377	287
Non-science and engineering	734,767	245,424	12,309	19,871	16,844	1,592	352,588	17,858	37,888	27,657	2,736
Percentage distributions within race/ethnic/gender categories:											
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Enginneering	5.2%	9.0%	18.8%	6.0%	10.4%	6.6%	1.4%	4.7%	1.8%	1.9%	1.2%
Physical science	1.6%	2.5%	2.8%	1.6%	1.6%	2.5%	1.0%	1.8%	1.0%	0.9%	0.8%
Mathematical science	1.2%	1.3%	1.8%	1.5%	1.1%	1.1%	1.0%	1.4%	1.0%	0.6%	0.8%
Computer science	2.0%	2.9%	5.6%	4.0%	3.1%	2.7%	0.8%	2.5%	2.3%	1.1%	1.0%
Biological science	4.9%	4.9%	12.2%	3.2%	4.8%	4.8%	4.3%	11.6%	4.1%	4.5%	4.1%
Agricultural science	1.3%	2.0%	0.5%	0.4%	0.8%	3.1%	1.0%	0.5%	0.3%	0.4%	1.1%
Social science	11.5%	13.4%	11.5%	14.7%	13.5%	15.1%	9.5%	12.1%	11.7%	10.6%	11.1%
Psychology	6.3%	3.7%	3.4%	4.5%	4.2%	4.5%	8.4%	7.6%	8.0%	8.7%	7.6%
Non-science and engineering	66.2%	60.3%	43.4%	64.1%	60.4%	59.6%	72.6%	57.7%	69.8%	71.3%	72.3%
Percentage distributions within field of degree categories:											
Total	100.0%	36.7%	2.6%	2.8%	2.5%	0.2%	43.7%	2.8%	4.9%	3.5%	0.3%
Engineering	100.0%	64.3%	9.3%	3.2%	5.1%	0.3%	12.1%	2.5%	1.7%	1.3%	0.1%
Physical science	100.0%	54.9%	4.3%	2.7%	2.4%	0.4%	27.1%	3.1%	3.0%	2.0%	0.2%
Mathematical science	100.0%	42.3%	4.0%	3.7%	2.4%	0.2%	37.9%	3.5%	4.0%	1.7%	0.2%
Computer science	100.0%	54.1%	7.3%	5.7%	4.0%	0.3%	17.1%	3.6%	5.8%	2.0%	0.2%
Biological science	100.0%	36.5%	6.4%	1.8%	2.5%	0.2%	38.4%	6.6%	4.1%	3.2%	0.3%
Agricultural science	100.0%	57.5%	0.9%	0.9%	1.6%	0.6%	35.0%	1.1%	1.0%	1.1%	0.3%
Social science	100.0%	42.9%	2.6%	3.6%	3.0%	0.3%	36.2%	3.0%	5.0%	3.2%	0.3%
Psychology	100.0%	21.8%	1.4%	2.0%	1.7%	0.2%	58.2%	3.4%	6.2%	4.8%	0.4%
Non-science and engineering	100.0%	33.4%	1.7%	2.7%	2.3%	0.2%	48.0%	2.4%	5.2%	3.8%	0.4%

NOTE: These date exclude nonresident aliens and U.S. citizens and permanent residents for whom their race/ethnicity was unknown.

SOURCE: National Science Foundation, Science and Engineering Degrees, by Race/Ethnicity of Recipients, 1987-1994, (NSF 96-329) (Arlington, VA, 199

Text table 3-7 (Source: NSF 99-338)

Statistical Table B

Representation Index of racial/ethnic/gender categories in earned bachelor's degrees by field: 1995[1]

Race/ethnicity/gender	All fields	Engineering	Physical sciences	Mathematical sciences	Computer sciences	Biological sciences	Agricultural sciences	Social sciences	Psychology	Non-science and Engineering
White, non-Hispanic males	102.0	178.9	152.8	117.7	150.5	101.5	160.0	119.3	60.7	93.0
Asian or Pacific Islander males	102.0	372.9	171.9	160.8	290.0	255.3	36.6	102.0	55.4	66.9
Black, non-Hispanic males	57.4	66.3	55.8	75.8	116.9	37.1	17.5	73.8	41.2	55.6
Hispanic males	75.7	152.6	72.3	73.7	121.1	74.5	48.5	89.5	50.3	69.1
American Indian or Alaskan Native males	82.2	105.2	123.8	76.9	114.4	80.6	197.7	108.3	58.7	74.1
White non-Hispanic females	111.2	30.8	69.0	96.4	43.6	97.6	89.1	92.1	147.9	122.0
Asian or Pacific Islander females	105.8	95.9	117.3	131.3	136.1	250.2	42.0	112.2	128.2	92.3
Black, non-Hispanic females	73.6	26.3	44.5	60.6	86.7	62.4	15.1	75.2	93.4	77.6
Hispanic females	84.5	31.9	48.1	41.4	47.8	78.0	26.9	78.0	116.8	91.0
American Indian or Alaskan Native females	94.7	21.8	48.8	62.5	47.1	80.4	82.3	91.8	114.0	103.5

[1]Data used in the calclulations of these indices are presented in appendix table 3-23.

