

Full text of **Ocean Literacy Online Workshop Meeting Room** conference

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Ocean Literacy 2005

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Ocean Literacy through Science Standards 2004

Meeting Room

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Agenda

Item 1 [Peter Tuddenham](#) Oct 15, 2004 11:33

[Agenda](#)

Response 1:1 [Peter Tuddenham](#) Oct 15, 2004 11:55

AGENDA

Ocean Literacy through Science

Standards 2004

October 15-October 31

The workshop site will open on October 15th, but discussions will not begin until Monday October 18th. You may find it helpful to use the weekend to read the documents listed in the [Ocean Literacy Online Workshop Resources Item 3](#) and begin considering what you want to say once the floor is open for discussion.

If you have not already completed the pre-workshop survey (in the Meeting Room), please do so immediately as the responses will feed directly into our discussions about ocean literacy definitions. [Complete the survey now](#)

WEEK 1:

Agenda for this week will include getting to know each other, learning to navigate the online workshop site, identifying ocean content for science standards and defining ocean literacy.

Day 1-3 (October 15-17)

- Introduce yourself to the other workshop participants, go to this item: [Introductions Around the Room](#), and post your workshop expectations. Go to this item: [Expectations from the Workshop](#)
- Navigate the workshop web site. Review the web site software tutorial and HELP DESK [Ocean Literacy Online Workshop Reception Item 3](#).
- [Complete online survey](#) (if you have not already done so).
- Read through the agenda, [Ocean Literacy Online Workshop Reception Item 1](#) introduction, and other “strongly suggested reading” background materials (in Resources room) [Ocean Literacy Online Workshop Resources Item 3](#).

Day 4 (Mon., October 18)

- Complete any unfinished tasks from Days 1-3.
- Post any comments or suggestions you might have on the workshop's agenda.
- Watch interviews of James D. Watkins and Gil Grovenor. These video clips can be downloaded from the “video theatre” section of the web site (here in Meeting Room).
- Read summary of the survey responses on ocean literacy definitions.

Day 5 (Tues., October 19)

- Review Day 4 postings.

- Post comments on ocean literacy definitions after reading survey summary. (Think not only about the content of the definition we need, but also scale of the definition. In other words, how broad or detailed does this definition need to be. Do we need several definitions at different scales of detail? If so, what would those be?)

Day 6 (Wed., October 20)

- Read Day 5 summary/postings.
- Review the list of ocean concepts that people have suggested be taught at some point in a K-12 classroom. (The concepts are those found in the several documents that were part of the required reading, i.e., "Oceans for Life" matrix, Bob Stewart's white paper and list of concepts, New England COSEE's working definition of Ocean Literacy. Visit the workshop "Resources" room for more information.)
- Identify any missing concepts from these documents.
- If you are currently teaching in a K-12 classroom, list any concepts that are taught. Do they overlap with the ones identified already?

Day 7 (Thursday, October 21)

- Read Day 6 postings.
- View presentation on the National Science Education Standards by Elizabeth Stage of the Lawrence Hall of Science. (This presentation can be found in the "Presentations" section of the web site.)
- Review the National Science Education Standards and Benchmarks for Science Literacy. Links to these documents are provided the "Resources" room on this web site.
- Post any questions you might have on either science standards or scope and sequence of concepts.
- If you are teaching grades K-12 please tell us if you are using the scope and sequence of any science standards in your classroom. If you aren't using science standards in your classroom, please indicate why.

Day 8 (Fri., October 22)

- Review Day 7 postings.
- Post any final comments on draft definition(s) of ocean literacy.
- Post comments on proposed key concepts. Consider which concepts are most important in light of what you learned about standards yesterday. How many should we have? What level of detail is appropriate? Which ones are most likely to help one achieve ocean literacy?

Days 9-10 (October 23-24)

This time is available to review discussions during Week 1 and to read-ahead for Week 2.

Week 2:

This week we plan to focus on aligning ocean concepts identified last week as important to K-12 science education standards. All participants (regardless of professional expertise) will be asked to choose a grade-band (K-4, 5-8, 9-12) for the purposes of this week's discussions. You may also choose to observe several groups in order to identify connections among grade bands.

Day 11 (Monday, October 25)

- Watch interview of Marcia McNutt. This video clip can be downloaded from the "Video Theatre" section of this web site.
- Read summary from Week One discussions.
- Comment on draft definition(s) of ocean literacy that are the result of last week's discussions.
- In your discussion group, begin to develop what the ocean "scope and sequence" might be for your grade group.
- Post your findings in "item" for your grade band.

Day 12 (Tues., October 26)

- Review Day 11 postings within your group.
- Continue discussions about scope and sequence for your grade group.
- Post any additional findings for your grade band.

Day 13 & 14 (October 27-28)

- Review the results from other grade groups and compare to your findings.
- Is there a "threaded" link between the topics suggested throughout grades K-12?
- Make recommendations for follow-up to this workshop.

Day 14 (Fri., October 29)

- Review draft workshop proceedings.
- Post your feedback on proceedings.
- Post your feedback on this workshop.

Day 15-16 (October 30-31)

* Post feedback on proceedings and workshop if you did not do so on Friday.

Note: After October 31st, you will be able to login to review the material, but will not be able to add any new material. This level of login access will

remain active at least until the end of the calendar year.

This workshop is sponsored by the National Geographic Society's Oceans for Life Initiative and the National Oceanic and Atmospheric Administration (NOAA).

It has been endorsed by the following organizations:

American Zoo and Aquarium Association (AZA);

Centers for Ocean Sciences Education Excellence (COSEE);

National Marine Educators Association (NMEA) and

The Ocean Project.

Response 1:2 [Peter Tuddenham](#) Oct 18, 2004 23:10

We are still receiving responses to the survey, so we have decided to give everyone another few hours to complete the survey. I will be pulling the results first thing tomorrow, Tuesday 19th, and will then be posting some initial summaries for us to take a look at.

We will be aiming to gather as much together as possible under a broad definition of ocean literacy from this community, with considerations for meaningful definitions or statements for the three age bands in the science standards, as well as considerations that maybe needed for other groups/audience if we have time and inclination to do so.

Response 1:3 [Peter Tuddenham](#) Oct 22, 2004 14:39

As you will notice, the look has changed. We upgraded the system today. If you see anything odd please email me peter@coexploration.net

Response 1:4 [Peter Tuddenham](#) Oct 25, 2004 12:52

Who is in the Meeting Room now?

Number of users currently logged in: 1 It is now: Jan 30, 2005 09:29

Member	Userid	Active Since	E-mail
Peter Tuddenham	(peter)	Jan 30, 2005 09:29	peter@webconferences.com

Introductions Around the Room

Item 2 [Peter Tuddenham](#) Oct 15, 2004 11:37

Please introduce yourself here. It is important for us to know who is here and to know each other quickly for us to work together in the web-based meeting room.

Please

1. Introduce yourself
 2. Say where you are located and what you do
 3. A summary of your background
-

Response 2:1 George Matsumoto *Oct 15, 2004 19:22*

Greetings from Monterey.

My name is George I. Matsumoto and I am the senior education and research specialist at the Monterey Bay Aquarium Research Institute or MBARI (www.mbari.org). As the senior education and research specialist, my role involves several different projects: seminar coordinator, summer internship coordinator, livelink mentor, distance education, links between the research institute and other partners, and other projects that I haven't begun yet. I am very interested in K-grey education and increasing the ocean literacy (once we define it) of the general population! I am looking forward to this workshop and welcome all of you to the wonder and beauty of the ocean realm.

George

Response 2:2 Dave Niebuhr *Oct 15, 2004 20:47*

Hi. I am Dave Niebuhr and I am a hurricane magnet. I'm the new Vice President of the Education Division at Mote Marine Lab & Aquarium in Sarasota, FL. Our Division includes direct (interns & volunteers) learning, on-site (school & public programs) learning, and distance (videoconferencing & broadcast media) learning at our sites in Sarasota and Key West.

I have a diverse background in education. I taught high school (licensed in biology & chemistry), was the Education & Communications Coordinator at the Ches. Bay NERR, studied lipid biochemistry of corals for my doctoral dissertation, taught biology as a tenure-track professor at Salem State College, and science education methods (K-12) at the William & Mary, School of Education before coming to Mote.

I am an opinionated realist who has worked, in classrooms, with kids, for many years...but, despite being bigger and louder than your average human, I can be quite understanding and lovable.

Response 2:3 Sarah Schoedinger *Oct 15, 2004 22:26*

Hi, I am Sarah Schoedinger, an education policy analyst for NOAA's Office of Education & Sustainable Development.

My scientific background is in larval fish biology, but I have spent the last 8+ years involved in marine education. Prior to coming to NOAA, I was on staff at the Consortium for Oceanographic Research & Education (at one point early on, I WAS the education staff). While at CORE I helped start the National Ocean Sciences Bowl, was part of the nascent COSEE program, and worked on other projects related to marine education. I am President-elect of NMEA and co-chair (with Craig Strang) of the NMEA Ad Hoc Committee on Standards.

I am excited about this workshop. Although this workshop was developed over the course of 10 weeks, the idea and impetus for this workshop, namely the need to define ocean literacy and benchmark the concepts that lead to ocean literacy, have been a long time in coming. Whatever we accomplish here will be possible because a large number of people have laid the ground work ahead of us. (As Isaac Newton once wrote, "If I have seen further [than others], it is by standing on the shoulders of giants.") Many of the required and suggested readings for this workshop are the results of those earlier efforts and many of the individuals who were involved in those earlier efforts will be participating in this workshop.

I am looking forward to our discussions and debates over the next two weeks. I hope you are too!

Response 2:4 Marlene Hilkwitz *Oct 16, 2004 00:08*

Hi, I am Marlene Hilkwitz. I work in the School District of Philadelphia as an Intervention Administrator. I lead teams in schools to help improve instruction. These schools are the ones that have not made adequate progress in Reading and Mathematics as defined by No Child Left Behind legislation.

Prior to this position, I was a Science Supervisor K-12 in Philadelphia and some of its surrounding suburbs. I also am involved with Project 2061. I was part of the original group that worked on the Benchmarks for Science Literacy from 1989-1993. I continue to be connected with their other design products and analyses. My background is Biology.

I look forward to our discussions about what is appropriate for children to be learning.

Response 2:5 Francesca Cava, Nat. Geo. Society, Santa Barbara, California *Oct 16, 2004 09:42*

Welcome again.

I am Francesca Cava, one of the workshop hosts and the program manager for the National Geographic Society's Ocean Literacy Program. My current position with the Geographic is a "second" career for me. I retired from

NOAA in 1994 where I was very honored to serve as the Program Director of the National Marine Sanctuary and Estuarine Research Reserve Programs. I now channel my energy and work at the Geographic to extend our capacity to conserve our marine resources through our Oceans for Life programs in partnership with NOAA, The College of Exploration, AZA, the National Science Foundation and many others.

If you haven't already, please also visit the Reception Room where I have posted a longer welcome and a Power Point Presentation on some of the events leading to this workshop. I look forward to our discussions and thank you for your participation in this exciting process.

Please don't hesitate to ask any questions you might have on what we have done in the past on ocean literacy or how we can help you better participate in this event.

Response 2:6 Gene Williamson Oct 16, 2004 14:26

Hi- Gene Williamson here. I am a retired oceanography and earth science teacher now living on the Oregon coast with my nose stuck right out in the salt air. I spent the better part of 30 years in the classroom with two sabbatical leaves, the first to Hatfield Marine Science Center in Newport, OR, and the second to work with the education department at the Monterey Bay Aquarium.

Outside of keeping a wife and two labrador retrievers at bay, my life now focuses on indirect marine education (NOSB and NMEA), travel, and staying as far as possible away from David Niebuhr. (See above.)
"understanding and loveable???" :-)

Response 2:7 Janice McDonnell Oct 16, 2004 18:00

Hi - I am Janice McDonnell and I am currently an Education & Outreach Specialist at the Institute of Marine & Coastal Sciences at Rutgers University in New Brunswick, NJ. I have several roles at IMCS including collaborating with science faculty on education and outreach projects associated with oceanographic research (the famed NSF criterion II), working on informal education projects associated with the Jacques Cousteau National Estuarine Research Reserve, and most recently as a CO PI on the Mid Atlantic Center for Ocean Science Education Excellence (MA COSEE).

My background is in the sciences (MS in benthic ecology) and I have been working in marine science education for 12 years. Prior to my position at IMCS, I worked for the National Undersea Reserch Center at the University of Connecticut Avery Point where I coordinated research experience for high school students using undersea technologies. I love to teach, I love children, and I love the ocean! I look forward to this workshop so we all can do a better job of helping people of all ages understand the ocean and protect it.

Response 2:8 Frank Muller-Karger Oct 16, 2004 23:56

Hello: I am an oceanographer (Professor) at the College of Marine Science, University of South Florida, where I direct the Institute for Marine Remote Sensing. I do research on marine primary production, on the role of continental margins in the carbon cycle, and study areas of upwelling, river discharge, and coral reefs using satellites. These satellites measure ocean color and sea surface temperature.

I know little about formal education in the K-12 setting, but had a chance to recognize its value and push for it as a member of the U.S. Commission on Ocean Policy.

I have B.S., M.S. and Ph.D. degrees in marine science and a Masters degree in management and have authored or co-authored over 100 scientific publications. I am of Hispanic descent, and speak Spanish and German.

Response 2:9 Laura Francis Oct 17, 2004 01:42

Hi, I am Laura Francis and I am currently the Education Coordinator at the Channel Islands National Marine Sanctuary in Santa Barbara California. I have worked for the National Marine Sanctuary Program for the past 10 years. I have diverse background that includes an MA in Deep Sea Biology studying hydrothermal vents and teaching middle and high school biology and marine science. I have also worked as an environmental consultant, environmental educator and kelp forest biologist. I first became interested in Ocean Literacy when I was on detail as NOAA's Education Coordinator for the Sustainable Seas Expeditions Project where I worked closely with National Geographic Society and the different marine sanctuary sites on developing marine educational programs and products. I have participated and helped coordinate a couple of the College of Exploration online workshops in the past. I have also collaborated with NASA Oceanography on Ocean Literacy projects including the development of Oceanliteracy.org. I love inspiring young minds to become interested in learning more about the oceans and creating links between research and education. I am looking forward to a great workshop!

Response 2:10 Jaime Malwitz *Oct 17, 2004 12:15*

Greetings from Wisconsin! My name is Jaime Malwitz, a former elementary school teacher for 35 years now serving as a scientist-in-residence for schools in my state.

Ten years ago I was trained in the NSF sponsored WASDI (Wisconsin Academy Staff Development Initiative) program and have since been doing staff development and inservice programs for teachers in Wisconsin. I have 4 workshops that I have developed and teach in Wisconsin's 11 summer teacher academies. In addition, I serve as one of 18 Polymer Ambassadors in the country doing workshops and presentations at NSTA national and regional science conventions as well as serving as a Key Leader for NSTA's Building a Presence for Science.

I left the classroom in 2002 to become Wisconsin's first Albert Einstein Distinguished Science Fellow and worked for 11 months at the National Science Foundation. Unable to get a sabbatical from my school district, I began working part time for the Sally Ride Academy as a consultant and Director of Special Projects in Wisconsin doing professional development and working with public, private, choice, and charter schools.

I would like to see some content in both national and state standards on oceans (and the Great Lakes), and am hoping to learn more from the expertise of the rest of you in this project and to possibly serve as a resource person to disseminate ocean-related information to teachers and students in Wisconsin.

[OLOW_Introduction.rtf](#)

Response 2:11 Patricia DuBose *Oct 17, 2004 12:36*

I'm Trish DuBose from St. Marys, Georgia. I started my career as a quality control technician for a major producer of herbicides and other agricultural products. Then I followed my heart to the classroom. I have taught high school science at Camden County High School for 17 years. I have taught physical science, biology and technical chemistry as well as oceanography. The oceanography course was my husband's brain child and I was happy to create the course and teach the course for the past 9 years.

My educational background is an undergrad degree in biology with a minor in chemistry from Wesleyan College and a master's degree in secondary science education from the University of North Florida. Currently I am working towards an educational specialist degree from Albany State University.

I participated in the first conference on ocean literacy by this group to produce the Oceans for Life document. I have participated in many teacher workshops hosted by the various groups associated with this project.

I look forward to participating in this project with the "giants" of ocean topics!

Response 2:12 Susan Snyder *Oct 17, 2004 13:38*

Hi, I'm Susan Snyder, a retired middle school science teacher of twenty-eight years. Presently I spend seven months in Ohio (Spring, Summer, and Fall) and five months (Winter) in Naples, Florida. My time is spent as a volunteer docent at the Conservancy of Southwest Florida's Nature Museum and as a web master for the history website of the National Marine Educators Association. Also, since 1983, I have co-authored or been a member of an author team for scores of middle school textbooks for Glencoe McGraw/Hill Publishing Company.

As a former teacher and an author, I am very aware that national and state standards govern what is being taught. Teachers teach to the test and book companies design their books to align with the standards so they will sell. It is time that the aquatic features of earth (oceans, lakes, groundwater) become highlighted in these standards. I look forward to working with others who share my passion for ocean (and other water) literacy.

Response 2:13 Chris Parsons *Oct 17, 2004 15:36*

Greetings from rainy Monterey, California (this is good news—our desperately needed first rain of the season!)

I'm Chris Parsons of Word Craft. I've been working in the field of informal ocean education for 30 years, and am excited to see the progress (although sometimes frustrated by the lack of it). For nearly 20 years now I've been an independent writer/educator/evaluator.

I'm here on assignment—I've been retained to serve as the summarizer of your conversations. At the end of each week I'll provide a summary of what's been posted for your contemplation, further review and discussion.

I look forward to viewing your thoughts, learning from you and synthesizing the discussion.
Chris

Response 2:14 Mellie Lewis Oct 17, 2004 17:33

Greetings from Maryland,

I am Mellie Lewis, currently a gifted and talented resource teacher for the Howard County Public School System. I have the fantastic opportunity of working with advanced level science and math students in grades two through five at Atholton Elementary School in Columbia, Maryland. My background in the ocean sciences has pretty much been self taught – studying the ocean as an avid scuba diver, taking graduate oceanography courses at Johns Hopkins University and online courses such as the College of Exploration Courses and DataStreme Ocean by the American Meteorological Society. I am a member of NMEA and serve as a TROLL for the BRIDGE of the organization.

I feel honored to be working with this illustrious group and am looking forward to the learning opportunities and our discussions over the next two weeks

Response 2:15 Beth Jewell Oct 17, 2004 19:13

Hi, I am Beth Jewell from northern Virginia. I am presently in the classroom and have been doing so for 20 years. During that time I have taught physical science, Earth Science, geosystems, biology, and oceanography. Lately though I have been teaching biology and oceanography. I started teaching oceanography 12 years in Fairfax County Public Schools. Along with another teacher in the district wrote our Program of Studies and recently started to match our POS with the national standards. Imagine the excitement of our curriculum specialist when I told her that this group was taking this project on! Like Mellie, my background in the ocean sciences has pretty much been self taught through online workshops offered through the College of Exploration, taking and mentoring the AMS DataStreme courses, serving as a TROLL for the BRIDGE, and seeking knowledge from many of the fine folks here whenever I can pin them down. I am an Oceanography workshop junkie. Presently, I am serving on the NMEA board of directors, the current past president of MAMEA and the NSTA district VIII director.

I am looking forward to the discussion here for the next two weeks and am excited to be a part it.

Response 2:16 Gerald Lieberman Oct 17, 2004 22:25

Hi, I am Jerry Lieberman director of the State Education and Environment Roundtable. Over the past 30 years, I have created and directed numerous curriculum development programs, working with formal education systems at local, state, national, and international levels. I have also designed and implemented professional development programs for more than 12,000 educators and environmental professionals, both in the United States and abroad.

Most of my attention is currently focussed on implementing California's new Education and the Environment Initiative for the California Environmental Protection Agency and Integrated Waste Management Board.

Response 2:17 Craig Strang Oct 18, 2004 06:02

Hello, I'm Craig Strang. Sorry I'm joining a little later than I'd planned. I was in the midst of my baby's two-year birthday party yesterday and it took me all day Sunday to recover! (I wish you all could have been there but we couldn't afford to make it a virtual party.) I'm Associate Director of Lawrence Hall of Science at UC Berkeley and Director of the MARE (Marine Activities, Resources & Education) program. I'm also Director of California COSEE and have served as the Chair of the National COSEE Council for the last two years. The National COSEE Council is the governing group of representatives from all seven centers in the National COSEE Network.

MARE has been bringing marine science to elementary and middle schools around the country for a long time, but it has been an uphill battle since ocean sciences are not well represented in the National Science Education Standards or the AAAS Benchmarks. Between COSEE and the Ocean Commission Report, it feels like things are changing, though. I hope in a couple of years, we'll look back on this workshop and say that it was an(other) important moment that helped to turn the tide of indifference toward our most important resource. It's very exciting to be here with you all. Thanks to all of you for your willingness to participate.

Response 2:18 Peter Tuddenham Oct 18, 2004 09:53

Hello and welcome from the team at the College of Exploration who are helping organize, host, and facilitate this workshop. If you have any comments or suggestions please let me know. We have been working on this project

now for several years, starting with a smaller similar effort to map ocean content to geography standards two years ago.

For over five years now we have partnered with the National Geographic, NOAA's Sea Grant and Office of Ocean Exploration, NASA's JPL, Bermuda Biological Station, FIU, COSEE West and many others to offer a wide range of professional development opportunities online on ocean related subjects. We are pleased to recognize the over 3500 educators who have participated here online with us in these educational programs. We are now on two COSEE teams, COSEE-West for distance learning and COSEE-GOM for program/learning evaluation.

I am looking forward to the next two weeks discussions as a way to help shape and direct all our learning and learning program development. We want to encourage the widest possible participation.. so please add your introduction here and add your thoughts and comments as we move through the agenda. Thank you for your time and contributions.

Response 2:19 [Al Plueddemann](#) Oct 18, 2004 11:19

Hi. I am an physical oceanographic researcher from Woods Hole Oceanographic Institution. My work focusses mostly on observations of physical processes in the upper ocean. I have gotten involved in Ocean Literacy through the New England Region COSEE group.

Response 2:20 [Mike Hughes](#) Oct 18, 2004 12:13

Hi! My name is Mike Hughes. I am a Middle School teacher in Key Largo, FL., certified in Special Education. Currently, I teach a Technology class that is essentially applied Math and Science. This is my 8th year in public schools. Prior to that, I taught for a local non-profit, marine science institution for 13 years, and continue to do so on occasion. I've had the pleasure of taking thousands of students from the entire US (from 9-70 years old!) to our coral reefs and related habitats to snorkel, observe, survey, and appreciate these delicate, inter-related habitats. I've seen it anew through each of their eyes. I've experienced their disappointment when they realize that the beauty they have witnessed is only a tiny fraction of what once existed. I've felt their sadness when they realize that our human carelessness and indifference is a large part of the cause.

I consider myself an avid sportsman and conservationist. I have observed the steady, alarming decline of these habitats firsthand. I have also witnessed some rebound due to longterm efforts and education. Much more is needed, of course, and I believe the seed must be planted in our schools and it can only happen with a careful plan brought about by a network of individuals with expertise and focus.

To that end, I am honored to be among the esteemed participants of this workshop. I look forward with anticipation of expanding my own knowledge and to participating, in whatever small way, in the effort to create change for the better and for the future.

Response 2:21 [Michiko Martin](#) Oct 18, 2004 12:17

Hi! I am Michiko Martin, National Education Coordinator of NOAA's National Marine Sanctuary Program. The National Marine Sanctuary Program's Education Team is composed of over twenty-five educators located in thirteen national marine sanctuaries and one coral reef ecosystem reserve—ranging from the Florida Keys to Monterey Bay to Fagatele Bay in American Samoa. The National Marine Sanctuary Program is a strong supporter of ocean literacy, and our education mission is to enhance public awareness, understanding and appreciation of the marine environment. We achieve this mission through diverse educational programming that includes both formal and informal ocean education for all learners. Since our national marine sanctuaries are located in nine different states and one U.S. territory, our educators experience first-hand the ways that the national and state standards of education guide what is taught in K-12 education.

Outside of my current position, my education experience includes five years of teaching oceanography and meteorology at the undergraduate level, and I hold an advanced degree in Educational Leadership. My science background is in marine meteorology, and prior to my life with NOAA, I was an oceanographer and meteorologist for the United States Navy. My undergraduate degree is in (Physical) Oceanography, and my advanced degree is in Oceanographic Engineering. Thus, my own educational background covers liberal arts, science and engineering!

I am excited to work with all of you over the next two weeks!

Response 2:22 [Elizabeth Day](#) Oct 18, 2004 12:26

Hellow everyone,

I am the education program leader for the national Sea Grant program and am currently home on maternity leave.

please pardon any lack of capitalization or punctuation; I do most things with only one hand these days. My baby is 7 weeks old and my "Big Girl" will be 2 on friday!!

I have a research background in Marine science and in science education, I have been a marine extension agent, an environmental educator, a grad student 2X, a fellow at NSF and am now with NOAA in the Sea Grant Program. I am thrilled to participate in this interesting, innovative, and much needed WS.

Response 2:23 Gabrielle Johnson Oct 18, 2004 12:42

Hello,

I am a recent PhD in Marine Science from UCSB. As a graduate student, I taught a diverse array of undergraduate courses with my favorite being the introductory course focusing on ecology/evolution. In addition, I have been teaching K-6 science for the past 4 years. During this time, I have been involved in a variety of curriculum development projects including the current Ocean Explorer's Project based out of the Center for Image Processing Education (CIPE).

I look forward to working with all of you over the next few weeks and being exposed to new perspectives in marine science education.

Response 2:24 Nancy Rabalais Oct 18, 2004 12:50

Hello, this is Nancy Rabalais from Louisiana Universities Marine Consortium. I am a researcher/educator at the university level, but primarily research. My research interests include river/ocean interactions, benthic ecology, nutrient over-enrichment, and coastal hypoxia. I teach upper level undergraduates and graduates in Biological Oceanography and Changing Coastal Oceans. I participate in numerous K-12 educational activities, formal and informal. I also interact with the public at all levels. I am currently Chair of the Ocean Studies Board

Response 2:25 Tina Bishop Oct 18, 2004 13:24

My name is Tina Bishop and I am part of the College of Exploration team, based in Potomac Falls, Virginia. My background is in educational measurement and evaluation, as well as in higher education and business management. The focus of my work as the Academic Director for the College of Exploration has been in distance learning and in evaluation of educational programs. The College of Exploration has partnered with National Geographic, NOAA Office of Ocean Exploration, USC Sea Grant, COSEE-West, the Bermuda Biological Station for Research, Department of Defense Dependents Schools, and NASA-JPL to offer Web-based teacher professional development programs on science and technology. We are part of the COSEE-Central Gulf of Mexico team, supporting their program evaluation efforts. We have worked with CORE/NOSB and Howard Walters on a research project on the National Ocean Sciences Bowl. It has been especially enjoyable to work in the marine education community, facilitating online linkages between scientists and educators in support of the message of the importance of oceans.

I look forward to participating in this online discussion!

Response 2:26 Margaret Gorcyca Oct 18, 2004 13:26

Hi! From the friendly state of Texas. My name is Margaret Gorcyca and I am from the beautiful city of San Antonio.

I am a science instructional specialist working this year with the high school science teachers. We are having two days of inservice for our Chemistry teachers and half of our Biology teachers. We have found that our high school teachers know their subject area, but don't know how to get it to the different types of learners we have in science classes today. In Texas, the high school students need three years of science to graduate. One year of Biology is a requirement with a choice of Integrated Physics and Chemistry, Chemistry or Physics as their second and third year. Aquatics, Environmental, Astronomy are electives the students may choose to take.

I'm excited about this workshop because the Texas state government is considering having a four year science requirement for graduation. This could mean that Oceanography may be an option.

Response 2:27 William Bragg Oct 18, 2004 13:48

Hi everyone

I'm William Bragg, also part of College of Exploration team - and am honored to be here to manage and help

facilitate this special event. As well, it has been very exciting to have collaborated with the College of Exploration and all their partners in the various marine education events that Peter and Tina have mentioned (above). Though my background is not in marine science, I have a deep interest in all facets of science education. My doctorate program was in education technology and research/evaluation methods in technology-based education environments.

So, if you need anything here online, feel free to email me:
drwbragg@coexploration.net

As well, there is a HELP DESK item in the "Reception" room where you could ask technical questions.

William Bragg, Ph.D.
Director, Virtual Campus
College of Exploration

**P.S. - Congratulations, ELIZABETH, on the baby (response #22 above)!

Response 2:28 Casella Francesca Oct 18, 2004 14:45

Hello.

My name is Francesca Casella. For the past 4 years I have worked for the JASON Foundation for Education developing science-based multi-media curricula, some on ocean topics.

Among other things I developed a Unit on the marine ecosystem in the Gulf of Alaska (JASON XIII), a digital lab on the deep-water environment in the Monterey Bay Canyon, an ocean exploration activity book for afterschool audiences (JASON Beyond School), a Unit on the kelp forest ecosystems off the coast of California Channel Islands.

Most recently my responsibilities have shifted from product development to the areas of standards correlations and assessment. For the past 2 years I have managed the development of databases of correlations of JASON content with Science, Math, English Language Arts, and Social Studies standards for elementary-middle grades in all US states, and have also developed standards-based assessment tools for the Foundation's science products.

Whereas my work at the Foundation is mainly focused on developing curriculum and tools for the formal classroom, I have been volunteering as a physical science interpreter at the Museum of Science in Boston for the past six years, so I have quite an good understanding of how to present scientific content in informal settings as well.

Looking forward to see how far we will go with this workshop. [And my apologies for being late in posting my introduction.]

Response 2:29 Melissa Feldberg Oct 18, 2004 15:13

Hi,

My name is Melissa Feldberg and I am currently the Education Coordinator for Oregon Sea Grant. I am relatively new to the world of Science Education, having received my MS in Oceanography in 2000. I was a Knauss Fellow at The GLOBE Program and have worked with science and math outreach programs at OSU. I have been involved in curriculum development and teacher professional development as well as aligning curriculum with NSES and Oregon State Science Standards. I am participating in this workshop in the hopes that I can contribute to the discussion and also to learn from all of you and your amazing collective experience in this field.

Response 2:30 Judy Doino Lemus Oct 18, 2004 15:17

Hello!

I'm Judy Lemus, Assistant Director of Education at the USC Wrigley Institute for Environmental Studies. I am also co-director of the COSEE-West program and I previously served as Marine Advisory Program Leader for USC Sea Grant.

USC Sea Grant and WIES have been working on pre-college informal and formal marine science education for about 8 years now. We originally developed a marine science curriculum for grades 4-5 and subsequent programs for middle, high school, parents and teachers (including COSEE-West) have evolved over the years from that initial effort. I'm very glad to have been a part of the original National Geo online conference, and happy to be back for this one as well.

Response 2:31 Andrea McCurdy Oct 18, 2004 15:51

Online greetings to all! My name is Andrea McCurdy I have been working for NASA as an online outreach manager for over a decade. Since 2000 I have been focused on using the Internet to help NASA's Oceanography Program use the Internet to help create a more ocean literate society. We have conducted many live events for teachers and students and have created several web sites to help reach many different audiences through a variety of activities. I am excited to be a part of the workshop and I hope to contribute a bit about what I have learned through my different experiences - and to assess what the NASA Oceanography community might contribute to this effort as we move forward.

Response 2:32 George DeBoer Oct 18, 2004 15:57

Hello. I'm George DeBoer. I have been Deputy Director of AAAS Project 2061 for three years. Before that I spent two years at NSF and before that I had a career as a professor of Science Education at Colgate University. I am interested in the present and historic goals of science education, the specific statements of what all students should know and be able to do found in state and national standards documents, accountability issues, and student assessment. I think what happens in the ocean provides many opportunities to teach important ideas in science. I look forward to the discussions.

Response 2:33 Julie Lambert Oct 18, 2004 16:08

Hi, I am Julie Lambert. I am an assistant professor in science education at Florida Atlantic University. I grew up in Richmond, Virginia and never had the opportunity to learn about the ocean (other than fishing and enjoying Virginia Beach). I majored in finance and marketing and soon realized that I had missed learning about what I truly wanted to - the oceans (It really did start as dolphins!). So I became an earth science teacher and spent every summer making up for my lack of knowledge about the oceans. I finally completed a master's in oceanography and a Ph.D. in science education. I wanted to know what was being taught and learned in Florida's high school marine science classes. Now I feel I have an idea and I want these students to have opportunities at a much earlier age than I had. First I think it starts with their teachers though and changing requirements in high school. I look forward to being a part of this workshop.

Response 2:34 Gary Wolfe Oct 18, 2004 17:14

Hello. I am Gary Wolfe. I have been teaching integrated marine science and Advanced Placement courses at Eau Gallie High School since 1985. I also adjunct at Rollins College in Winter Park, Florida where I teach marine and environmental science lab courses. Originally from Fall River, Mass I traveled to Florida Tech to begin my education in the marine sciences. Teaching marine science from a thematic approach had always come naturally to me so when the integrated movement really started in the early 1990's I found it to be a natural combination. In the past five years I have been pursuing interests in showing others how to integrate the core sciences into a marine theme. Not very easy, but it is enjoyable. I look forward to working with everyone in the coming weeks and hope that my experience as a classroom teacher can add positively to this project.

Response 2:35 Rita Bell Oct 18, 2004 17:58

Hi,
I'm Rita Bell, Education Programs Manager at Monterey Bay Aquarium. Formerly a 7th and 8th grade math and science teacher and school administrator, I moved to informal education about 7 years ago. I oversee our school, teacher, teen and community partnership programs and work with George Matsumoto (way back at the top of this list) on a number of joint projects with MBARI.
Having worked in the professional development field for many years, I know how important it is to have a cohesive, organized and developmentally appropriate sequence of concepts and ideas to build programs and curriculum around. I'm especially excited about this opportunity to work with you all to identify those concepts.

Response 2:36 Lynn Whitley Oct 18, 2004 18:03

Hi! I am Lynn Whitley, Education Coordinator for the University of Southern California Sea Grant Program, where I help create marine science curriculum and ocean related programs for teachers, students (and parents!) in K-12 and informal science venues. I am also USC Program Manager for COSEE-West and work closely with teachers in that capacity as well. Ocean literacy has been of great interest to me for some time and I was delighted to participate in the original National Geographic online conference and am equally delighted to be involved in this one, too. I am looking forward to working and learning together with this outstanding group on this important topic!

Response 2:37 Karina Serrano Oct 18, 2004 19:35

¡Hola! My name is Karina Serrano. I am a 1st grade bilingual (spanish/english) Teacher. I teach at Central Elementary in National City, CA. (a small city south of San Diego. In fact there are several small cities even closer to the Mexico/US border than San Diego.) I was born and raised in National City. I attended UC Santa Cruz and earned my BA in Sociology as well as my teaching credential and MA in Education. I then decided to return to my

hometown and teach in my community.

Even though I have no science degree I have always "secretly" loved science. I am currently taking courses to complete a Science certificate from UC San Diego. I've also attended the MARE (Marine Activities Resources and Education) Institute and was able to incorporate a school -wide marine science based program at Central. As an educator I am always looking for opportunities to incorporate Science into my daily curriculum even though it is not a focus for my district for primary grades.

