

**Oral Testimony to the House Appropriations Committee
Subcommittee on Commerce, Justice and Science
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**By Craig Strang, Associate Director, Lawrence Hall of Science
University of California, Berkeley, CA 94720-5200
cstrang@berkeley.edu**

Thank you, Mr. Chairman and Committee members, for inviting me to testify about the importance of inquiry-based science education. Thank you for supporting the role that NOAA, NSF and NASA play in improving science education. You can be proud of their work that improves the lives of young people, provides assistance to teachers, and strengthens our workforce. If I leave you with one message, it is: science agencies must play a leadership role in the improvement of science education. Achieving science literacy for all Americans and preparing future scientists requires direct involvement from today's scientists. Science agencies must have the mandate and funding to devote significant resources to science education.

I am Associate Director of Lawrence Hall of Science, University of California, Berkeley. **LHS** is a national leader in the development of K-12 inquiry-based science and math instructional materials. One in five children in the U.S. uses curriculum developed at LHS.

I am also Director of a NOAA, Office of Education –sponsored project, the *Ocean Sciences Curriculum Sequence for Grades 3-5*. This grant created a partnership between the LHS Center for Ocean Sciences Education Excellence and Rutgers University to provide students with inquiry-based experiences in ocean sciences. These materials will become the most widely used elementary ocean sciences curriculum nationwide. They were developed by scientists, science educators, and educational researchers, tested by the developers in local classrooms, then field-tested by 70 teachers nationwide to ensure their effectiveness and broad applicability. We are now analyzing the very positive field test data to revise the final version of the materials.

My written testimony provides more information, including our evidence of their effectiveness. This project would not have been possible, however, without previous strategic investments by NSF and NOAA to build and change the landscape of science education that made a project like mine possible.

For most of my career marine education has resided at the distant margins of K-12 science education. Understanding the ocean is critical to the health of our planet. Climate change, ocean acidification, extinction, hurricanes, tsunamis dominate the news. California alone has a \$43 billion ocean economy.

Yet, ocean topics are idiosyncratically missing from national and state science standards. The U.S. Commission on Ocean Policy reported that the absence of ocean sciences in

schools resulted in a generation of Americans ignorant of the importance of the ocean, placing our economy, environment and national security at risk.

In 2002, the NSF Division of Ocean Sciences (with a small contribution from NOAA) invested \$3.5 million to establish a National Network of Centers for Ocean Sciences Education Excellence (COSEE). I am the Director of one of those Centers. COSEE has coalesced and elevated ocean sciences education by engaging scientists and educators in mutually beneficial partnerships. Ocean scientists themselves believe that education is so critical, they devote their own research dollars to the endeavor. In the early days of COSEE, we began to discuss creating an “ocean literate society” by infusing more ocean concepts into K-12 science education standards.

In 2004, the NOAA Office of Education made a strategic investment, just tens of thousands of dollars, to convene meetings between leaders of COSEE, NOAA, National Geographic Society, National Marine Educators Association and College of Exploration to define Ocean Literacy and the ocean concepts that should be in K-12 science standards. The result was the publication of this brochure that describes seven big ideas that all 12th graders should understand about the ocean.

The Ocean Literacy Brochure is a transformative consensus document. There have been nine conferences in three countries devoted to it. It has resulted in publication of a high school textbook, a high school course, museum and aquarium exhibits, lecture series and web sites. Several states have incorporated ocean concepts into their standards. This is the new context for developing our Ocean Sciences Curriculum Sequence.

NOAA and NSF funding brought coherence and prominence to a once marginalized domain of science education. Their involvement ensures that science education keeps up with the fast moving world of scientific discovery.

Public understanding of science leads our young people to be creative, thoughtful decision-makers, and is a key to the improvement of our economy, environment and quality of life. Thank you, Mr. Chairman and members of the Committee. Please continue to support science education within NOAA, NASA and NSF.