

TOPIC: *EDUCATION*

KEY ISSUE: *K-12 Ocean Curricula*

ISSUES RAISED

- Sea Grant conducts priority-driven research, transfers scientific results to public, and provides educational opportunities from K-12 to graduate degrees. (DeVoe)
- A breakdown of NOAA's Education/Outreach budget and description of NOAA programs that address K-12 education are provided. (Bodman)
- A description EPA's K-12 education program is provided. (Wayland)
- Oceans play minor role in national science education standards, included as small component within Earth and Space Science sections. K-12 teachers are inadequately trained to teach marine science or incorporate ocean learning into the classroom. (Prager)
- Many highly regarded teacher training and K-12 education programs are struggling or have disappeared altogether. Many seek funds through NSF's new Center of Ocean Science Education Excellence for programmatic support rather than the coordination effort as it was intended. (Prager)
- Have a formal curriculum for young people about importance of oceans. (Weldon)
- K-12 ocean education; try to duplicate successful NASA program. (Hollings)
- Community Action is a small organization and is intensely involved in education. They have 23 schools in the Seattle area in which there are salmon in the classroom programs. (North)
- Children in kindergarten through 12th grade are poorly educated about ocean science and management issues. (Hamilton)
- Supportive school curriculum materials and science education programs that extend the experiential base are important to challenge all students. Quality science education programs provide the appropriately active "doing of science" experiences as opposed to the often used, passive approach of "read, rote, and regurgitate". (Mohling)
- The effort to enhance the scientific literacy of the nation's citizenry was underscored in the initiative to develop the National Science Education Standards brought forward and supported by NSTA to the National Academy of Science. The result of the collaborative effort between the science and science education communities has been the rededication to involve ALL students in quality science learning programs. (Mohling)
- Although not all ocean science content is included in the K-12 National Science Education Standards it is evident that topics of ocean science are encompassed in the content standards at every grade level. (Mohling)
- Ocean education within schools is essential. Ocean messages, however, can become lost within a school district's broader science education objectives. The National Science Teaching Standards barely mention the oceans and contributing experts for those standards do not include ocean scientists. (Carr)

PRESENTER RECOMMENDATIONS

- Oceans must be better represented within the national science education standards. (Prager)
- Recommend the expansion of the program. (North)

K-12 Ocean Curricula (continued)

- Incorporate ocean science and management curriculum into the national science standards. Include ocean and marine science and management issues within state and Federal K through 12 testing standards. Establish ocean education coordinators for each coastal zone state. (Hamilton)
- We need strong educational programs in Earth system science that also stress the coupled, integrated nature of the system. These should underpin not only the training of professionals, but also K-12 education of the general populace. (McPherson)
- Ocean science content must be incorporated into the National Science Education Standards and state education standards [discussion provided]. (Allen, W)

TOPIC: *EDUCATION*

KEY ISSUE: *Coordination Among Existing Ocean Education Efforts*

ISSUES RAISED

- NSF beginning Centers for Ocean Science Education Excellence to enhance ocean learning opportunities for all ages and networking between oceanographic researchers and educators. (Keener-Chavis)
- National Marine Educators Association another vehicle for cooperation. (Keener-Chavis)
- API “Energy and Society” K-8 program in partnership with environmental education Project Learning Tree, provides educators with tools to educate students and parents about role of energy. (Fury)
- Partnering with state or federal agencies to provide information and develop local & state knowledge:
 - 1) Many companies sponsor high school and college scholarships, internships, etc.
 - 2) Offshore energy industry supports “ocean and coastal literacy.” (Fury)
- There are many examples of folks who want to do good things for science education but too many examples of reinventing the wheel. (Mohling)
- As programs are developed in, or funded by, government agencies with the goal of public education about the importance of the oceans that there be some organic mechanism to bring members of the aquarium community in early, either as partners or as contributors. (Boyle)