I'm always eager to learn and gather information/resources to use in my classroom with my students, especially science :)

Response 2:38 [Jean May-Brett](#) Oct 18, 2004 19:53

Greetings from Louisiana!

This is Jean May-Brett, I taught high school earth and environmental science along with mathematics for 25 years in New York and Louisiana before accepting a position as the Assistant Director of Educational Services with Louisiana Public Broadcasting which I enjoyed for 5 years. I have been in my current position as the Math Science Program Coordinator with the Louisiana Department of Education where I work in the Division of Student Standards and Assessments for a little over a year. As a science educator I have had a variety of experiences and opportunities to work on standards and GLEs at the national and state level. I look forward to working with and learning from each of you.

Response 2:39 [David Smith](#) Oct 18, 2004 21:12

Hi everyone.

I am David Smith from the United States Naval Academy. I am a professor of meteorology in the Oceanography Dept. and the co-director of the AMS Maury Project. I have been involved in teacher enhancement programs for 18 years, 11 years with the Maury Project.

Response 2:40 [Erika McPhee-Shaw](#) Oct 18, 2004 21:26

Hi. I am the newest member of the faculty at Moss Landing Marine Laboratories (CSU) in Monterey Bay, where I teach Physical Oceanography. My teaching at the university level has mostly been to graduate students, but I also had a few years of experience teaching marine science to middle school students through the University of Washington's Extension Program.

Response 2:41 [Stacey Halboth](#) Oct 18, 2004 21:31

Hello.

My name is Stacey Halboth and I am a fifth grade teacher at Rancho Santa Fe Elem (San Diego). I live in Cardiff By the Sea, which I am witnessing a beautiful sunset as I type.

I have been an elementary teacher for 13 years focusing on fourth and fifth grade. I

was trained in 1992 through the Lawrence Hall of Science MARE program. I was able to bring the program to our school the following year. This year will be our thirteenth year.

I have recently graduated from SDSU with my Masters in literacy. I have also participated in the Hofstra University Marine Lab in Jamacia. I am looking forward to the next couple of weeks.

Response 2:42 [Allison Whitmer](#) Oct 19, 2004 01:37

My name is Ali Whitmer and I am the Director of Education and a research scientist (evolutionary and population genetics) at the Marine Science Institute at UC Santa Barbara. Our education programs include K-12 teacher professional development and curriculum enhancement, undergraduate curriculum reform, and graduate student professional development.

My background includes a degree and teaching in early childhood education as well as research and teaching in undergraduate science curriculum (much more similar than you might suppose).

I have the good fortune of partnering with Laura Francis and Julie Bursek from the Channel Islands National Marine Sanctuary (see entry above) on improving ocean literacy at the regional level and look forward to expanding the conversation through this workshop.

Response 2:43 [Mark Gold](#) Oct 19, 2004 02:25

I am Executive Director of an environmental nonprofit organization working to make SO CAI beaches healthy and safe again for people and marine life. We work through advocacy, scientific research and education programs. We are also the sponsors of AB 1548, the Education and the Environment Initiative which will develop environmental education principles and model curricula for public school K-12. National Geo is a partner in this effort.

Response 2:44 Valerie Chase Oct 19, 2004 08:24

Hi All,

I was trained to do research, found I like teaching, was a college professor for 7 years and then moved to Baltimore where I stumbled into a job at the then under construction National Aquarium in Baltimore. I retired two years ago as Education director, in part because I was not well suited to sitting in meetings all day and not doing any work with teachers and students. Paula Keener-Chavis has been using me as a NOAA consultant since then. I edited a printed selection of the Ocean Exploration lesson plans and have been presenting OE teacher workshops around the country with Paula and other OE NOAA staff. I was NMEA president in 1990 and a board member and treasurer also.

Response 2:45 Mellie Lewis Oct 19, 2004 09:27

Hi Stacey,

I'm so glad to see another elementary school teacher involved in this workshop.

Mellie

Response 2:46 Sue Cook Oct 19, 2004 12:49

Hi, everyone. I've been the Education Director at CORE since June and before that was a program director at NSF and before that a manager of ocean education programs at marine labs (Harbor Branch and the Bermuda Biological Station). My degree is in marine zoology but I pretty quickly saw the light and moved into educational administration. My primary interest at this point in my career is in scientist-educator partnerships - figuring out how all of us (with our differing points of view) can work together most effectively. I'd also like to see us use the charisma of the oceans to improve science education generally.

This is my first on-line workshop and I'm really curious to see how the discussions develop.

Cheers,

Sue

Response 2:47 Dionne Hoskins Oct 19, 2004 13:23

Hi, I'm a Fishery Biologist for NOAA who has the terrific fortune of having a cooperative position at Savannah State University. I have been here 5 years and conduct research in deposit feeder nutrition and the macrofaunal composition of bottom communities.

Response 2:48 Rebecca Fenwick Oct 19, 2004 13:58

Hello!

My name is Rebecca Fenwick and I am a 3rd year PhD student at Scripps Institution of Oceanography. My background is in Earth Science and Marine Geology and I look at how tectonics, climate and sea level change affect coastal sedimentation. I am also involved in writing 6th grade geology curriculum for an educational charity here in San Diego called Aquatic Adventures. I am very interested in how science can be made more accessible/easily understood to K-12 students and from there to the public generally, as it seems that science literacy and ocean understanding needs to become more widely spread.

Response 2:49 Bob Wohlers Oct 19, 2004 15:07

Hello to you all. It is an honor to a part of this workshop. On behalf of Current Publishing, thank you for the opportunity to provide our thoughts, comments and suggestions. As the Vice President of Instructional Design and Development for Diving Science and Technology (DSAT), I was the originator, project manager and one of many authors of Current Publishing's new high school marine science curriculum (soon to be released). In years past I taught middle school, high school and community college marine science. I also taught invertebrate zoology at a marine research field station in Grenada, West Indies. More recently I've been involved in the development of recreational scuba diving and first aid/CPR curricula and materials.

Response 2:50 Eric Lindstrom Oct 19, 2004 15:07

I am Ocean Physics Program Scientist at NASA Headquarters. My background is in seagoing physical

oceanography studies and air-sea interaction. I have a deep interest in seeing a more informed public on ocean matters to sustain our field of research and the ocean environment for the long-term.

Response 2:51 Mike Perfit Oct 19, 2004 16:24

I am a Professor of Geology and Graduate Coordinator in the Department of Geological Sciences. I have been at the University of Florida in Gainesville for the past 21 years after spending 5 years as a Research Fellow at the Australian National University. I teach both undergraduate and graduate classes and am a member of the Honors Faculty. My specialty is igneous petrology and geochemistry and use my background in marine geology to study the generation and evolution of oceanic crust. I have participated in over 20 major oceanographic cruises and have had over 35 dives in the manned submersible ALVIN and have been using remotely operated vehicles (ROVs) for the past decade. Some of my most recent work has been done in conjunction with the folks at MBARI like George Matsumoto (2:1).

I have been a member of the United States Science Advisory Committee (USSAC), the Lithosphere Panel of the Joint Oceanographic Institutes and a panel member on the Ocean Science Division of the National Science Foundation. I have also served as the Chair of the Review Panel of the U.S. Science Support Program for NSF and the Chair of the Deep Submergence Science Committee (DESSC). I currently serve on the Executive Committee and Education and Outreach Committee of the RIDGE2000 program that serves to direct, organize and support mid-ocean ridge scientific exploration, research and education. Through the RIDGE program we have been trying to bring real-time marine exploration into the K-12 classroom.

I have been working closely with Dr. Matt Smith who recently came to UF as a lecturer from the American Geological Institute. He has a good deal of background in geoscience education and has been developing new teaching methods and outreach programs at the college level. I enjoy "guest" teaching in local K-9 classes and find the kids to be very enthusiastic about earth science, but am concerned about the lack of any marine or geoscience in the high schools. You would think that in Florida, more people would be interested in the oceans. I look forward to hearing the thoughts and experiences of many of you who work in the "trenches".

Response 2:52 Sharon Walker Oct 19, 2004 16:30

I am a former High School Science Teacher (Chemistry, Advanced Marine Biology, Anatomy and Physiology, and Environmental Chemistry) for eight years, and I have also been teaching K-12 teachers (pre- and inservice) and their students, as well as K-12 audiences for the last 20 years as the Director of Education with the MS-AL Sea Grant Consortium and through serving as the Administrator of the J.L. Scott Marine Education Center and Aquarium (MEC&A) in Biloxi, MS; the MEC&A is administered by The University of Southern Mississippi (USM). I am also a Professor in the Department of Coastal Sciences within USM's College of Science and Technology. And, I am honored to serve as the PI for the COSEE-Central Gulf of Mexico, as well as having served on the Science Advisory Panel for the U.S. Commission on Ocean Policy. I am a past NMEA President and Secretary and am currently the NMEA Membership Secretary and the Education Chair for the Marine Technology Society.

I am delighted to be involved with this Ocean Literacy Online Workshop, for we all have much work to do during the next two weeks! My hope for this Workshop is that we will collectively develop a "working and meaningful" definition of ocean literacy and then determine effective implementation strategies in ascertaining "how we will know" when we have an ocean literate citizenry.

As Sarah Schoedinger indicated in her introduction, there have been many people involved in providing us the opportunity to be involved in the momentum currently in place for ocean sciences education. Further, I believe this Workshop will prepare us as scientists, policy analysts, and informal and formal educators to "bridge the gap" between ocean sciences research and the significance of those data to our everyday lives.

Response 2:53 Rebecca Bell Oct 19, 2004 16:40

I am the Environmental Education Specialist at the Maryland State Dept of Education. I taught biology (general to AP) in high school and sciences in middle schools for 26 years. I also worked in staff development and gifted education. I currently work with school systems, NPOs, and government agencies to implement EE in Maryland schools. As part of the science team at MSDE, I am involved in developing the state science curriculum and required assessments. Ocean education was quite the thing when I started teaching a long time ago. I am glad to see it's coming back!

Response 2:54 Liesl Hotaling Oct 19, 2004 16:41

Hi Everyone-

I am involved with this workshop due to my work with real time data and curriculum development. I have worked as a scientist and educator and am bringing the experiences together in an effort to create Internet-based

curriculum focused on real time data produced by ocean observing systems. Internet-based curricula offer the potential to reach a wider audience and enliven a curriculum by infusing technology and real world problem solving using the real time data.

I am very much looking forward to reading your opinions on the various topics addressed in this workshop.

Response 2:55 Bob Stewart *Oct 19, 2004 17:54*

Hi, I am a professor of oceanography at Texas A&M University. For the past six years I have been learning about education and how to teach oceanography. Before that I was a senior research scientist at the Jet Propulsion lab and a research oceanographer and adjunct professor at Scripps Institution of Oceanography. So you might say I have gone from the lab to the classroom. I am a physical oceanographer, an expert on satellite oceanography, and I care a lot about education. I hope I can make a small difference.

Response 2:56 Jonna Engel *Oct 19, 2004 21:32*

Hello everyone, my name is Jonna Engel and I recently started working for Channel Islands National Marine Sanctuary as an Education and Outreach Specialist. I am late logging in because I was in Cambria with a group doing intertidal sampling over the weekend and I have been going through the hoops of getting NOAA dive certified the last couple days. I am really excited to be a participant in this conference. My passion is linking marine research and conservation through science education. I have been immersed in the marine research realm for the past 12 years, earning a Master's of Marine Science degree from Moss Landing Marine Labs (where I examined the impacts of commercial trawling on a benthic community within Monterey Bay National Marine Sanctuary) and a Ph.D. from UCSC (where I studied the influence of Pleistocene ice age history, biogeography, and micro-evolutionary and ecological processes in shaping population genetic structure of the California sea mussel, *Mytilus californianus*). I am eager to get up to speed with what is happening in the K-12 science education world! I have some catching up to do—a lot has happened since I was the Education Coordinator of the Sea Center of the Santa Barbara Museum of Natural History (1987-1992). This conference is a great way for me to get plugged into the world of science standards and I look forward to joining you in defining ocean literacy, developing the scope and sequence of ocean content in K-12 education, and to mapping this to the national science standards.

Response 2:57 Elizabeth Rogers *Oct 20, 2004 09:43*

Greetings from Charleston, SC! My name is Elizabeth Rogers and I am the Curriculum Specialist at SECOSSE. I am also in graduate school for science education with the middle grades. Before starting back to school, I developed an earth system science textbook for middle schoolers at the American Geological Institute.

I am excited about being involved with this group!

Response 2:58 Elizabeth Rhodes *Oct 20, 2004 10:31*

Hello, my name is Elizabeth Rhodes. I am located in Charleston, SC at the College of Charleston. I teach undergraduate introductory geology courses and marine and coastal science for the MEd program here at the college. For several years I worked as a naturalist and wilderness guide, then as an educator at an environmental education center with a focus on coastal and marine science. We provided programs for K-12 through adults, although our primary audience was K-5. My thesis research examined coastal erosion in SC and entailed the use of GIS to make a quantitative analysis of the success of beach renourishment.

I am excited to be a part of this workshop.

Response 2:59 Steve Webster *Oct 20, 2004 16:05*

I'm Steve Webster - arriving a bit late as I just returned from the Sea of Cortez where I was chasing whale sharks and continuing 30 years of research on Mexican tequilas.

I'm just retired (still volunteering) after 25 years at the Monterey Bay aquarium, where I directed the education division for 13 years and more recently have been called Senior Marine Biologist. I've helped train our volunteer guides (docents), have present auditorium programs like our deep sea link with MBARI, and answer our visitor questions and questions that arrive via our web site. I also serve on the board and work with the Sea Studios Foundation, whose four-part series, *Strange Days on Planet Earth* will air on PBS in April.

I'm looking forward to catching up and chatting with you all.

Response 2:60 Matt Smith *Oct 20, 2004 17:09*

Hi All,

Sorry to be joining the conversation late. I am Matt Smith, a lecturer at the University of Florida. I have been researching mid-ocean ridge systems and the magmatic and tectonic processes occurring here for about 15 years. I have participated in about a dozen oceanographic cruises to various sites in the eastern Pacific. My areas of expertise are marine geology, igneous petrology and high-temperature geochemistry. Before coming to UF about 18 months ago I was the Education Programs Manager for the American Geological Institute (a position I held for 2 years) My primary charge there was managing the development, publication, and implementation of several NSF-funded, inquiry-driven, standards-based Earth science curricula for middle school and high school (whew, that is a lot of hyphens in one sentence ;-). I continue to do research relating to mid-ocean ridges and the formation of ocean crust, but more and more my efforts are devoted to curriculum development at the K12 and collegiate levels, and trying to apply various pedagogical strategies to the large-enrollment introductory classes that I teach here at UF (~500 students/semester).

I am looking forward to participating in the conversations and hopefully I can get caught up on what I have missed thus far.

Cheers.

Response 2:61 Carmelina Livingston *Oct 20, 2004 18:21*

Hi,

My name is Carmelina Livingston. I am the Educator Programs Coordinator at the SC Aquarium which is in Charleston, SC. I work with SC teachers in providing professional development opportunities on standards-based instruction. I also have the wonderful opportunity to teach K-12 students at the Aquarium in our FREE Standards-based school programs. I am a former K-5 classroom science teacher of 17 years. I am the chapter representative for NMEA representing SC. I am looking forward to working with all of you in generating a ocean literacy definition(s) and future standards.

Response 2:62 Pam Stryker *Oct 21, 2004 00:44*

Hello to all. I'm Pam Stryker a 33 year teaching veteran currently teaching second grade at Barton Creek Elementary and madly involved in trying to complete the 25 parent conferences that I have this week. I am an active member of the National Marine Educators Association as well as current president of the Texas Chapter, TMEA. In my spare time outside the classroom, I am a science and math consultant. I have also co-authored science curriculum materials as well as a science textbook currently in adoption. My love for the ocean began early as I lived all along the Texas, Louisiana, and Mississippi coasts. Although, my formal science education experiences were not in the areas of the marine sciences, I feel blessed to have so many mentors such as Rick Tinnin at the UTMSI, Craig Strang at Lawrence Hall, and all the other great folks I've met along the way in NMEA. Through their guidance I have been able to marinate the lives of both students and their parents for over 15 years.

Response 2:63 Melissa Demetrikopoulos *Oct 23, 2004 07:17*

My name is Melissa K. Demetrikopoulos. I am with the Institute for Biomedical Philosophy which is a small consulting firm located in Atlanta with branches in TN, FL, and NJ. I work with schools, universities, and informal educators to develop and evaluate educational programs. My background includes an undergraduate degree in chemistry from Eckerd college. Eckerd now has a marine biology program but even when I was there there was a big marine focus in many of the courses. My masters is in behavioral neuroscience from Rutgers and my PhD is from UMDNJ. Although my formal content training is outside of marine science, I have had a life long love of the ocean and use it as a hook to teach other areas of science. I teach a workshop in the keys on using marine science to teach a variety of other subjects and have developed a number of marine based games.

Response 2:64 Dave Karl *Oct 24, 2004 22:04*

Aloha from the ocean state of Hawaii. My name is Dave Karl. I have been on the faculty of the University of Hawaii since 1978 where I teach (mostly grad students) and conduct research on marine microorganisms. Earlier in my career I taught science and math at an inner city high school in Buffalo, New York. One area where I hope to make a difference is in the integration of research and secondary education. We hope to restart a successful, but no longer functional Bluewater Marine Laboratory here in the islands.

Response 2:65 Dean Allen *Oct 25, 2004 18:35*

Hello Everyone,

I am Dean Allen, Vice President of PADI's Education Division, Current Publishing Corp., located in Rancho Santa Margarita, California. My 31 year career in Educational Publishing includes developing and implementing science training programs to elementary and middle school teachers and administrators nationally. Prior to publishing, I

was the Naval Science Department Head for the Texas Maritime Academy, which is part of the Marine Science and Maritime Resources College at Texas A&M, in Galveston, Texas.

Response 2:66 Bob Chen Oct 25, 2004 19:52

Hi All,

I am Bob Chen, a co-PI on the New England Center for Ocean Sciences Education Excellence NE-COSEE), and Associate Professor (marine organic geochemistry) in the Environmental, Earth and Ocean Sciences department at UMassBoston. A team at NE-COSEE has developed a 4 part definition for our own purposes of evaluating whether our other efforts are "excellent" as judged against some standard. This definition is posted, but also a work in progress, so feel free to comment. I have also developed an 8 "key concepts" of Ocean and Environmental Science document and am teaching courses based on this simplified (mile deep, inch wide) framework rather than trying to cover an ever growing # of pages and facts in Introduction to Oceanography texts.

Response 2:67 Craig Strang Oct 27, 2004 09:34

Hi, Bob,
Welcome. Can you post the 8 key concepts? Might be helpful.

Response 2:68 Bob Chen Oct 28, 2004 10:22

Hi Craig,

Sorry for the delay. They are posted in Item #10 (10:28).

Response 2:69 Margaret Tower Oct 29, 2004 13:08

Margaret Murray Tower is my name. I am a science and special education teacher in a Chicago Public School, Foreman High. We have about 1700 learners, 81% Hispanic, 7% Polish, and a variety of other nationalities represented. Chicago, District 299, is poor and urban and exciting! I was an RET this past summer at Feinberg School of Medicine, Northwestern University, Chicago, IL. RET is research for teachers, a National Science Foundation grant to encourage NSF researchers to hire k-12 teachers in their laboratories so we can bring the message back to the kids: major in science in college! We are down to 8% science majors in colleges in the USA. With Homeland Security we are told to grow our own! This was a wonderful experience. I too worked on the national and state science standards. My Bachelor's Degree in Biology is from Northwestern University, Evanston, IL and my first Master's Degree is in Biology from the University of Michigan, Ann Arbor, MI. My second Master's degree is An M.A. in Educational Administration from Northeastern IL University, Chicago. I have 7 children, all reared. I just finished working two years for the Chicago Public Schools on a Local Professional Development Committee, approving plans and workshop, etc. work for teachers' re-certification in the State of IL. I volunteered for several years on a Task Force in bring in the requirement of three years of science for every graduate of a Chicago Public High School. We are very proud of that!

Response 2:70 Paula Keener-Chavis Oct 29, 2004 14:13

Hi All: I am going to try to do what I can to jump in here at the end of the workshop and read as much as I can and contribute what I can over a very busy weekend. Paula Keener-Chavis

Response 2:71 Kate Madin Oct 29, 2004 15:41

Hello to all, this is Kate Madin. I am extremely apologetic for signing on so late. I had every intention of being here all along, but didn't manage to. I'm at the Woods Hole Oceanographic Institution and at Woods Hole Sea Grant, where I've been involved in writing and producing children's science books, putting on teacher workshops, science writing and editing for our in-house magazine, and other projects, including NE-COSEE and occasionally a research project on salps out at MBARI. This is a wonderful opportunity to interact, and I am so sorry I wasn't contributing all along. Wish it could continue a while longer! Kate

Response 2:72 Fritz Stahr Oct 29, 2004 19:49

Greetings from Seattle. Hard to know where to start as I'm so late to join this section, apologies. (I'm inspired to this entry by the others from today). Glad to see so many here who are experts in education and oceanography. I've been on both sides, research in physical oceanography & hydrothermal vents, teaching intro college classes and students on the water through a non-profit venture. I too am trying to catch up on the workshop (have only checked in sporadically) but from my reading so far believe that other's have voiced my concerns in their comments...thanks and good work all.

Expectations from the Workshop

Item 3 Peter Tuddenham *Oct 15, 2004 11:37*

Please let us know what your expectations are for the next two weeks

Response 3:1 Frank Muller-Karger *Oct 16, 2004 23:59*

My expectation is simply to see a basic set of concepts develop of what are generalized priorities for ocean literacy, both in formal education settings but also in informal settings. I also hope I can contribute to the expectations of others.

Response 3:2 Melissa Demetrikopoulos *Oct 17, 2004 13:11*

I am looking forward to being involved in this process since I am in the midst of discussions about undertaking this same task in another content area. I am not sure that I have any expectations. That being said, I was somewhat surprised by the depth and length of the preliminary list of facts that have been suggested as key to ocean literacy. Thus, I am anticipating discussions that will allow us to prioritize this ambitious list.

Response 3:3 Jaime Malwitz *Oct 17, 2004 20:26*

I am looking forward to seeing a development of ocean science standards, both content and performance, and to possibly use information gathered here to develop a workshop for use in Wisconsin. I hope too this may lead to some future online fellowship and sharing of resources.

Response 3:4 Elizabeth Day *Oct 18, 2004 12:29*

I hope and expect the stated goals will be accomplished through lively and engaged on-line conversation. That will be quite an accomplishment!!

Response 3:5 Gabrielle Johnson *Oct 18, 2004 12:47*

I am most looking forward to gaining new perspectives on ways to expand marine education. In addition, I would like to see further development of ocean science standards integrated into all aspects of curriculum including social sciences, mathematics and language arts.

Response 3:6 Nancy Rabalais *Oct 18, 2004 12:51*

I expect to see the steps necessary to take ocean science into the national ocean standards, and how as a researcher and educator at the college level our community can help.

Response 3:7 Mike Hughes *Oct 18, 2004 13:26*

Professional educators are highly trained and willing to move students to the highest levels of Bloom's taxonomy in any given subject, but most of us have precious little practical life experience in the subjects we teach. This is especially true in the critically-formative elementary grades, because they teach so many subjects. Nor do we have close contact with what will be expected from our students as they move into the world of work. So, educators must depend on the professionals in the field to help us develop an age-appropriate, educationally sound, scope and sequence that is applicable to the real world.

Response 3:8 Margaret Gorcyca *Oct 18, 2004 13:36*

My expectations are:

* to be sure that the Ocean Literacy will fit our curriculum, TAKS: Texas Assessment of Knowledge and Skills.*

*I would also like to grow in my knowledge about Ocean Literacy.

*Interact with others during this workshop and get to know people from all over the US

Response 3:9 Andrea McCurdy *Oct 18, 2004 16:01*

We went through a relatively involved process in creating an online opinion poll for: <http://oceanliteracy.org> - I hope to contribute what I learned through that process -and- to see how different the outcomes are relative to what people think an ocean literate person will know about our oceans.

I also look forward to seeing how these concepts are mapped to existing national science standards in an effort to better map our products to these same standards.

Response 3:10 Michiko Martin *Oct 18, 2004 16:16*

My expectation is to achieve workshop goals: (1) To determine the "scope" of ocean content that should be taught in our schools; and, (2) To determine how we "map" those topics into the national science standards.

As a bonus, I hope to learn more about what others are doing to support ocean literacy and to determine ways that we can promote awareness of NOAA's National Marine Sanctuaries, America's ocean and Great Lakes treasures.

Response 3:11 Rita Bell Oct 18, 2004 18:07

I'm hoping that we will be able to identify a list of essential key concepts that, when understood, will help students and the general public understand their connection with the oceans and their role in ocean conservation.

Response 3:12 Lynn Whitley Oct 18, 2004 18:25

My expectations are to achieve the workshop goals of identifying essential key concepts and how those concepts will be mapped into the scope and sequence to best benefit students and teachers. I also expect that this will be an interesting and engaging process in which we will all share and learn!

Response 3:13 Laura Francis Oct 18, 2004 20:15

My expectations are for the group to come to some consensus on the essential key concepts that students need to understand and be able to apply to real world situations to be considered ocean literate and to map these concepts to the national science education standards and the AAAS Benchmarks.

Response 3:14 Marlene Hilkwitz Oct 18, 2004 21:15

My expectations for this workshop/conference are to accomplish what was expected - a set of consensus statements that are developmentally appropriate that describe the unique learnings from our oceans and how we interact with that knowledge. I also expect that through our wonderful and productive discussions will come great ideas for collaboration on future projects and products that will help support our goals.

Response 3:15 David Smith Oct 18, 2004 21:16

I would like to see a comprehensive plan for enhancing the study of the Ocean sciences at all grade levels as well as informal educational settings. In my opinion, previous efforts have been too fragmented. We need to collaborate in an effort to utilize our resources more efficiently and effectively.

Response 3:16 Craig Strang Oct 18, 2004 21:16

My expectation and hope is that we can arrive at some consensus about what we think are the most important ideas and concepts that all people should know about the ocean. It sounds so simple...but it seems a little allusive. Won't it be great when the next science standards are being developed and one of us is invited onto the panel and we bring with us a document that represents broad agreement from prominent scientists, educators, policy makers, professional associations and the entire COSEE Network?

Response 3:17 Patricia DuBose Oct 18, 2004 21:46

I am confident we will reach consensus on the essential questions of ocean topics. As we identify these essential questions I have hopes of inspiring textbook companies to invest in high school level textbooks to enhance the teaching of these key concepts.

Response 3:18 Allison Whitmer Oct 19, 2004 01:04

Like the rest of you, I also hope to come to some consensus about what we think are the most important ideas and concepts that all people should know about the ocean. I also hope that the ideas and concepts we identify are broadly agreed upon by the many interested groups we represent.

Response 3:19 Mark Gold Oct 19, 2004 02:23

I understand and appreciate the focus of the conference to develop the scope of ocean content and see how to map that into national science standards.

I am however curious whether there will be any coverage/discussion about how the national science standards relate to various state science standards, and whether the mapping suggestions can be applied to state standards? Heal the Bay is interested in the application of this conference material to the Education and the Environment Initiative in California.

Response 3:20 Beth Jewell Oct 19, 2004 07:21

I would like to see a wide-ranging strategy for augmenting the study of the Ocean sciences that is all-encompassing. To this point, previous efforts have been too disjointed. We need to work in partnerships in an effort to exploit our talents more proficiently. Identifying the major concepts and ideas that our students should be learning about the ocean will be a big step forward in unifying what it is taught in our classrooms as well as a great stepping stone for those that aren't making learning about the ocean a priority in their curriculum.

Response 3:21 Peter Tuddenham *Oct 19, 2004 08:10*

Mark.. it is a very good question and comment about the possibility of discussion and application of the material here to the Education and Environment Initiative in CA, not to mention the other states. That is beyond the scope of the specific agenda we have for two weeks, however you are welcome to start an item in "Oceanside" and lead that discussion for anyone interested, and or we could conceivably set up seperate spaces for each state to address their needs.

Response 3:22 Valerie Chase *Oct 19, 2004 08:35*

I would like to come away with both a list and a plan for implementation that integrates ocean science into the existing NSES and AAAS Benchmarks. I have watched the EE community produce a long, detail document that has been largely ignored. The curriculum is stuffed with content already. Ocean science fits into all the sciences that are currently taught, but is poorly understood by most of the people who produce curriculum and textbooks and is also poorly understood by the folks who produced our standards. If we do not use the existing frameworks and standards and if we do not fit into the existing political system by which standards and benchmarks are produced, we will have little impact. Since the NSES came out of the National Academy of Sciences, our greatest allies are the ocean scientists who are in the Academy and who are in a position to encourage ocean science inclusion. We cannot be an add-on. Ocean science needs to be part of the main stream.

Response 3:23 Dave Niebuhr *Oct 19, 2004 10:43*

I'm hoping we come away from this meeting with areas of essential content emphasis and strategies for inclusion in existing state and national standards.

I must agree with Valerie about structuring our efforts to be inclusive of what has gone before. Additionally, we must not only consider the NSES, but also each of the state standards/frameworks...which in my experience are all VERY similar (giving some leeway for particular state emphasis).

Response 3:24 Stacey Halboth *Oct 19, 2004 10:53*

Teaching eight other subjects besides science, I hope to come away with a better understanding of what other people are doing to bring the state standards more relevant to the children and to support the planet. To ensure change for the future awareness, starts with the children. I look forward to giving my input and to hear others. Afterwards, I will be the voice of science which has not been heard over the reading, writing, and math standards. My administration is eager to listen and allow me to educate the staff regarding science. I am open to do my part, whatever that may be.

Response 3:25 Janice McDonnell *Oct 19, 2004 13:51*

As Craig noted, I am hoping we can come together as a community to agree what is important to know about the ocean. I think agreement on this (as it aligns with NSES and AAAS Benchmarks) will transport us out of the margins of national education initiatives and into mainstream. I can't wait to use the standards we create, along with our best evaluation data on student prior knowledge and professional development best practices to build a comprehensive network of marine education products and services. By the way, I want world peace too!

Response 3:26 Susan Snyder *Oct 19, 2004 14:25*

My expectation for this workshop is that 1) we develop a definition of "ocean literacy" that we can all agree on, 2) we come to consensus about the concepts that should be taught K-12, and 3) we agree on where these concepts fit with the science standards K-12.

The reality of science education K-12 right now is that the writers of state proficiency tests control what is being taught by most teachers. The test writers interpret vague science content standards and ask questions about concepts they deem important. Teachers teach to the test because they want their students to do well on the tests; and, in some states their salary and future prospect of staying in the profession is based on student test scores. Curriculum committees adopt textbooks that teach the concepts identified as important on the tests. In order to be competitive, textbook companies produce books that emphasize the concepts identified by curriculum committees. Since state tests and curriculum committees emphasize different concepts, textbook companies have for some years been publishing texts that are state specific. It seems that the tail (test writers) is wagging the dog (curriculum).

Ultimately, I hope that the result of our work reaches the education community where it will have the greatest impact on the curriculum.

Response 3:27 Rebecca Bell *Oct 19, 2004 16:34*

I hope to revive ocean studies within the formal education community by identifying topics that fit with the existing

national science standards. I agree with Valerie that these goals/activities must meet the existing framework so that ocean education becomes the avenue for instruction.

Response 3:28 Liesl Hotaling Oct 19, 2004 16:44

My expectation is to get a better understanding of the various viewpoints held within the community and hope that we can come to common ground to advance the cause of ocean literacy.

Response 3:29 Bob Wohlens Oct 19, 2004 16:46

My expectations for this workshop are the same as Susan Snyder's -- to: 1) develop a definition of "ocean literacy" that we can all agree on, 2) come to consensus about the concepts that should be taught K-12, and 3) agree on where these concepts fit with the science standards K-12. If we can accomplish these stated expectations, then as a marine science curriculum publisher we will have consensus among all stakeholders prior to product development.

Response 3:30 Bob Stewart Oct 19, 2004 18:05

I agree with Susan S. and Bob W. I hope we will, first of all, reach an agreement on what we mean by ocean literacy. If we don't know why we are teaching oceanography, we will not know what to teach, or how to teach it. Then, I hope we can reach some agreement on what concepts are most important. The list of concepts I helped write is much too long, and I agree with Melissa D. that we need to pare it down and put it into some priority order. I liked the questions we needed to answer at the beginning of the workshop regarding content at different grades. It seems that our priorities may change with grade level.

Response 3:31 Julie Lambert Oct 19, 2004 18:34

I am not sure if this addresses some of the expectations, but it may help. I have been working on a table that I will use in a few grant proposals to support my rationale for funding. It correlates topics in a typical high school level marine science curriculum to the FL Sunshine State Standards and the National Science Education Standards. I don't know if this would be helpful at this point, but it may be a start. It looks similar to the Oceans for Life but is based on the national standards.

Response 3:32 Peter Tuddenham Oct 19, 2004 18:40

Thanks Julie .. perhaps we could offer it in the resources area.

Response 3:33 Francesca Cava, Nat. Geo. Society, Santa Barbara, California Oct 19, 2004 22:20

Julie,
I would be very interested in what you are working on and urge you to follow Peter Tuddenham's suggestion and post your materials in the resource room.

Response 3:34 Elizabeth Rogers Oct 20, 2004 09:47

I am interested in helping develop the "scope" of ocean content that should be taught in 4th, 8th, and 12th grades; and, (2) "mapping" those content areas using the national science standards in a manner that explicitly shows how the ideas are scaffolded (or builds upon one another).

Response 3:35 Jonna Engel Oct 20, 2004 13:02

My HOPE for the workshop is that we achieve the goal of developing the scope and sequence of ocean content that should be taught in our schools AND that we arrive at consensus on how to map ocean topics into the national science standards. I expect to learn and become familiar with the National Science Standards for K-12 education through participation in this workshop. I would love to have this workshop initiate a movement or be the impetus for the development of K-12 ocean textbooks.

Response 3:36 Gary Wolfe Oct 20, 2004 17:21

I would like to see a change in the way administrators and educators view the teaching of marine science at the high school level. For as long as I can remember the prevailing view was that if you can not take biology, chemistry, and physics, then take a marine science or environmental science class. For years I have been pushing the idea that the major content areas could be easily taught through marine science. If this workshop can produce a clear frame of what content area is introduced and at what grade level then it would help in the validation of marine science as a legitimate vehicle to teach science literacy to the youth of our nation. In addition, Not only do we have to be clear as to the content area and appropriate grade level but we need to be very clear in what sequence the material should be introduced. Students need a continuous flow from one subject area to another. They need to see how the content areas connect together and how they are reinforcing each other. Oceanography is an integrated science, not a segregated science. From reading the expectations of all who posted it seems that we are on the right path.

Response 3:37 Carmelina Livingston *Oct 20, 2004 18:37*

I would like to see ocean standards integrated into the already existing national standards on each grade level. Educators do not want a whole separate list of standards. They are already overwhelmed with standards in all disciplines across the curriculum. After we find an ocean literacy definition, we need to integrate what needs to be learned at each grade level with the existing national standards.

Response 3:38 Gene Williamson *Oct 20, 2004 22:31*

Carmelina: " After we find an ocean literacy definition, we need to integrate what needs to be learned at each grade level with the existing national standards."