NOTE: These data exclude nonresident aliens and U.S. citizens and permanent residents for whom their race/ethnicity was unknown.

Degrees Awarded by Race in 1996

DOCTORATE DEGREES

Statistical Table C

Academic Discipline	Total of All Races and Ethnicities	Temporary Resident (NCES data only)	Black, Non-Hispanic	American Indian or Alaskan Native	Asian or Pacific Islander	Hispanic	White, Non-Hispanic	Other/Unknown Races and Ethnicities
+ ENGINEERING	6,370	3,117	69	11	533	84	2,344	212
+ PHYSICAL SCIENCES	4,570	1,596	53	11	384	70	2,290	166
+ GEOSCIENCES	0	0	0	0	0	0	0	0
+ MATH AND COMPUTER SCIENCES	2,076	940	17	3	168	17	844	87
Mathematics and Statistics	1,209	545	8	1	89	8	497	61
Computer Science	867	395	9	2	79	9	347	26
+ LIFE SCIENCES	7,944	2,234	152	19	654	163	4,409	313
Agricultural Sciences	1,035	457	17	3	61	8	464	25
Biological Sciences	4,786	1,284	74	14	437	102	2,676	199
+ SCIENCE AND ENGINEERING TECHNOLOGIES	26	14	0	0	2	0	6	4
Science Technologies	8	5	0	0	0	0	3	0
Engineering Technologies	18	9	0	0	2	0	3	4
+ S&E TOTAL (EXCL MEDICAL/OTH LIFE SCI)	27,009	8,598	554	83	1,842	576	14,311	1,047

SOURCE: NSF WebCASPAR Database System.

Degrees Awarded by Race in 1995

Academic Discipline	Total of All Races and Ethnicities	Temporary Resident (NCES data only)	Black, Non-Hispanic	American Indian or Alaskan Native	Asian or Pacific Islander	Hispanic	White, Non-Hispanic	Other/Unknown Races and Ethnicities
+ ENGINEERING	6,110	3,001	71	5	592	56	2,176	209
+ PHYSICAL SCIENCES	4,485	1,473	42	9	415	66	2,324	156
+ GEOSCIENCES	0	0	0	0	0	0	0	0
+ MATH AND COMPUTER SCIENCES	2,110	925	14	1	176	19	911	64
Mathematics and Statistics	1,226	549	5	1	89	13	531	38
Computer Science	884	376	9	0	87	6	380	26
+ LIFE SCIENCES	7,763	2,076	177	15	595	150	4,502	248
Agricultural Sciences	1,046	442	7	2	61	17	493	24
Biological Sciences	4,646	1,166	83	4	387	95	2,744	167
+ SCIENCE AND ENGINEERING TECHNOLOGIES	24	9	0	1	2	0	12	0
Science Technologies	5	1	0	0	0	0	4	0
Engineering Technologies	19	8	0	1	2	0	8	0
+ S&E TOTAL (EXCL MEDICAL/OTH LIFE SCI)	26,432	8,230	512	56	1,938	512	14,287	897

SOURCE: NSF WebCASPAR Database System.

Degrees Awarded by Race in 1994

Academic Discipline	Total of All Races and Ethnicities	Temporary Resident (NCES data only)	Black, Non-Hispanic	American Indian or Alaskan Native	Asian or Pacific Islander	Hispanic	White, Non-Hispanic	Other/Unknown Races and Ethnicities
+ ENGINEERING	5,963	3,174	57	5	439	49	2,105	134
+ PHYSICAL SCIENCES	4,641	1,653	44	6	306	86	2,410	136
+ GEOSCIENCES	0	0	0	0	0	0	0	0
+ MATH AND COMPUTER SCIENCES	1,967	923	17	2	138	15	803	69
Mathematics and Statistics	1,157	561	7	1	77	10	456	45
Computer Science	810	362	10	1	61	5	347	24
+ LIFE SCIENCES	7,522	2,148	132	17	406	148	4,480	211
Agricultural Sciences	1,072	484	14	1	27	16	506	24
Biological Sciences	4,542	1,245	62	9	279	101	2,723	123
+ SCIENCE AND ENGINEERING TECHNOLOGIES	40	16	0	1	5	1	17	0
Science Technologies	16	2	0	0	2	0	12	0
Engineering Technologies	24	14	0	1	3	1	5	0
+ S&E TOTAL (EXCL MEDICAL/OTH LIFE SCI)	25,832	8,721	460	55	1,422	518	13,977	679

SOURCE: NSF WebCASPAR Database System.