PRESENTER RECOMMENDATIONS

- Coordinate efforts to educate all citizens about the economic, environmental, and cultural importance of ocean resources, and encourage greater public participation in protection and conservation of ocean resources. (Murley)
- National Oceanographic Partnership Program (NOPP) provides a valuable forum for addressing shared needs of importance to the science community, including oceanographic facilities and ocean education. (Colwell)
- Specific recommendations presented. (Allen)
- Through our Good Mate Program we have been working with the Coast Guard for quite some time developing educational material, providing outreach to recreational boaters. (Weissman)
- Collaboration between the education and research communities must increase to effectively incorporate the excitement of ocean investigation, exploration, and monitoring into formal classrooms, aquaria, museums, and public media throughout the country [discussion provided]. (Allen, W)
- Ocean education and outreach must be effectively coordinated and promoted at the national level [discussion provided]. (Allen, W)
- Improving ocean literacy calls for development of a national vision for ocean education resulting in a strategic plan that includes multiple Federal agencies, state governments, non-governmental organizations, school systems, and institutions of higher learning. (Allen, W)
- We urge the creation of a National Graduate Fellowship Partnership between Federal Agencies and Universities. (NASULGC)

TOPIC: *EDUCATION*

KEY ISSUE: *Teacher Training and Preparation*

ISSUES RAISED

- BRIDGE Web site provides educators with free, fast, and convenient access to accurate, peer-reviewed materials and information. (Keener-Chavis)
- The recently enacted federal legislation, No Child Left Behind, promises to bring changes to schools nationwide. There are key changes that impact science education initiatives. The law requires states to develop plans with measurable objectives that will ensure that science teachers are “highly qualified” by the end of the 2005-2006 school year. States must administer an annual assessment of student achievement in science at least once in grades 3-5, 6-9, and 10-12, beginning in 2007. (Mohling)

PRESENTER RECOMMENDATIONS

- NOAA Ocean Exploration Program unprecedented opportunity. (Keener-Chavis)
- Increase educator training on coastal and marine science and on current ocean issues; encourage teachers to introduce ocean themes in diverse curricula. (Murley)
- Must provide means to disseminate excellent marine science curricula and activities with adequate teacher training provided. (Prager)
- Quality teachers of science must have a firm command of the content they are teaching, sustained professional development for continued learning, and time in the school day to plan, strategize and collaborate with their colleagues. (Mohling)
- Professional development for in-service and pre-service teachers in ocean education must be enhanced [discussion provided]. (Allen,W)

TOPIC: *EDUCATION*

KEY ISSUE: *Ocean Literacy and Public Outreach*

ISSUES RAISED

- Effective extension education programs rely on current research, both basic and applied. (Bacon)
- Educational outreach programs are being developed and conducted for 113 Calhoun Street Project, Charleston. (Bacon)
- Many groups now profoundly under represented at professional levels in the marine science, resource management, and technology work force. Solution is education and participation. (Gilligan)
- Stewardship is an ethic that must be shared by the public at large; challenge is to raise awareness about importance of marine environment to our lives and future. (Bodman)
- A breakout of NOAA Public Affairs budget is provided. (Bodman)
- In dealing with complex programs like the marine sanctuary program, considerable outreach and education is a challenge; diverse and changing audience. (Causey)
- Scientists and policy makers must impress upon the public the importance of properly treating wastewater and changing actions that contribute to contaminants in stormwater runoff; brochures help. (Chanton)
- How to communicate with the public in light of the established communities that already exist and lack of willingness to alter lifestyle:
 - 1) Most people very concerned about environmental issues and want to change their behavior to live less harmfully on earth, but they don't know what to do and get no leadership from elected officials;
 - 2) Environmental health is a form of public health, public environmental education should be conveyed by the same avenues as public health education; environmental health should be advertised as is public health information. (Chanton)
- Several federal agencies now require outreach to be part of research proposal; good start but not necessarily effective means to combine science with education. Scientists are good at science not education. (Prager)
- Few broadcast media give science a chance. (Prager)
- Education played an important role in obtaining legislative approval for the \$3 billion Florida Forever Plan. [discussion provided] (Struhs)
- Educational efforts to illustrate why natural resources matter encourages changes in social behavior. (Struhs)
- Information and outreach play an important role in giving public awareness and understanding of the status and threats of resources. (Struhs)
- One of most important topics facing us today is creating "ocean literate" society. (Cousteau)
- The sea and its mysteries can be used to engage students to think how they are connected to the sea and how oceans play a role in our collective future. (Cousteau)
- Zoos and aquaria are trusted providers of information on the environment; they are popular and people trust them. (Andrews)
- Technology support has greatly expanded the opportunities to learn about the oceans. The JASON Project has been noteworthy in using advanced technology to bring students in touch with ocean discoveries. (Mohling)