You go girl. That's exactly the words I have been looking for. We don't need new marine standards. We need to meet existing standards using a marine vehicle.

Response 3:39 Peter Tuddenham *Oct 20, 2004 22:49*

thats one of the major goals and we are heading towards that.. hold on...

Response 3:40 Jean May-Brett *Oct 21, 2004 08:32*

I hope to see a workable list of fundamental ocean concepts for the different K-12 grade bands put forth that may be used by teachers of science in both classroom instruction and informal experiences. Without waiting for a revision of NSES or state documents the need is (as has been noted by others previously) to incorporate the ocean sciences in instruction to allow for real life application of a tremendous number of fundamental principles in science.

Response 3:41 Craig Strang *Oct 21, 2004 18:00*

The last several comments seem to all be converging and heading in the same direction--so I want to add to the momentum. I think there is broad agreement that we do not need or want a separate set of ocean sciences standards. I think we want to come to agreement on the short list of the most essential ocean concepts at each grade that should be included in mainstream science standards (national, state, local), curriculum and assessments.

Most of these might be "examples" that illustrate large concepts that already exist in the NSES (adaptation, ecological relationships, density, convection, etc.), but some might not fit neatly under an existing standard (chemosynthesis? upwelling?). Once we have agreement about the essential ocean concepts, we can promote them as a vehicle for implementing existing science standards AND we will be poised to directly infuse them into new science standards whenever they are developed or revised. I think that someday, whether a year from now or a decade from now, the NSES will be revised--we need to be prepared to have input.

Response 3:42 Peter Tuddenham *Oct 21, 2004 20:26*

Thanks Craig, I would like to encourage the momentum to other item now.

This item was intended to help us in the early stages of the workshop ensure that we share our expectations and that we can work to meet them.

I would like to suggest that we wind this specific item down, as by now expectations, I hope, have been voiced, and we are into the work of the workshop in subsequent items.

We will move to "freeze" this item at close of business tomorrow Friday, so if there are any other thoughts on expectations please make them in the next 24 hours.

Response 3:44 Tom Greene *Oct 22, 2004 09:24*

Thank you for giving marine educators the opportunity to sit down after all these years and finally hammer out a curriculum for K-4, 5-8 and 9-12 aligned with the standards you provided for us in Resource Item 6 (National Science Standards). In many high schools, science is compartmentalized into biology, chemistry, earth science and physics. The introduction of "Marine Science"(marine biology and physical oceanography)containing elements from the traditional sciences would provide a great foundations course for freshmen. If this workshop can produce a solid curriculum for marine science in the high schools, NMEA and NOAA can then recommend this interdisciplinary science to the State Education Departments. We will have found a most effective way of disseminating marine education - through the schools.

Response 3:45 Sarah Schoedinger *Oct 22, 2004 11:48*

Tom: Perhaps I misunderstood your comment above, but I think we can expect this workshop to produce guidance for a future curriculum of marine science but not the curriculum itself--that would be a tall order to meet in our short time here online. Toward the end of the second week we plan to open a discussion on next steps after this workshop concludes. Some of what you mention above can be incorporated into that guidance.

Response 3:46 Bob Chen Oct 25, 2004 19:57

I guess I would like identify where ocean sciences can teach national standards as well or "better" than other (e.g. terrestrial examples) ways that are more often used. Seawater for density, chemosynthesis for photosynthesis (contrast helps understand primary productivity better), deep ocean organisms for evolution, solubility....etc. There may be a few standards that can only be taught through ocean science as well (3 dimensional ecosystems, origin and evolution of life on earth, methane hydrates for phase diagrams, etc).

Response 3:47 Lundie Spence Oct 26, 2004 10:38

If we were able to agree on a few major priorities that constitute a beginning set of understandings students and the public should have, then we can address these as a group. I like Bob Chen's approach in the formal education arena that some standards in biology and physics, etc would benefit from ocean examples and that there are some concepts unique to the water world emerging from research that need to be promoted.

Response 3:48 Kate Madin Oct 29, 2004 15:55

It's late for me to post expectations, but my hopes are: First, that there will be agreement about what "ocean literacy" is, with a provisional draft definition of the term. Second, that a fairly short list of concepts about the ocean will come out of this workshop that are a) simply stated but can be addressed with many examples, b) essential for citizens to know something about, and c) flexible enough to teach at many levels and with varying degrees of depth. Third, that there will be ways to continue involvement with the process, and a plan for future interaction to work toward the goals. It seems to me that mapping to grade level is a very complex task for now.

Summary of the survey

Item 4 Peter Tuddenham Oct 15, 2004 11:38

Here I will post summaries of the survey that hopefully you have completed.

If not please do so now
<http://www.betaresourcesinc.com/nc/olit2004>

Response 4:1 Peter Tuddenham Oct 19, 2004 09:30

Here are the results of the survey so far. Over half of the invitees have responded, thank you to those of you have taken the time to complete this work so far.

I have compiled the responses to the questions about the three statements of ocean literacy.

Here they are as a pdf file [olit2004qn1-3all.pdf](#)

and here is a link to a web page version of this summary

[D6_olit2004_qn1-3.htm](#)

Let us move on to discuss the definitions of ocean literacy in [Item 6](#) here

[D6_olit2004_qn1-3.htm](#)
[olit2004qn1-3all.pdf](#)

Response 4:2 Peter Tuddenham Oct 25, 2004 09:32

Here is a full report of the pre-workshop survey in Adobe pdf format. This maybe helpful to you in this weeks activity of putting/matching ocean content to science standards.

[olit2004sun24.pdf](#)

Video Theatre

Item 5 **Peter Tuddenham** Oct 15, 2004 11:50

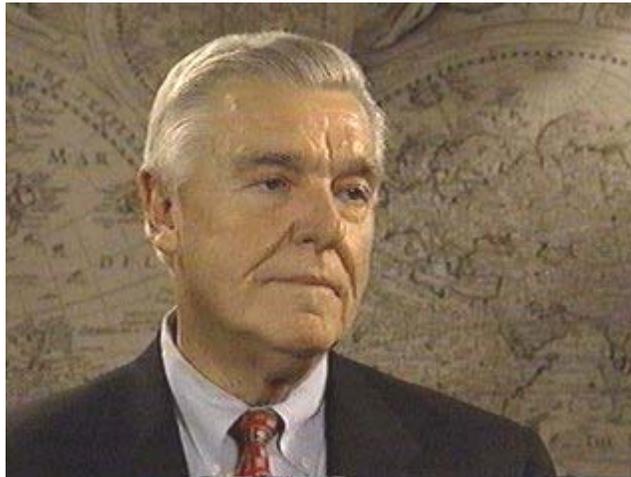
We are pleased to present Admiral Watkins, Gil Grosvenor, and Marcia McNutt who will each offer their perspective on the importance of ocean literacy.

To view these videos you will need the Real Player from Real Networks.
<http://www.realnetworks.com/info/freeplayer/>

Response 5:1 **Peter Tuddenham** Oct 15, 2004 12:12

Ms. Francesca Cava interviews Admiral Watkins, Chair of the U.S. Commission on Ocean Policy.

Click on the image to start the video (10 minutes). Please add any reflections or comments in the response section below.

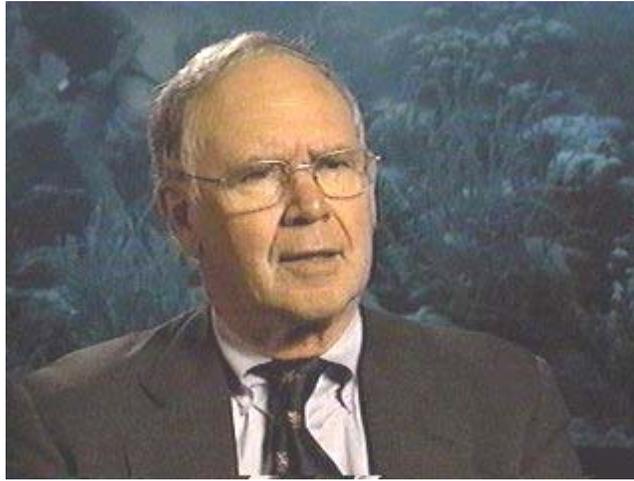


[Admiral Watkins talks about Ocean Literacy](#)
(in Real Media format)

Response 5:2 **Peter Tuddenham** Oct 15, 2004 12:14

Ms. Francesca Cava interviews Mr. Gil Grosvenor, Chairman, National Geographic Society

Click on the image to start the video (10 minutes). Please add any reflections or comments in the response section below.



Mr Grosvenor talks about Ocean Literacy
(in Real Media format)

Response 5:3 [Peter Tuddenham](#) Oct 15, 2004 12:15



Interview with Marcia McNutt
(in Real Media format)

Response 5:4 [Elizabeth Day](#) Oct 18, 2004 16:43

I can not get the interviews to play. I have tried from 2 different computers, one at home, one at work. Is there a way to get a transcript or just the voices?

Response 5:5 [William Bragg](#) Oct 18, 2004 16:50

YYou need "latest version" of Real Media... Will this help?

If you want to view the videos, YOU NEED latest version of the "REAL MEDIA" free "player" (for MAC, PC, etc..)

The latest version is called "Real One" and it is FREE:

> <http://www.realnetworks.com/info/freeplayer/>

Click on that to go to REAL MEDIA website for Real One player

***Make sure you get the free version. DO NOT ENTER any CREDIT CARD info on that site, if you are prompted for it you have the wrong version.

Response 5:6 Valerie Chase Oct 19, 2004 08:37

Is the text available?

Response 5:7 Peter Tuddenham Oct 19, 2004 09:22

no, not at present.

Response 5:8 Mike Hughes Oct 19, 2004 12:20

While there is much to reflect upon here, two things really struck a chord with me. I don't have answers, just comments and reflections.

The first was the Admiral's comment, to the effect that, this is a high-interest topic for students that can make learning other concepts fun. There are many lesson plans available that use ocean-related concepts to create interdisciplinary units with cross-curriculum skills embedded. Aquariums in the classroom can make graphing, chemistry, and other math and science concepts more experiential. The question may be "Why don't more K-8 teachers use these plans?"

Money? Time? Content knowledge? "Why don't more K-8 textbooks use this theme?"

The second point that really struck me was Mr. Grosvenor's passion for the sea and his comment that everyone should make the pilgrimage. Wouldn't it be something if each child could experience a day at the beach or local aquarium, snorkel, sail, fish, or work next to a scientist? This may be a dream scenario. If teachers, at least, had that experience and passion the students would pick up on it.

While nothing can overshadow the real thing, one way to accomplish this is through outreach. Mote Marine has a fantastic mobile unit that they bring to our school. Our teachers love it when they come here. The Florida Keys Nat'l Marine Sanctuary also comes in and teaches our 8th grade students about reefs, then takes them snorkeling! You'd be surprised how little our students know about the sea, even though we live in a community surrounded by it. We could use more of this type of delivery to reach teachers and children everywhere.

Apologies for the length:)

Response 5:9 William Bragg Oct 19, 2004 13:39

Excellent comments, Mike... I especially agree with:

"Wouldn't it be something if each child could experience a day at the beach or local aquarium, snorkel, sail, fish, or work next to a scientist? ... If teachers, at least, had that experience and passion the students would pick up on it."

It would seem the most effective way to get kids interested is engage them in live, first-hand experiences. And, like you say - if the teachers could do it (at the minimum) - their passion would definitely be passed on to the students! The outreach idea - and perhaps even more web-based ideas - could also break down the normal confines of the classroom walls!

Response 5:10 Bob Stewart Oct 19, 2004 18:29

I only had time to listen to the admiral. I agree completely with his opinions. I notice however, he implies "science education" is learning the results of science. Students also need to learn how science differs from other intellectual activities. How scientists think and work is the heart of the national science standards. But, students also need to know some "natural history" in the opinion of Morris Shamos (a former president of the NSTA who wrote extensively on science literacy). In particular, students need to know, as the admiral states, that the oceans are important and why. This is more along the lines of natural history than science.

I also agree with Mike H and William B on the need to get students interested in the oceans by visiting the oceans. But, how do we interest the students in Kansas, who may never see the oceans before they graduate from high school?

Response 5:11 Jaime Malwitz Oct 19, 2004 22:37

I enjoy listening to speakers who are enthusiastic about their subject as the admiral was. It is difficult to get some teachers involved in some topics because of their lack of content, but in school, as suggested, we can take a cross-curricular approach to the teaching of science and work with the strengths and interests of a variety of teachers to implement ocean literacy. Although, as the admiral said, there are only 1 or 2 standards (for now) relative to the ocean, teachers can still bring about the awareness, content, and deeper understandings of the ocean through inquiry, which to me, is the most important science standard.

Response 5:12 Beth Jewell *Oct 21, 2004 15:27*

Before you start shelling me with tomatoes, take in mind I have just stood in front of groups of 28 students for the last 6 hours. I agree that hands on is the best way to make connections. Keep in mind that translates into \$\$\$ and time. Both of which are in short supply for teachers. Also keep in mind that an end of the year test weighs heavily on the minds of teachers as they prepare and deliver each and every one of their lessons over a course of 180 or so days. With that said there is little time and money to get out there and get those experiences and training. Until there are connections made (through correlating ocean standards of knowledge to the present national standards) teachers aren't going to teach it. We don't have time in our program of studies to teach something that isn't tested. Having said that, along with another teacher, I did do some correlating of what we felt was important to teach in our oceanography classes- we have been struggling in our district with standards for the course. After creating a list of essential concepts we sought the national standards that matched. And lo and behold, most of it was already there.

So it looks like I may be suggesting that we develop this definition of Ocean literacy, later develop what we feel falls under that and then take a look at the national standards. In my opinion, this is the way you are going to entice teachers to give the ocean more time in their classrooms.

Response 5:13 Rebecca Bell *Oct 22, 2004 13:23*

The fact that the word "ocean" is mentioned only once in the Natl Standards does not need to deter us. Physics, chem, biology, geology, and environmental concepts in the Standards can all be addressed thru ocean studies. (Not to mention environment, natural resources, economics, geography, and government policy and law). When I started teaching 30 years ago (!!!) oceanography was 1/4 of our school year. We used Nystrom's kit and county lesson plans to address the physical, chemical, geological, and biological aspects of the oceans. At the Gr 6 level, we added in use of resources and exploration as well. I don't know what happened to all of those materials, and I don't know what happened to oceanography, but it has disappeared from the curriculum. In Maryland, we will be producing and/or collecting lessons that illustrate our state standards (which are aligned with the natl ones) and I plan to have oceans become a visible part of that curriculum.

Response 5:14 Stacey Halboth *Oct 23, 2004 19:05*

As an elementary teacher of 13 years, I feel enlightened by the truth Admiral Watkins speaks throughout the presentation. I still feel very young in the profession of education, and I have been waiting to hear someone of his caliber to mention why science must be a part of the everyday learning. I just received my Masters in literacy, so I have been reading a lot of research based materials over the past three years.

Reading, writing, and math standards are all I ever hear, and science has been pushed to the back burner. If we teach science as a connection to everything, wouldn't students be better readers, writers and mathematicians? Non-fiction materials have been the big push regarding literacy, so why not teach science? Isn't that one of the best forms of non-fiction material? Science, as Admiral Watkins states, is fearful for most teachers. We need to stop that now by teaching the students, so they will not grow up to feel the same way. They will have the understanding that everyone is a scientist. It is just human nature.

We also need to make the teachers aware of HOW to teach science through inquiry rather than factual based presentations. Let the teachers be the guide in discussions and allow the students to do the research and ask the questions. Let the fear out to teachers, they do not need to know everything. I do not use fancy whistles and bells to teach science in my busy schedule (though my school has plenty of money). But after and before a beautiful storm, we take 5 minutes to walk outside and observe. The students write what they observe and questions they might have.

I am blown away by how they think. One student might ask a question and another student might help them figure it out. In other words, the teacher just listens and the students do the research. Isn't that what we want overall, students to think.

I hope this all makes sense. I have a lot in my head regarding this topic and feel a sense of freedom to share my opinions. I thought science was for the 3%. Who would of thought I would be part of this discussion panel?

Response 5:15 Mellie Lewis Oct 24, 2004 06:03

Right on Stacey! I agree that if we "teach science as a connection to everything, wouldn't students be better readers, writers and mathematicians?" And of course since this is an Ocean Literacy conversation, I would add that if we used the Ocean System as the foundation and basis of study; all the core curriculum studies would be synthesized together. There is Art, Music, Technology, Language Arts - rich in literature, Mathematics, Science, Social Studies - everything could be taught using the Ocean as a basis for learning.

Response 5:16 Gene Williamson Oct 24, 2004 09:18

Mellie: "everything could be taught using the Ocean as a basis for learning."

My recollection is that this was tried in the late 70s or maybe early 80s at Bay Channel High School in New York. I lost track of the program. Tom Greene, you got your ears on? Is there any remnant of that program still in existence? What kind of success did they have? It always sounded like a great idea, at least for those who are passionate about salt water.

Response 5:17 Michiko Martin Oct 25, 2004 20:04

Re Gene's post 5:15:

I have also heard that there is a Monterey Bay area school (currently active) that teaches its entire curriculum in an ocean context. Any details from those who work in the Monterey area?

Response 5:18 Francesca Cava, Nat. Geo. Society, Santa Barbara, California Oct 29, 2004 16:07

This has been an incredibly thoughtful week. I would like to end on a lighter note, by posting the following short video introduction to our upcoming Crittercam virtual teacher workshop that will be ongoing from November 6 - 20, 2004. The link to that workshop for more information and registration is:
<http://www.coexploration.org/crittercam>

In the meantime, here is a short video segment on crittercam from a recent awards ceremony, it is a little humor from a completely different audience
<http://64.137.37.1/ramgen/crittercam/crittercamawards.rm>

Response 5:19 Francesca Cava, Nat. Geo. Society, Santa Barbara, California Oct 29, 2004 16:10

And here is a 4 minute short presentation/video by the students on this summers field trip organized by the National Geographic Society.
<http://www.coexploration.org/swfpres/oceanliteracy/riverstoreefs>

Response 5:20 William Bragg Oct 29, 2004 16:47

These are excellent! Quite motivating in regard to the reason for the efforts here (the kids!).

Response 5:21 Mellie Lewis Oct 30, 2004 09:55

Thanks for posting the information for the Crittercam virtual teacher workshop beginning November 6th. How are teachers going to know about this? I'm a little concerned because this was the first announcement I had seen. I'm going to forward the information to the Howard County Teachers and others I know from the DC Geographic Alliance.

Response 5:22 Dr. William Bragg Oct 30, 2004 10:17

Thanks, Mellie...

Emails have been sent, and more coming! As well, the National Geographic is publicizing it.

It should be very interesting. And, Graduate Credit is offered through California State University at Fullerton (website has details).

Again: <http://www.coexploration.org/crittercam>

See you there, Mellie!

Response 5:23 Beth Jewell Oct 30, 2004 11:23

I will be posting this site as web, looks like an interesting workshop.

Comments on Ocean Literacy Definitions

Item 6 **Peter Tuddenham** Oct 15, 2004 12:19

Please post your comments on ocean literacy definitions.

Think not only about the content of the definition we need, but also scale of the definition. In other words, how broad or detailed does this definition need to be. Do we need several definitions at different scales of detail? If so, what would those be?

Open for discussion Tuesday 19th October

Response 6:1 **Peter Tuddenham** Oct 19, 2004 09:36

One of the goals of this workshop, is to define "ocean literacy" for the community represented in this workshop (understanding that this community comprises different constituencies, disciplines, organizations and individuals with unique goals). And also recognizing that the primary audience we are addressing is K-12 education.

As a community, we would be strengthened with a common definition, however, it is recognized that as individuals and institutions, there may be a need for audience-specific definitions.

As you share your ideas on how to define ocean literacy, we ask that you may consider and identify or note specific audiences who may require a separate or expanded definition of ocean literacy (or tell us why this may not be useful). For instance, do we need different definitions for the scientific community, students, the public, etc.? If so, who are these audience groups and why would we need a different definition to reach them? If we don't need different definitions, why not?

However the main focus of this item and this discussion over the next few days must be on the necessary components of a statement on ocean literacy that will help us move quickly to map concepts to science standards in the K-12 education setting.

I encourage you to read the summary of the survey so far, and especially the comments added after each statement and also as general comments. Then please help us all shape the definition by adding your comments here in this item.

Response 6:2 **Michiko Martin** Oct 19, 2004 10:10

Alright, so I'll go out on a limb to start... :-) (Be kind!)

I think that Bob Stewart's summary article "What Do We Mean By Ocean Literacy?" is a great intro into this topic and recommend reading it (and scanning the primary source documents):
<http://oceanworld.tamu.edu/home/ocean-literacy.html>

I like the big-picture definition of ocean literacy proposed by the New England COSEE: Ocean literacy is "the awareness and understanding of a set of fundamental ideas, perspectives, or big picture concepts about the ocean that every citizen should have."

I then like Bob Stewart's description of an ocean literate person as one who "has a basic oceanic vocabulary; is able to converse, read, and write coherently, using oceanographic terms in perhaps a non-technical but nevertheless meaningful context; knows key facts and concepts about the ocean relevant to daily life; has a knowledge of the important oceanic and earth systems and how they interact to produce a habitable planet."

Just to let you know, I have been using this hybrid combination (from the work by NE COSEE and Bob Stewart) for awhile now in my work for the National Marine Sanctuary Program, and people (teachers/students/general public) that I encounter seem to "get it":

Ocean literacy is the awareness and understanding of a set of fundamental ideas, perspectives, or big picture concepts about the ocean that every citizen should have. An ocean literate person is one who has a basic oceanic vocabulary; is able to converse using oceanographic terms in a meaningful way; knows key facts and

concepts about the ocean relevant to daily life; and has a knowledge of the importance of oceanic and earth systems and how they interact to produce a habitable planet.

Even the Federal Government's Office of Management and Budget (OMB) "got it" when I used a slightly condensed version of this explanation in a recent evaluation of our education program. :-)

For me, the harder problem is then determining (and achieving consensus for) the content that makes up the "key facts and concepts" or "big-picture concepts" and organizing these ideas in a manner most effective for integration into K-12 education.

Response 6:3 Francesca Cava, Nat. Geo. Society, Santa Barbara, California Oct 19, 2004 10:36

Michiko,
Thanks for breaking the ice and getting this conversation started.

I think your recommendation that we turn our focus to the "key facts and concepts" is excellent. This will be the most important outcome of our workshop. The definition of ocean literacy will most likely be derived in part from these facts and concepts, will help us become a more focussed community and will hopefully lead to better integration and partnership.

Response 6:4 Gene Williamson Oct 19, 2004 11:23

I believe that we should be striving to identify the "key concepts", but I think that identifying key "facts" could quickly carry us into a quagmire. We are talking about (at least I hope we are talking about) things that every student should know about the ocean when he/she finishes with formal K-12 education. We will be looking to those involved in informal ed, higher ed, and research to guide these deliberations, but my understanding is that we are most concerned with integrating marine concepts into the K-12 system.

As Michiko says, Bob Stewart's work is an excellent starting point and I strongly urge anyone who has not done so, to take a few minutes and review this work. As a teacher who worked with middle school kids for more years than I care to admit, I hope to serve as a reality check if things start to get too detailed.

I understand that the list of what every kid should know about the ocean is a work in progress, so I am not quibbling at this point with any specifics, but I want to use one example just to make my point.

The list includes a statement that every student should know the four elements that most directly limit productivity in the ocean. After teaching 30 years of oceanography and reading volumes about the ocean, I can't do that. I know silicon and iron are on the list, and more importantly I know where to go to find the answer. We can't expect all kids to know this, at least at this level of specificity. I will be looking for statements along the line of "Students know that salt water contains dissolved materials that support life and that the amount of life present can be limited by insufficient quantities of any of these life supporting materials." Please, do not all throw rotten tomatoes at once. That's a first draft and I have jury duty in an hour, and I need my breakfast. More of this anon.

Response 6:5 Al Plueddemann Oct 19, 2004 11:34

It is indeed fascinating to read through the responses. All of the points raised have merit, and we run the risk of diverging. The good news is the (statistically) overwhelming support for the existing statements (agree/strongly agree), at least as a starting point.

My first impressions are as follows. We definitely need multiple levels or scales of detail. The highest level statements will by their nature be somewhat "trivial" or self evident. This is OK, I think we need to accept this and then try to reach agreement that these statements are accurate (not misleading) and appropriate (convey the intended concept). Knowing that the lower levels will be filled in, it may be reasonably easy to get consensus on the highest level. Thus, I would advocate focusing on this first. Several important points were raised with regard to grammar, concept conveyed (e.g. image of a purposeful ocean), and redundancy.

The problem gets harder as we move to more detailed levels. I was initially against statements about "vocabulary" and "key facts and concepts", but perhaps using this language is OK because it forces us to decide what the vocabulary and concepts are at a more detailed level. The danger is that it could be a long debate on increasingly minute details... how do we keep this discussion from producing a long list of everything that anyone thinks is important? If we start at the high levels, then we can "triage" the list of details by asking "how does this relate to one or more of the high level concepts we are trying to convey?".

Response 6:6 Peter Tuddenham Oct 19, 2004 11:55

We need to spend time thinking about the higher level concepts included in definitions of ocean literacy. I agree that this is also informed by detail, tension between divergence and convergence and also between broad higher level and details can be a source of creative energy.

For this item here lets stick with the higher level concepts that need inclusion in one or several statements on ocean literacy. We have plans to meet the agenda need to assemble concepts, issues, details, and subjects by science standard description and also grade level here soon. I want to get the summaries on this from the survey together first and also finalise the structure of the discussion for this aspect of the workshop.

Response 6:7 Dave Niebuhr Oct 19, 2004 12:30

At the risk of my becoming irritatingly esoteric...before contemplating Ocean Literacy, I've been contemplating the concept of "Literacy," in general. To be literate, we assume that you must be able to READ, but you must also maintain a DESIRE to explore additional information beyond the rudiments. However, if I went to China (I don't read Chinese in any form), I think I would still be a literate individual, because of my comprehension of some basic skills and a desire to seek new knowledge and ASK good questions.

Too often, we focus on the content, rather than the concepts at their basic, more universal, level.

I think the NECOSEE is on the right track, but I see our efforts as including the "how" as well as the "what" of the essential elements of literacy.

Save some tomatoes for me, Gene...

Response 6:8 Susan Snyder Oct 19, 2004 13:37

My opinion: We need to have one definition for "ocean literacy" because that shows that we are united in what we feel is important. However, if we are to have only one definition, it will have to be general and vague. We cannot be too specific because there should be different benchmarks for students as they go through school .

Statement 1 (New England COSEE), which we saw yesterday, is a good example of a general definition, but as was suggested in the comments about this statement, a few more things could be added to the list.

The next step we could take is to develop a more specific list of the key facts and concepts that we think students should know (a scope and sequence) for K-12. Working on a list as we go is a good idea. Later, we can plug each item in where we think it best fits with the K-12 standards. I agree with Gene Williamson, we must be careful that the key "facts" don't carry us into a quagmire.

Response 6:9 Gerald Lieberman Oct 19, 2004 14:24

This needs to be handled at the conceptual level or it will just become the next laundry list of facts, vocabulary, etc. We must be careful to avoid an approach that easily gets converted into "wordsearch" games, crossword puzzles and vocabulary lists.

The ultimate problem that we will face is helping teachers, make high-quality, academically-meaningful connections to their academic content standards.

These connections can be more readily achieved at the conceptual level than at the detailed level of "facts."

Likewise, to achieve success with this endeavor, it will be crucial to keep any definition from using "value laden" words or phrasing.

Response 6:10 Craig Strang Oct 19, 2004 14:51

First I want to thank all the brave souls that worked on the 3 statements and are willing to subject themselves to...us! I also want to recommend that people read several (short!) things to help us get to the same page faster. In addition to Bob Stewart's piece, please read the full NE COSEE statement on Ocean Literacy (it's more than the four "components"--there are bullets under each that elaborate), and please take a look at the National Science Education Standards, mostly to get a feel for the level of detail that is included in a "standard"--I think it's appropriate for our statement of ocean literacy to be broad and general, as long as we know that the standards will provide the necessary level of detail about content.

I agree with all that Gene said (don't tell him, though). It sounds like we're moving toward a hybrid of at least two and possibly all three of the statements. The challenge will be to come up with one that is not three times as long as the current ones.

Response 6:11 Craig Strang Oct 19, 2004 15:24

Hi, again. I just want to throw in my 2 bits about Peter's last question up at the top--I don't think we need different definitions for each audience. I think we can come up with one that should be universal. What do others think about that?

Response 6:12 Lynn Whitley *Oct 19, 2004 16:31*

There certainly have been some good ideas conveyed so far. I agree we need a big picture ocean literacy definition first and then add the details as we progress (including audiences). I like the hybrid Michiko has started for us from Bob Stewart's and NECOSEE's work:

"Ocean literacy is the awareness and understanding of a set of fundamental ideas, perspectives, or big picture concepts about the ocean that every citizen should have. An ocean literate person is one who has a basic oceanic vocabulary; is able to converse using oceanographic terms in a meaningful way; knows key facts and concepts about the ocean relevant to daily life; and has a knowledge of the importance of oceanic and earth systems and how they interact to produce a habitable planet. "

However, I also agree 'vocabulary ' and facts might bog this down and be more relevant elsewhere, and I think it would be good to include some reference to human impact. So a suggestion for the second sentence:
"An ocean literate person is one who knows key concepts about the ocean relevant to daily life, has a knowledge of the importance of oceanic and earth systems and how they interact to produce a habitable planet, and an has an awareness/understanding of how human activity impacts the ocean (systems)."

I think Craig is on track with suggesting we look deeper into the NECOSEE definition and NSEstandards. it will be most interesting to see what we all arrive at!

Response 6:13 Gerald Lieberman *Oct 19, 2004 17:22*

I would suggest that when we refer to human activity, we state that it "influences" rather than "impacts" ocean systems. This leaves it open to a more scientific inquiry regarding the outcome of the human activities.

Response 6:14 Sharon Walker *Oct 19, 2004 18:20*

For the moment, could we consider using the "NECOSEE and Bob Stewart" two sentences as a starting point, i.e., "Ocean literacy is the awareness and understanding of a set of fundamental ideas, perspectives, or big picture concepts about the ocean that every citizen should have. An ocean literate person is one who has a basic oceanic vocabulary; is able to converse using oceanographic terms in a meaningful way; knows key facts and concepts about the ocean relevant to daily life; and has a knowledge of the importance of oceanic and earth systems and how they interact to produce a habitable planet."and, then focus on our key concepts? I believe "if" we consider this approach, we might then be able to strengthen our definition after developing and agreeing, in general, to these key concepts.

And, everyone should save some tomatoes, for we will all need them before we finish this Workshop....but, we will have fun, agreeing to disagree, for we all have the same goal in defining ocean literacy and how we accomplish achieving it!

Response 6:15 Judy Doino Lemus *Oct 19, 2004 18:24*

I'd like to express kudos and support for Dave Niebuhr's "esoteric" comments. As I read through the survey responses, I was thinking to myself, "what is literacy anyway?". Is it just the ability to read, or as Dave suggests, does it also encompass a desire or intent to further one's competency or knowledge. Just for "fun", I went to the National Institute for Literacy website and obtained this definition, "an individual's ability to read, write, speak in English, compute and solve problems at levels of proficiency necessary to function on the job, in the family of the individual and in society."

Now, most of this does not directly relate to our purposes, but the statement, "levels of proficiency necessary to function" struck a chord with me. So, if we were, for a moment, to take out the "ocean" part of this equation, what is our functional definition of literacy? In the responses I have read, I THINK I hear a lot of people referring to an ability to function in society (without saying it directly), which to me means the ability to make informed decisions.

So I guess my preference for this exercise and workshop would be to concern ourselves with the broader conceptual framework, as several others have already suggested. And my focus question would be, "What should someone know about the ocean that would enable them to make informed decisions, and able to function in a science-driven society?" When I think of it this way, then the key words that come to mind are "interactions" and "relationships".

How about a broad definition of ocean literacy that focuses on interactions?... here is a straw man for folks to shoot at: "An understanding of the impacts and interactions of the ocean with all other physical and biological earth systems".

Okay, perhaps I have taken this to the nth level of irritating... In any case, I've rambled too long now... fire at will!

Response 6:16 Liesl Hotaling *Oct 19, 2004 18:25*

I agree with so much I have read. However, I have been carrying around a concern....(please reference Valerie's point in her expectations).

Okay, hate me or agree...I think we should remember that we are a small subset of people who are extremely passionate about the ocean, science, and ocean literacy. Those of you who know me know that I am one of the biggest flag wavers out there, but I also think that when in discussions of "standards for all" that we need to remain measured in our expectations. Not everyone is cut out to be passionate about the ocean. I think as a group, we need to do some true interspection and boil down our keys messages into a few points that can be brought to market to serve as our campaign platform. If our wishlist of standards becomes too long, it will be too easy for the audience to tune out.

Response 6:17 Bob Stewart *Oct 19, 2004 18:58*

I like the comments and the proposed revisions to my definition. Let me add a few words about vocabulary. the ideas go back to Donald Hirsch's very popular books on "Cultural Literacy". We need a shared vocabulary before we can discuss ideas. We cannot say marine resources are important unless we can define a "marine resource". That is all I meant by vocabulary. It need not be extensive, just enough to read magazine articles about the ocean.

I think it is premature to get very far into a discussion of key concepts. If we don't agree on why we want to teach about the ocean, we don't know what to teach. We agree we want to produce students who are literate, but what do we mean by "literate"? I tried to write my definition in a way that it then leads to clear statements of **WHAT** we need to teach (sorry, I don't know how to emphasize a word in this post without making it all caps).

Response 6:18 Jaime Malwitz *Oct 19, 2004 21:46*

I agree with Liesl when she says not everyone is as passionate about the ocean as most of you are, and there is the potential of turning students and teachers off, not only by their length, but their interpretation. and I think that developing standards for ocean literacy must be specific enough to allow evaluation and proper teaching methods, but at the same time, we have to keep a level of understanding so that students in Wisconsin or Montana can be as competent as students in Florida or California. We must also keep in mind that the standards are for the scientifically literate, not necessarily advanced scientifically literate. I look forward to seeing what develops.

Response 6:20 Patricia DuBose *Oct 19, 2004 21:48*

I definitely like Judy's suggestion of levels of proficiency... the educational jargon is important if we want this piece to be used in the formal educational setting... ability to measure learning is important in the formal setting... I also like Judy's interactions and relationships... perhaps these are more important as they will encourage higher order thinking skills and inquiry based activities that teachers seem to have difficulty implementing in the classroom

Response 6:21 Frank Muller-Karger *Oct 19, 2004 21:58*

First, I have to say that I am impressed with the comments so far, and with the definitions that Bob Stewart distilled. I actually agree with them quite a bit. So please keep that in mind in reading the following:

I am uncomfortable with the term "ocean literacy", which I view as a bit isolating - sort of like a pigeonhole. Why would we want the general public to be more knowledgeable about oceans, and not equally knowledgeable about the ocean, atmosphere, land, rivers and lakes? People? Plants?

I understand that the terms "ocean literacy" have a nice ring to them. Don't know if that is because it does flow in English or because I am an oceanographer.