Degrees Awarded by Race in 1993

Academic Discipline	Total of All Races and Ethnicities	Temporary Resident (NCES data only)	Black, Non-Hispanic	American Indian or Alaskan Native	Asian or Pacific Islander	Hispanic	White, Non-Hispanic	Other/Unknown Races and Ethnicities
+ ENGINEERING	5,823	3,137	41	2	365	50	2,135	93
+ PHYSICAL SCIENCES	4,380	1,658	36	4	201	69	2,288	124
+ GEOSCIENCES	0	0	0	0	0	0	0	0
+ MATH AND COMPUTER SCIENCES	1,994	984	14	1	107	14	824	50
Mathematics and Statistics	1,189	632	8	0	54	8	464	23
Computer Science	805	352	6	1	53	6	360	27
+ LIFE SCIENCES	7,188	2,040	135	9	335	127	4,388	154
Agricultural Sciences	978	430	10	0	16	18	488	16
Biological Sciences	4,443	1,209	61	5	257	83	2,722	106
+ SCIENCE AND ENGINEERING TECHNOLOGIES	45	14	1	0	6	1	23	0
Science Technologies	17	4	0	0	4	0	9	0
Engineering Technologies	28	10	1	0	2	1	14	0
+ S&E TOTAL (EXCL MEDICAL/OTH LIFE SCI)	25,184	8,867	394	42	1,135	485	13,896	565

SOURCE: NSF WebCASPAR Database System.

Appendix P: Glossary of Acronyms

AAAS	American Association for the Advancement of Science
AFS	American Fishery Society
AISES	American Indians in Science and Education Society
AMS	American Meteorological Society
AOD	African Ocean Days '98
ASLO	American Society of Limnology and Oceanography
AWIPS	Advanced Weather Interactive Processing System
CFO	Chief Financial Act
CIRE	Collaboration to Integrate Research and Education—in Marine and Environmental Science and Biotechnology Program
CMER	Cooperative Marine Education and Research Program
COMET	Cooperative Operational Meteorological Education and Training
COP	Coastal Ocean Program
CORE	Consortium for Oceanographic Research and Education
DMSP	Defense Meteorological Satellite Program
DOC	Department of Commerce
DOD	Department of Defense
EDTA	Ethylene Diamine-Triacetic Acid
EEO	Equal Employment Office
EPA	Environmental Protection Agency
FTE	Full-time Equivalent
GAAN	Graduate Assistance in Areas of National Need
GERS	Gulf Estuarine Research Society
GMD	Grants Management Division
GOES	Geostationary Operational Environmental Satellite
GOOS	Global Ocean Observing System
HACU	Hispanic Association of Colleges and Universities
HBCU	Historically Black Colleges and Universities
HBMSCU	Historically Black or Minority-Serving Colleges and Universities
HBOI	Harbor Branch Oceanographic Institution
HU	Hampton University
IOC	Intergovernmental Oceanographic Commission
IODE	International Ocean Data Exchange
IPA	Intergovernmental Personnel Act of 1970
JOI	Joint Oceanographic Institutions Incorporated
MAFAC	Marine Fisheries Advisory Council
MBL	Marine Biological Laboratory, Woods Hole, Massachusetts
METCON	Metropolitan Consortium for Minorities in Science and Engineering
MINRC	Minorities in Natural Resources Committee
MOA	Memoranda of Agreement
MOU	Memorandum of Understanding
MSCU	Minority-Serving Colleges and Universities
MSI	Minority-Serving Institutions

NAML	National Association of Marine Laboratories
NASA	National Aeronautics and Space Administration
NASULGC	National Association of State Universities and Land-Grant Colleges
NCA&TSU	North Carolina Agricultural and Technical State University
NCAR	National Center for Atmospheric Research
NEAMGLL	Northeast Association of Marine and Great Lake Laboratories
NEBHE	New England Board of Higher Education
NEFSC	Northeast Fisheries Science Center
NESDIS	National Environmental Satellite, Data, and Information Service
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NOPP	National Ocean Partnership Program
NOS	National Ocean Service
NRC	National Research Council
NSF	National Science Foundation
NWS	National Weather Service
OAQPS	Office of Air Quality Planning and Standards
OAR	Oceanic and Atmospheric Research
OGP	Office of Global Programs
ORISE	Oak Ridge Institute for Science and Education
OSLR	Ocean Science in Relation to Living Resources
OSNLR	Ocean Science in Relation to Non-living Resources
PACSICOM	Pan-African Conference on Sustainable Integrated Coastal Management
PHASE	Practical Hands-On Application to Science Education
PI	Principle Investigator
PMI	Presidential Management Intern
REU	Research Experience for Undergraduates
RFP	Response for Proposals
SAML	Southern Association of Marine Laboratories
SBIR	Small Business Innovative Research
SCEP	Student Career Experience Program
SCSU	South Carolina State University
SEEP	Student Educational Employment Program
SEFSC	Southeastern Fisheries Science Center
SF	Standard Form
SICOM	Sustainable Integrated Coastal Management
SIO	Scripps Institute of Oceanography
SLIC	Science Linkages in the Community
SSU	Savannah State University
TOS	The Oceanography Society
UC	University of California
UCAR	University Corporation for Atmospheric Research
UMES	University of Maryland Eastern Shore
UNC	University of North Carolina
UNESCO	United Nations Educational Scientific and Cultural Organization

URI	University of Rhode Island
VIMS	Virginia Institute of Marine Science
WAML	Western Association of Marine Laboratories
WHOI	Woods Hole Oceanographic Institution
WMO	World Meteorological Organization
Y2K	Year 2000