Ocean Literacy and Public Outreach (continued)

- Educating the public about oceans and the Great Lakes requires both technical mastery and popular appeal. (Carr)
- The need for education is undeniable. Abundant research portrays alarming changes to ocean ecosystems that predict immediate challenges to the quality of human life. Public understanding of oceans and ocean issues can best be described as dismal. (Carr)
- America's aquariums form the core of a network of educational institutions that daily deploy an array of effective educational experiences about oceans and the Great Lakes. Collectively, these institutions have demonstrated the ability to reach any audience, any message, any need. (Carr)
- The John G. Shedd Aquarium here in Chicago is a stellar example. Its mission reflects its singular focus: "The Shedd Aquarium promotes the enjoyment, appreciation and conservation of aquatic life and environments through education, exhibits and research." (Carr)
- A 1996 poll by the Mellman Group named aquariums and zoos as the third most trusted messenger concerning conservation and the environment. (Carr)
- The Ocean Project is an international network of institutions working to increase awareness and appreciation of the importance and value of the oceans to all people. The aim is to significantly increase the effectiveness of ocean conservation efforts through an unprecedented collaboration among aquariums, zoos, science, technology, and natural history museums. (Boyle)
- When people become aware of the effects their actions have on the waters of the world, they may be more likely to make land and water management decisions that are beneficial to those waters. (Johnston)
- The Lake Michigan Federation has learned many lessons of how to interact with the public. Need to use the media that people relate to and watch and read in order to get the message across. (Davis)
- Discussion of background and current ocean education issues. (Rufe)
- Another critical element in developing and sustaining innovative approaches to ocean governance is the much-needed improvement in U.S. ocean literacy, and in the nation's ability to attract people to ocean science and leadership positions. (NASULGC)
- Findings, goals and objectives for education. (CSO)

PRESENTER RECOMMENDATIONS

- To accomplish inclusiveness, we need to:
 - 1) Insist upon minority representation in programs, panels, boards, etc.;
 - 2) Insist upon respecting criteria for evaluation of proposals for federal awards that address broader impacts on society and infrastructure of science;
 - 3) Use oceans as a unifying thematic base in education to demystify science, view global issues, stimulate math and science achievement, and performance in schools that enroll significant percent of under represented groups, and build cultural bridges;
 - 4) Reinvent the process by which individuals become ocean explorers, scientists, and resource managers;
 - 5) Provide level of capacity building and support to the places that have demonstrated their effectiveness. (Gilligan)
- National guidelines for ocean literacy:
 - 1) Understanding oceans facilitates operational ocean observing system as a research and educational tool;
 - 2) Ocean science a part of teaching and learning in educational institutions;
 - 3) NASA Oceanography, with others, will champion establishment of ocean literacy guidelines for educators. (Lindstrom)
- Educate policymakers and public about importance of oceans. (Loy)

- Engage public in forthright discussion of what we want fisheries and ecosystems to look like. (Rassam)
- Improve awareness and understanding about the importance of the oceans and develop a sense of stewardship toward coastal and ocean areas. (Murley)
- Create and support innovative partnerships to engage the public in learning and caring about ocean resources. (Murley)
- Marine sanctuaries offer opportunity to engage students and be centers of learning and connection. (Cousteau)
- National policy must include as a first order priority the education of the public “all the way up the stream,” throughout watershed. (Carpenter)
- Enhanced research and education capabilities and expanded public information and outreach efforts need to be supported as a basis for improving decision-making about ocean resources. [discussion provided] (Delaney)
- To get to most people, the majority of scientific data that is generated must be reduced to 3-D color animations that clearly present the problem and solutions. This is the Dr. Ballard’s telepresence and the Jason Program. And that starts with the kids and the college students. (Lobecker)
- A charismatic leader, much like John Kennedy, is needed who will tell us to go to the oceans, young man, in order to focus the national priority. It is not the scientists, educators, businessmen that represent the constituency that will really set the priorities. It is the people like the Red Sox, Patriot and Yankee fans, the people on the beaches and who fish for and eat the fish, and most importantly, the legislators. (Lobecker)
- An effort to improve learning in science and technology, both in public literacy and in encouraging individuals pursuing careers, will require a sustained commitment, of 10 to 20 years. First, we must excite and engage a generation in the fields of science and technology, who will then communicate that excitement. We must make the latest and most exciting science and technology easily available to children and adults. (Lindstrom)
- The oceans community will need to do an assessment of its “assets” and identification of those which are current, timely and fresh; all the while keeping in mind issues of scalability and sustainability. (Lindstrom)
- It is important here to note the growing trend to employ evaluation and audience research throughout development of educational programs and exhibits. (Carr)
- Shedd Aquarium, with its 70-year history in aquatic education, stands ready and eager - along with over 200 other North American zoos and aquariums - to address this urgency and facilitate the educational initiatives that will surely evolve from the Commission’s work. (Boehm)
- Monterey Bay Aquarium Splash Zone Exhibit is good example of aquarium learning experience. (Carr)
- The task we face is a need to increase the urgency of ocean protection. (Boyle)
- Three elements of an effective message on oceans:
 - 1) Ocean messages should: recreate and reinforce the positive connections many Americans already have to the oceans, especially recreational and emotional connections.
 - 2) Frame the messages and animal care needs of the projects in the values. Use the values framework of the balance of nature when presenting information about the oceans and their functions because this holds a high level of credibility with the Board.
 - 3) We also need to emphasize the importance and power of individual responsibility for this project. (Boyle)