Therefore, I am a bit concerned that some or most of us are imbibed with ocean affairs and/or science, and that our comments come from some sort of activist drive. A desire that everyone be like us. Not a bad thought, of course. But probably not realistic. Or useful.

I do agree that it is critical to develop an environmental awareness, within which the ocean has a place as much as an atmosphere and land, and basic natural processes that connect them and living things - and how people are part of all these. I would then emphasize the importance of oceans for their role in critical, life-sustaining processes, and how we can impact these.

There are any number of "literacy" movements. There are books and meetings and all sorts of people talking about each "literacy project", as an objective and core activity to be analyzed to death. I would not want to spend time defining "it", but rather just put the energy into figuring what to teach (like R. Steward said). This should weave the basic sciences to get a balanced understanding of the world components (not just an ocean-centric world).

A key core outcome of all this should be an individual that cares and has a "stewardship ethic". This takes more than just learning basic concepts about the ocean, and more than an ocean focus in early or continuing education.

Of course I understand that branding helps find support and funding...

Response 6:22 David Smith *Oct 19, 2004 22:34*

I found Bob's references quite informative. I particularly like the definition of ocean literacy as stated by Shamos'. It is clear, concise and consistent with my own definition. Thanks, Bob.

Response 6:23 Nancy Rabalais *Oct 19, 2004 23:19*

Coming in quite late on this, I have a question as to whether we are striving for ocean literacy or the ability to meet science literacy standards as defined by Dept of Educ and various states with concepts of the ocean. This, of course, leading to a better understanding of the ocean through the general population and eventually, we hope, better stewardship.

Response 6:25 Stacey Halboth *Oct 20, 2004 00:15*

Wow, everyone has such great input.

I agree we should use reference to the ocean (all connected as one) rather than oceans. I agree with Gerald we should use the term "influences" when referring to human activity. State standards are general, the books and materials the teacher uses are the way to get into the detailed part of the standard. Some vocabulary terms could stay general throughout all k-12. ex. open ocean instead of pelagic zones. Those students who want more details, will take the higher level classes. Some vocabulary could start general in the lower grades and go more into details as they go through the grades. ex. whales, dolphins or porpoises to cetacea. While others could start off directly to the higher level words at k-1. ex. mullusks. I am just using these as general ex.

As reference to not all people are as passionate about the ocean as we are, well they should be! Actually, with the internet, t.v., movies, etc. more people are exposed to the ocean. One does not need to see the ocean in order to have an appreciation for it or to have a deep passion. If we teach general standards, the students will most likely become more passionate. In other words, build it and they will come.

Response 6:26 Melissa Demetrikopoulos *Oct 20, 2004 00:25*

I just want to add a few of my thoughts from reading this discussion. I have numbered them for clarity.

1. I do not think we need different definitions since we are focusing on pre-college education. The level used in public education is typically at the middle school level and thus fit within this scheme.
2. I think Judy had a strong point with "What should someone know about the ocean that would enable them to make informed decisions, and able to function in a science-driven society?"
3. Vocabulary is key since it allows us to talk to one another.
4. I think the big challenge will be to come up with a reasonably short list of key concepts--one that everyone truly needs to know. There are lots of points one could know, but not a whole lot of points one needs to know to be a functional citizen.

Response 6:27 Francesca Cava, Nat. Geo. Society, Santa Barbara, California *Oct 20, 2004 10:17*

I would like to thank everyone for their comments and thoughts so far. When we started our efforts on "Oceans for Life" 2 years ago, we had only 30 participants [an excellent pioneer group] meet over a 3 week online workshop to define ocean concepts that could be mapped to National Geography Standards. Eight months later, we convened a second, smaller meeting at the Monterey Bay Aquarium Research Institute to help refine our online progress AND draft our definition of ocean literacy. With that perspective, it is truly encouraging to see so

many ideas so early in our discussions

Our efforts 2 years ago were an enormous undertaking and I am thrilled to see that this workshop is moving so quickly. The comments both here and in the survey have been extremely enlightening. I look forward to everyone weighing in so that we can try to pull together the concensus of this workshop by week's end. Thanks again and keep up the great discussion!

Response 6:28 Elizabeth Day Oct 20, 2004 10:55

i agree that one definition is the way to go. also focusing on concepts is more critical at this point and for this ws than focusing on specific vocabulary and facts. I agree with Lynn Whitley's post. i also agree with Sharon that revisiting the definition in a few days is a really good idea as we all solidify some of the specifics in our minds. I support Melissa's points, adding that appropriate vocabulary is fine. I just would hate to see a body of knowledge about the oceans actually becoming a long list of words and their definitions. Too much of science is taught thus way and it turns off too many students and teachers.

Response 6:29 Beth Jewell Oct 20, 2004 14:06

Let me again echo about the great input. I do see some themes coming together here and surely dont need to rehash them. In my view, literacy needs to include a shared vocabulary that will allow one to find answers and to make informed decisions. The defintion does need to be broad. The specifics will come later when this gets broken down to grade level.

Response 6:30 Bob Wohlers Oct 20, 2004 15:06

I believe that Dr. Karger's comments regarding the term "ocean literacy" are important. Nevertheless, my opinion is that as a group, we do need to brand our work (and Frank acknowledges this). Of course the entire Earth and it's various ecosystems are interconnected, but if other "groups" (geologists, space and earth scientists, limnologists, botanists, etc...) develop their own set of "literacy" concepts then perhaps all these stakeholders can sit down and pound out unified "science literacy" positions.

Response 6:31 Sharon Walker Oct 20, 2004 18:30

After reading today's dialogue thus far which is GREAT and leaves us all with probably more questions than answers, it appears we still have reservations about the word literacy in general and our collective definition of ocean literacy, in particular. However, many of today's comments in my opinion re-affirm the need to set the stage for the development of "key concepts" being more general than specific concerning the fact the ocean (or water) is an unequalled medium from which to teach holistically. I believe we want to empower our audiences, particulary K-12 students, to make responsible resource decisions which allow future generations to have the ocean and its watersheds in the next millenium. And, to achieve empowered K-12 students or our citizenry, I believe we need to develop key concepts using hands-on activities, based on sound science. I also believe the benefits will result, in an empowered citizenry (from K to grey) who has an enhanced environmental stewardship and is aware and understands the importance of the ocean to all humans' everyday lives, no matter whether the individuals comprising this citizenry live in a coastal or inland state.

Response 6:32 Peter Tuddenham Oct 20, 2004 18:32

The National Research Council in its National Science Education Standards publication on page 23 says

Scientific literacy implies that a person can identify scientific issues underlying national and local decisions and express positions that are scientifically and technologically informed.

Some derivation or adaption of that may help us to frame the definition of ocean literacy for us.

For example a suggestion:

Ocean literacy implies that a person can identify issues concerning the ocean and the ocean-atmosphere-earth system, especially those underlying national and local decisions, and express positions that are scientifically, culturally and technologically informed

Response 6:33 Peter Tuddenham Oct 20, 2004 18:42

In the introduction to perspectives and terms NSES says (p22)

"Scientific literacy is the knowledge and understanding of scientific concepts and processes required for personal decision making, participation in civic and cultural affairs, and economic productivity. It also includes specific

types of abilities. In the *National Science Education Standards*, the content standards define scientific literacy."

So I do like the emphasis on personal decision making within the context of day to day life and society. At this stage in this (our) communities development on this search for collective agreement a definition or statement on ocean literacy I think leaning (borrowing bits of) on this definition of scientific literacy can help.

..Should we be talking about **oceanic** literacy? :-)

Response 6:34 Bob Stewart Oct 20, 2004 18:45

I hope I don't offend anyone by saying I don't like "Ocean literacy is the awareness and understanding of a set of fundamental ideas". I recommend we drop "understand" because even research scientists don't "understand" the ideas. Let's just say we are aware of the ideas.

With that, I propose this slight variation of Sharon Walker's definition (Thanks Sharon):

Ocean literacy is the awareness of a set of fundamental ideas, perspectives, or big picture concepts about the ocean that every citizen should have. An ocean literate person is one who has a basic oceanic vocabulary; is able to converse read, and write coherently using oceanographic terms in a meaningful way; knows key facts and concepts about the ocean relevant to daily life; and has a knowledge of the importance of oceanic and earth systems and how they interact to produce a habitable planet."

I also acknowledge Frank Muller-Karger's suggestion that we think more broadly. If we do, the we might broaden Sharon's definition to say:

Environmental literacy is the awareness of a set of fundamental ideas, perspectives, or big picture concepts about the earth that every citizen should have. An environmentally literate person is one who has a basic earth-system vocabulary; is able to converse read, and write coherently using earth-system-science terms in a meaningful way; and knows key facts and concepts about the earth relevant to daily life.

In particular, they know that we are now capable of interfering with the processes that make Earth a habitable planet. We have become custodians of planet Earth, and with custody comes the need to be good stewards.

From here we can begin adding ocean-specific items of environmental literacy.

Environmentally literate persons:

*Understand that the ocean has a place as in our lives just as much as an atmosphere and land. etc.

Response 6:35 Peter Tuddenham Oct 20, 2004 18:46

as Sharon put in 6:31

"to make responsible resource decisions which allow future generations to have the ocean and its watersheds in the next millenium"

Response 6:36 Carmelina Livingston Oct 20, 2004 18:55

I like Peter's suggestion on the comparsion of the National Research Council defintion of science literacy to his suggested Ocean literacy definition. I think it definitely encompasses all that we are trying to generate.

Response 6:37 Judy Doino Lemus Oct 20, 2004 21:16

I too, endorse Peter's suggestion and would like to reiterate my support for breadth versus depth. I don't have a problem using the word "understanding" because, 1) awareness does not imply or dictate competency, and 2) "understanding" is modified by "fundamental". No, scientists don't completely understand all of the ideas/concepts, but we understand some of the basic concepts pretty well, and that is what we are talking about here.

I am also still not convinced that we need to talk about "basic vocabulary" and "terms"... So, to slightly modify Bob's definitions, I suggest...

"Environmental literacy is the awareness of a set of fundamental ideas, perspectives, or big picture concepts

about the earth that every citizen should have. An environmentally literate person is one who has a basic earth-system understanding; is able to converse read, and write coherently about earth-system-science in a meaningful way; and knows key facts and concepts about the earth relevant to daily life. "

And...

"Ocean literacy is the awareness of a set of fundamental ideas, perspectives, or big picture concepts about the ocean that every citizen should have. An ocean literate person is one who has a basic understanding of the ocean system; is able to converse read, and write coherently about ocean-system-science in a meaningful way; knows key facts and concepts about the ocean relevant to daily life; and has a knowledge of the importance of oceanic and earth systems and how they interact to produce a habitable planet."

Response 6:38 Mike Hughes Oct 20, 2004 22:51

OK, folks... I've been sitting back watching this discussion unfold. The challenge, for me, is to condense it into a consensus that I believe dovetails with the current demands on the classroom teacher.

In doing so, I recommend we keep Carmelina's excellent comment from 3:37 in mind. Whatever we do should integrate into the Nat'l Standards, not add to them. Educators don't need another list of things to teach. I assure you, they are overwhelmed with what they have. As Susan said in 3:26, the tail IS wagging the dog.

I'm going to hit the brakes for a minute, so hang on.

For the teacher who is buried in curriculum demands; For the segment of the population with limited proficiency in English; For the student with Behavior Disorders or Processing Deficits, (and who is below Grade-Level in Reading and/or Math), Science really does become an interesting way to learn vocabulary and basic facts in order to understand the simplest of concepts, as Gerald alluded to in 6:9.

However, the mission of today's educator is not to deliver facts, but to guide a student to become a lifelong learner who can access, synthesize, and evaluate information, detect bias, adapt in an increasingly changing world, keep pace with technology, and learn to perform jobs that haven't yet been created.

I agree with Stacey (6:25), and with Liesl, that all should be as passionate as we are... but they aren't and you probably won't change that appreciably. We have to keep it simple in the basic definition, and in the expectation, so that it dovetails with current standards and so there will be sufficient latitude to evolve in the long term.

I embraced M. Martin's reference to the NECOSEE definition and Bob Stewarts definition in 6:2. For me, that answers Dave's question in 6:7 as to the meaning of literacy concerning the oceans.

In 6:21, Dr. Karger proposes that the term "Ocean Literacy" (O/L) is confining and he brings Environmental Awareness into the discussion. I feel like Bob is right on target in 6:34 when he incorporates Dr. Karger's suggestion into Sharon's definition of Environmental Literacy.

However, and for what it's worth, I disagree with dropping the term "understanding". True, scientists don't really understand some things, but they have a functional understanding consistent with contemporary levels of knowledge, so the understanding evolves just as it will with the emergent learner.

Stacey summed it up for me in 6:25 when she said that state standards are general. Ultimately, teachers decide how to teach those standards. In some cases, their district may provide a curriculum with objectives and even content limits that govern the scope, sequence, and depth of knowledge. Teachers teach that and move on. There is little time to embellish and there is no room to add anything. Textbooks are viewed as resources to supplement instruction, as are outreach programs, field trips, videos, internet research. Often, the resources go too deep, so chapters may never be read in their entirety, or they may be revisited when the curriculum spirals around to them in the next quarter or the next year.

For me, it all boils down to this: Ocean Literacy is a subset and a specialization of Environmental Literacy, which is a necessary component of Science Literacy.

Response 6:39 Janice McDonnell Oct 21, 2004 00:20

Hi All – It has been great reading all your comments. Here are mine to add to the pot!

In reference to Carmelina's excellent comment from 3:37 – the scope and sequence of where ocean topics fit into the existing NSES is already done by AAAS's new and not yet published Strand Map for the Ocean. It uses the four base themes of geology, weather and climate, water cycle, living things dependence on the environment, and interdependence of living things and relates these themes over the K-12 scope and sequence. Ted Willard from AAAS was good enough to share this with us (unpublished). I gave a PDF version to Peter for inclusion in the resources for consideration. Please take a look. It is worth considering in this discussion, With regards to the literacy definition evolving from Sharon, Bob, and Dr. Karger, "Environmental literacy is the awareness of a set of fundamental ideas, perspectives, or big picture concepts about the earth that every citizen should have. An environmentally literate person is one who has a basic earth-system vocabulary; is able to converse read, and write coherently using earth-system-science terms in a meaningful way; and knows key facts and concepts about the earth relevant to daily life". My only major hang up is the reference to earth –systems vocabulary. I am with Beth Day (6.28) that we have to be very careful that we don't ask teachers and students to focus on the "second language" acquisition of science. I agree with Dr. Liberman that we have to deal with this conceptually and leave science jargon out of this.

Response 6:40 Gabrielle Johnson Oct 21, 2004 01:18

Hello there,

In reading through these comments, a few items struck a chord with me. I agree that not everyone may be passionate about the ocean as we are, but in all my years of teaching from elementary to university it appears to be a universal connection. Students of all ages love to hear stories about the ocean and get jazzed by the amazing critters that live there, so I think this gives us an upper edge. In my recent travels to Madagascar, the villagers I worked with were amazed to hear about our giant kelp plants just as I was amazed by the diversity of their corals. I have a teacher friend in Kansas who has few students which have ever even seen the ocean with their own eyes, yet the ocean unit is their favorite. I know I don't have to convince any of you of its values and appeal.

I really like Frank's idea (and several others) of putting it into an environmental perspective. In addition, this flows into the idea of keeping with standards. Though I teach at a private school, I constantly hear of other teacher's concerns in keeping with the standards and how they often feel limited by having to keep so strictly within their boundaries. However, as experts in the field of ocean study we can certainly help them make connections that they might not otherwise see. We can only hope, as Admiral Watkins mentioned, to get the national standards expanded to include ocean-related ideas as the efforts of projects such as these mean to accomplish in the long run.

In addition, I agree that we must keep the definitions simple. Perhaps I have not added anything new here but wanted to express my support of these major ideas.

Response 6:41 Susan Snyder Oct 21, 2004 10:35

I really like the "Ocean literacy implies...." statement made by Peter Teddenham (6:32) because 1) It is general enough that everyone will understand it. 2) It describes the importance of the ocean-atmosphere-earth system and the importance of understanding issues that will help people make intelligent national and local decisions. 3) It implies that there will be understandings (key facts and concepts) that will be necessary to know in order to identify issues and express positions that are informed.

Key facts and concepts can be described in a scope and sequence.

Response 6:42 Laura Francis Oct 21, 2004 10:47

Hello Everyone,

I have enjoyed reading through all of these comments and I think this is an important discussion. I agree with keeping the definition of ocean literacy more simple, broad, and straightforward. We don't want to lose people with the definition being too complex. I think one definition is the way to go, rather than a series of definitions for different audiences. I think that "understanding" needs to be part of the definition. Understanding involves higher level insights, abilities, and applications of knowledge to varied situations and contexts. From my perspective, it is important that our audiences understand how ocean systems work and why they are important to every day life and this is more than knowing key facts and concepts.

Here is another idea to add to the list:

"Ocean literacy is the knowledge and understanding of the influences and interactions of ocean systems and processes required for informed decision making."

Or Another Option:

"Ocean literacy is the understanding of ocean systems and processes that every citizen should have. An ocean literate person is able to converse, read, and write coherently about ocean-system-science in a meaningful way; knows key facts and concepts about the ocean and can apply them to decisionmaking in every day life."

Response 6:43 Francesca Cava, Nat. Geo. Society, Santa Barbara, California Oct 21, 2004 12:59

The National Geographic and others have also wrestled with definitions. In the last 20 years, there have been over 20 drafts and changes to the definition of geography literacy. However, in order to put some of our discussions into perspective, I thought it might help to show how another discipline has dealt with framing a definition to meet their communities needs. Here is what we have come up with:

Definition of "Geographic Literacy"

A geographically literate person understands the relationships between peoples, places, and environments and sees the connection to their own daily life.

Why Geographic Literacy?

Today, geographic literacy is more important than ever. Our children face a world more inter-dependent, more global, and more fragile than at any time in human history. There is no sphere of our society not touched by geography—from the food we eat, to the energy we consume, to the conflicts we are engaged in, we are shaped by, and we shape, the geographic forces in which we live. Never has it been more important to understand the broader implications and consequences of the actions we take. Geography provides the essential context in which this understanding takes place. In the 21st century, understanding the world is not a luxury but a survival skill.

Of course, these short statements are backed up with much more information and also reflect the structure and content of the National Geography Standards and their Scope and Sequence. The goal in this definition of geography literacy is to given a consistent message that can be used at the broadest level yet maintain the core message of the importance of geography both to education and to our lives. In summary to give it maximum relevance.

Response 6:44 Melissa Feldberg Oct 21, 2004 13:02

Hi All,

I too have been reading along with the discussion and wanted to jump in with my support that the definition include some words about informed decision making, such as Laura Francis suggested.

When I think of someone who is literate in something, I tend to think of someone who can read a newspaper article about an issue (in this case about the oceans), understand it and the vocabulary used, and know enough to question the information and make decisions in their own lives based on the information presented. Definately NOT a definition of literacy, but I think, especially with ragard to earth and environmental topics, being able to make informed decisions is an important part of literacy.

Response 6:45 Chris Parsons Oct 21, 2004 13:09

Thought I'd lob an affective bomb into the conversation (which has been really fascinating). Current environmental ed research suggests the need to address affective/values issues as part of environmental literacy. Knowledge + affect + skills are all part of decisions and actions. Some of you have alluded to this with your comments about stewardship and personal connections and daily decisions.

Do we need an affective/values component to the ocean literacy definition? We can't expect everyone to love the oceans as this community does, but...does a literate citizen need to care about, or at least see the value of, the oceans?

Response 6:46 Francesca Cava, Nat. Geo. Society, Santa Barbara, California Oct 21, 2004 14:15

Chris, You are certainly bringing a potential bomb shell and some of today's political rhetoric into this discussion when you allude to "values" [just joking of course.]

I thnk the question for this workshop is how do we promote more ocean content in the classroom and subsequently increase the public knowledge base about the ocean. This can be accomplished many ways including elevating its importance. For some people, this is effectively done by making them think it is important, through values, relevance, aesthetics, science, education, etc.

But as a community we are looking for a consensus of what we collectively think is the best way to define ocean literacy. With such a definition, hopefully we can also then take on broader issues like how ocean literacy most appropriately can be framed in other issues such as environmental literacy, geographic literacy, science literacy, biodiversity/sustainability literacy, etc. [please don't get hung up on the word literacy in this sentence, I could have just as easily said education, this is just meant to be an example] I believe we must take one step at a time and starting with defining ocean literacy and the concepts needed to attain ocean literacy seems like a logical place to start.

What do others think?

Response 6:47 Rita Bell Oct 21, 2004 17:11

How's this for a synthesis of our comments?

Ocean literacy implies that a person can identify issues concerning the ocean and the ocean-atmosphere-earth system, evaluate information and make decisions that are scientifically, culturally and technologically informed.

An ocean literate person is aware of a set of fundamental ideas, perspectives and big picture concepts about the ocean that are relevant to daily life, including the importance of oceanic and earth systems and how they interact to produce and sustain a habitable planet.

Note: Vocabulary, conversing, reading and writing coherently are important, but I see them more as tools and skills that help us reach understanding instead of the central focus of our work.

Response 6:48 William Bragg Oct 21, 2004 17:35

Great synthesis! :-)

Response 6:49 George Matsumoto Oct 21, 2004 18:21

Nice synthesis - we get the definition of ocean literacy and what an ocean literate person is capable of doing/understanding.

Response 6:50 Gene Williamson Oct 21, 2004 18:28

Rita: "How's this for a synthesis of our comments? "

I like it. You should be a teacher. Oh, wait a minute. You were a teacher and you left all that for a cushy job at the aquarium. Right?? :-)

Response 6:51 Dave Niebuhr Oct 21, 2004 18:30

Rita,

I really feel that you've captured my thoughts with your first sentence here. way to go!

Response 6:52 Bob Stewart Oct 21, 2004 18:44

I find the discussions very interesting. Clearly everyone is working hard. Rita (6:47) and Pater (6:32) have added an important sentence, but I am concerned that the sentence is too demanding, and therefore doomed to failure (despite its importance). The first part, and Peter's definition (6:32) is the working definition of "civic science literacy" proposed by Benjamin Shen (Shamos: 85). Few adults reach this level of literacy.

Shamos points out that careful studies show that "The fraction of adult Americans who possess a minimal understanding of scientific terms and concepts[is] about 30%". The fraction is the same in the UK. Shamos: 89. Such adults have "functional scientific literacy." So very few of our students will be able to "evaluate information and make decisions that are scientifically, culturally and technologically informed." For this reason, I limited my definition (6:34) to the bare minimums proposed by Shamos as rewritten by Sharon Walker (6:31).

Regarding vocabulary. Yes it is just a tool.--Rita (6:47). But it is at the heart of Hirsch's cultural literacy. We expect students in other fields to have a good vocabulary and reading skills, and they are tested for these skills. I hope we expect the same of our students, and that we make it an explicit goal (and one that is tested). If it is not, I am afraid we will end up with students who think they can read about the ocean, but who can't.

Response 6:54 Lynn Whitley Oct 21, 2004 19:45

I think Rita (6:47) has taken a lot of the concepts and ideas that keep surfacing in this discussion and distilled

them quite well. I agree with some of Bob Stewart's concerns about the actual level of scientific literacy that manifests in society, but I would hope we could at least aim high. Francesca's information about the Geographic literacy definition has merit as a model. It's short and concise (like Rita's definition) and yet the short blurb that follows allows it to be explained a little more. Perhaps this might work with Rita's suggested definition.

Response 6:55 Craig Strang *Oct 21, 2004 19:51*

Hello, all. It's hard to know where to begin or which thread to follow! Thanks to all of you for the great conversation. A few comments...

While we could encompass ocean literacy as a subset of environmental literacy, I don't think it will serve us. We need to be clear about our purpose--to describe what it is about the ocean that every person should know--including connections between the ocean, atmosphere and land. Whatever we come up with as the essential ocean sciences concepts should have their own intrinsic coherence--they should all add up to what a person needs to become ocean literate. Once the concepts are infused into science standards they will appear diffuse, but we will know that they retain the coherence we imbued them with.

Several of the definitions for literacy have included some form of this statement: "...knows key facts and concepts about the ocean and can apply them to decisionmaking in every day life." I think this is great but think we need to give some description of what those key facts and concepts are. That's why I like (with some friendly amendments) the NE COSEE statement that says what it is we think people should actually know. They should be big ideas with a large grain size but with enough detail that we know what them mean.

Response 6:56 Craig Strang *Oct 21, 2004 19:54*

Hi, Again. I realized there is a somewhat overlapping conversation going on in the Expectations for the Workshop section. I encourage people that haven't been there in a while to visit.

Response 6:57 Francesca Cava, Nat. Geo. Society, Santa Barbara, California *Oct 21, 2004 20:15*

I think we are getting closer, although there still may be a bit of disagreement.

I like the idea of a short definition, as Rita and others have listed above. We can link this definition to facts and concepts and any other clarifications/explanations as are necessary, but it would be nice to have something short and sweet and very clear to as many people as we can reach.

I also like Lynn Whitley's suggestion above that we can expand on the definition with other statements of clarification, as was done in the case of Geographic Literacy. Can we agree on something like that?

It may be time to also move to the section of the workshop to identify what these concepts, facts and whatever else is needed to help define what ocean content should to be in the classroom.

I also encourage everyone to view the video theater to get a sense of what Admiral Watkins and Gil Grosvenor have said about ocean literacy in their own words. These interviews are quite interesting and do add another perspective.

Response 6:58 Peter Tuddenham *Oct 21, 2004 20:32*

Just a process and timing note here.. We will aim to draw this item to a close later on Saturday, so that Chris and the team here can work on a summary of this great dialogue and this first weeks contributions.

So please keep discussing and refining ideas here until then, but know that we will be moving on in 48 hours from this item, when it will be "frozen".

Response 6:59 Sarah Schoedinger *Oct 21, 2004 23:30*

I agree that we need to stick with defining ocean literacy (and creating one definition) rather than expand our scope to defining environmental literacy. I also find it appealing to think of our ocean literacy definition being consistent with a definition of science literacy (although that doesn't mean identical to it).

Another point of interest (at least to me) is that the North American Association of Environmental Educators (NAAEE) does not have a succinct definition of environmental literacy. I was surprised by this, given the amount of effort they have put into developing guidelines for excellence in environmental education. Instead they use their guidelines for learning (Pre-K to 12) as a proxy for a concise definition. (I'll post them in the resources area.) So I asked a past president of NAAEE, Bora Simmons, why this was the case.

Apparently a key reason NAAEE avoided defining environmental literacy was because any definition should include something about the importance of feelings/attitudes about the environment and doing so would open a can of worms in terms of dealing with education reform in public school systems.

Response 6:60 Mike Hughes Oct 22, 2004 07:47

Sarah, I'm not sure I understand that. Did NAAEE decide the def'n. should contain that component or is that written or suggested somewhere else? Do we agree that it must? It seems to me that, if people are literate, they can and will develop their own attitudes and that may not need to be in a definition. Also, why would it be a problem in P/S reform?

Response 6:61 Carmelina Livingston Oct 22, 2004 09:11

I agree with many of you about keeping the definition general and broad. Keep in mind that the National standards were written in the same manner to accommodate all students and teachers' cognitive and affective levels. When looking at a definition, I look at it in the same manner as I would read or write a mission statement for a school district or an aquarium. It is broad enough to cover all levels of understanding. Once the mission (definition) is written, then we look into giving specifics (examples) to our public such as what Francesca mentioned in 6:43 and Rita in 6:47. We should not assume that our public understands the terminology that we are use to hearing every day as marine educators. I agree with Bob in 6:52 about "that the sentence is too demanding, and therefore doomed to failure". If educators/general public can not understand the definition because of specific jargon, teachers/educators will not practice it! We must assume that this definition accommodates all abilities levels. There is nothing wrong with being generalistic just as long we back it up with specifics such as in the example of geographic literacy in 6:43.

Response 6:62 Sarah Schoedinger Oct 22, 2004 11:41

Mike, re: 6:60 and 6:59, yes, NAAEE did not create a succinct definition of environmental literacy because they thought it should include something about student attitudes and feelings about the environment.

I did not have an extensive conversation with Bora about why including an affective criterion to a definition would be problematic. I assume it may have something to do with the difficulty in measuring feelings or rather using changes in student attitudes as a benchmark. I'll see if I can find out more and report back.

Response 6:63 Rebecca Bell Oct 22, 2004 13:05

I wonder if we should step back and figure out what we want kids to actually DO with their knowledge of oceans, then use those behaviors (both persoal and on a larger govt scale)and the prerequisite knowledge that guides those behaviors to define literacy. Twenty years from now, when a child I taught is an adult and a consumer, what do I want them to be doing? That Earth's systems are connected, that what happens to the oceans influences the other systems and humans, what resources we get from oceans, what the problems are or may be, the source of those problems, possible long term solutions that govt's must take charge of, and possible solutions via personal behaviors. Students must understand that different cultures view the use of the resources in different ways; how competing international and national policies/laws govern use of the resources; and economic and aesthetic connections

Response 6:64 Mike Hughes Oct 22, 2004 13:42

Thanks, Sarah. Anything that keeps us from re-inventing the wheel is good! I have to wonder if attitudes/feelings even belongs in such a definition, though. I disagree with their assessment of that. I feel like literacy is having enough knowledge and understanding to develop your own attitude/feeling (vote!) on important issues. Maybe being an informed citizen IS the definition!

Carmelina made a nice parallel to a mission statement in 6:61. These statements often go toward such ideas as exposing people to certain things (an aquarium, a nature walk) to increase awareness and appreciation, or schools creating lifelong learners. While these statements are not directly measureable, they achieved by measureable components. Also, as Carmelina says, it encompasses all cognitive and affective levels. The Special Ed. teacher in me thinks that's an important component.

Response 6:65 Judy Doino Lemus Oct 22, 2004 14:02

I really like Rita's definitions, although I might go a bit further and substitute "understands" for "is aware of" in the second statement. I also think we need to aim high - I am reminded of Eliabeth Stage's presentation on the NCTM standards and how those were intended to be a "banner" for people to follow and look toward as a goal (i.e., something to strive for rather than something to be tested). I also think it is really interesting that NAAEE does not use a definition of environmental literacy... maybe something to be learned there. However, I know that teachers are so busy teaching the tested standards, that it leaves little room for anything else. So when we do start talking about concepts that will serve as the guidelines for what students should know, I suggest we focus on aligning ocean concepts with the existing national standards, instead of creating new standards... then we will not

only have a "standard" (ocean literacy) to strive for, but a realistic mechanism for achieving it.

Response 6:66 Rebecca Bell Oct 22, 2004 14:16

This is an excerpt from the Environmental Literacy Council's web site, which might help here. Check their web site for other info.

Ask an Expert for October 25, 2002

Question: What is the difference between environmental literacy and environmental science?

Answer:

Environmental science is a study that seeks to understand the systems of the natural world, including how human activities affect those systems. It is a multidisciplinary field that applies concepts from physics, chemistry, biology, and the earth sciences. Environmental science also draws from the social sciences, including sociology, political science, history, and economics.

Knowledge gained from the environmental sciences contributes to environmental literacy. Environmental literacy requires a fundamental understanding of the systems of the natural world, the relationships and interactions between the living and the non-living environment, and the ability to deal sensibly with problems that involve scientific evidence, uncertainty, and economic, aesthetic, and ethical considerations..... more

Response 6:67 Sharon Walker Oct 22, 2004 14:54

Wow....all these comments and dialogue will teach me NOT to miss another day! In reading all of yesterday's and today's thoughts thus far, I believe Rita's synthesis of our commennts is almost there, i.e., 6:47..."Ocean literacy implies that a person can identify issues concerning the ocean and the ocean-atmosphere-earth system, evaluate information and make decisions that are scientifically, culturally and technologically informed. An ocean literate person is aware of a set of fundamental ideas, perspectives and big picture concepts about the ocean that are relevant to daily life, including the importance of oceanic and earth systems and how they interact to produce and sustain a habitable planet."

With this said, I believe, in the second sentence of this quote, we need to include the word, understands....., for I believe you have to be aware that a set of fundamental ideas, perspectives and big picture concepts exist and from this awareness, an individual would then hopefully believe he/she needs to understand this set of fundamental ideas, perspectives and big picture concepts....so, the ocean's relevance to our everyday lives becomes obvious, no matter where we live....to all "ocean literate people."

And, again, I believe as we examine more closely the "key concepts" from our surveys....we can refine and "word-smith" this ocean literacy definition. Howewver, these thoughts represent a really wonderful discussion!

Response 6:69 Bob Stewart Oct 22, 2004 17:58

I am still concerned that we have not learned enough from the past. We encourage our students to identify the experts, and to learn from them. I am not an expert on ocean literacy, so I looked for the experts. A few years ago I leaned of the work of Morris Shamos, who spent his whole life trying to improve the teaching of science, and who put much effort into understanding the concepts of science literacy, including writing a book summarizing his views. He was a former president of the NSTA, but more importantly, he was past president of the National Academy of Sciences. His credentials are impressive.

I think it is important to listen to his well argued view that hopes for widespread science literacy have been unfulfilled for two centuries because the hopes exceeded students ability. He then states we need to rethink what we expect our student to know about science. That lead to his definitions:

a) Cultural Scientific literacy: A grasp of certain background information and vocabulary shared by all literate people...This is the only level of literacy held by most of the educated adults who believe they are reasonable literate in science." and

b) Functional Scientific Literacy. "Here we add some substance to the bare skeleton of cultural literacy by requiring that the individual not only have have command of a scientific lexicon, but also the ability to converse,

read, and write coherently, using science terms in perhaps a non-technical but nevertheless meaningful context. This means using the terms correctly, for example knowing what might be called "some of the simple everyday facts of nature," such as having the knowledge of our solar system, of how the Earth revolves about the Sun and the Moon revolves about the Earth, and how eclipses occur. Much of this is better classified as natural history than as science proper, but it is nevertheless a part of the overall scientific enterprise. Elementary, to be sure, yet unfortunately not at the fingertips of most Americans. Or to get a bit more sophisticated, expecting the individual to identify the ultimate source of our energy; or the "greenhouse effect," or knowing what "clean air" means or how we get the oxygen we breathe." This level of literacy is attained by about 30 percent of Americans.

I propose we seriously consider his definitions, and if we reject them, at least state why he is wrong or why they do not apply to teaching about the oceans. I agree with Sarah (6:59) that we ought to at least be consistent with the idea of science literacy, especially in light of Shamos' inclusion of knowledge of the earth and ocean in his definition.

Response 6:70 Mike Hughes Oct 22, 2004 18:21

Thanks, Bob. By these definitions, and the sum of all the discussion to date regarding individual abilities, cognitive and affective levels, access to resources, demands on teachers, and what people should be able to do with their knowledge..., do you think we should be aiming to achieve "Cultural" or "Functional" Ocean Literacy in the general population?

Response 6:71 Mellie Lewis Oct 23, 2004 11:28

There has been a lot to synthesize on this thread. As a classroom teacher, I agree with Laura Francis 6:42 that our ocean literacy definition should be simple, broad and straightforward and that "understanding" needs to be part of the definition. I especially like Rita Bell's "ocean-atmosphere-earth system" integration into the definition.

