Admiral James D. Watkins, U.S. Navy (Retired)
Chairman, U.S. Commission on Ocean Policy

Luncheon Keynote
Capitol Hill Oceans Week 2002
Wednesday, June 5, 2002

I. Introductory Remarks

It is a pleasure to join you today and have the opportunity to talk about something near and dear to me, the ocean and science education of our nation's youth.

The Oceans Act of 2000 mandates that the U.S. Commission on Ocean Policy make recommendations for a coordinated and comprehensive national ocean policy. Recommendations for improving ocean education and ocean literacy will be important components of our report.

Oceans are not only important to us for a wide array of reasons; they are critical to our very survival. Oceans cover 70 percent of the earth and yet are the least explored and least understood area of the planet.

From food to weather and jobs to national security, our lives are inextricably linked to the oceans. Simply put, we cannot live without them. In turn, the health of the oceans and coastal areas is directly dependent upon our actions. It is clear that human activities are altering the state of coastal and ocean environments and impacting the sustainability of marine resources. The potential for increased human insults on the coastal and oceanic realms looms high with projections that within the next 25 years 75 percent of the U.S. population will live in the 17 percent of the U.S. land area that we call the coastal zone.

Thus, it is imperative that we have an ocean literate public that understands the role of the oceans and has the basic knowledge to be able to make the hard decisions relating to our use of the oceans and our impacts on them. We can only accomplish this through the education of our youth who will eventually be the stewards of our natural and cultural resources.

II. Ocean Commission Meetings to Date

The Commission has completed five of the regional meetings in its nine-stop tour of U.S. coastal areas. We have heard from about 150 witnesses covering almost every aspect of marine endeavors, including education.

We have had witnesses representing all ocean sectors:

- 38 representing federal government
- 23 representing state and local government
- 21 representing conservation organizations

- 19 representing industry
- 34 representing academia
- 14 representing others (including the American Bar Association, the Pew Oceans Commission, The H. John Heinz III Center for Science, Economics and the Environment)

Ten expert witnesses have addressed the importance of education covering the gamut of K-12 education, undergraduate and graduate training, and public outreach programs.

- Dr. Rita R. Colwell, Director, National Science Foundation
- Dr. Eric J. Lindstrom, Oceanography Program Scientist, NASA
- Dr. Carolyn Thoroughgood, Chair, Board of Governors and Acting President Consortium for Oceanographic Research and Education
- Ms. Paula Keener-Chavis, National Education Coordinator, NOAA Office of Ocean Exploration and Immediate past President of the National Marine Educators Association
- Dr. Matthew R. Gilligan, Professor, Marine Science Program, Savannah State University
- Mr. Robert H. Bacon, Program Leader, South Carolina Sea Grant Extension Program, South Carolina Sea Grant Consortium and Clemson University
- Mr. M. Richard DeVoe, President, Sea Grant Association
- Dr. Ellen J. Prager, Assistant Dean, Rosenstiel School of Marine and Atmospheric Science, University of Miami
- Dr. Sharon H. Walker, Associate Dean, College of Marine Sciences, The University of Southern Mississippi and Administrator, J.L. Scott Marine Education Center and Aquarium
- Mr. Jean-Michel Cousteau, President, Ocean Futures Society

As we travel the country gathering information, we hear repeatedly the conflict between using ocean resources and protecting them, the struggle to balance human needs with preservation of the marine environment.

III. What the Commission has Heard to Date

Even though we have heard from 150 different witnesses representing the broad spectrum of ocean stakeholder groups, we have heard several recurring themes throughout our meetings. These are:

- Coastal zone management is a morass of overlapping and often conflicting laws and governmental jurisdictions. Compounding this at the federal level is the fact that 44 separate Congressional committees have various oversight responsibilities for the nine federal ocean agencies.