Ocean Literacy and Public Outreach (continued)

- There is a major need for ongoing support for effective programs to increase the public's ocean awareness as outlined in this report. This should be a specific program, managed as a separate federal mandate to increase ocean awareness among the public, as opposed to a sub-program within the existing structure of the agencies with jurisdiction over the U.S. oceans and coastal zones. Typically, funds for public education in the budgets of these agencies often remain unidentified, unspent, or directed to other purposes. (Boyle)
- Somehow we've got to make people think about the relationship between what happens on land does affect what happens in the ocean. (Panetta)
- Coastal and ocean education must be improved at all levels; a better-informed citizenry is a key element to the success of a national policy on the oceans. (Allen)
- Ocean literacy among the general public must increase [discussion provided]. (Allen,W)
- Specific recommendations are presented. (Rufe)
- We urge that the outreach models, both university-based and non-university, serve as the vehicle for disseminating information simultaneously among jurisdictions (from local, to regional, and national levels) about those natural (e.g. hurricane) or human-induced (e.g. eutrophication) events that may be locally derived but ultimately affect the entire nation. (NASULGC)
- Recommendations presented for education. (CSO)

TOPIC: *EDUCATION*

KEY ISSUE: *Federal Government Role in Ocean Education*

ISSUES RAISED

- Federal programs have supported development of marine science teacher training programs and curricula; there are few means to provide funding to sustain, disseminate or coordinate these programs. (Prager)
- Education and Outreach; ways to capture attention of public; no investment in outreach is wasted. (Farr)
- Education is a shared responsibility between the academic institutions and the Federal Government. (Nowell)
- NASA has exciting subject matter that stretches the imagination; heroes that have gone where few dare, expertise that draws on the best minds in the world, images and data that show us what no one has ever seen. It is a winning package that has inspired television programs, motion pictures, museums, and new realms of research. (Lindstrom)
- NASA's role has been to continue gathering images and data and then disseminate them. The channels of dissemination have evolved into programs that encourage students and faculty in the study of our planet and space through faculty and graduate workshops, fellowships, and funding resources. We are also building partnerships with an array of informal learning organizations. (Lindstrom)
- NASA has a finely tuned educational program that supports all citizens. Its success began with the images taken by astronauts of the Earth and the moon, and continues today with data images and movies about the universe and Earth's environment. (Lindstrom)
- The most important lesson we have learned is to consider all of our efforts in the context of their ability to be scalable and sustainable and then we focus in on issues related to meeting the needs of the education community. (Lindstrom)
- Federal and state government agencies play an important role in supporting science education. In addition to those mentioned elsewhere, a range of programs provided by NOAA, NASA, EPA, and other agencies have made unique contributions to the professional development and enhancement of teachers of science. (Mohling)
- National Invasive Species Plan calls for a national, well coordinated, educational campaign. (Williams)
- The Sea Grant program is spending a tremendous amount of money to get out and reach individual charter captains, individual anglers and bait producers and stores. About \$2.2 million a year for research, education and outreach—but it is still not enough. (Reutter)
- Some of the Discovery missions had a one or two percent earmark set aside for education and public outreach programs. Education is now a core mission of NASA. Most agencies don't have a sustained budget or effort required to provide support that's needed in education. (Mohling)
- The Cooperative Research and Extension Service has a primary education role and very important work that they do through youth programs such as 4-H; we have some educational outreach we do as far as the conservation community as well. (Knight)
- The Office of Naval Research's (ONR) role in supporting graduate education has declined since its high point during the 1980s when ONR was a leader in this area. In addition, the National Oceanic and Atmospheric Administration (NOAA) has been significantly absent throughout its history in supporting graduate education on a national scale, other than through research assistantships associated with specific contracts or grants and a small program of marine policy and industry fellowships. (West)