I think Rita Bell 6:47 has done an excellent job of synthesizing our comments and like Sharon Walker 6:67, I think we could mesh together Laura and Rita's ideas. We would then have:

Ocean literacy implies that a person can identify issues concerning the ocean and the ocean-atmosphere-earth system, evaluate information and make decisions that are scientifically, culturally and technologically informed.

An ocean literate person understands a set of fundamental ideas, perspectives and big picture concepts about the ocean that are relevant to daily life, including the importance of oceanic and earth systems and how they interact to produce and sustain a habitable planet.

Response 6:72 Laura Francis Oct 23, 2004 21:06

What a wonderful discussion this has been!

I think that Rita's 6:47 definition is getting really close and I like Mellie's 6:71 replacement of the word "awareness" with the word "understanding".

Response 6:73 Tom Greene Oct 24, 2004 11:07

It's good that we are sharing all these ideas about ocean literacy but in trying to come up with a definition of "ocean literacy" we may have put the cart before the horse. Let's think about first constructing a framework for the major concepts and big ideas we wish to include into grade levels, K-4, 5-8, and 9-12, and then fashion a working definition for "ocean literacy" from these concepts. You may decide on a half dozen fundamental concepts. The fundamental concepts should be the same at each grade level, however the number of facts and their complexity will vary as students move from one grade to the next. Some suggested concepts:

1. The Ocean as a Living System (biology)
2. The ocean -Its Physical Setting(chemistry, physics)
3. Planet Ocean -(earth science)
4. The Ocean and Beyond (Astronomy)

You can see that that we will have created a true interdisciplinary science of "Oceanography" or "Marine Science" because it contains components from all the sciences.If we can get a framework started I think we will have accomplished a great deal.

Response 6:75 Peter Tuddenham Oct 24, 2004 11:30

Tom, et al, we (Sarah, Craig, Francesca and I) have had several spirited conversations in preparation for this workshop about the topic you raise, what comes first, concepts and details or big picture vision/statement on ocean literacy. There is no one right answer. Both approaches inform the other. I think too that it is also related to how you and I individually approach the world, i.e. how is our world view formed.

I am truly impressed and grateful for the spirited, detailed, thoughtful and considered contributions that are being made in this item. The sense of evolution of thought here, is, I hope, collectively shared. My sense is that we are pretty close to relative agreement about the nature of a statement we can all live with.

Your point may well be served by this coming weeks activities to put ocean content to science standards. There are eight categories of standard, and contained within each a number of standards, in fact 87 I think I counted for grades K-12. Gathering specific content on oceans and matching to these standards will inform the discussion on literacy and also on the broader concepts...

Response 6:76 [Frank Muller-Karger](#) Oct 24, 2004 13:46

It certainly is hard to synthesize all that has been stated in the past few days - I don't envy those that will attempt to do this, but I am looking forward to their product!

A couple of comments follow:

1) I tend to agree with an earlier comment from R. Steward that "understanding" is a tricky word. I think I understand some things about oceans and its interactions with land, atmosphere, and living things including people. But it would be irresponsible if I stated that I "understood" natural processes. I do prefer the word "awareness" in part because it better describes what (I think) I understand.

Further, it is even harder to have a "fundamental understanding" about anything, and especially to expect so in the general or lay public, as opposed to achieving a "basic level of understanding" (which could be defined as to what to teach to meet a standard). Perhaps I am reading too much into the word "fundamental" and this may be a semantics issue.

2) I have a sense that there is something missing in any of the definitions outlined thus far, and that is what the ultimate objective would/should be. Let me see if I can focus on this below.

I agree that we should look for basic comfort with the scientific method (i.e. we all apply it every day in our private or professional lives), be aware of critical connections between parts of nature, and understand that there are processes that have rendered and keep the planet habitable.

However, there needs to be a reason for such "knowledge" beyond simply "making decisions that are scientifically, culturally and technologically informed". Just assuming that everyone will use knowledge "the right way" is disingenuous. Throughout history we have made the wrong "decision" with regards a broader framework, if those decisions use "understanding" for short-term, selfish benefit.

Further, in many cases we really lack "understanding" even at the most basic level and yet we are faced with a decision - which way should we go? This is the problem addressed by the "precautionary principle", which we tweaked and redefined as the "precautionary approach" in Chapter 3 of the USCOP report. I think this is a very important "approach" to making decisions, and indeed all Commissioners from all walks of life agreed.

If interested in details, I suggest people read Chapter 3 of the US Commission on Ocean Policy? (See attached or http://www.oceancommission.gov/documents/prepub_report/chapter3.pdf) [USCOP_chapter3.pdf](#)

This chapter attempts to "set the nation's sights", and one of the opening sentences (box) is:

"In keeping with the latest scientific understanding about the world, management based on ecosystems rather than political boundaries should be at the heart of any new ocean policy framework. Success also depends on greatly improved public awareness of the relationship between the oceans and human existence, the connections among the land, air, and sea, the balance of benefits and costs inherent in using ocean and coastal resources, and the role of governments and citizens as ocean stewards."

There are some elements in this last sentence that we have not touched on, in terms of broader benefits and the role of individuals as stewards (i.e. not just use "understanding" at some level for quick and personal gain). Indeed, as the USCOP recognizes, science cannot determine the "best" outcome in the absence of clearly identified management goals.

Chapter 3 of the USCOP has 13 principles we used, to the extent we could, in designing every recommendation in the report. I think that some or all of these could be helpful in guiding a corollary statement that may broaden a definition of "ocean literacy" and "environmental literacy".

I believe this can be brought into the definition without a biased "values" statement.

Possibilities may be modifying the partial definition below(used here for illustration):

Ocean literacy implies that a person can identify issues concerning the ocean and the ocean-atmosphere-earth system, evaluate information and make decisions that are scientifically, culturally and technologically informed [and which help ensure the sustainability of ecosystems for the benefit of future as well as current generations].

[While I like the following corollary, it also lacks that specific guidance to do the right thing with the "understanding" gained:]

An ocean literate person understands a set of fundamental ideas, perspectives and big picture concepts about the ocean that are relevant to daily life, including the importance of oceanic and earth systems and how they interact to produce and sustain a habitable planet.

Response 6:77 [Jonna Engel](#) Oct 24, 2004 15:15

Whew, I have been reading along and feeling overwhelmed but also excited and hopeful that we are arriving at a really important product – a definition of ocean literacy. I agree with what seems to be the consensus, that we need an umbrella definition for ocean literacy that is general, inclusive, over-arching, and written for what we expect/hope of a person coming out of K-12 education. I would like to see us come up with both the definition for ocean literacy and the “why” of ocean literacy—similar to what has been done for geographic literacy that Francesca shared (6:43). And following the why of ocean literacy we next move on to the “how” of ocean literacy in our scope and sequence discussions that will involve weaving ocean facts, concepts, and processes into the National Science Standards.

I believe the 90+ comments on this topic are moving us toward our goal of a definition of ocean literacy. I think that these comments should be synthesized into several final definitions that we vote on in the end.

I am now working on a synthesis statement or my plug for one of the existing statements. I have been mulling over how to make the statement feel hopeful, enthusiastic, inviting – so that when someone reads what ocean literacy is, they want to have it! And also as so many people have put forward – I think the statement needs to include a stewardship component – that being ocean literate involves personal responsibility in actions and behavior on our planet.

I recognize that the really valuable comments are from those folks who have stuck their necks out and have given potential definitions – thank you!

Response 6:78 [Gene Williamson](#) Oct 24, 2004 15:16

Frank: "lacks that specific guidance to do the right thing with the 'understanding' gained"

I know what you are saying, and I agree that "understanding" is not only tricky, but very hard to evaluate. There is a further problem as I see it. If we expect students or adults to do the "right thing" once they have achieved "understanding", my question is "the right thing" according to whom?

If we attempt to set ourselves up as arbiters of right answers we may find ourselves hung out to dry somewhere between "1984" and the Spanish Inquisition. I strongly urge that we try to define the big-picture issues and let the "understanding" and concomitant doing of the "right thing" fall where they may. Am I making any sense here, or have I gone into terminal brain-block after reading 76 bits of input?

Response 6:79 [Jonna Engel](#) Oct 24, 2004 15:20

p.s.

70+ comments that is. And, I think that the word "knowledge" should be included in the definition:

Ocean literacy implies a basic knowledge and understanding of ocean concepts and processes....

yes, yes - this is not easy. More to follow

Response 6:80 Peter Tuddenham Oct 24, 2004 15:50

Gene ..yes you are making sense.. somehow the excitement of continuous inquiry should come through..as much, or more, emphasis on process as opposed to end state (knowledge, understanding)...hmm

Response 6:81 Frank Muller-Karger Oct 24, 2004 17:46

Gene - yes, you make sense. I am latino, and dread the Spanish Inquisition!

I do agree with you and fully understand that we can't define what is right in terms of values, given that in the US everyone believes their values are better than someone else's.

The point I tried to make was that we need to guide those receiving education toward an objective, which to me is more than "understanding" and more like a hopeful outcome of "understanding".

So, what I tried to do is to phrase this with a specific example by using the language of the USCOP at the end of one of the definitions posted earlier (I repeat here with text highlighted in yellow, enclosed in brackets):

Ocean literacy implies that a person can identify issues concerning the ocean and the ocean-atmosphere-earth system, evaluate information and make decisions that are scientifically, culturally and technologically informed [and which help ensure the sustainability of ecosystems for the benefit of future as well as current generations].

I don't see this necessarily as a "value", but it still is what I believe (or hope) all of us are looking for as a long-term outcome (the "right thing").

What I want to avoid is to develop "understanding" with which resources may be used more efficiently, but that does not accomplish that long-term goal of helping more than the individual (clearly this is part of the problem in present society - the individual's values are sacrosanct).

Getting too deep for a Sunday night. I have a 4-pound octopus cooked and beer ready, just waiting for guests to arrive...

Cheers, from Margarita Island in the S Caribbean...

Response 6:82 Craig Strang Oct 24, 2004 17:59

Gene's comments about "doing the right thing according to who?" are very relevant--which is why I think the environmental ed folks were concerned about including values and feelings in their definition. Schools are not supposed to be involved in advocacy. Teachers aren't supposed to advocate particular points of view or to "politicize" their curriculum. Ha! That's one of the big myths of education. Every passionate teacher conveys a point of view about things about which they care deeply. But we have to walk a fine line so that our work is not publicly discounted as advocacy. I like Frank's wording very much (6:76):

"Ocean literacy implies that a person can identify issues concerning the ocean and the ocean-atmosphere-earth system, evaluate information and make decisions that are scientifically, culturally and technologically informed [and which help ensure the sustainability of ecosystems for the benefit of future as well as current generations]. "

Who can argue that we shouldn't ensure sustainability of ocean ecosystems for current and future generations? I think it's unassailable--and doesn't everyone want to sail?!

Thanks again to all those sticking their necks out. I think we're getting somewhere even if we all don't agree with everything all the time.

Response 6:83 Julie Lambert Oct 25, 2004 00:24

I really think that Rita's two statements capture a lot of the comments about ocean literacy. To add to Bob Stewart's comment on literacy, I am attaching a file of the first chapter of my dissertation on scientific literacy and marine science. You will see a table of different levels of scientific literacy according to Rodger Bybee of BSCS.

These are nominal, functional, conceptual, and multidimensional. They may help us further define ocean literacy.

[PrologueCHAPTER_1.doc](#)

Response 6:84 [Chris Parsons](#) *Oct 25, 2004 00:54*

See the summary of this great conversation (and all of the Week 1 events) in the Summary section of the Meeting Room.

Response 6:85 [Bob Stewart](#) *Oct 25, 2004 10:33*

The definition proposed by Craig (6:82) and Frank (6:81) is very narrow. It focuses entirely on civic literacy. Do we need ocean literacy only to produce citizens who can make informed decisions? Do we also want to raise new scientists? Do we want students to have an appreciation for the beauty of the oceans? Plus, it seems to me citizens can function well without being able to "identify concerns." Oceanographers and environmentalists have already done this. For these reasons, I propose we go back to Sharon Walker's definition (6:14) which is much broader and more all encompassing. It also includes civic literacy.

"Ocean literacy is the awareness of a set of fundamental ideas, perspectives, or big picture concepts about the ocean that every citizen should have. An ocean literate person is one who has a basic oceanic vocabulary; is able to converse read, and write coherently using oceanographic terms in a meaningful way; knows key facts and concepts about the ocean relevant to daily life; and has a knowledge of the importance of oceanic and earth systems and how they interact to produce a habitable planet."

Response 6:86 [Melissa Feldberg](#) *Oct 25, 2004 13:50*

I am just going to jump in and add support to Bob's thought that we go with a definition that is more broad and captures the idea that students care about the ocean AND actually know important information and vocabulary regarding the ocean. I personally think it is important that we leave out mention of values and stewardship in the definition of ocean literacy. Perhaps we could introduce these in the "set of fundamental ideas, perspectives, or big picture" to be developed?

Response 6:87 [Chris Parsons](#) *Oct 25, 2004 14:32*

Please see the literacy definition suggested based on a summation of this stream of discussion in the Weekly Summary, Item 12. Thanks.

Concepts and Issues - Grades 9-12

Item 7 [Peter Tuddenham](#) *Oct 20, 2004 09:36*

Here are the summaries of responses from the pre-workshop survey so far.

Webpage: [Summary of concepts and issues grades 9-12](#)

PDF: [Summary of concepts and issues grades 9-12](#)

This summary serves as a good way to begin discussions on what concepts and issues a high school graduate should know. We will be getting to more specific detail linked to science standards next week. Here we should focus on the higher level concepts.

Response 7:1 [Peter Tuddenham](#) *Oct 20, 2004 15:16*

Ocean Literacy Online Workshop
Pre-workshop Survey Report
October 2004

Concepts and Issues 9-12

What are the most important ocean-related concepts/issues for a student to understand by the completion of 12th grade?

- The interplay of marine ecology and ocean economics.
- interaction of man and the ocean... ability to make choices in political areas for sound policies for the future (ability to identify sound policy)
- climate and global change and the interrelations with the oceans
- human interaction and impact, ocean connection to weather, resources, oceans are complex systems, coastal
- Same as above plus:-Add complex interactions between living and non-living components of the ocean, international Earth-system level-People are part of the ecosystem
- Basically same as 8th grade, but in more complete form. Could introduce links to government and environment
- I/m not as familiar with these grades.
- importance of the ocean to the economy/science of the ocean/politics about the ocean
- All of those listed in the above three statements. They should be able to use their knowledge to be conversant on issues and make informed decisions not just recite information.
- I endorse the Oceans for Life Scope and Sequence as a starting point.
- See above.
- Same as above and:8. light/energy in the ocean9. endangered species
- Ocean chemistry/Oceans and climate/Ocean/environmental conservation
- Environmental and economic decisions have global impacts. The role of genetic variation in evolution.Natural processes and human impacts.
- All the above, but at a deeper level of understanding. The importance of microbes in the ocean (life in the ocean based).
- At the high school level, kids study the "why"- why biodiversity is important, why organisms are found where food chain is important re stability
- issues such as sustainability can be introduced here. Global systems and their interconnectedness on a global scale important here.
- Biogeochemical cycles and the ocean.Global warming and the ocean.Fisheries and ocean conservation.
- Waves, currents, tides, salinity.The role of oceans in the Earth system.
- Complete ocean literacy as per the first definition above.
- Research, bio-medicine, ocean exploration, new technology to assist with exploration
- For high school students, "some issues" which should be understood may include by are limited to....the ocean potential oceanographic and/or ocean-related careers
- 2) is only beginning to be understood for its vast medicinal values
- 3) contains many circulation patterns which "help drive" our weather
- these patterns should be better understood by our high school students
- 4)contains constancy of chemical composition
- 5)I will "return to this response."
- Issues of ocean conservation, scientific research. Role of ocean in sustaining the planet through climate, bioeconomy.
- a much more in-depth understanding of statements 1-3.
- n/a
- HOW oceans affect our lives
- Senior level students should be able to discuss advanced plate tectonics, global warming, some nutrient cycles/pollution as it relates to the oceans.
- No comment as yet.
- Humans depend on the ocean. The Ocean depends on humans.Life came from the ocean.The ocean controls the ocean has been there since the early earth.

- Even though humans are terrestrial, their existence and the planet's existence and overall health is strongly the ocean.

Response 7:2 William Bragg Oct 20, 2004 19:59

Per Bob Stewart's suggestion in 5-8... (again, I deleted a couple that had no comment)

Ocean Literacy Online Workshop
Pre-workshop Survey Report
October 2004

Concepts and Issues 9-12

1. The interplay of marine ecology and ocean economics.
2. interaction of man and the ocean... ability to make choices in political areas for sound policies for the future of the oceans... ability to identify sound policy
3. climate and global change and the interrelations with the oceans
4. human interaction and impact, ocean connection to weather, resources, oceans are complex systems, coastal processes
5. Same as above plus:-Add complex interactions between living and non-living components of the ocean, interactions on an Earth-system level-People are part of the ecosystem
6. Basically same as 8th grade, but in more complete form. Could introduce links to government and environmental policy.
7. I/m not as familiar with these grades.
8. importance of the ocean to the economy/science of the ocean/politics about the ocean
9. All of those listed in the above three statements. They should be able to use their knowledge to be conversant in ocean issues and make informed decisions not just recite information.
10. I endorse the Oceans for Life Scope and Sequence as a starting point.
11. Same as above and: 8. light/energy in the ocean 9. endangered species
12. Ocean chemistry; Oceans and climate; Ocean/environmental conservation
13. Environmental and economic decisions have global impacts. The role of genetic variation in evolution. Natural coastal processes and human impacts.
14. All the above, but at a deeper level of understanding. The importance of microbes in the ocean (life in the oceans is microbe based).
15. At the high school level, kids study the "why"- why biodiversity is important, why organisms are found where they are, why a food chain is important re stability
16. issues such as sustainability can be introduced here. Global systems and their interconnectedness on a global scale are important here.
17. Biogeochemical cycles and the ocean. Global warming and the ocean. Fisheries and ocean conservation.
18. Waves, currents, tides, salinity. The role of oceans in the Earth system.
19. Complete ocean literacy as per the first definition above.
20. Research, bio-medicine, ocean exploration, new technology to assist with exploration
21. Issues of ocean conservation, scientific research. Role of ocean in sustaining the planet through climate, biota, and economy.
22. a much more indepth understanding of statements 1-3.
23. HOW oceans effect our lives
24. Senior level students should be able to discuss advanced plate tectonics, global warming, some nutrient cycles and pollution as it relates to the oceans.
25. Humans depend on the ocean. The Ocean depends on humans. Life came from the ocean. The ocean controls climate. The ocean has been there since the early earth.

26. Even though humans are terrestrial, their existence and the planet's existence and overall health is strongly linked back to the ocean.
27. (this is all #27) For high school students, "some issues" which should be understood may include by are limited to....the ocean:
 - 1) what are potential oceanographic and/or ocean-related careers
 - 2) is only beginning to be understood for its vast medicinal values
 - 3) contains many circulation patterns which "help drive" our weather these patterns should be better understood by our high school students
 - 4) contains constancy of chemical composition
 - 5) I will "return to this response."

Response 7:3 William Bragg Oct 20, 2004 21:34

Another response to the survey:

>> For High School Students, "some issues/concepts" which should be understood may include but are not limited to....the ocean:

- 1) represents unparalleled opportunities for oceanographic and/or ocean-related careers;
- 2) is only beginning to be understood for its vast medicinal values;
- 3) contains many circulation patterns which help drive our weather; these patterns should be better understood by our high school students;
- 4) contain constancy of composition;
- 5) is in trouble for many reasons, such as having less than desired water quality, excessive coastal development, and being overfished for most of the world's fisheries and therefore needs be better managed;
- 6) is of precedented value for its diversity in economic development efforts ranging from the shipping industry to recreational and commercial fisheries, to recreational use, to offshore oil and gas, to aquaculture ventures and "on and on" for this country, as well as many, many other countries;
- 7) is essential to our national security; and
- 8) contains the world's primary oxygen producers, phytoplankton.

Response 7:4 Julie Lambert Oct 20, 2004 22:59

Hello, I developed a draft of a table that shows my correlation of marine topics, National Science Education Standards, and Florida's Sunshine State Standards. I know that these are just topics and not statements and are fairly high level, but I think something like this serves a purpose for some audiences. I think we need multiple ways of presenting ocean literacy to others. Julie Lambert[standards_topics].doc

Response 7:5 Tom Greene Oct 25, 2004 08:29

It might be a useful idea for us to think about constructing a framework into which we can put all of the understandings we wish students to have. The framework can consist of major concepts we wish to include into grades 9-12. You may decide on a half dozen fundamental concepts. The fundamental concepts should be the same at each grade level (K-12), however the number of facts and their complexity will vary as students move from one grade to the next. Some suggested major concepts:

1. The Ocean as a Living System (biology)
2. The Ocean -Its Physical Setting (chemistry, physics)
3. Planet Ocean -(earth science)
4. The Ocean and Beyond (Space Science)
5. Human Impact on the Oceans (Environmental Science)

This framework contains components from all the sciences making "oceanography" truly an interdisciplinary science. Now we can fill in each of the major concepts with the many topics and issues cited in the responses.

Response 7:6 Mellie Lewis Oct 25, 2004 09:08

Tom - would the geological ocean come under number 3 - Planet Ocean?

Response 7:7 Beth Jewell Oct 25, 2004 10:41

I like this framework. Further emphasizes the interaction of all sciences in oceanography.

Response 7:8 Tom Greene Oct 26, 2004 07:55

To answer Mellie's question, yes the geological features would come under #3 Planet Ocean. In addition, each of the 5 major themes or concepts would be infused with math and inquiry (experiments and activities) two of the

seven science standards.

Response 7:9 [Patricia DuBose](#) Oct 26, 2004 09:48

I'm a little slow... these new headings at the top of this section are confusing me (i think!)... are we to place our concepts/activities/topics under the individual headings or post them in this major section...

Response 7:10 [William Bragg](#) Oct 26, 2004 09:53

Click on that section and go to that room, and in that list - that would be the place to put them.

These areas:

|Unifying Concepts and Processes | Science As Inquiry | Physical Science | Life Science |
| Earth & Space | Science & Technology | Personal & Social Perspectives | History & Nature of Science | Other topics |

Hope that helps! (it is a lot, don't worry!)

Response 7:11 [Peter Tuddenham](#) Oct 29, 2004 12:25

Please move to summarize in [Item 10](#)

Concepts and Issues - Grades 5-8

Item 8 [Peter Tuddenham](#) Oct 20, 2004 09:39

Here are the summaries of responses from the pre-workshop survey so far.

Webpage: [Summary of concepts and issues grades 5-8](#)

PDF: [Summary of concepts and issues grades 5-8](#)

This summary serves as a good way to begin discussions on what concepts and issues a middle school graduate should understand. We will be getting to more specific detail linked to science standards next week. Here we should focus on the higher level concepts.

Response 8:1 [Peter Tuddenham](#) Oct 20, 2004 15:17

**Ocean Literacy Online Workshop
Pre-workshop Survey Report
October 2004**

Concepts and Issues 5-8

What are the most important ocean-related concepts/issues for a student to understand by the completion of 8th gr

- The oceans are effected by what humans do on land.Many problems with the oceans are not easy to see (n overfishing)Oceans are linked with our lives on land.
- Briefly a general understanding of the physical ocean. The extent and nature of the sea floor, geologic proce tides, currents would be undeerstood at a basic level.
- physical and chemical nature of the oceans... interrelationship between the ocean and terrestrial habitats...
- ecological principles as related to the oceans
- connection between humans and the ocean, power of the ocean, ocean as an ecosystem
- Physical Science: Motions and forces of waves, tides, and currents
- Transfer of energy from ocean water to the atmosphere

- Life Science: Marine organism populations and ecosystems, diversity and adaptations of marine organisms
- Earth Science: Structure of the ocean system
- Science and Technology: Understanding about science and technology as it relates to the oceans (building on what is learned in elementary school.)
- Distribution of energy from solar heating, major wind and current systems, hydrologic cycle, the nature of weather, climate, ecosystems.
- The ocean and new exploration. The nature of science through ocean studies. Chemical and physical systems of the ocean. Characteristics of specific ocean biomes. Human use and abuse of the oceans.
- geology of the ocean relationships in the ocean
- I endorse the Oceans for Life Scope and Sequence as a starting point.
- Physical oceanography in concert with the earth sciences
- currents, tides, coastal erosion, water cycle, watersheds
- See above.
- 4 things listed above and: 5. natural selection and evolution 6. biodiversity 7. Conservation
- Productivity in the oceans Plate tectonics Ocean resources Ocean/environmental conservation
- Oceans are the source of rain that falls on land. 2) Changes in the ocean affect climate. 3) Fish are mostly gone. Everyday activities affect the ocean. 5) The oceans influence all our lives.
- Healthy oceans are essential, and you know what to do to help. How oceans relate to CO₂ and O₂ in the atmosphere. Composition of sea water. Major ocean zones and living communities.
- The oceans interact with land at coastlines. Basic ocean circulations (gyres). Oceans influence weather and climate.
- Much of the ocean is not owned by any country. These "high seas" are open to exploitation and enforcement of international laws, is extremely difficult.
- The oceans, atmosphere and land are linked and effect climate on our planet. Oceans are finite and their conservation is important to all earth's ecosystems.
- Pollution, species decline, fisheries management, stewardship of ocean resources
- For upper elementary through middle school students, "some issues" which should be understood may include limited to....the ocean: 1) provides 60-80% of the oxygen for our planet
- 2) is critical to the national security of this country, as well as most other countries
- 3) should not be a reservoir for point and non-point source pollution
- 4) has limited resources
- 5) fossil fuel reservoirs (methane hydrates) are an area receiving increased attention as an energy source
- 5) hydrothermal vents and the associated lifeforms are a completely new branch of science and engineering
- 6) needs to be protected, certainly some of the recently designated areas, and better managed
- 7) could easily serve as vehicle to teach many disciplines
- and 8) is incredibly diverse
- however it also contains many threatened and endangered species.
- The basic geography of the ocean. Elementary physics, chemistry, biology and geology related to the ocean
- Statements 1-3 above
- n/a
- an understanding of systems related to oceans
- No comment as yet.
- The ocean is a dynamic place, always moving, changing, circulating and that change has an impact on the climate and life in the ocean.

Response 8:2 [Bob Stewart](#) Oct 20, 2004 17:41

It would be very useful if the html coding of the page were changed to an ordered list (numbered) from unordered list (bulleted) so we could refer to specific items in our discussion, same for the lists for other grade levels. Thanks

Response 8:3 [William Bragg](#) Oct 20, 2004 18:08

**Ocean Literacy Online Workshop
Pre-workshop Survey Report
October 2004
Concepts and Issues 5-8**

What are the most important ocean-related concepts/issues for a student to understand by the completion of 8th grade?

1. The oceans are effected by what humans do on land.Many problems with the oceans are not easy to see (nutrient pollution, overfishing)Oceans are linked with our lives on land.
2. Briefly a general understanding of the physical ocean. The extent and nature of the sea floor, geologic processes, waves, tides, currents would be undeerstood at a basic level.
3. physical and chemical nature of the oceans... interrelationship between the ocean and terrestrial habitats...
4. ecological principles as related to the oceans
5. connection between humans and the ocean, power of the ocean, ocean as an ecosystem
6. Physical Science: Motions and forces of waves, tides, and currents
7. Transfer of energy from ocean water to the atmosphere
8. Life Science: Marine organism populations and ecosystems, diversity and adaptations of marine organisms
9. Earth Science: Structure of the ocean system
10. Science and Technology: Understanding about science and technology as it relates to the oceans (building on what was learned in elementary school.)
11. Distribution of energy from solar heating, major wind and current systems, hydrologic cycle,the nature of weather and climate, ecosystems.
12. The ocean and new exploration.The nature of science through ocean studies.Chemical and physical systems found in the ocean.Characteristics of specific ocean biomesMans use and abuse fo the oceans.
13. geology of the oceanrelationships in the ocean
14. I endorse the Oceans for Life Scope and Sequence as a starting point.
15. Physical oceanography in concert with the earth sciences
16. currents, tides, coastal erosion, water cycle, watersheds
17. 4 things listed above and: 5. natural selection and evolution6. biodiversity7. Conservation
18. Productivity in the oceansPlate tectonicsOcean resourcesOcean/environmental conservation
19. Oceans are the source of rain that falls on land. 2) Changes in the ocean affect climate. 3) Fish are mostly gone. 4) Everyday activities affect the ocean. 5) The oceans influence all our lives.
20. Healthy oceans are essential, and you know what to do to help.How oceans relate to CO2 and O2 in the atmosphere.Composition of sea water.Major ocean zones and living communities.
21. The oceans interact with land at coastlines.Basic ocean circulations (gyres).Oceans influence weather and climate.

22. Much of the ocean is not owned by any country. These "high seas" are open to exploitation and enforcement of laws, even international laws, is extremely difficult.
23. The oceans, atmosphere and land are linked and effect climate on our planet. Oceans are finite and their conservation and preservation is important to all earth's ecosystems.
24. Pollution, species decline, fisheries management, stewardship of ocean resources
25. The basic geography of the ocean. Elementary physics, chemistry, biology and geology related to the ocean.
26. Statements 1-3 above
27. an understanding of systems related to oceans
28. The ocean is a dynamic place, always moving, changing, circulating and that change has an impact on the cool critters that live in the ocean.
29. following is all #29:

For upper elementary through middle school students, "some issues" which should be understood may include by are limited to....the ocean:

- provides 60-80% of the oxygen for our planet
- is critical to the national security of this country, as well as most other countries
- should not be a reservoir for point and non-point source pollution
- has limited resoures
- fossil fuel resevoir's (methane hydrates) are an area receiving increased attention as an energy source
- hydrothermal vents and the associated lifeforms are a completely new branch of science and engineering
- needs to be protected, certainly some of the recently designated areas, and better managed
- could easity serve as vehicle to teach many disciplines
- and
- is incredibly diverse however it also contains many threatened and endangered species.

Response 8:4 William Bragg Oct 20, 2004 18:15

Hope that helps, Bob. Great idea! (And, I took out the 4 or 5 that had no answer...)

Response 8:5 Stacey Halboth Oct 20, 2004 23:44

I have a question Peter. I reviewed the science standards from K-8. I placed a star by all the standards that directly stated the vocabulary words tied to the ocean. I also looked through and place a dot by the standards that could be taught using marine science but with no actual reference to ocean lieteracy.

My question: When we talk about what students should understand are we

- 1) trying to keep the original standards and just adding a few words to include ocean literacy, or
- 2) trying to add new standards to gear toward ocean literacy?

It seems the standards were written to only look at the land animals, plants and systems with brief or no mention of ocean. But, the standards are so general, do we just need to write more curriculum that covers the standards using ocean literacy and provide them to more teachers? Does this make sense. (It has been a rainy day session for the last three days at school. I am a little wacked!

Response 8:6 Peter Tuddenham Oct 21, 2004 00:45

For this workshop Stacy the emphasis is on 1. However having said that we recognize that it may not be possible to put the desired content/subject/topic to a science standard per se. In which case it will be necessary to describe it in a new category, at the moment called "other".

Response 8:7 Tom Greene Oct 25, 2004 08:33

It might be a useful idea for us to think about constructing a framework into which we can put all of the understandings we wish students to have. The framework can consist of major concepts we wish to include into grades 5-8. You may decide on a half dozen fundamental concepts. The fundamental concepts should be the same at each grade level (K-12), however the number of facts and their complexity will vary as students move from one grade to the next. Some suggested major concepts:

1. The Ocean as a Living System (biology)
2. The Ocean -Its Physical Setting (chemistry, physics)
3. Planet Ocean -(earth science)
4. The Ocean and Beyond (Space Science)
5. Human Impact on the Oceans (Environmental Science)

This framework contains components from all the sciences making "oceanography" truly an interdisciplinary science. Now we can fill in each of the major concepts with the many topics and issues cited in the responses.

Response 8:8 [Stacey Halboth](#) Oct 25, 2004 11:00

I like your fundamental major concepts you have suggested Tom. Major concepts is how the California State standards are listed today with a common thread at each level. However, as of right now they are listed as:

Physical Science

Life Science

Earth Science

Investigation and Experimentation

In sixth grade, the major concepts change a little with a lot more depth. Then by seventh and eighth grade the standards dive straight into major concepts.

As Peter responded in 8:6 saying we are trying to stay to the standards, I find it difficult to keep to the standards when they are poorly organized to begin with. Would it be easier for teachers to read state standards as Tom has suggested listing or for now is it better to plug in with the system that is already in place and continue to build. I like what Admiral Watkins said on the video: we need to look at things as a whole system rather than teaching science separate. As a teacher, it is easier to read standards when written in major concepts.

Response 8:9 [Peter Tuddenham](#) Oct 29, 2004 12:27

Please move to summarize in [Item 10](#)

Concepts and Issues - Grades K-4

Item 9 [Peter Tuddenham](#) Oct 20, 2004 09:44

Here are the summaries of responses from the pre-workshop survey so far.

Webpage: [Summary of concepts and issues grades K-4](#)

PDF: [Summary of concepts and issues grades K-4](#)

This summary serves as a good way to begin discussions on what concepts and issues an elementary school graduate should understand. We will be getting to more specific detail linked to science standards next week. Here we should focus on the higher level concepts.

Response 9:1 [Peter Tuddenham](#) Oct 20, 2004 15:18

**Ocean Literacy Online Workshop
Pre-workshop Survey Report
October 2004**

Concepts and Issues K-4

What are the most important ocean-related concepts/issues for a student to understand by the completion of 4th gr

- The oceans are effected by what humans do on land.Many problems with the oceans are not easy to see (n overfishing)
- ocean life... rivers to reef type concepts... what we do inland impacts the ocean...
- The difference between fresh and salt water, the location of the major oceans, the role in the water cycle, ty animals
- differences between fresh water and salt water, some of the organisms and types of habitats
- Oceans matter, ocean habitat,
- The ocean forms an eco-system that is related to all lifeforms.All lifeforms are reliant on the ocean in some v cover approximately 3/4ths of the earth's surface.
- The energy input from the sun, the state of and movements in the atmosphere and ocean, and the condition surface are all linked.
- Habitat of the ocean.Adaptations of ocean life
- I endorse the Oceans for Life Scope and Sequence as a starting point.
- Ocean habitats/resources: the oceans provide us with oxygen,food,energy, medecine, etc. The food web
- characteristics of organisms, classification, concept of adaptations
- ocean ecology and conservation. Presented on an introductory level and built upon in sequential learning ph middle and high school programming.
- Those that tie in to and demonstrate already recognized and accepted national science standards.
- 1. Properties of water2. Organisms and their:life cycles/adaptations/habitats3. Relationships between ocean land organisms 4. There is ONE ocean
- Food web interactionsOcean resourcesOcean/environmental conservation
- Ocean-atmosphere interconnections.Ocean as 99% of the living space on earth.Ocean resources are finite
- many are in trouble.
- The extent of the oceans on the globe.How the oceans impact their lives.That ocean water is comprised of s
- That it's large, important for all life including humans, closely connected to the atmospheric system, complex needs study to understand.
- Oceans are finite systems and humans can (and have) alter them.
- The oceans effect our daily lives.
- For pre-school through the fourth grade, "some issues" which should be understood may include by are not ocean: 1)is big and deep, covering approx. 3/4 of our planet
- 2)is deep and salty
- 3)determines our weather
- 4)is a source of food for humankind
- 5) allows worldwide (global) transportation
- 6)is a place for recreation
- 7) should not contain mankind's trash, and (8 the ocean provides most people with a "good/peaceful" feeling
- That we live on an ocean planet and that the ocean impacts our lives in many ways.
- Oceans are an integral part of our daily lives and are necessary for our survival. Plus all of statement 1 abov
- I don't know enough about 4th graders to answer this.
- n/a
- interconnectedness of all life, in sea, air, and land. how the ocean affects us and how we affect the ocean.
- oceans effect our lives on land
- I think students should be able to discuss the physical nature of the oceans, identify the earth's oceans, and of the diversity of the ocean's inhabitants.
- No comment as yet.
- The ocean is an interesting place, full of life, interactions...it is just hard to see underwater.There is a huge d things in the ocean.