- Our marine fisheries are in dire straits. The vast majority of stocks are being fished at or over maximum sustainable levels. Collapse of groundfish stocks off New England and the Pacific Coast may just be the tip of the iceberg unless

effective and scientifically based management plans are implemented immediately.

- Land-based non-point source pollution is the biggest threat to our coastal and near-shore environments.

- Pollutant and nutrient inputs are creating health hazards, not only for the marine ecosystems but for humans as well. Examples include: 1) viral and bacterial diseases; 2) dead zones like the one in the Gulf of Mexico; and 3) harmful algal blooms that can cause shellfish poisoning.

- We need a national ocean observing and prediction system that provides operational data and information for a wide audience of users from coastal managers to marine shippers.

- We need better stewardship and protection of our living and cultural marine resources. Ideas offered here include creation of marine protected areas, protection of vital habitats from development, tighter restrictions on extractive industries, and enhanced anti-pollution efforts.

- And, as the last example, we have heard, not only from the official witnesses, but also in public comments, the need for better education of our youth and general public to create an ocean literate society that understands the coastal and ocean issues confronting this nation and the people of this nation.

IV. Need for Ocean Science Education

With the coastal zone already home to half the nation's residents and the coastal population expected to rise dramatically over the next few decades, the need for a well-informed citizenry educated on the importance of oceans and the value of ocean and coastal resources is more urgent now than ever.

Given the complexity of ocean-related issues, determining the appropriate mechanism to address these issues now and in the future by necessity requires a scientifically informed public. Scientific literacy is key to effective public involvement in the decision-making process.

The excitement and interest oceans evoke provide a stimulating platform from which to engage people in science; the multidisciplinary nature of ocean science naturally lends itself to the teaching of basic principles of biology, chemistry, geology, physics, and mathematics.

The allure of the oceans makes them a natural catalyst for generating a life-long interest in science in today's youth, who are tomorrow's leaders and decision-makers. This allure also makes oceans an excellent medium for drawing adults to science and developing a high-level of scientific literacy in today's generation of decision-makers who must address the complex interactions between science and societal needs.

V. Oceans as Educational Motivators

It is estimated that 95 percent of the ocean is unexplored. It is the last frontier on Earth, and the potential for discovery is vast. The thrill of discovery is a powerful tool for engaging kids in science and keeping that interest through a lifetime. The excitement that oceans generate presents an opportunity for momentum in science education to be regained.

Relatively recent advances in technology allow us to "see" things we could not see before. These technologies allow students and teachers to trade in classroom-bound learning for first-hand experiences that bring the ocean into the classroom. For example:

- Remotely operated and autonomous vehicles enable people at the surface to observe things at depths of several thousand meters in real time. This has opened up a whole new "laboratory" for students and teachers through programs such as Bob Ballard's JASON Project.
- Ocean observation labs, such as the one at Rutgers University, enable teachers and students through a special website to observe real-time and near real-time measurements of temperature, waves, currents and other parameters and use this information in educational exercises.
- The NEPTUNE project headed by John Delaney at the University of Washington aims to establish a system of underwater observatories in the northeastern Pacific Ocean. Real-time data available online will be used in an array of educational programs and activities to include K-12 curricula, museum exhibits, and undergraduate and graduate-level research.
- Today's teachers have the opportunity to actually download live satellite images of Earth, including the oceans, showing synoptic views of sea surface temperature and ocean color, to mention just a few. They also can download telemetry data from oceanographic drifters and plot drifter movements over time. Programs such as the Consortium for Oceanographic Activities for Students and Teachers lead by Sharon Walker at the University of Southern Mississippi and The Bridge headed by Vicki Clark and Lee Larkin out of the College of William and Mary bring ocean education resources and materials to the desktops of educators and students.
- The Ocean Exploration Program within the National Oceanic and Atmospheric Administration, sponsors many ocean exploration expeditions. The Galapagos Rift Expedition happening right now commemorates the 25th anniversary of the discovery of hydrothermal vents at the Galapagos Rift. A series of online lesson plans developed with teachers highlights ocean exploration and the research activities of the expedition.