PRESENTER RECOMMENDATIONS

- Sea Grant should become nation's primary university-based research, education, training, and technical assistance program in support of coastal, marine, and Great Lakes resource use, management, and conservation. (DeVoe)
- Sea Grant should be positioned within NOAA to most effectively contribute to the overall environmental, economic, and educational goals of the agency and nation. (DeVoe)
- Data and analysis should be made available on web to scientists and education networks as envisioned through NSF/COSEE program. (Sedberry)
- Enhance ocean science education support and human resource development. (Thoroughgood)
- Need coordination and commitment over long-term; establish Office of Education and Outreach within NOAA to coordinate educational programs nationwide and facilitate national ocean outreach campaign. Beginning budget of \$10-20 million for National Science Bowl, Jason, competitive grant program for ship time use in education. (Prager)
- NOAA should direct its labs in OAR and NMFS to encourage their scientists, in practical and beneficial ways, to join in partnership with nearby academic institutions in teaching courses, advising students and providing experiential learning opportunities for undergraduates. (Nowell)
- NOAA should take responsibility to provide training funds to universities to support students. (Nowell)
- NSF should break down the barriers between its science directorates and its education directorate. (Nowell)
- NSF should look at the NIH institutional traineeship model that has proved so effective in the health and medical sciences. (Nowell)
- ONR should reconsider its dwindling investment in graduate education and consider how it could provide increased number of fellowships under the NDSEG heading especially as a long-term investment in homeland security. (Nowell)
- The Commission should encourage universities to increase the teaching of oceanography at the undergraduate level. (Nowell)
- Support education and training programs that enable our residents to contribute to research data collection needs in their remote locations. (Pawlowski)
- A national ocean education strategy must: draw on our reservoir of present day ocean science explorers and adventurers to inspire interest and excitement about the ocean; dovetail into the broader education context – earth system science, biological sciences, general science education, and geography; and work across government agencies, educational institutions, and the private sector. The Education Strategy being developed under the National Oceanographic Partnership Program is on the right track. (Lindstrom)
- We have recently introduced an educational outreach program for kindergarten through 12th grade concerning our navigation mission through an interactive website. There are many opportunities for all of us to spread the message about the value of our oceans and the need for all Americans to take part in preserving and protecting our coastal resources. We need to work together to improve this dialogue. (Griffin)
- Given the scale of the agency and its potential import in addressing issues of resource management and sustainable development, it is imperative that NOAA take on a significant share of the responsibility for supporting graduate education and training across the marine sciences and public policy arenas. (West)
- Science education should be part of each federal ocean agency's mission. (West)
- The Commission should support more cooperative programming between the Education and Human Resources (EHR) Directorate and the Geosciences Directorate at NSF. (West)

TOPIC: *EDUCATION*

KEY ISSUE: *Academic Institutions and the Training of Educators in Ocean Sciences*