- There are really cool critters that live in the ocean.
- 1.How can the plants and animals of the oceans be sorted into groups?2. How are fresh and salt water similar different?

Response 9:2 William Bragg Oct 20, 2004 20:08

per Bob Stewart's suggestion in 5-8... (and again, I deleted a couple that had no comment)

**Ocean Literacy Online Workshop
Pre-workshop Survey Report
October 2004**

Concepts and Issues K-4

What are the most important ocean-related concepts/issues for a student to understand by the completion of 4th grade?

1. The oceans are effected by what humans do on land.Many problems with the oceans are not easy to see (nutrient pollution, overfishing)
2. ocean life... rivers to reef type concepts... what we do inland impacts the ocean...
3. The difference between fresh and salt water, the location of the major oceans, the role in the water cycle, types of marine animals
4. differences between fresh water and salt water, some of the organisms and types of habitats
5. Oceans matter, ocean habitat,
6. The ocean forms an eco-system that is related to all lifeforms.All lifeforms are reliant on the ocean in some way.Oceans cover approximately 3/4ths of the earth's surface.
7. The energy input from the sun, the state of and movements in the atmosphere and ocean, and the conditions on the earth's surface are all linked.
8. Habitat of the ocean.Adaptations of ocean life
9. I endorse the Oceans for Life Scope and Sequence as a starting point.
10. Ocean habitats/resources: the oceans provide us with oxygen,food,energy, medecine, etc. The food web
11. characteristics of organisms, classification, concept of adaptations
12. ocean ecology and conservation. Presented on an introductory level and built upon in sequential learning phases during middle and high school programming.
13. Those that tie in to and demonstrate already recognized and accepted national science standards.
14. -- (1)Properties of water (2) Organisms and their:life cycles/adaptations/habitats (3) Relationships between ocean organisms and land organisms (4) There is ONE ocean
15. Food web interactionsOcean resourcesOcean/environmental conservation
16. Ocean-atmosphere interconnections.Ocean as 99% of the living space on earth.Ocean resources are finite
17. many are in trouble.
18. The extent of the oceans on the globe.How the oceans impact their lives.That ocean water is comprised of salt and water.
19. That it's large, important for all life including humans, closely connected to the atmospheric system, complex and therefore needs study to understand.

20. Oceans are finite systems and humans can (and have) alter them.
21. The oceans effect our daily lives.
22. That we live on an ocean planet and that the ocean impacts our lives in many ways.
23. Oceans are an integral part of our daily lives and are necessary for our survival. Plus all of statement 1 above
24. interconnectedness of all life, in sea, air, and land. how the ocean affects us and how we affect the ocean.
25. oceans effect our lives on land
26. I think students should be able to discuss the physical nature of the oceans, identify the earth's oceans, and describe some of the diversity of the ocean's inhabitants.
27. No comment as yet.
28. The ocean is an interesting place, full of life, interactions...it is just hard to see underwater. There is a huge diversity of living things in the ocean.
29. There are really cool critters that live in the ocean.
30. How can the plants and animals of the oceans be sorted into groups?
31. How are fresh and salt water similar and different?
32. (all this is #32) For pre-school through the fourth grade, "some issues" which should be understood may include by are not limited to....the ocean:
 - is big and deep, covering approx. 3/4 of our planet
 - is deep and salty
 - determines our weather
 - is a source of food for humankind
 - allows worldwide (global) transportation
 - is a place for recreation
 - should not contain mankind's trash, and (8 the ocean provides most people with a "good/peaceful" feeling.

Response 9:3 [Rebecca Bell](#) Oct 22, 2004 13:50

I think we can use existing national standards for all 3 grade bands. The stds outline major "themes" that are developed through the years based on student readiness - Systems, order, and organization; Evidence, models, and explanation; Constancy, change, and measurement; Evolution (of ocean, of life forms, etc)and equilibrium; Form and function. This is still giving us concepts to teach, defines what a student should know and be able to do (using science as a process), but still does not define literacy. The Natl Stds define the levels that kids at various stages can understand- In K-4 they explore earth's materials, organisms, and the properties of common objects. Kids need direct experiences at this level, manipulating objects, handling and seeing living things, playing with sand and soil- observation, comparing, classifying are major activities. Understanding interrelationships is difficult at this level. I think of elementary school as focusing on objects, the individual, and the family, up to a community level; middle school at the personal (mostly ME) , relationships , and a community toward a world view and high school as a global and international focus.

Response 9:4 [Mellie Lewis](#) Oct 23, 2004 12:20

I agree with Rebecca Bell 9:3. Although understanding interrelationships may be difficult at the K-4 level, it is appropriate at the 5-8 levels. Our fifth grade Ocean Systems unit focuses first on the ocean as a system, and then on the interrelatedness of the biological, chemical, geological and physical ocean.

Response 9:5 [Tom Greene](#) Oct 25, 2004 08:36

It might be a usefull idea for us to think about constructing a framework into which we can put all of the understandings we wish students to have. The framework can consist of major concepts we wish to include into grades K-4 You may decide on a half dozen fundamental concepts. The fundamental concepts should be the same at each grade level(K-12), however the number of facts and their complexity will vary as students move from one grade to the next. Some suggested major concepts:

1. The Ocean as a Living System (biology)
2. The Ocean -Its Physical Setting(chemistry, physics)

3. Planet Ocean -(earth science)
4. The Ocean and Beyond (Space Science)
5. Human Impact on the Oceans (Environmental Science)

This framework contains components from all the sciences making "oceanography" truly an interdisciplinary science. Now we can fill in each of the major concepts with the many topics and issues cited in the responses.

Response 9:6 Pam Stryker *Oct 26, 2004 13:30*

After teaching about the for more years than I care to think about, I have taken that focus in many directions. My first units were general ocean units where we learned where the oceans were, the animals that live in the oceans, salt and fresh water, etc. Later, after my Project Ocean and MARE training, I saw instruction in a completely and much more meaningful light. Instead to "facts" which were all taught in hands-on methods, but did not make the connections between the habitat and the organisms. The MARE curriculum focused on one marine habitat per grade and made those connections apparent to the kids. If you live on a rock, you better have a way to hold on or keep yourself from being washed away. I really believe that the systems and interrelationships between the biotic, abiotic, and man is primary to understanding ocean issues and I believe that it can start at an early age. It is all in how you present it and if the teacher really understands those connections.

Response 9:7 Mike Hughes *Oct 26, 2004 22:22*

You said it, Pam: Teacher understanding is the key to giving students an early start in developing, not only the knowledge of interrelations you speak of, but the sense of stewardship that follows and will last a lifetime. I think this is an area where we may be "soft", as a nation, at the k-4 or 5 levels.

Response 9:8 Francesca Cava, Nat. Geo. Society, Santa Barbara, California *Oct 27, 2004 09:31*

The following basic ocean concepts are taken from Oceans for Life and I believe can be also used to align to national science standards. I will list them here both as examples and also to ask if there are other concepts missing. Some these concepts can be taught in multiple science standards, depending on the focus and complexity.

USES OF OCEANOGRAPHY:

Knowledge of oceanography enables people to develop an understanding of the relationships between life, habitats, and environments over space and time—that is, of Earth as it was, is, and might be.

- Changes in ocean/land area distribution over time (e.g. sea level change, plate tectonics)
- Influence of oceanography on past events (e.g., circumnavigation of Earth, naval warfare, ship groundings)
- Influence of oceanography on current and future events (e.g., marine mammal groundings, climate and weather predictions)
- Ocean themes in literature, art, and music (e.g., fish prints, sea chanties, aquaria)

ENVIRONMENT AND SOCIETY

Oceans are modified by human activities, largely as a consequence of the ways in which human societies value and use Earth's natural resources, and human activities are also influenced by the oceans' physical features and processes.

- Introduction to marine resources (e.g., fishing, aquaculture, minerals, oil, sustainability)
- Human influences on oceans (e.g., beach closures, marine debris, overfishing, loss of habitat, water quality)
- Ocean influences on humans (e.g., weather and climate, tidal waves, hurricanes)
- Water as a resource (e.g., potable water, recreation)

HUMAN SYSTEMS

Oceans and human systems are interconnected politically, economically, and culturally.

- Oceans as providers of goods and services (e.g. fisheries, transportation)
- Oceans as barriers and conduits for trade and transportation (e.g. Panama canal, intercoastal waterways, distance and climate)
- Ocean resources as a focal point in shaping political and geographic policies (e.g. ocean management at local to global scales, EEZ, fishing and whaling rights, global oceanic interdependence)
- Exploration and settlement (e.g. immigration patterns, 1% of ocean explored, underwater habitats)

PHYSICAL SYSTEMS

Physical processes drive global systems in which oceans are fundamental.

- Relationship of rivers, estuaries and oceans and the concept of watersheds (e.g., interconnectedness of land and sea; changes in one part affect another)
- The hydrologic cycle—relationship to the ocean (e.g., evaporation, transpiration, condensation, etc.)
- Ocean influence on weather and climate (e.g., connections to the water cycle)
- Biodiversity (e.g., classification, interaction of organisms)
- Ocean habitats (e.g., effects of depth and temperature on habitats)
- Simple ocean dynamics (e.g., tides and currents, salinity, density, waves)
- Changes in shorelines (e.g., effects of tides, beach transport, erosion)

PLACES AND REGIONS

Oceans have physical and biotic characteristics which are used to define habitats and regions.

- Characteristics of ocean habitats (e.g., shorelines, water column, habitats and ocean life)
- Characteristics of oceans and ocean ecosystems and habitats (e.g., salinity, density, temperature, ph, food webs)
- Similarities and differences among the world's oceans (e.g., salinity, depth, size, volume, temperature, organisms)
- Concept of regions as applied to oceans (e.g., watersheds, continental shelves)

THE WORLD IN SPATIAL TERMS

Oceanography studies the relationships between life, habitats, and environments by mapping information about them into a spatial context.

- Location of nearby bodies of water and watersheds (e.g., ponds, streams, lakes, rivers, inlets, etc.)
- Location of significant rivers, estuaries, and watersheds (e.g., Ohio/Missouri/Mississippi, Amazon, Chesapeake Bay)
- Location of major world oceans, seas and gulfs (e.g., Atlantic, Pacific, Mediterranean Sea, Gulf of Mexico)
- Oceans as three-dimensional habitats (e.g., area, depth, volume)
- Distribution of water (e.g., more than 70% of the Earth's surface; relative amounts, location, ice vs. fresh vs. salt)

Now the task is to place them, align them, with the correct national science standard and also consider if these concepts can be taught at these grades.

Response 9:9 [Dave Niebuhr](#) Oct 27, 2004 17:03

It's not only difficult to get teachers to understand those concepts...anyone who has spent time in and around marine science comprehensive examinations knows that many grad students don't "get" the connections either. Let's keep it as simple as possible.

Response 9:10 [Peter Tuddenham](#) Oct 29, 2004 12:27

Please move to summarize in [Item 10](#)

General Discussion on Concepts and Issues

Item 10 [Peter Tuddenham](#) Oct 20, 2004 09:47

It may be we need a space to discuss concepts and issues in general - apart from grade band distinctions. Here you are. There have been a number of points raised so far in the discussion on literacy that might well fall under the title of what should society understand about the oceans.

Response 10:1 [Dave Niebuhr](#) Oct 20, 2004 16:47

To steal from the various states I've worked in recently...some general themes seem to emerge.

Florida (paraphrased): Energy. The Earth and how it changes. Life. Interactions.

Massachusetts (paraphrased from Earth & Space Science):the Earth, Energy, Weather, Periodic changes

Virginia (paraphrased): energy, life, interrelationships, cycles, resources.

These are the guiding themes of study from K-12, perhaps we can start here and consider them in an ocean context.

Response 10:2 [Bob Stewart](#) Oct 20, 2004 17:49

I too find there are general themes as Dave points out, but I also find that the themes are usually disconnected. For example, the hydrological cycle is usually taught independently of the ocean, although most rain that falls on land comes from the ocean. I hope we will emphasize the interconnectedness of the cycles, with the ocean at the center.

For weather and climate my colleagues have proposed the general theme:

We cannot understand climate and climate change without understanding the ocean. The ocean dominates the global energy, carbon, and hydrological systems. [It shows the differen cycles are connected, and the ocean is at the center.]

This theme can then be made more particular to each class of grades-elementary, middle, high schools.

Response 10:3 Peter Tuddenham Oct 20, 2004 18:26

The other thought I had in this regard was to look at the overarching themes of the science standards as guides to organizing or incorporating the concepts and issues. They are:

1. Systems, order, and organization
 2. Evidence, models, and explanation
 3. Constancy, change, and measurement
 4. Evolution and equilibrium
 5. Form and function
-

Response 10:4 Bob Stewart Oct 20, 2004 18:53

Peter, I prefer the original organization because it is hard to map the State of Texas standards (Texas Essential Knowledge and Skills) and Benchmarks of Science Literacy into this format.

Response 10:5 Peter Tuddenham Oct 20, 2004 18:57

Bob.. what is the "original organization" ? (what did I miss?)

Response 10:6 Jean May-Brett Oct 21, 2004 08:44

My thanks to Peter for entering the "Big Picture" themes. They are an open door for bringing in essential marine science concepts.

Response 10:7 Peter Tuddenham Oct 21, 2004 11:23

Janice McDonnell has provided the draft "special topic map" from AAAS on the oceans. I have posted a link in the [Ocean Literacy Online Workshop Resources Item 7](#) room.

It has a sequencing in five themes

1. Geologic Activity
2. Weather and Climate
3. Water Cycle
4. Living things dependence on the environment
5. Interdependence of living things

more grist for the mill... (is there an ocean analogy like that?)

Response 10:8 Gene Williamson Oct 21, 2004 14:00

In 1971 a sponge biologist working with a group of teachers at Oregon State University gave us the following sage advice. I had it done in calligraphy and posted it on the wall of my classroom where it could not be avoided. You are free to avoid it here, but I hope it will strike a responsive cord as we continue to discuss the meaning of literacy and how we achieve it.

"It is more important to be approximately correct and understandable than to be academically accurate and incomprehensible." Don Giles, 1971

I'll put on my 8th grade teacher hat to make one more suggestion. Most of our conversation here has been civil and productive. Let's all try not to say things like "that is weak", or "that is poorly written". Comments will carry a lot more weight if they contain a constructive alternative. There. Now I can take off my teacher hat and go back to studying the great ideas that are emerging here. (poof!)

Response 10:9 Francesca Cava, Nat. Geo. Society, Santa Barbara, California Oct 21, 2004 15:00

Gene,

Thanks so much for your comments, which not only will keep us on task but will elevate the discussion to the content of what is said, the ideas, not the grammar. I do think it is also important that within our community and during this workshop it is understood that we will disagree and will have different opinions. We encourage all

ideas to be put on the table. One of the benefits of this media is to try to see how we can bring those opinions and disagreements together. That will require respect for all opinions and trust that we can say what we think.

Wouldn't it be great if this workshop helps us build more respect and trust in our community?

Response 10:10 Rebecca Bell Oct 22, 2004 13:56

I would support Peter's suggestion of the Natl Standards themes:

1. Systems, order, and organization
2. Evidence, models, and explanation
3. Constancy, change, and measurement
4. Evolution and equilibrium
5. Form and function

I think these will keep us at the larger level of lasting ideas (enduring understandings to some folks) and help us to avoid listing topics and facts. I am not, however, convinced, that even addressing these big ideas will give us a definition of literacy. The list is more "what to know". Science skills are "how to". We also need "why should I" and "what do you want me to do"

Response 10:11 Elizabeth Rogers Oct 22, 2004 15:26

I agree with Rebecca and Peter's suggestions regarding the enduring understandings. However, in my opinion, the order of these understandings does not necessarily support the how people learn (i.e., that is moving from the concrete to the abstract). For example, I have a difficult time understanding the nature of systems without first addressing the form and function of one system, but maybe that's just me.

Response 10:12 Melissa Demetrikopoulos Oct 23, 2004 06:56

The overarching ideas coming from the standards are a good place to start, but like most standards, they are, to me, too vague to be of much practical use in extracting specific concepts. Thus, I would suggest that we keep these in mind as the organizational structure under the AAAS special topic map. That way the specific content areas under the AAAS special topic map can be easily related to the standards. As with a previous comment, I am not sure that the order of a-e is the one I would go with in a final draft. However, I have gone with the original order for the sake of clarity of issues.

I propose the following organizing structure.

1. Geologic Activity

- a. Systems, order, and organization
- b. Evidence, models, and explanation
- c. Constancy, change, and measurement
- d. Evolution and equilibrium
- e. Form and function

2. Weather and Climate

- a. Systems, order, and organization
- b. Evidence, models, and explanation
- c. Constancy, change, and measurement
- d. Evolution and equilibrium
- e. Form and function

3. Water Cycle

- a. Systems, order, and organization
- b. Evidence, models, and explanation
- c. Constancy, change, and measurement
- d. Evolution and equilibrium
- e. Form and function

4. Living things dependence on the environment

- a. Systems, order, and organization
- b. Evidence, models, and explanation
- c. Constancy, change, and measurement
- d. Evolution and equilibrium
- e. Form and function

5. Interdependence of living things
 - a. Systems, order, and organization
 - b. Evidence, models, and explanation
 - c. Constancy, change, and measurement
 - d. Evolution and equilibrium
 - e. Form and function

Response 10:13 [Melissa Demetrikopoulos](#) Oct 23, 2004 08:01

Sarah Schoedinger posted the NAAEE's Guidelines for Learning, Pre-K to 12 in another area of the discussion and I have copied this below. I am wondering if this could not be integrated into the framework I posted above. At least section II parts a-d could have the other a-e as subdivisions. Perhaps someone can integrate these 3 structures in a more meaningful way.

- a. Systems, order, and organization
- b. Evidence, models, and explanation
- c. Constancy, change, and measurement
- d. Evolution and equilibrium
- e. Form and function

- I. Questioning, Analysis, and Interpretation Skills
- II Knowledge of Environmental Processes and Systems
 - a) Earth as a Physical System
 - b) The living environment
 - c) Humans and their societies
 - d) Environment and society
- III. Skills for Understanding and Addressing Environmental Issues
 - a) Skills for analyzing and investigating environmental issues
 - b) Decision-making and citizenship skills
- IV. Personal and Civic Responsibility

Response 10:14 [Sharon Walker](#) Oct 24, 2004 21:23

Boy, we have "come a long way in a week!" And, now, we begin the concepts and issues component; this too should be an intensely positive dialogue for all of us! Thus far, I think using Peter's (10:3) and Melissa's (10:12) "big picture" thoughts, based on the five overarching science standard groupings, may be an effective mechanism in which we can initiate key ocean concepts for K-12, just providing more specificity for each normal division, i.e., K-4, 5-8, and 9-12. To re-iterate these groupings...

1. Geologic Activity

- a. Systems, order, and organization
- b. Evidence, models, and explanation
- c. Constancy, change, and measurement
- d. Evolution and equilibrium
- e. Form and function

2. Weather and Climate

- a. Systems, order, and organization
- b. Evidence, models, and explanation
- c. Constancy, change, and measurement
- d. Evolution and equilibrium
- e. Form and function

3. Water Cycle

- a. Systems, order, and organization
- b. Evidence, models, and explanation
- c. Constancy, change, and measurement
- d. Evolution and equilibrium
- e. Form and function

4. Living things dependence on the environment

- a. Systems, order, and organization
- b. Evidence, models, and explanation
- c. Constancy, change, and measurement
- d. Evolution and equilibrium

e. Form and function

5. Interdependence of living things
 - a. Systems, order, and organization
 - b. Evidence, models, and explanation
 - c. Constancy, change, and measurement
 - d. Evolution and equilibrium
 - e. Form and function

Now, I have to "study" all the "concepts" everyone submitted for each grade grouping to "see" where I think we should go.

Response 10:15 Bob Stewart Oct 25, 2004 10:59

The breakdown by Melissa (10:12) and Sharon (10:14) seem to me to perpetuate the common classroom idea that these are separate systems. Where in the proposed scheme do students learn that "Earth processes are the result of many different, interacting biological, chemical, and physical systems, many of which are strongly influenced by the ocean"? Where do they learn that the water cycle is very tightly connected to weather and climate, and that both are strongly influenced by life? Where does technology fit? Satellites carry very many important instruments observing many parts of the earth system, and the technology cuts across all the issues. Same for computer models. Seems to me we need an "Over-arching, big-picture" category before we go to the much narrower concepts of geology, weather, or life.

Although I don't like the framework, I know it is comforting to teachers and is common in some districts but not others. So, if we are going to fit oceans into it, why not add:

1. Earth-System Science
 - a. Systems, order, and organization
 - b. Evidence, models, and explanation
 - c. Constancy, change, and measurement
 - d. Evolution and equilibrium
 - e. Form and function
-

Response 10:16 Mike Hughes Oct 25, 2004 22:15

Folks, again, I've been just sitting back and observing until something really lights my fire. So, I'm going out on a limb here again. Please don't shake me out of the tree.

It seems to me that the "over-arching, big picture" is not a category unto itself but that should become a constant undercurrent to each of the groupings that Sharon proposes in 10:14. There seems to be consensus, at least from the teachers, that we not add to existing curriculum. In real life, there isn't any more time to teach. But it doesn't take much instructional time to put the correct packaging on the information to bring about the awareness that the ocean is all-important, that is, to develop the Ocean Literacy we have been discussing. In actuality, for students to really learn new information, they should be scaffolding, or building on prior knowledge. New information should be relevant to, and build on the previous. Research shows this to be effective for all learning styles, all ages, all special needs.

For example: Sharon's first grouping, Geology. The ocean floor is the youngest geologic formation we have on Earth, and there is a great deal of activity there. So the ocean can easily be a large part of that.

In the second and third groupings, the weather and the water cycle, fit naturally with ocean currents, The Great Lakes, rivers, streams, and watersheds, if the teacher just weaves it in there and wraps it all in the big picture.

Living things dependence on the environment: Coral Reefs are one of the most diverse and most endangered of all environments, not to mention one of the most interesting and colorful. Again, we should be able to depend on the teacher to apply the proper emphasis as he/she includes this along with rain forests, estuaries, wetlands, etc.

Finally, interdependence of living things. Food webs in the oceans are naturally included, of course. Again, everything from plankton, invertebrates, sharks, benthics, and pelagics, along with the factors that impact and threaten them, can and should be included by the teacher as a component of good teaching.

Here's a possible answer to Bob's question in 10:15 about the place of technology: It fits in each grouping with models and measurement. That's where you teach about computer models, sensors, methods of data collection. You teach the technology with the latest technology, and the internet can help you involve experts as you do it in real-time, locally and remotely.

All the way through, if you truly have an "over-arching, big picture" theme there is no need for a huge change in the outline, and certainly not for a separate category; only a shift to a broader, all-inclusive view.

So, what are we doing here?

My real feeling after witnessing this workshop to date, is that the whole thrust of effort doesn't necessarily involve re-writing ANY standards or curricula, but educating teachers on the big picture. Something like...I don't know...stipending teachers to attend workshops on Oceans for Life, sending them to oceanfront education centers to work with scientists and researchers; getting them hands-, minds-, and snorkel gear-on.

MarineLab, here in the Keys, used to do just that, until the funding dried up. I've seen the interest wane ever since. The Florida Keys National Marine Sanctuary makes an incredible effort to continue it, but they only seem to have enough man-power (sorry, Ivy!) to reach local teachers. It takes major funding to get teachers from Kansas down here where the reefs are. It takes major stipends to get them to give up their R&R on weekends and summer breaks.

Maybe something like Oceans For Life should be a required content course for Elementary and Middle School Science teachers, so they can and will include it where it naturally belongs: Woven into everything else they teach. Still, it just isn't the same as actually going and doing science in the field, with experts like yourselves. That's how I learned it, and that's where my passion for the sea and for passing it on, came from.

Thanks for listening.

Response 10:17 [Dave Niebuhr](#) Oct 26, 2004 09:12

Mike, you sum up my own thoughts tremendously well.

And while I agree with you 100%, we are still left with the big problem...what is the best mechanism for getting teachers --real teachers, the down in the trenches, slugging through work, barely keeping their heads above water, teachers --to incorporate ocean sciences in their classes.

The only solution I see, is to have more than one solution...which is, I guess, why we see so many divergent opinions expressed here. I think that we NEED to: work on new NSES, define Ocean Literacy, make strides in incorporating ocean standards into state frameworks...but we also need to: capture and train Science Methods professors to include ocean sciences topics in their courses for preservice teachers, provide enticing opportunities for all teachers (not just those that are already jazzed on ocean sciences) to participate in training programs, and strive to base our informal programs on true market research to define what is NEEDED rather than developing programs based upon "what we know teachers need".

Rather than us splitting hairs on the gruesome specifics, I'd like to see us discussing issues that are a bit more universal...

Sorry, to go on a bit...it's early and the coffee hasn't quite kicked in...

Response 10:18 [Tina Bishop](#) Oct 26, 2004 09:32

I agree with you Dave that we should look for diverse ways to approach addressing the problem and try to find a many avenues as possible for reaching teachers and students with ocean science topics and materials.

Response 10:19 [Mike Hughes](#) Oct 26, 2004 11:51

Thanks, Dave and Tina. I realize that, to a great extent, I'm just re-stating the problem and not coming up with tangible solutions. That's my way of dealing with this overwhelming body of information.

I do believe that the shift in thinking (I mentioned) probably needs to begin with the professors of Science Methods and their pre-service teachers (as you mentioned). That is where teaching philosophy begins to develop and everything else stems from there. That is certainly not the only possible and appropriate course of action, but

a viable one that will go a long way to achieving the desired result.

So, not only do we need to develop the components (definition, new standards) and look for diverse ways of addressing the problem (pre/in-service, research), but to prioritize them and develop a plan of action to implement them.

It does sound like much of that is in the plan for the future, thanks to the vision of those who developed this workshop!

Response 10:20 Stacey Halboth *Oct 26, 2004 19:29*

As I sit here at my classroom desk reading the last responses, I am reminded of the reality of most schools. Science is at the bottom of all subject matters when it comes to k-6 grade. This is not my reality of course. This thought was confirmed in 2000 when I was able to take a year off from my classroom job. I was a substitute teacher at many different schools, inbetween my travels. At the various schools when I ask them how much do they spend teaching science in the class, majority of the teachers never even picked up the science book. I was shocked. Reason: SO MUCH PRESSURE ON TESTING for reading, writing, and math. No need to.

The deep rooted seeds that need to be planted first, needs to be science as part of literacy. Science is starting to be tested in fifth grade in California as a state test. Though I don't care for the overall state testing, I am glad science is now being part of it. Maybe this will part of the push for science.

To address Mike, Tina and Dave regarding teacher inservices or materials. I believe that is the next step. A wonderful program already in place is MARE through the Lawrence Hall of Science. This program, almost 20 years old, is ready for teacher training across the nation and internationally. All other programs could be a branch or connection to this program. I know there are WONDERFUL other programs, but this is why it should be the base. Reasons why I believe this could be the bases for training: 1) The program is almost 20 years old, so this is not just a program that will be gone next year. 2) The program directors are constantly open for suggestions and different ways to make the lessons fit into environments, state standards, international concerns and diversity among students. It is not there way or the highway. It is constantly evolving which is the bases for education.

Response 10:21 Janice McDonnell *Oct 26, 2004 23:41*

We have been working with Craig and the MARE program for almost 10 years and I whole-heartedly agree it is a wonderful program. Once we have the key concepts worked out by grade level, we can use programs like MARE to fulfill what is needed as Dave put so well in his comments (10:17).

Response 10:22 Beth Jewell *Oct 27, 2004 11:34*

There are programs out there. Our local VA Sea Grant educators do a remarkable job offering workshops and courses for teachers. Hestitant to put words in their mouths but I would guess one of their stressers would be how to get more teachers involved. I do see a great deal of the same folks at these events. Those that are already jazzed by the ocean sciences. I am one of their groupies.... is there a pun in there? Anyway, as been stated before, variety is the key. I maybe wrong in my thinking but, I strongly feel that one of the jobs of the informal educator is provide opportunities to share their research, knowledge and or facility with teachers. The hard part is finding and encouraging teachers to participate. Not sure I like the reference to giving up our R & R time on weekends and summers, but would prefer to look at it as a decompression time. Trust me, you dont want us in those classrooms without it. Have just offered thoughts about some of the obvious. What got me hooked was an informal educator (or a small army of them) that developed a course, put a bug in my ear about the class, and then found some money for me to attend the MAMEA fall conference. The ball started to roll as I interacted with more informal educators and learned about more programs. So, keep pushing your programs, seeking those grants that will help educators afford the experiences, and talk with teachers.

Response 10:23 Mellie Lewis *Oct 27, 2004 13:40*

Well said Beth. I think if we had more exposure at Regional and National Math and Science Conferences we might attract more teachers. MAMEA has tried to do this at both the National NSTA and the December NSTA Regional in Richmond. If we could somehow get NOAA to present one of the short courses perhaps more teachers would see how teaching ocean science isn't adding to the standards or curriculum but rather the vehicle to teach the standards and curriculum. If not NOAA, perhaps a short course using "Oceans for Life."

Another idea might be to link inland teachers and their classrooms with teachers and classrooms around the

Great Lakes, might rivers and oceans. Perhaps a short weather unit where students could record data and look for patterns. (Ocean-Atmosphere interrelationship)

And finally, perhaps inviting teachers to join NMEA in Hawaii next summer!!!! Just my \$0.02 worth.

Response 10:24 Francesca Cava, Nat. Geo. Society, Santa Barbara, California Oct 27, 2004 15:49

Mellie, Beth and others,

Great ideas. If you think a short course on how to use Oceans for Life or the outcome of this workshop would be a good follow-up, I would be happy to try to make this happen. I think this workshop has done a great deal to allow "our" community to learn from each other and to see what others are doing. It would be tremendous to continue this dialog next year to see how we can make all these efforts more relevant and useful.

Response 10:25 Patricia DuBose Oct 27, 2004 16:21

We just held our state marine education conference (GAME) and the focus was linking researchers and educators... researchers presented, we as teachers were able to tell them the format we would need their data; how would could include real data into our lessons; how they could help us learn more content... it was a fabulous interaction... we need these more often and in many parts of the world to ensure all teachers (especially those teaching our younger students) have access to good science, good content... would love to see this Oceans for Life turn into a teacher workshop!!!

Response 10:26 Bob Stewart Oct 27, 2004 19:35

Lots of good ideas. I agree with Mike (10:15), all of the key ideas in oceanography fit within the existing national standards, not just science but social science, and geography.

As many of you have pointed out, the real issue is how to get teachers excited about the ocean. I agree it must start at the pre-service level (Hughes 10:19) and through workshops. But, most importantly, it must be supported by the state education agencies. We must work to ensure that ocean-related questions are part of state teacher certification exams, and part of state-wide tests for students. As Stacy (10:20) points out, if it is not tested, it is not taught. Fortunately, it is being tested in more and more states.

I keep looking for ways to reach the 3,000,000 science teachers in the country, not the 10,000 who go to workshops. How to reach the other 2,990,000?

Response 10:27 Mike Hughes Oct 27, 2004 21:19

Bob, we work cheap. Miracles cost extra!

Seriously, though...

How about asking the 10,000 teachers why they go, and asking the rest what would get them to go to?

Inviting them to Hawaii would work for most. I know I'd go.

As for the followup to this workshop, I think Bob may have identified the one condition where it is best to put the "Cart before the Horse" (Sorry, cliché's are just too convenient). How DO you go about getting such things into state teacher exams and on state-wide tests?

Response 10:28 Bob Chen Oct 28, 2004 10:19

Hi All,

In terms of big concepts, I (and others) have conducted a survey of Environmental and Ocean Sciences key concepts and come up with 8 Key Concepts which can align with all grades K-16. Examples of each can be chosen for appropriate grade levels. We decided that we need declarative statements (with a verb) to describe the concept, rather than simply listing topics. While they are not specifically "Ocean", there are numerous examples that come from Ocean Sciences that align with these (and it also happens that they align with national standards).

Hope this is useful to the discussion.

I.) WAYS OF KNOWING

(Scientific Method, Observations, Technology, Informatics, Habits of Mind, Faith)
 "Reflection on how we know what we believe will help our understanding"

II.) HUMAN INTERACTIONS

(Sustainability, Environmental Ethics, Environmental Justice, World Views, Ocean Policy and Management, Human Health)

"Currently, the human species is significantly affecting earth systems, but has the ability to choose its relationship with the environment"

III.) ECOSYSTEMS

(Biological Communities, Population Ecology, Habitats)

"The survival and health of individuals and groups of organisms are intimately coupled to their environment"

IV.) EARTH SYSTEM SCIENCE

(System Properties, Biogeochemistry, Models)

"The Earth as a whole acts as a complex set of interacting systems with emergent properties"

V.) EVOLUTION-BIODIVERSITY

(Species Diversity, Natural Selection, Biogeography)

"Evolution explains both the unity and diversity of life"

VI.) ENERGY FLOW AND TRANSFORMATION

(Forms of Energy, Thermodynamics, Conservation of Energy, Energy Use, Motion)

"Energy transformations drive physical, chemical, and biological processes. Total energy is conserved and flows to more diffuse forms"

VII.) CONSERVATION OF MASS

(Input/Output Models, Elemental Cycles, Hydrological Cycle, Stoichiometry, Equilibrium)

"Mass is conserved as it is transferred from one pool to another"

VIII.) SPATIO-TEMPORAL RELATIONSHIPS

(Geospatial Position, Mapping, Historical Trends, Coordinate Systems)

"Choosing the appropriate reference frame is the key to understanding one's environment."

Response 10:29 Dave Niebuhr Oct 28, 2004 11:06

Bob. You hit the nail on the head with the 2,990,000 question!

Response 10:30 Sharon Walker Oct 28, 2004 17:51

As always, the discussions are wonderful....but, I am convinced that we don't need nor do we want a specific set of ocean sciences standards; teachers already have "way too much" to do on a daily basis. So, I believe we need to "fit" ocean sciences case studies and/or fundamental ocean sciences concepts into the existing science standards format, i.e.,

- a) Systems, order, and organization
- b. Evidence, models, and explanation
- c. Constancy, change, and measurement
- d. Evolution and equilibrium

e. Form and function And, it would seem logical that this "fit" could be accomplished by using the AAAS Special Topic Map's overarching groupings which Melissa Demetrikopoulous shared in 10:12, i.e., Geologic Activity, Weather and Climate, the Hydrologic Cycle, Living Things Dependence on the Environment, and Interdependence of Living Things. And, Mike Hughes in 10:16 has provided excellent examples of the ease in which we can "fit" ocean sciences concepts within these "big picture" topics.