With new technologies that make it feasible, and even easy, for students and educators to access the oceans from inside a classroom, the door is more open than

ever before for using this vast and fascinating expanse of our planet to engage young people in science. The awe-inspiring and often unexpected discoveries from the ocean's depths contribute to the allure of ocean science. A few examples are:

- Chemosynthetic communities on the ocean floor – previously completely unknown ecosystems that rely on chemosynthesis instead of photosynthesis – life without light – have revolutionized theories on the origin of life.
- Underwater volcanoes, mountain ranges, trenches and canyons that dwarf those on land. The largest trench, found in the Western Pacific, is big enough to hold six Grand Canyons.
- Hundreds of previously unknown species, including large organisms like the megamouth shark that escaped our detection until 1976.
- Rediscovered species thought to be extinct such as the coelacanth.
- Historical and cultural resources including the *Titanic*, the *Monitor*, and John F. Kennedy's boat, PT-109, found just two weeks ago by Bob Ballard.

VI. Education Comments/Recommendations the Ocean Commission has Heard to Date

Over the course of our first five regional meetings, the Commission heard from a number of experts on ocean education issues facing the nation today, many of which were repeated from meeting to meeting. These include:

A. The need to train teachers and pre-services teachers – "educating the educators" - on how to teach ocean sciences

We have heard that K-12 teachers are not properly trained to teach ocean science or incorporate it into their lessons and that teachers are unlikely to incorporate new materials without adequate instruction. If the educators do not or cannot teach ocean science, the chances of young people being exposed to it are miniscule.

B. The need to incorporate ocean science into the *National Science Education Standards*

The *National Science Education Standards* released by the National Research Council in 1996 contain virtually no reference to the ocean or ocean science despite the fact that the ocean represents an excellent opportunity to engage students in all areas of science.

C. The need for cooperation between educators and researchers – "bridging the gap" between the two communities

Witnesses have expressed that a fundamental block to effective researcher/educator collaborations lies in a general lack of understanding between the two communities. The absence of collaborative efforts prohibits us from realizing the full potential for integrating research and research experiences into effective and stimulating educational materials and experiences.

D. The potential for using ocean exploration as an education tool
This is one of the key points others and I are trying to get across. The excitement of discovery and exploration can be a potent catalyst to get students interested in science.

E. The need for expanded "ocean literacy" among the general public
For the public to be able to effectively participate in decision-making on ocean issues, they must understand the issues. The success of this nation in properly and successfully addressing these very complex topics depends on a knowledgeable citizenry.

F. The need for greater minority representation in the ocean sciences
It should come as no surprise that minority groups are grossly underrepresented in the ocean community. As we have heard from witnesses, the future of the marine science and policy workforce lies in no small part within the intellect and skill of groups so greatly underrepresented in our professional field today.

G. The need for a coordinated and effective mechanism to promote and enhance ocean science education
Suggestions from witnesses at our regional meetings include establishing a nationally recognized Office of Education and Outreach to coordinate ocean science education efforts on a national scale. While the "how" is up for debate, witnesses have made it clear that coordination and cooperation is needed.

VII. Closing Thoughts

The Oceans Act of 2000 directs the Ocean Commission to make recommendations that "promote the expansion of human knowledge on the marine environment." I can tell you that even if education were not mentioned at all in the Act, it would still be a key focus of this Commission. Education is a subject that is near and dear to the hearts of many of the Commissioners. We believe it is the foundation for the future of this nation. We are going to try to bring education to the forefront and keep it there as we listen to witnesses at the remaining regional meetings and work toward new policy suggestions to enhance ocean education on all levels and for all people.

We want to understand how we can bring marine science into the game of helping the nation come out of its slump in understanding the importance of science to all citizens, to the world around them, to all children and certainly to adults to help them make the best decisions possible for our precious marine resources.