ISSUES RAISED

- This Commission has an opportunity to make substantive and implementable recommendations that can affect the types and quality and availability of graduate and undergraduate students coming from the 60 or more academic institutions that produce doctoral students, and the one or two universities that are also engaged in undergraduate teaching of ocean science majors. (Nowell)
- Progress in the science of oceanography in America now suffers from one of its greatest handicaps, for progress in this science is a matter not only of ships, laboratories and money, but far more of men, which implies opportunities for education. (Nowell)
- As far as employment opportunities in the marine related areas, I can take a local example in the School of Oceanography at the University of WA. Forty percent of faculty will turn 65 by the year 2007. Many will retire, as will those of the same age in the Federal agencies. There was a boom of hiring in the 1970s. In the next five to ten years there will be a desperate need for those knowledgeable in the marine sciences. (Nowell)
- Over twenty years ago, the University of Massachusetts Boston recognized that one of the most promising frontiers for advancing science and education would occur at the interfaces of disciplines, and established its first graduate program in Environmental, Coastal, and Ocean Sciences (ECOS). This department is unique in that it brings together faculty with expertise in biology, chemistry, physics, geology, economics, management, planning, law, and policy. (Delaney)
- Scientifically trained individuals with knowledge of coastal and ocean environments are needed to provide managers and policy makers with information to make decisions. (Jumars)
- The future quality of ocean sciences in the United States and our nation's capability to understand and manage marine issues related to environmental quality, economic well-being, and national security depend upon maintaining graduate educational programs of high caliber. (West)
- Graduate student support is not being provided in the ocean sciences at a level comparable to the life sciences. (West)

PRESENTER RECOMMENDATIONS

- Concerning education, there is a need to open it up to other social sciences including liberal arts, conservation, etc. (Weissman)
- Funding for undergraduate research internships is highly encouraged. Allow and encourage Federal marine resource managers to attend annual conferences of scientific societies to help bridge the gap between science and management. (Jumars)
- Minority representation and participation in the ocean community must increase to change the demographic composition of this community to reflect the changing demographics of our country [discussion provided]. (Allen, W)
- Recommend sustained funding for ocean education at a level that is at least ten times greater than current funding levels [discussion provided]. (Allen, W)
- At present, the financial aid system for graduate students is too dependent upon research assistantships. (West)

TOPIC: *EDUCATION*

KEY ISSUE: *Other Issues*

ISSUES RAISED

- Perceptions, misconceptions, and general lack of understanding exists between scientific and education communities of what teachers “do” in classroom as teaching professionals, and what scientists “do” as scientific researchers in lab or field. (Keener-Chavis)
- Lack of action has resulted in: missed opportunities for program collaboration among scientists and educators, lack of educational product development based on exciting ocean science, general lack of information dissemination, lost opportunities to leverage funding, ineffective efforts to recruit educators, scientists, students. (Keener-Chavis)
- Ocean research offers opportunities to bring science to classrooms and public; now is the time to expand educational efforts. NSF developing centers for ocean science education excellence to foster integration of ocean research into high quality educational materials. (Colwell)
- Research, education, and integration of technical information into marine operations critical to continued improvements of MTS. (Nagle)
- Must invest in ocean and coastal science education; all grades, K-12, undergraduate, and graduate. Looming need to replace retiring marine scientist in academics and Federal agencies. (Fletcher)
- NASA spends about \$150 million for education. (Prager)
- Examples where research has been integrated into education and outreach:
 - 1) Our Ocean World radio spot (www.ouroceanworld.com)
 - 2) The Jason Project
 - 3) Teacher training programs that encourage participation in research
 - 4) The Sea Education Association (www.sea.edu) (Prager)
- Education is a key first step for national system of Marine Protected Areas (MPAs), including primer on MPAs, lessons learned from other sites, and review of current status including available biological and socioeconomic information. (White)
- Programs to increase public awareness of ocean issues and how living marine resources interact and are affected by man’s actions:
 - 1) Farm runoff affects hypoxic areas in Gulf: eutrophication has been greatly accelerated by human activity. [examples provided]
 - 2) Marsh loss due to natural (subsidence, sea level rise) and man-induced (reduced freshwater and sediment input, dredging, etc.) causes has reached crisis.
 - 3) Flood control levees have effect on salinity regimes and deprived marshlands of needed water and sediments. (Simpson)
- Need minority role models in communities and in mentoring positions to encourage minority students to enter these fields. Hiring by federal agencies will not solve the problem. (Hinkey)

PRESENTER RECOMMENDATIONS

- Education should be the foundation of an ocean strategic plan; it is how we will engage citizens, politicians, media, business community in support of oceans. (Prager)
- Examine ways some groups have attempted to educate about energy issues: National Energy Education Development project, network of students, teachers, businesses, and industry. (West, JR)

- Consider mechanisms to reverse current approach to getting minorities into marine fields and replace it with bottom-up recruiting approach: fellowships, partnerships, and funding to make salaries at MSIs and in local and state resource management agencies as attractive as federal positions essential to keeping minority marine scientists or managers in community as role models, not in Silver Spring as statistic. (Hinkey)