My thoughts reside in the fact that I believe our success in incorporating ocean sciences in existing standards rests in "making it work" within the existing infrastructure and I am also confident, we will have many hurdles, but using Mike Hughes' examples with Milissa Demetrikopoulous' and Janice McDonnell's AAAS Special Topics Map and the NSES format....is doable!

I believe we need to spend some time reaching a consensus on the key concepts and then determine "how and where" we "fit" them into the existing science standards. And, even though we probably can agree we need to

spend more time with preservice teachers and the professors/faculty who teach preservice teachers, the fact remains that we also need to continue our efforts with inservice teachers. So, just know I certainly concur with the preservice dialogue, but...I need to focus my thoughts on ocean sciences education excellence and ocean literacy as they relates to the standards. So, ultimately, we have a definition of ocean literacy and ocean sciences key concepts that we can all embrace and move forward within the existing NSES, once they are revised! And, as Craig Straig indicated in one of our earlier conversations, the time will come in the near future when the NSES will be revised!

Response 10:31 Mellie Lewis *Oct 29, 2004 09:38*

Thank you Sharon. I believe it's a must that we "fit" the fundamental ocean sciences concepts into the existing science standards. As a classroom teacher I just don't think I could handle another set of standards or another set of paperwork to prove I've taught, and my students have mastered, another set of standards.

A few thoughts on reaching the 3,000,000 science teachers Bob mentions in 10:26. One possibility would be for Francesca (10:240) to pursue offering short course on Oceans for Life. This could be at NSTA, or it could be offered online.. Another thought would be for NOAA to implement a program similar to NASA's Space System Ambassador Program (SSA). As an SSA I receive training and information on NASA's latest missions via monthly phone calls. My responsibility is then to make a minimum of three presentations a year to the community. Another Ambassador and I do some of these together as evening presentations at our local library. I encourage my students to come and bring their parents. I also do a presentation at the beginning of the school year to our GT Resource Teachers. Just a couple of thoughts.

Response 10:32 Rebecca Bell *Oct 29, 2004 09:57*

I think Bob's 10:28 is more useful for teachers because it incorporates content AND skills and processes. There also needs to be an avenue for kids to do something to preserve/restore the oceans- an action component of some kind. Of course politics and economics would be major players. Incorporating those topics helps address the concerns (Mike 10:16) of integrating the sciences and social studies, in this case. Don't forget recreation, history of exploration, and aesthetics. It is possible to take ocean standards and make them parallel natl science stads to provide a framework. It is also possible to take the natl stds as is and gather lesson plans that illustrate the standards. There are tons of lessons out there that can, if necessary, be reworked to fit natl stds, and incorporate reading and math lessons. (You have to read about SOMETHING! Might as well be oceans.) I am not sure that motivating interest in oceans is the problem. Kids LOVE studying the oceans. Having teachers see it as more stuff to teach is the problem, along with the emphasis on reading and math. Science will be tested soon, so this is a good time to gear up materials for it. Re: preservice- We have never had any luck in influencing preservice education. Other science areas feel the same way- env sci is short-changed, chemistry, physics etc.. Although we still try, our efforts have gone into developing units and state standards to allow the teaching of various topics, including oceans. I would be happy to host an oceans conference or oceans for life wksp for Maryland teachers and surrounding states, if I can get help with the funding (meaning I have no budget). If MD teachers can get together, we can develop units, probably from existing materials. In MD, we will be posting our curriculum on the web. Teachers will be able to click on an indicator to get lessons. Ocean lessons could be an option. Re: the 3 million, how about articles to Science Teacher, Science Scope, Science and Children etc?

Response 10:33 Francesca Cava, Nat. Geo. Society, Santa Barbara, California *Oct 29, 2004 10:07*

Rebecca, Mellie,

Thanks for all your great feedback and suggestions. These are items that we should follow-up on after this workshop and I will be back in touch with you and anyone else interested to see how we can do some of the things you suggest.

Response 10:34 Bob Chen *Oct 29, 2004 11:30*

Hi All,

Here is what I have input into Sections 13-15. I would prefer a simpler map for teachers to follow (bookmark) than a long laundry list. I think this gets us to "ocean literate" people.

K-4

Ocean is big.

Ocean affects us.

Ocean life is fascinating.

Coasts are important.

Grades 5-8

Ocean affects weather.
 Organisms adapt to their environment.
 Organic matter can be formed by photosynthesis or chemosynthesis.
 Mankind is affecting the ocean.
 Water has unique properties.

Grades 9-12
 Life evolved in the ocean.
 The ocean plays a critical role in climate change.
 Ocean resources are limited.
 Technology allows us to "see" (or observe) the ocean better.

Response 10:35 Peter Tuddenham Oct 29, 2004 12:25

Thanks to all of you who have been condensing these concepts in succinct groups.

We encourage you all to add you what you think are the top two or three concepts per grade band.

We want to be able summarize these efforts aas get many of your summations as possible.

Response 10:36 Mellie Lewis Oct 29, 2004 14:51

Rebecca,

I don't think we would have to write new lessons. NOAA's Office of Exploration has already done this for us.
<http://oceanexplorer.noaa.gov>

I think we could get Maryland Teachers - probably not all - but some to attend an all day workshop if MSDE could offer some kind of credit. Perhaps the Mid-Atlantic COSEE would help co-sponsor the workshop. It would probably be a good idea to charge a small registration fee to help cover printing of materials, etc. Perhaps we could have a "big name" come in and "kick-off" the workshop. I'd be very happy to work with you and others to get this off the ground. We just need to get started!

One last thing, I've found that most of my colleagues are unaware of what is available to them in teaching about the ocean. I tell everyone I know about Ocean Explore, the Maury Project, DataStreame Ocean, Teacher At Sea, and of course NMEA. I've been pushing the July Conference in Hawaii and may have a few Howard County teachers joining me.

Just thought of another idea. What if we had the workshop begin as an overnight at the National Aquarium in Baltimore or at Horn Point? I think many of my colleagues like getting away for an evening.

Response 10:37 Lynn Whitley Oct 29, 2004 16:18

Overall I agree with Sharon, Rebecca and others who have suggested whatever we do should align with the National Science Standards.

1. Systems, order, and organization
2. Evidence, models, and explanation
3. Constancy, change, and measurement
4. Evolution and equilibrium
5. Form and function

Within that framework, My content selections (drawn from contributions by others, Jaime M., and Bob Stewart, Bob Chen, Oceans for Life, et al!) for each grade band would be:

K-4:

- The ocean covers 3/4 of the Earth's surface and has a variety of names
- The ocean is a source of life ranging in size from whales to plankton and many microscopic lifeforms. .
- There are consequences in the misuse of the ocean in the forms of pollution, mismanaged fishing and hunting, and destruction of food chains.
- The ocean affects weather and climate.

(I also like Bob Chen's simpler way of expressing most of these concepts:
 Ocean is big.

Ocean affects us.
 Ocean life is fascinating.
 Coasts are important.)

Grades 5-8:

- Oceans have physical and biotic characteristics which are used to define habitats and regions.
- Organisms adapt to their environment
- Physical processes drive global systems in which oceans are fundamental (this includes weather and climate)
- Humans affect all marine ecosystems

Grades 9-12

Basically concepts above but with more detail, such as:

- Ocean life is microbe based.
 - Changes in the ocean's circulation can cause climate change (and how that circulation works).
 - Organic matter can be formed by photosynthesis or chemosynthesis.
- Life evolved in the ocean.
 Ocean resources are limited.

Response 10:38 Pam Stryker Oct 29, 2004 19:32

I agree with Janice. I have worked with the MARE program for several years. The key concepts are imbedded from year to year. They organize the way that we look at each habitat. The Ocean is huge. For too many year, teachers, especially at the elementary grades, have taught an "Ocean Unit". It is full of a lot of facts...% of water covering the earth, classification of animals...but the meaning is not there. IN MARE, these overarching concepts are what connect all the habitats together, but the students really get indepth understanding of a habitat making them much more meaningful. Each year...here those big ideas come again. Elementary teachers do not think this way. They think in apple units and ocean units, not systems and change. We study a whale one day and a fresh and salt the next. It is up to us to make those connections for them. When I present workshops, I am always amazed at the lack of science back ground that the teachers have. I am afraid of just listing an bunch of topic under these.

Response 10:39 Fritz Stahr Oct 29, 2004 21:54

Lots of good ideas here on all the things we need to do (so many of both it's hard to know where to start).

Re: setting standards, I tend to agree that simpler is better initially and endorse Lynn's synopsis above (10:37). However, I also see the power of promulgating oceans through achievement standards such as those from Florida (15:5), Georgia (Resources topic 5:1), and New York (15:21)...thanks for the examples.

Engaging teachers who aren't and educating them in how easy it is to use ocean science to satisfy already accepted standards is also powerful. I like Mellie's idea above re: "ocean ambassadors" (10:31) and expanding on programs like MARE, Oceans for Life and REVEL for inservice teachers. Also, just making such resources as the Bridge (<http://www.vims.edu/bridge/>) known through pre-service curriculums around the country may have a significant impact on the future.

It can't all be done at once, but persistant concerted effort on many fronts should yield results. Further, there's now backing at high levels due to the Pew and Watkin's Commisions reports so now is the time to push on whatever levers we have. Agreeing upon set of simple standards (e.g., 10:37) that all can use, innovate on, and mesh with state standards as wanted/needed, will help tremendously. While the evolution of ideas and standards is inevitable, we have to start somewhere, and given that there's nothing out there now that's "accepted nationally", let's put something on the table...sooner rather than later.

Response 10:40 William Bragg Oct 29, 2004 21:58

Good points, Fritz - and especially that last sentence! It's a great start.

Response 10:41 Michiko Martin Oct 30, 2004 08:26

I apologize for the redundancy, but there was a thread of discussion in Item 7 of Resources that I think is relevant to the discussion. I am reposting my comment Resources 7:12 to Ali's posting in Resources 7:11. I like the simplicity of Bob Chen's list (10:34)--this is a list that people can get their hands around and it is not intimidating. I also agree with Lynn's posting and analysis (10:37).

The additional point that I make below is that when looking for opportunities to teach ocean science through the existing science standards [which, like others--Sharon Walker, Becky Bell, Bob Chen, Lynn Whitley, et al--I believe is the way to go], identifying the concepts (such as primary production of oxygen; climate) for which the ocean is the most relevant context for teaching and learning K-12 science is especially helpful and relevant to classrooms. As a science teacher, if someone explained to me that teaching about the oceans is the "best" way to teach about a certain topic--that my treatment would be inaccurate or incomplete without discussing the oceans--I would be more inclined to do so.

comments from Item 7 of Resources:

I completely agree with Ali Whitmer's comment 7:11: "Certainly students will learn in many contexts, but what I have noticed and that is of concern to me is the complete absence of the study of oceans even when it is *most* relevant." The oxygen example is perfect!

It would be wonderful to identify other concepts (and examples) for which the ocean environment is the most relevant context for teaching and learning K-12 science. Should we find that this content is also identified in the Grade-banded "Concepts & Issues"?

Response 10:42 Dr. William Bragg Oct 30, 2004 08:32

Good morning, Michiko... I had to edit out the CML script that was in the "copy" above - which included the links to edit, etc.. and just made it plain html (not CML, from pull-down list) - easiest thing is actually just typing in or copying in just plain text, using the "word wrapped" which is the default. (and added the part: comments from Item 7 of Resources: -- hope that is ok!)

Great points!

Response 10:43 Beth Jewell Oct 30, 2004 11:34

Rebecca and Mellie- I was interested in helping with this workshop. I am betting we can work something out with the Baltimore aquarium.... I have a connection or two there. I do know they are planning a sleepover for teachers in March in conjunction with MAMEA. We could possibly piggyback on that or ask for another weekend. But at any rate, Virginia wants in!

Response 10:44 Mellie Lewis Oct 30, 2004 16:53

Great Beth - let's get our head together and make this happen!

Response 10:45 Laura Francis Oct 30, 2004 18:31

I agree that our first task should be to identify key ocean concepts that correlate with the NSES by grade level and I like the concepts that Lynn has put together in 10:37 as a start. I also think that if we stop there, we may lose the opportunity for the important messages of stewardship and personal action and decisionmaking that can influence the ocean. I agree with Rebecca (10:32) that we should also be prepared with lessons, resources, and information for students and teachers to get actively involved with monitoring, preserving and restoring the oceans. In my experience, this is what gets them hooked and eager to become life long learners. I think that if we can connect with teachers in preservice programs, we could help instill that the ocean is a great example to teach many science concepts. Incorporating ocean case studies into text books would also help, as well as getting support from the states and districts to hold "Oceans for Life" teacher workshops during school inservice trainings as well as the national conferences identified earlier in this discussion.

Response 10:46 Sharon Walker Oct 31, 2004 11:18

Happy Halloween...to re-iterate, staying within the NSES framework is essential to the success of incorporating ocean concepts (case studies) within this country's precollege schools. So, with these thoughts, I have no problem with incorporating many of Bob Stewart's, Janice McDonnell's, Rebecca Bell's Bob Chen's, Lynn Whitley's, Mellie Lewis', Francesca Cava's, and other folks' combined thoughts, i.e., using the NSES format....

1. Systems, order, and organization
2. Evidence, models, and explanation
3. Constancy, change, and measurement

4. Evolution and equilibrium

5. Form and function

Within that framework, K-4 and beginning with:

-The ocean covers 3/4 of the Earth's surface and has a variety of names

-The ocean is a source of life ranging in size from whales to plankton and many microscopic lifeforms.

-There are consequences in the misuse of the ocean in the forms of pollution, mismanaged fishing and hunting, and destruction of food chains.

-The ocean affects weather and climate.

(I also like Bob Chen's simpler way of expressing most of these concepts, particularly for this age group:

Ocean is big.

Ocean affects us.

Ocean life is fascinating.

Coasts are important. And, I would add for this age group...

We need to take care of the ocean and its coasts.

Grades 5-8:

-Oceans have physical and biotic characteristics which are used to define habitats and regions.

-Organisms adapt to their environment.

-Physical processes drive global systems in which oceans are fundamental (this includes weather and climate)

-Humans affect all marine ecosystems

Grades 9-12

Basically concepts above but with more detail, such as:

-Ocean life is microbe based.

-Changes in the ocean's circulation can cause climate change (and how that circulation works).

-Organic matter can be formed by photosynthesis or chemosynthesis.

Life evolved in the ocean.

Ocean resources are limited. And, I suggest we continue to "build on" humankind's impact from sustainability, national security, economic development, pollution, and "sense of place" perspectives.

I also believe we need to cite the Pew and Watkins Commission Reports, as well as others...when appropriate.

Response 10:47 [Kate Madin](#) Oct 31, 2004 16:28

Happy halloween to all. I know it's late to comment on this discussion, but wanted add one thought into the mix. Everyone has such thoughtful and valid approaches to matching ocean concepts to NSES frameworks. But maybe it is too early to state it in this level of detail. It is a great step to address the question of what ocean literacy in the general population would encompass. Putting it into very detailed steps and essential teachings for each grade level seems a little too rigid and like it's adding a great deal to what teachers must already know and do. Could this step evolve more gradually?

Introduction to Science Standards

Item 11 [Peter Tuddenham](#) Oct 20, 2004 22:32

If you look at the agenda for Thursday October 21 this is what you will see:

Day 7 (Thursday, October 21)

- Read Day 6 postings.
- View presentation on the National Science Education Standards by Elizabeth Stage of the Lawrence Hall of Science. see next response - scroll down
- Review the National Science Education Standards and Benchmarks for Science Literacy. Links to these documents are provided in the [Resources Room](#)
- Post any questions you might have on either science standards or scope and sequence of concepts. Do that below

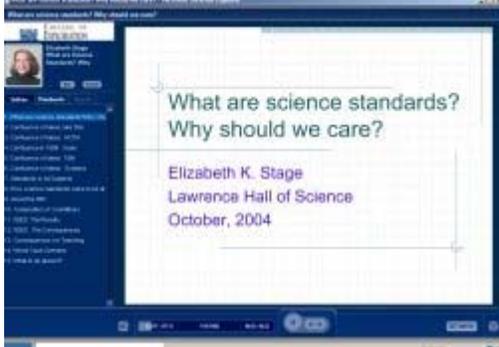
If you are teaching grades K-12 please tell us if you are using the scope and sequence of any science standards in your classroom. If you aren't using science standards in your classroom, please indicate why.

Response 11:1 [Craig Strang](#) Oct 20, 2004 22:33

Dr. Elizabeth K. Stage is Director of the Lawrence Hall of Science at the University of California, Berkeley. She has been instrumental in the several influential science and mathematics reform efforts including, the development of the Science Framework for California Public Schools (1990), the National Science Education Standards and the New Standards (Science). We are very pleased to have her join us.

This link is a to streaming flash presentation that will open in a new window, you will need speakers plugged in, turned on, and the volume up.

[What are Science Standards? Why Should We Care?](#)



Response 11:2 [Margaret Gorcyca](#) Oct 21, 2004 09:58

In Texas we used the National Standards as a guide when setting up our state standards. We have in our own district produced our own scope and sequence for each grade level. Our Texas Essential knowledge and skills (TEKS) statement are broad and then the student expectations narrow the big idea down to what we want the students to learn.

It has taken us years to decide what the students are to know and what and how the state will test the TEKS and the student expectations. To this day we are still working with our teachers trying to get them to give up the unnecessary information the TEKS are not addressing.

Response 11:3 [Gene Williamson](#) Oct 21, 2004 10:23

Margaret: "To this day we are still working with our teachers trying to get them to give up the unnecessary information the TEKS are not addressing."

I know this is happening, and at some sort of base level maybe I even understand why it is happening, but it scares the beehoozits out of me because it is exactly this that is leading teachers away from marine education.

So sayeth the curmudgeon, who now climbs down off his soapbox and goes back to reading.

Response 11:4 [Susan Snyder](#) Oct 21, 2004 11:52

I echo Gene's comment. It seems that when a group of people interpret general standards and decide what is unnecessary information---- that is scary.

Just as we learned in Dr. Elizabeth K. Stages video above, historically.... physics, chemistry, and biology have been considered important and astronomy and oceanography have been ignored. We can certainly learn a lot from history, so that we don't make the same mistakes again. We need to be careful what we eliminate from the curriculum and also remember that teachers cannot teach it all and students cannot learn it all.

Response 11:5 [Francesca Cava, Nat. Geo. Society, Santa Barbara, California](#) Oct 21, 2004 12:15

Based on Susan's comments above and others, your comments are some of the reasons why we need to identify what core ocean concepts MUST be included in classrooms and other informal education venues.

Even then, we won't be able to guarantee a total revolution in education, but with time, this information should begin to become more a part of the process of education, these concepts will begin to more systematically be

included in text books or other education resources, etc. and teachers will have more support to include ocean topics in their highly competitive curricula [in terms of available time].

This is a long term process, but events like this workshop should help us move in the direction of a better educated and more ocean literate public than we currently have.

Response 11:6 Dave Niebuhr *Oct 21, 2004 16:08*

I found Elizabeth's presentation to be both enlightening AND troubling.

Enlightening because it sheds light on how the included topics developed, and troubling because I see how the NSES are manifest at the state level. In Virginia, for example, almost 95% of the standardized test questions in the biology exam are focused on molecular level issues, with less than 5% remaining to cover evolution, and ecology. This would support the argument that we should develop National Ocean Science Standards.

Yet, I am torn...because I'm in the camp that does NOT propose creating additional, national ocean literacy standards (believing instead that we should emphasize the integration of ocean issues into the extant science standards).

The secondary issue, too, is that only politicians, informal educators, and grant writers actually concern themselves with the NSES. Classroom teachers are nearly 100% focused on their state standards.

So, should we spend time working on national standards if the teachers who would implement them, wouldn't ever see, or concern themselves with them?

Response 11:7 Peter Tuddenham *Oct 21, 2004 16:26*

Dave, here is one answer to your question. I do not think it is fair to say that teachers "wouldn't ever see, or concern themselves with" national standards. I know many do refer to them for guidance. No doubt too the state standards and SOLs etc seem to take preference, but I am sure that at least in their initial drafting and also revisions that the national standards were influential. Furthermore we have many informal educators and institutions represented here and they do rely on the national standards.

We have to start somewhere.

Once we have this process completed we could entertain similar efforts on a state by state basis.. funding permitting :-)

Response 11:8 Rita Bell *Oct 21, 2004 17:17*

Even if classroom teachers never looked at them, having a set of national standards would be very helpful to those of us that provide teacher professional development and develop curriculum materials. Coming to some sort of consensus about what content is important could be a good first step toward identifying good models for teaching that content.

Response 11:9 Dave Niebuhr *Oct 21, 2004 18:27*

Peter and Rita, please pardon my ineptitude at expressing myself clearly. I did not intend to denigrate the NSES, but rather to offer my position that while I would rather work within the confines of the existing NSES, Elizabeth's talk seems to compel us to work towards developing additions to the NSES. This raises a conflict with me. As an informal educator, I see the value of the NSES in guiding my program development AND in trumpeting ocean topics to the forefront of effective and exciting ways of teaching kids science (all science). Yet, if we want our efforts and products to really be used in the schools we need to accept that all "politics are local" and teachers' paychecks depend upon serving the local masters.

I use the NSES when I develop grants, and I introduce my preservice students to them in my classes, but...when my student teachers [and inservice teachers] have to answer to department heads and assistant principals, they better darn well be guiding their instruction to their state standards (which, in almost every instance, and with subtle nuance and geographical quirks, are all derived directly from the NSES.)

My question is: Do we put our efforts in striving to develop new National Standards, or do we put our efforts into integrating ocean standards into the structure that has been developed previously?

Response 11:10 Francesca Cava, Nat. Geo. Society, Santa Barbara, California *Oct 21, 2004 19:19*

David, Rita and others,

This has been a community debate for some time -- integrate into existing standards, change the existing standards and even, develop separate ocean standards.

We have decided in this workshop to be proactive in integrating ocean concepts into the existing science standards, much as we did with geography standards in 2002, and thereby also revealing if the existing standards do indeed need change, as some have argued, or if we can work within the current standards.

Changing standards is a much larger job than what we are currently trying to do in this workshop. But if this step is necessary, then this workshop will help us be better prepared for that step.

Response 11:11 Craig Strang *Oct 21, 2004 20:15*

I agree with Francesca! This is also exactly what Elizabeth Stage recommended in her presentation--pursue both strategies! She implies, and I think is correct, that eventually the NSES will be revised and when they are, we should be at the table. There are also 50 states, and they all develop and revise their standards on different cycles. If we can decide what we think is essential to teach about the ocean, we can be poised when any set of standards at any level are up for revision. Until then, we can integrate ocean concepts into existing science standards.

I don't think we need or want to develop a comprehensive (large) set of ocean sciences standards that are separate from science standards. That puts us in the land of irrelevance--overloaded curriculum, another special interest group, etc.

Response 11:12 Erika McPhee-Shaw *Oct 22, 2004 01:58*

Dr. Stage's presentation was very interesting and I really appreciated the timeline and political context. Her explanation of the way the "big three" (physics, chemistry, biology) came to dominate via the members of the academy explains why things are the way they are. It also seems to suggest that there are no national curriculum guidelines on environmental science. Am I wrong about this? I hope I am.

However, if we truly are limited to fitting ocean science in to current standards aimed only at the "core" science curriculum, I think we scientists may be able to best benefit teachers by suggesting definite ways that lessons within an oceanographic context can be used to illustrate specific contexts within Physics, Chemistry, or Biology. This doesn't mean that I don't agree with Craig and others that we should speak up and be a part of the conversation when the standards are revised. But I also agree that developing a separate set of ocean standards will just push the topic off the table because there just won't be room for it. I do think, however, that we can be helpful and effective in the short term addressing specific scientific concepts with ocean examples and lessons. I would think teachers would enjoy this too. After all, it can get boring teaching gravitational acceleration with rocket examples over and over, for example. Instead, teachers might have fun discussing buoyancy in the ocean, and how gravity determines the distribution of heat and quantities that affect the entire world system - ocean, atmosphere, all of it..... you can see where I'm going that this could just be such an exciting way to present physics, without really having to step outside of the current curriculum standards.

Response 11:13 Karina Serrano *Oct 22, 2004 02:49*

Here is something to think about:

I'm a first grade teacher and there are two reasons why I happen to have a copy of the National Science Standards (Which is rare for a teacher to have those standards). One is because I think science is as important as reading, writing and math in the primary grades. The second reason is because I was required to purchase it while I was in my Masters program at UC Santa Cruz. I think that if it wasn't for my MA program pushing to be aware of ALL standards I would of never had the opportunity and requirement to develop science lessons.

The four years that I have been teaching there has been no reference to science standards in any workshop or professional development given by my district to primary K-3. Just last year they bought science curriculum for 4th and 5th grades because the fifth graders are now being tested in Science. if it wasn't for that state test those grades would not have curriculum. In the mean time us teachers in the primary grades are either 1. not teaching science or 2. figuring out what to teach and try to meet at least some science standards even though we are not required.

So WHILE we are thinking about what standards to use or how to define them. We also need to think about how we can make the "local masters" as some one said before acknowledge that science is as important as other

subjects in Primary grades.

Just this tuesday my student teacher said, "What? you are going to teach science?" She had not seen me teaching science because she was never there when I had scheduled it. This time I happen to teach it out of schedule because there was a "teachable moment". We had been talking about the water cycle in my class and it started raining for the first time this school year. I call it Perfect timing!!!!

Response 11:14 Tina Bishop Oct 22, 2004 09:27

Thanks Karina for sharing your perspectives about your experience with science and standards in the primary grades. I find your comments thought-provoking and wonder how widespread these attitudes and approaches are. It was troubling to hear that standards have not been mentioned in any of your professional development workshops. I agree with your statement about getting the "local masters" to acknowledge the importance of science. But what are the best ways that this community (of those committed to ocean education) can help facilitate that process?

Response 11:15 Sarah Schoedinger Oct 22, 2004 12:10

Erika, RE: item 11:12 and environmental curriculum guidelines, NAAEE has developed guidelines for excellence in environmental education for learning in grades K-12 and for evaluating educational materials.

Here's a link to this information: http://www.naaee.org/npeee/learner_guidelines.php

We might find it useful to look at what they say for the different grade bands (K-4, 5-8, 9-12) as we sort out our own guidance for what students ought to know by grades 4, 8 and 12. However, I'd like to voice my support for the idea that we have a two-prong approach, as E. Stage suggested, for infusing ocean content into K-12 classrooms.

I'm just curious, has anyone involved in this workshop used these NAAEE guidelines in their teaching either in formal or informal education? If so, were they useful?

Response 11:16 Gabrielle Johnson Oct 22, 2004 13:03

Hello Everyone,

As a K-5 science specialist, I use both the California and the National Standards as a framework. I teach at a private school and am not held as tightly to the standards as public school teachers. However, I feel an obligation to keep my students along a similar learning progression. With my 5th grade class, I have developed a year-long ocean oriented program. It is amazing how the ocean can be used as a model to cover a good portion of these standards. I do have the advantage of coming in with a strong Marine Science background which provided me with much of groundwork needed to formulate this program.

In addition, I am lucky enough teach students as they progress from year to year up to 5th grade. This allows me to maintain continuity and continue to build off a framework. This is probably the most challenging part for a any teacher-not knowing what they had before makes it difficult to know where to take them. We need to be sure if we build in grade bands that a continuity is kept, and that they show a distinctive progression which will certainly show some repetition of ideas increasing in sophistication with higher grade levels.

I also agree with Karina in that many of the primary school teachers I have run across do not teach science or are picking and choosing. If we can make it easier "to pick and choose" than we are sure to make a greater impact. Individuals lacking a science background are often intimidated by teaching science, and their students may suffer-meaning not receive much science instruction- as a result. If we-the experts in the field- can assist in showing them a simplistic approach to teaching some amazing ideas, it will much easier to get them on board. If the teachers aren't excited about teaching it, than no matter how beautifully written the standards are, it probably won't get taught-unless the states jump on board with testing-which we all know if they test for it, it willmore likely get taught.

Anyhow, it also troubles me to hear that many primary level teachers are not teaching "much" science. This is the best chance to get the students on board with the ideas. I have been told by education researchers that fourth grade is the turning point for maintaining a student's interest in science. If that is the case, then we should spend some time focusing at that level.

Another question arises in my mind, Santa Barbara is fortunate in being right near the ocean and there are many local groups offering education on the ocean. I imagine this changes dramatically when you move away from

coastal regions. I would like to get a better feel for what is available to those living in-land. Certainly, water/environmental education in general is still emphasized?

Response 11:17 Rebecca Bell Oct 22, 2004 14:09

Great discussion! I am concerned about the statement "Classroom teachers are nearly 100% focused on their state standards." Since our state standards are based on the national, that is a GOOD thing! I am for integrating oceans into existing curriculum which is bursting at the seams. I see the oceans as a great way to integrate all the content areas. As we (in MD) produce model unit plans, we can use the oceans as a venue for reading, writing, science, social studies, math etc. The process of natural selection works on lesson plans, too. The most effective, motivating, and interesting ones will rise to the top and be used and shared. I also agree that if the NATI Std's are reworked, we should jump in there, too. The catch is that everyone else who feels they have been short-changed (physics, earth science, environmental science have all complained, it will become a free-for-all. I am all for entering the fray, but see oceans as a powerful way to get all the sciences taught in an integrated way.

Re: education for the non-coastal population-In Maryland, we have a major focus on the Chesapeake Bay. Apparently, the world ends at the mouth of the Chesapeake. My goal is to extend the investigation out past Ocean City.

One more thing and then I'll stop. With No Child Left Behind, many schools are abandoning science and social studies for a concentration on math and reading. I am sure this will not promote student achievement in the long run. I hope we will include somewhere a strong statement about the importance of science education and ocean ed.

Response 11:18 Bob Stewart Oct 22, 2004 17:21

I agree with the comments so far. I have found teachers do watch their state standards very closely, but different states are at very different stages in implementing standards and statewide assessment of how well students know the material that they have been taught.

I just downloaded the NAAE Guidelines for Learning environmental science. The guidelines for 12 grade restate the guidelines for earlier grades, so I searched for "ocean" in that document. Oceans are mentioned only twice. Clearly, environmental education as described by the NAAE is focused on local land-based environments with little tie to global environment. Guess it is left to us to fill in the gaps.

Response 11:19 Melissa Demetrikopoulos Oct 23, 2004 07:11

My experience in Atlanta has been that our teachers use both the local and national standards. The teacher leaders keep an eye on the national standards since these have a broader application. As was already mentioned, the local standards are loosely based on the national standards. My impression is that they take the more vague language of the national standards and fill it out with more specific content areas. If we can help teachers to utilize marine content to accomplish, that would be terrific. I am of two minds about the issue of new standards. It seems to me that if this workshop could identify the primary items that need to be learned---that would be a huge first step. Once these are identified, the next step (which perhaps can also happen in this workshop but this seems like too much to ask) would be to attempt to map these onto the current standards. Once this occurs, it should be obvious if there are key areas which need to be addressed that fall outside the current standards. If such informational gaps exist, then it would make sense to attempt to develop new standards to bridge the gaps.

Response 11:20 Jaime Malwitz Oct 23, 2004 15:09

It is unfortunate that many teachers are not teaching in a standards-based school district. Both as a teacher and presenter, all of my lessons and activities must be standards-based. Our state tests are based on state standards, and here, in Wisconsin, they are near photo copies of national standards. That being said, I would tend to include ocean standards in the already existing science standards. For one, they would appear less intimidating if they were part of something that already existed, but also, as a separate group, they would be easier to dismiss for several reasons. If a teacher is already teaching 180 days of science, she or he may feel there is not time or room to teach anything else. Also, she or he may question the relevance of teaching about oceans. But, on the other hand, if it were brought in and were used as an extension of our earth, life and environment, or social perspectives, and connected to our Great Lakes, I think it would be a better fit. We can't put something in without taking something out, but if what we take out is unnecessary (not standards-based), we can make room. If it becomes a standard, we will teach it.

Response 11:21 Jonna Engel Oct 24, 2004 15:56

If this workshop can conclude with a definition of ocean literacy and a recommendation (a strategy) for integrating

ocean science (aquatic science) into the National Science Standards, it will have been a huge success. If we are able to come up with a scope and sequence for teaching ocean science--that is even better.

Francesca states (11:10) that the goal of the this workshop is to integrate ocean science into the existing national science standards (acknowledging that there has been much debate on this subject and that the jury is still out) and Craig (11:11) concurs that this is a good plan and will have us poised to be successful when standards are revised. I concur!

I see two approaches to doing this (I am confident there are others).

1. weaving ocean science into all eight categories of the science content standards: 1) Unifying concepts and processes in science, 2) Science as inquiry, 3) Physical science, 4) Life science, 5) Earth and space science 6) Science and technology, 7) Science in personal and social perspectives, 8)History and nature of science) OR
2. Modifying one or more content standards to include ocean science: e.g. 5) instead of "Earth and Space Science", "Terrestrial, Aquatic, and Space Science"

What are some of your thoughts on this?

Response 11:22 Peter Tuddenham Oct 24, 2004 16:01

Joanna.. we are going to do number 1. of your two statements. Modifications and evolutions/developments will need to be the focus of a future workshop.

Response 11:23 Jonna Engel Oct 24, 2004 16:57

I just finished watching Elizabeth Stage's presentation "What are science standards? Why should we care?" I thought it was excellent and inspiring. She ends with 2 things that we (US – this conference!) can do to solve the problem of the absence of ocean science in the National Science Standards:

1. Lobby the NRC to revise the National Science Standards
2. Emphasize that studying the oceans encompasses all of the traditional science subjects (this argues for integrating ocean science into all 8 of the science content standard categories).

I believe the time is right/ripe to do just this. What with the PEW Oceans Commission Summary Report—Recommendations for a New Ocean Policy (May 2003), The U.S. Commission on Ocean Policy's final report (July 2004) , and the Smithsonian Institution's new Ocean Hall at the National Museum of Natural History in the works (see portion of Washington Post article below) —the time is right to update the National Science standards. As Claire Johnson (NOAA National Marine Sanctuary West Coast Education Program Liaison) told Dan Basta, Director of the National Marine Sanctuary Program, after reading "The Tipping Point" by Malcolm Gladwell, "maybe this is the tipping point for the oceans".

I just looked up the membership of the National Academy of Sciences. Members are listed by discipline and I am going to list the disciplines here:

Animal, Nutritional, and Applied Microbial Sciences
 Anthropology
 Applied Mathematical Sciences
 Applied Physical Sciences
 Astronomy
 Biochemistry
 Biophysics
 Cellular and Developmental Biology
 Cellular and Molecular Neuroscience
 Chemistry
 Computer and Information Sciences
 Economic Sciences
 Engineering Sciences
 Environmental Sciences and Ecology
 Evolutionary Biology
 Genetics
 Geology
 Geophysics
 Human Environmental Sciences
 Immunology
 Mathematics

Medical Genetics, Hematology, and Oncology
 Medical Physiology and Metabolism
 Microbial Biology
 Physics
 Physiology and Pharmacology
 Plant Biology
 Plant, Soil, and Microbial Sciences
 Psychology
 Social and Political Sciences
 Systems Neuroscience

There is not a listing for Ocean Science and that is because, as Elizabeth Stage, pointed out, ocean science encompasses nearly all the traditional science subjects. The NAS members are listed under each of these subjects and under nearly all you will find ocean scientists. Under Environmental Sciences and Ecology are Jane Lubchenco and Mimi Koehl, to name two who popped out for me, who I believe would be sympathetic and helpful in our efforts to lobby NRC to revise the National Science Standards. And I am sure we could come up with a long list of other NAS ocean scientists to discuss our goals with.

Museum to Get \$60 Million Exhibit
 Smithsonian Plans Ocean Display, Research at Natural History
 By Jacqueline Trescott
 Washington Post Staff Writer
 Thursday, September 16, 2004; Page A01

The Smithsonian's National Museum of Natural History plans to announce today the largest renovation in its nearly 95-year history, creating Ocean Hall, an unusual hybrid of public display and research.

Ocean Hall will cost \$60 million and cover 28,000 square feet -- 3,000 more than the successful makeover of the Hall of Mammals last year. It will bring together for the first time all 50 of the museum's marine scientists and government specialists in what's being called the Smithsonian Ocean Science Initiative.

"Oceans are going to be the most important topic for the public in the next decade. They will be the rainforest issue," says Robert Sullivan, the museum's associate director for public programs. "The hall will be a provocative starting point for those discussions. We are going to do what has been impossible for a natural history museum. We are going to do what is current."

This project will be the most visible example to date of the mandate given to the Smithsonian last year to improve its science operations. A panel studied science throughout the museum and recommended more financial and moral support of scientific work, which includes saving endangered species and studying ice formations. The report also advocated bringing some of the research in its seven laboratories and field camps to the museum exhibitions

Response 11:24 Jean May-Brett Oct 24, 2004 17:00

I have had the pleasure of working with Bora in a number of ways on the materials that came from NAAEE basically through funding from EPA. The funds came after NSES were released when some felt that EE was not given enough attention and/or exposure. Following sessions at NCTC we delivered workshops to the informal environmental educators across the state on NSES and the Guidelines to Learning. They were helpful to us because in Louisiana we actually have a content standard for EE.

There are many reasons to be familiar with the Guidelines for Learning K-12. Especially given the need for us in science to educate with an eye on data based decision making. Several things could be said about the four strands.

Response 11:25 Beth Jewell Oct 25, 2004 10:59

Although I do see the need for documentation of what our students are learning, this end of the year test is doing so many injustices to our students and teachers. That end of the year test weighs heavily on the minds of teachers as they prepare and deliver each and every one of their lessons over a course of 180 or so days. Of course we are paying close attention the slate level standards, that is what we are being tested on. Little else will get in there unless it is tested. I feel for those at the elementary level who want to get the science in there whether it be ocean science or not. Too little time to cover too much. I also applaud those that are creative and work hard to get it in their classrooms. Until there are connections made (through correlating ocean standards of knowledge to the present national standards) teachers aren't going to teach it. We don't have time in our program of studies to teach something that isn't tested. Having said that, along with another teacher, we did do some correlating of what we felt was important to teach in our oceanography classes- we have been struggling in our district with standards for the course. After creating a list of essential concepts we sought the national standards

that matched. And low and behold, most of it was already there.

So it looks like I may be suggesting that after we develop this definition of Ocean literacy, we create a framework and develop what we feel falls under that and then take a look at the national standards. In my opinion, this is the way you are going to entice teachers to give the ocean more time in their classrooms.

Response 11:26 [Rebecca Bell](#) Oct 27, 2004 14:07

We found that schools that teach the tested areas- math and reading- through sciences and social studies show greater achievement than those that concentrate only on reading or math. I submitted our state high school ecology standards under Content 9-12. You can see how the language, which is directly from natl stds, can be taught thru marine topics.

Response 11:27 [Mike Hughes](#) Oct 27, 2004 21:26

My school is doing exactly that, Rebecca. Every teacher in my school is considered to be a reading teacher. The same initiative is happening in Math. All elective teachers now have copies of the reading and math curriculum scope and sequence and are expected to include parallel ideas (to what is happening in these academic classes) in their lesson plans. It is definitely effective, and I'm waiting to see some research on it. If we can get kids reading and doing math on grade-level, we might be able to do the same with Science!

Response 11:28 [Stacey Halboth](#) Oct 28, 2004 16:49

I am so glad to here that Mike (11:27). What I am finding out about what drives education--if research proves it, then it is true. So, I hope more research will prove what we already know regarding connections and combining subjects will make for a deeper rooted system. Science should be the base to all systems.

Response 11:29 [Rebecca Bell](#) Oct 29, 2004 10:03

Hi Mike- 11:27. Re: data- In MD, we have just completed a study using our Green Schools (schools that use the env as an instructional focus) and matched "non-Green Schools". We found a statistically significant diff in achievement in science (10 yrs of data) and reading and math -except for gr 5 math-(only 2 yrs of data with the new requirements). This is at the printers now... The math people here says that science needs to really have a look at the math indicators for each grade. If kids are making data charts and calculating averages, doing graphs etc, they are working on only a 3rd grade level. We need to increase the rigor so math can use science materials.

Response 11:30 [Paula Keener-Chavis](#) Oct 30, 2004 16:50

Thank you for this weekly summary. It was wonderful to have this to read through and catch up as I went through reading the sections for week 2. Excellent job.

Response 11:31 [Jean May-Brett](#) Oct 31, 2004 09:53

Louisiana's LaSIP projects had results similar to those Rebecca mentions in 11:26(higher math and reading scores) following teacher participation in summer science programs.

Weekly Summary

Item 12 [Chris Parsons](#) Oct 25, 2004 08:45

Below you'll find a summary of Week 1 offered in two sections: Section 1 deals with workshop process; Section 2 covers workshop content. We welcome comments, corrections, kudos and critiques of this summary.

Section 1. Workshop Process

Overview

The workshop opened to great fanfare (albeit quiet fanfare) on Friday, October 15, 2004 for introductions and orientation. Discussions began on Monday, October 18. This is a virtual workshop hosted online by the College of Exploration. The "discussions" are asynchronous—invited guests participate at a time convenient to them. As of this writing (Oct. 24), there are 92 invited participants and 26 observers. (Observers can view the process in a "read only" format.) Participants (and observers) include teachers, curriculum developers, scientists, informal educators, policy makers and parents—all around great people. The workshop is to close on October 31, 2004.

The workshop's hosts/planning team are Francesca Cava, National Geographic Society; Sarah Schoedinger, NOAA; Craig Strang, Lawrence Hall of Science, UC Berkeley; and Peter Tuddenham, College of Exploration. This workshop is sponsored by the National Geographic Society's Oceans for Life Initiative and the National Oceanic and Atmospheric Administration (NOAA), and has been endorsed by American Zoo and Aquarium Association

(AZA); Centers for Ocean Sciences Education Excellence (COSEE); National Marine Educators Association (NMEA) and The Ocean Project.

The purpose of this online workshop is to describe and document the science content and processes related to the ocean (a term encompassing oceans, coasts and Great Lakes) that should be included in all future science education standards at local, state and national levels. The hope is that teachers, parents, administrators, scientists, informal educators and policy makers can use the resulting workshop products to influence the development of future science standards. The primary focus of this workshop is the formal K-12 education system; however, the products may be of use in guiding and influencing the development of educational efforts in non-formal and informal (or free-choice) learning environments. The workshop products we striving for are: 1) a “scope” of ocean content that should be taught in K-12 schools, and 2) a “map” of that content into the National Science Education Standards (at grades 4, 8 and 12).

The workshop discussion spans two weeks. During Week 1, participants' discussions are to focus on defining ocean literacy and identifying the content that people need to know to be ocean literate. During Week 2, the plan is to review the draft literacy definition(s) and concepts/content, and then benchmark the concepts to the appropriate grade levels (i.e., what gets taught when to whom). This document summarizes Week 1.

At the start of the workshop the hosts asked participants to complete a brief survey regarding their expertise, to react to several ocean literacy definitions currently in use, to rate a listing of ocean concepts, and list professional development needs. The final weekend is for wrap-up—to gain feedback and final thoughts on the progress and products. The workshop will officially close on October 31, 2004. After that and until the end of the calendar year, participants and observers can login to review materials, but will not be able to add anything new.

It's expected/hoped that participants will login each day and consult the agenda for that day's activities, which usually include reviewing background material and commenting on any of the topics up for discussion.

The virtual conference center has four distinct places for meetings and discussions. The Reception area is just that, a place for orientation to the conference center and the workshop purpose, agenda and process. This is where everyone started. The Meeting Room is the main area for discussions, which will be developed into workshop products. The Resources Room is the location for background materials (print documents, interviews, videos, websites, etc.) to help inform participants, as well as a place where participants can post pertinent resources they had. The Oceanside Room is our playground for relaxing, musing, sharing stories, music and pictures about the ocean. Within each room/area are a list of items for discussion and information and a tally of new and existing comments by participants.

As of this writing (Sunday, Oct. 24), of the 92 invited guests (which includes the 5 hosts/facilitators and 1 humble scribe), it looks as if everyone has logged in at least once and 64 people have introduced themselves (Meeting Room #2).

Participants

Below is the breakdown of all 92 participants by category (based on Sarah's sign-up spreadsheet)

Category	n	%
scientist	24	21%
policy maker	22	19%
combo (ed w/ sci or policy)	19	16%
teacher	14	12%
ed programs (informal)	11	9%
curriculum specialist	5	4%
ed coordinator	5	4%
outreach/communications	4	3%
evaluator	1	1%
wkshop team	6	5%
no answer	5	4%

note: n is greater than the total because some participants are identified by more than one category

Below is the breakdown of the 63 participants who introduced themselves by category

Category	n	%
scientist	17	22%
policy makers	14	18%

combo (ed w/ sci or policy)	13	16%
teacher	12	15%
ed programs	9	11%
curriculum	3	4%
ed coordinator	3	4%
outreach/communications	2	3%
evaluator	1	1%
wkshop facilitators	6	8%

note: n is greater than the total because some participants are identified by more than one category

Expectations

When asked about expectations for this workshop, 40 participants responded. Here's a summary of the top responses.

Response Category	n	%
align ocean content with national/state standards	20	51%
identify/prioritize a set of concepts	19	49%
define ocean standards (scope & sequence)	13	33%
application/use of workshop products	11	28%
new learning/ new perspectives	6	15%
define of ocean literacy	5	13%

note: the total may be greater than 100% because many respondents gave multiple answers.

Discussions

The first week's discussions have been collegial, mostly cordial, yet challenging, thoughtful and thought provoking. Many participants have commented on the high quality of the postings and the hosts are pleased with the level of participation (and want to encourage more of the same).

Some participants have raised questions about the approach to this week's focus— defining ocean literacy and identifying the content an ocean-literate person knows. We started with defining ocean literacy, but should that go first? Or, should we identify the content, then define what it means to be ocean literate? The workshop hosts recognize the potential for a chicken-and-egg conundrum and want to assure the participants that we view this process as iterative. As we map out content during Week 2, we're sure that those discussions will continue to inform a definition of ocean literacy and vice versa. We also hope that these conversations will continue beyond this venue.

During this week some participants have raised several additional questions/issues, such as a definition for environmental literacy, how to change the national standards, what to do about adult ocean literacy, etc. We believe these issues are important, but unfortunately outside the scope and timeframe of this workshop. Workshop participants still need to tackle mapping a scope and sequence of ocean content/topics onto the National Science Education Standards, and have only a week remaining to do so.

Given that, we invite you to review and comment on the results of Week 1 (summarized below), but also encourage you to continue with your excellent efforts toward meeting this workshop's goals.

Section 2. Workshop Content

Part 1: Ocean Literacy Definition

As part of the survey at the beginning of the week, organizers presented to participants three ocean literacy definitions currently in use or development, and asked them to rate their agreement/disagreement with each. The survey results were:

Statement 1 (NGS)

An ocean literate person understands: • Oceans matter to all life; • Oceans are complex systems; • Oceans and humans are interconnected; • Oceans are a finite resource.

Responses	n	%
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Strongly agree	39	85%
Agree	6	13%
Mildly agree	1	2%

Statement 2 (short NECOSEE)

Ocean literacy consists of four main components: • The oceans make the planet habitable; • Oceans and terrestrial systems are linked; • The distinct properties of the oceans create distinct habitats and ecosystems; • Oceans and humans are intimately linked.

Responses	n	%
Strongly agree	29	59%
Agree	12	26%
Mildly agree	3	6%
Neutral	4	8%
Mildly disagree	1	2%
Disagree	1	2%

Statement 3 (Stewart)

An ocean literate individual has a basic oceanic vocabulary, is able to converse, read and write coherently using oceanographic terms, perhaps in a non-technical, but meaningful way; knows key facts and concepts about the ocean relevant to daily life, has knowledge of the important oceanic and earth systems and how they interact to produce a habitable planet.

Responses	n	%
Strongly agree	23	49%
Agree	14	29%
Mildly agree	8	21%
Neutral	1	2%
Disagree	1	2%

In addition to the ratings respondents offered comments about what worked and what didn't for each definition. On the first day the ocean literacy topic moved to a meeting room (#6) and a lively discussion ensued, with 82 comments contributed by 38 people.

Workshop participants quickly combined and rearranged the definitions provided in the survey to include two components: first, a definition of ocean literacy, then a delineation of what an ocean-literate person would know. Below is the evolution of the definition that occurred during the week.

The first combo offering was (6:2)

Ocean literacy is the awareness and understanding of a set of fundamental ideas, perspectives, or big picture concepts about the ocean that every citizen should have. An ocean literate person is one who has a basic oceanic vocabulary; is able to converse using oceanographic terms in a meaningful way; knows key facts and concepts about the ocean relevant to daily life; and has a knowledge of the importance of oceanic and earth systems and how they interact to produce a habitable planet.

Another offering was (6:12)

An ocean literate person is one who knows key concept about the ocean relevant to daily life, has a knowledge of the importance of oceanic and earth systems and how they interact to produce a habitable planet, and has an awareness/understanding of how human activity impacts/influences the ocean (systems).

Several participants echoed/provided text from other "literacy" definitions. Based on a modification of the science literacy definition in the National Sci Ed Standards (6:32)

Ocean literacy implies that a person can identify issues concerning the ocean and the ocean-atmosphere-earth system, especially those underlying national and local decisions, and express positions that are scientifically, culturally and technologically informed.

The next offering (6:34)

Ocean literacy is the awareness of a set of fundamental ideas, perspectives, or big picture concepts about the ocean that every citizen should have. An ocean literate person is one who has a basic oceanic vocabulary, is able to converse, read and write coherently using oceanographic terms in a meaningful way, knows key facts and concepts about the ocean relevant to daily life, and has a knowledge of the importance of oceanic and earth systems and how they interact to produce a habitable planet.

Another option (6:42)

Ocean literacy is the knowledge and understanding of the influences and interactions of ocean systems and processes required for informed decision making.

Or, an expanded version:

Ocean literacy is the understanding of ocean systems and processes that every citizen should have. An ocean literate person is able to converse, read, and write coherently about ocean-system-science in a meaningful way, knows key facts and concepts about the ocean and can apply them to decision making in everyday life.

The offering that received the most positive response was (6:47)

Ocean literacy implies that a person can identify issues concerning the ocean and the ocean-atmosphere-earth system, evaluate information and make decisions that are scientifically, culturally and technologically informed.

An ocean literate person is aware of a set of fundamental ideas, perspectives and big picture concepts about the ocean that are relevant to daily life, including the importance of oceanic and earth systems and how they interact to produce and sustain a habitable planet.

That evolved into 6:76

An ocean literate person understands a set of fundamental ideas, perspectives and big picture concepts about the ocean that are relevant to daily life, including the importance of oceanic and earth systems and how they interact to produce and sustain a habitable planet.

And the last entry was 6:81

Ocean literacy implies that a person can identify issues concerning the ocean and the ocean-atmosphere-earth system, evaluate information and make decisions that are scientifically, culturally and technologically informed [and which help ensure the sustainability of ecosystems for the benefit of future as well as current generations].

Based on these proposed definitions and the discussions, the community seemed to say that an ocean literacy definition should include/address the following:

- statement of what literacy is as it pertains to the ocean (and relates to other literacy statements) along with a statement of the basics that an ocean literate person would know
- reference to ocean-atmosphere-earth system
- relevance to one's personal life
- awareness/understanding of some set of ocean science fundamentals
- ability to communicate (whether that be read, write, talk, etc.) about the ocean in a meaningful way
- ability to make informed decisions.

Given that summary of the discussion, here's a summative offering:

Ocean literacy is the awareness and understanding of a basic set of fundamentals about the functioning of the ocean-atmosphere-earth system. An ocean-literate person recognizes the influence of the ocean on his/her daily life, can communicate about the ocean in a meaningful way, and is able to make informed decisions to ensure the ocean continues to sustain a habitable planet.

As part of the literacy discussion, there was also a discussion about being aware vs. understanding vs. knowing. Words can have different meanings among different disciplines, as we saw in the conversation. Because the definition we're crafting is for use in the education community, primarily, and in conjunction with education standards, the definition proposed above is using "awareness" and "understanding" as suggested by the educators.

Within the ocean literacy discussion, there was also a request for a shorter statement, like a mission statement,

that would be easy to digest and remember. Below are two possible tagline/mission statements:
 Ocean literacy is understanding how the ocean impacts your life and how you impact the ocean.
 or
 Ocean literacy is understanding the ocean's influence on you and your influence on the ocean.

Concepts

As part of the survey at the beginning of the week, organizers asked participants the following question, one for each grade category: What are the most important ocean-related concepts/issues for a student to understand by the completion of the 4th/8th/12th grade?

By mid-week workshop participants were asked to review survey responses and remark on the key concepts that should be taught by grade band: K-4, 5-8, and 9-12. Each grade band had its own meeting room (7, 8 & 9), plus there was a general discussion on the topic meeting room #10 where 8 people have as of this writing.

Some participants have started this conversation and offered other resources (see Resource Room) to help aid the discussions, but there hasn't been enough substantive discussion to summarize at this time.

To better facilitate that discussion, the hosts have posted the survey comments along with a matrix of the national standards and urge participants to begin mapping ocean concepts/content onto the national standards. As with the ocean literacy definition, we urge comments on content postings.

Response 12:1 Margaret Gorcyca Oct 25, 2004 10:51

Ocean literacy is understanding how the ocean impacts your life and how you impact the ocean. I really like this statement. It gives the overall picture of what we want a productive adult to know. To get to this point we need to expectations of what we want K-4, 5-8 and 9-12 to be able to do so that they can meet the criteria for this definition.

Response 12:2 Bob Stewart Oct 25, 2004 11:05

I agree with the proposed definition (summative offering). I also like:

Ocean literacy is understanding the ocean's influence on you and your influence on the ocean.

Response 12:3 Rita Bell Oct 25, 2004 11:58

Great job, Chris. Your summative offering works well... and I like the idea of the tagline: Ocean literacy is understanding the ocean's influence on you and your influence on the ocean.

Response 12:4 Michiko Martin Oct 25, 2004 15:11

I support the summative offering. I think it captures the major ideas we've discussed.

I'm wondering if we could condense slightly. Do we need to include "...the functioning of..." and "...a basic set of..." Would the following slightly condensed version still represent the consensus:

Ocean literacy is the awareness and understanding of the fundamentals of the ocean-atmosphere-earth system. An ocean-literate person recognizes the influence of the ocean on his/her daily life, can communicate about the ocean in a meaningful way, and is able to make informed decisions to ensure the ocean continues to sustain a habitable planet.

Just trying to condense the first sentence slightly--but, I don't want to move us backwards...

Response 12:5 William Bragg Oct 25, 2004 15:34

Michiko:

That slight change is very succinct and clear; "open" and yet comprehensive – and seems to capture the spirit of the ideas shared over the past week.

Overall, these summative attempts have an inspiring tone as well.

Response 12:6 [Dave Niebuhr](#) *Oct 25, 2004 17:29*

It's a good feeling to see these manifold and diverse thoughts beginning to coalesce into a working definition

Response 12:7 [Frank Muller-Karger](#) *Oct 25, 2004 19:03*

I also like the version posted by Michiko Martin 12:4 Oct 25.

Response 12:8 [Jaime Malwitz](#) *Oct 25, 2004 20:51*

I, too, prefer the changes made by Michiko, and think this is a move forward.

Response 12:9 [Mike Hughes](#) *Oct 25, 2004 22:38*

I support the changes made by Michiko.

Response 12:10 [Allison Whitmer](#) *Oct 26, 2004 00:08*

Having been out most of last week I'm running as fast as I can to catch up. From my perspective the summative offering seems to capture the essence of the previous conversations. I also like the revisions by Michiko. Good job!

Response 12:11 [Laura Francis](#) *Oct 26, 2004 10:29*

Chris, Thank you for the excellent summary of week one and the proposed definition for Ocean Literacy. I think it works well and I also support Michiko's slight changes to make it more succinct. I also like the tagline "Ocean literacy is understanding the ocean's influence on you and your influence on the ocean."

Response 12:12 [Tina Bishop](#) *Oct 26, 2004 10:35*

Yes the tagline is easy for all to understand and personalizes connections to the ocean, while at the same time allowing for complexities to be presented as expansions to the concept.

Response 12:13 [Pam Stryker](#) *Oct 26, 2004 11:31*

Thanks Chris for the summary. I also like the revisions made by Michiko Martin. I love the tagline. All too often I get questions by inland teachers on why they should even bother to teach the ocean. They don't seem to understand how it impacts their lives.

Response 12:14 [Mellie Lewis](#) *Oct 26, 2004 13:47*

Thanks Chris for the excellent week one summary. And, I too, cast a vote for Michiko's revision.

Response 12:15 [Al Plueddemann](#) *Oct 26, 2004 17:35*

OK, first the steps forward: Great work by Chris summarizing a wide ranging discussion. I add my voice to the chorus suggesting that the short mission statements are great, and are the "right" place to start when someone stops you in the hallway and asks "what is ocean literacy" (as they so often do). Both of Chris's versions are about the same, but I prefer the second one.

Also, Chris's detailed summary statement (summative offering) is a step forward, and a valiant effort at including everything in a relatively short statement. In particular I am really glad to see the term "big picture" dropped. Let's not let it creep back in. Michiko's revisions improve some awkwardness in the original by Chris, so I also add my vote for that version.

Now for possible steps back: Despite the consensus, I have to offer some (minor) dissenting opinions. First, I don't like the fact that we are proposing the "understanding of fundamentals". What we want people to understand are "fundamental concepts". The latter wording, or something similar, was in nearly all of the originals, but got lost in Chris's final version. A subtle difference I suppose, but why not get it right?

Similarly, wording in the original statements suggesting that an individual should understand ocean concepts that are relevant to national and local decision making in a scientific and cultural context (my sense was that this referred to the political process) has been changed so that it sounds as if the individual is personally making decisions that will directly impact whether the ocean continues to sustain a habitable planet. Are we talking about recycling? Catch and release when fishing? I think losing the (admittedly indirect) reference to the political process really strikes the wrong tone here. We are not trying to put day to day decision making responsibility for a habitable planet on the individual (are we?). Rather, we want them to have an informed opinion within the local

and national political process (i.e. when they vote). I would like to go back to something like "an understanding of issues concerning the ocean, especially those underlying national and local decisions" or "evaluate information and make decisions that are scientifically, culturally and technologically informed", both of which recieved quite a bit of support previously.

Response 12:16 Chris Parsons Oct 26, 2004 21:02

Fine food for thought.

Response 12:17 Craig Strang Oct 27, 2004 10:40

I agree with AI's ammendments to the statement. I think they improve the precision of what we are trying to communicate. By the end of the week, perhaps we can come up with a new, revised version...

Response 12:18 Chris Parsons Oct 27, 2004 13:07

The end-of-the-week summaries are based solely on the online conversations, so this discussion will get included.

Response 12:19 Bob Stewart Oct 27, 2004 19:51

I have no problems with changing "fundamentals" to fundamental concepts" as suggested by AI (12:15). Although I reiterate, only 10-15% of the population will ever reach this level of literacy. This is the main thing we have learned about science literacy over the past 150 years.

I do have a problem with bring politics back into the definition. Please, let's leave politics out of it. Perhaps the presidential election is finally getting to me. I dislike telling people how to behave. Let's just tell students about the wonders of the ocean, and about our impact on the ocean, and let them come to their own conclusions.

Otherwise, I am afraid parents and legislators will read between the lines and come to the conclusion that we are teaching children about the ocean so they will vote for environmental regulations when they grow up.

Response 12:20 Judy Doino Lemus Oct 27, 2004 20:16

I too, think it is not only prudent, but critical to keep politics out of this definition. I agree with all of the definition as it now stands as proposed by Michiko, with the exception of "to ensure the ocean continues to sustain a habitable planet."

Response 12:21 Valerie Chase Oct 28, 2004 09:41

I like Michiko's inclusion of personal responsibility. We are stewards of our planet, whether we like it or not.

Response 12:22 Bob Chen Oct 28, 2004 11:00

Hi All,

I am trying to summarize in my own mind. I have tried to identify workshop goals, see where the group is, and make my own comments in [].

Overall GOAL: Use workshop to come to consensus to form a single voice on Ocean Science Literacy to be most effective at integrating Ocean Sciences into educational practice.

[I agree with this goal. A single national voice is powerful. Many smaller voices and definitions will be necessary for particular applications. I think many of them are discussed here. Keep in mind none of them are wrong, just that they have different applications.]

Goal 1: Define "Ocean Literacy".

Ocean literacy is the understanding of fundamental concepts about the functioning of the ocean-atmosphere-earth system.

[Could this also be Earth Literacy or Atmosphere Literacy?]

[I would prefer "Ocean Literacy is the understanding of fundamental concepts about the the ocean".]

Shorter tagline:

Ocean literacy is understanding the ocean's influence on you and your influence on the ocean.
[I prefer this as the sole definition of ocean literacy]

Goal 2: Define an "Ocean Literate" person.

[I propose]

An ocean-literate person recognizes the influence of the ocean on his/her daily life, can communicate about the ocean in a meaningful way, and is able to make informed decisions regarding the ocean.

Goal 3: Define Ocean Science Concepts.

In progress—there are several good lists, each with appropriate applications.

Goal 4: Determine how to best ensure all citizens become "Ocean Literate".

This workshop attempts to approach formal education (K-16) as the most effective method at reaching all future citizens.

Here are some of the approaches:

1. Re-write national standards with "ocean standards".
2. Re-write state standards with "ocean standards".
3. Write and integrate "ocean science" questions on high stakes science tests (teaching licensure, student science assessment exams).
4. Re-write text books to focus on ocean concepts rather than ocean facts.
5. Map ocean concepts to national and state standards.
6. Provide ocean examples for existing national standards.
7. Provide exemplary ocean science activities/lesson plans/curricula to teach existing national standards.
8. Work district by district (or with publishers of curriculum) to integrate ocean science into curriculum where it is currently under-represented.
9. Add Ocean Science standards to existing standards

[These are all valid approaches. I would place my emphasis on #6—using perfectly good existing national standards and identifying effective ocean examples at various grade levels; #7—providing excellent resources; #8—work with existing forces]

Response 12:23 [Dave Niebuhr](#) Oct 28, 2004 11:12

Bob (12.22) I've got to agree with you here...

"Shorter tagline:

Ocean literacy is understanding the ocean's influence on you and your influence on the ocean."

Flexible, pithy, and no overtones that could be construed as political.

Response 12:24 [Sharon Walker](#) Oct 28, 2004 16:50

Chris Parsons....you prepared an excellent summary of Week 1; thank you, thank you, thank you! I join the consensus of supporting Michiko's changes (12:4, i.e., "Ocean literacy is the awareness and understanding of the fundamentals of the ocean-atmosphere-earth system. An ocean-literate person recognizes the influence of the ocean on his/her daily life, can communicate about the ocean in a meaningful way, and is able to make informed decisions to ensure the ocean continues to sustain a habitable planet." I also support the tagline, "Ocean literacy is understanding the ocean's influence on you and your influence on the ocean." And, I don't even want to think about our ocean literacy efforts in a political sense!

Response 12:25 [Lynn Whitley](#) Oct 29, 2004 00:23

I totally agree with what Sharon Walker states in 12:24. --Great summary, Chris Parsons. --yes, to Michiko's suggestions for ocean literacy and I definitely like the tag line:

Ocean literacy is understanding the ocean's influence on you and your influence on the ocean.

It is succinct and gets to the heart of what I think we are trying to convey.

I also vote (no pun intended) to keep out any political overtones. I think the closer we can adhere to aligning the

ocean content with the existing standards the easier it will be for teachers to implement, and anything 'political' will most likely stand in their way.

Response 12:26 Rebecca Bell Oct 29, 2004 10:08

I am not sure of the meaning of politics in this context. It is not the same as advocacy. Kids can know a great deal about the ocean, pass all the tests, yet have no idea about how to change their own behavior or influence public policy in re to the environment. Maybe rather than "politics", it is "government" that they need to learn. In our high school gov classes, students examine case studies, learn about differing points of view, and find out how very difficult it is to make policy. Use of whales is a case in point. That's politics. Knowing a lot about whales doesn't solve a problem. or even define one.

Response 12:27 Al Plueddemann Oct 29, 2004 15:03

I retract all statements about politics, sorry. Clearly a distraction we don't need. Let's look at it a different way. Rebecca's comments above (12:26) capture what was bothering me about the "informed decisions" part of the statement better than my own previous comments. I just don't get what kind of decisions we are talking about, and how these decisions will ensure a habitable planet. But this seems to be just my problem, and I don't want to derail the growing consensus. I'm happy to move on from what is probably a minor side-issue.

Response 12:28 Mike Hughes Oct 29, 2004 15:52

Al, I don't think you've derailed anything at all. I know I said something about being an informed voter and citizen early in the discussions, too. Any comment that leads us to reflect is valuable, especially when the result is in black and white and subject to scrutiny.

Rebecca may have hit on the key word: advocacy. I think that's what we are really striving for: Informed people who can advocate for a critical resource, just as teachers advocate for students who have no voice of their own. That one word removes political implications and underscores the importance.

Response 12:29 Margaret Tower Oct 29, 2004 16:17

6:34 Decidedly not good and not popular.

6:47 Good and popular.

Critical thinking is most important, especially in the context of the scientific method, where measurement and controls are paramount. Can another get the same results, using the same technique?

Learning and thinking can take place in many ways in many people. Einstein, Tom Cruise, Nelson Rockefeller could not read or write to grade level. Yet they can or could communicate with others.

The water cycle should be addressed and its importance in all water, including the Great Lakes, where I teach. The need for potable water is extremely important world-wide. China tried to tap into our Great Lakes water.

Response 12:30 Jean May-Brett Oct 31, 2004 09:00

I apologize for being out of the conversation for the past week...it is conference time at the state level for K-12 science educators.

A simple echo of what others have said...great summary, no politics, and thanks to Michiko and Dave for their items.

Response 12:31 Kate Madin Oct 31, 2004 13:19

This whole conversation is so thoughtful and important. Since NE-COSEE's draft document on literacy provided one of the starting points for the whole discussion, I thought I should just read others' comments. It seems like there is agreement on needing a short phrase as a mission statement or tag line. A comment -- does it seem like "understanding" all "the ocean's influence on you" is a lot to ask?

Maybe "understanding that the ocean influences your life and you influence the ocean", or "understanding how the ocean influences your life and you influence the ocean" gives a sense that a person should know the ways in which the ocean intersects human life and humans have an impact on the ocean, without having to fully understand all the processes. I don't think, though, that it would be good to use any of these short statements in place of a more specific (but still short) list of the concepts we believe ocean literacy should include. I still favor some modification of the short NE-COSEE list.

Response 12:32 Chris Parsons Nov 09, 2004 18:13

Week 2 Summary

This document is an overview of one week's worth of discussion during a two-week virtual workshop on ocean literacy.

Section 1. Workshop Content

For a summary of the process see Section 2 below.

Part 1: Ocean Literacy Definition

At the end of Week 1 (see Week 1 Summary), taglines and a summative definition of ocean literacy were offered for comment. During Week 2, those who commented on the tagline were in favor of the second option (see below). Participants offered edits of the summative definition and approval of edited versions.

The ocean literacy tagline and definition most widely (although not unanimously) accepted during Week 2 were:

Tagline: Ocean literacy is understanding the ocean's influence on you and your influence on the ocean.

Definition: Ocean literacy is the awareness and understanding of fundamentals about the functioning of the ocean-atmosphere-earth system. An ocean-literate person recognizes the influence of the ocean on his/her daily life, can communicate about the ocean in a meaningful way, and is able to make informed decisions to ensure the ocean continues to sustain a habitable planet.

There were suggestions to expand “fundamentals” to “fundamental concepts,” and to simplify “ocean-atmosphere-earth” to “ocean.” There were additional comments about expanding on what “fundamentals” mean, including more content (for example, as the NECOSEE definition), and the political ramifications of “informed decisions.” But there was no consensus on these suggested changes.

Part 2: Discussions of Ocean Concepts and Science Standards (Room # 10 & 11)

Note: These discussions are summarized together because of the great overlap of the ideas and suggestions.

A general discussion of standards began during the middle of Week 1 and continued through Week 2. The 31 discussion points focused on several main topics:

- state vs. national standards
- standards and testing and what gets taught
- the challenges classroom teachers face teaching content that's not standards/test-based and given limited time
- research to show that science topics improve math and reading test scores
- whether we (as an ocean-literacy community) should be developing a separate set of ocean science standards or aligning ocean content with national science standards.

A general discussion of ocean concepts and standards began during the middle of Week 1 and continued through Week 2. The 47 discussion points started with participants offering models for organizing ocean content, including:

- National Science Education Standards (NSES) eight categories
- Various state standards categories/themes
- AAAS Strand Map's five themes

- North American Association for Environmental Education (NAAEE) Guidelines for Learning
- Lambert's Planning Guide aligning NSES standards and Florida State standards to marine science topics
- Chen's Environmental and Ocean Sciences eight key concepts
- National Geographic Society's Oceans for Life six essential elements.

As useful as these models are for various audiences and reasons, the recommendation, especially from teachers who are focused on national and state standards, was to align ocean content with the current National Science Education Standards (NSES).

Some participants struggled (and the discussions lost momentum) at the beginning of Week 2, feeling constrained and frustrated by the matrix format (see Rooms 13, 14, and 15) offered by workshop hosts; some raised concerns about the NSES model, the sequencing of concepts (not in a concrete-to-abstract hierarchy) and the difficulty integrating/bridging concepts and disciplines. Many participants seemed more comfortable in a stream-of-consciousness mode rather than the NSES matrices mode, and so a substantive discussion continued in the open forum meeting room.

A few participants suggested an interim step between the definition of ocean literacy and the alignment of ocean content with standards:

1. defining ocean literacy
2. listing/describing an ocean literate person, that is, the concepts/content necessary to meet the “fundamentals” in the ocean literacy definition
3. aligning the ocean content/concepts to NSES.

A couple of participants offered a list of concepts that could serve as the “fundamentals” for an “ocean literate person.” These examples are offered here to aid future discussions regarding bridging an ocean literacy definition and alignment of ocean content with NSES standards.

Response 10:34 (Chen): I think this gets us to "ocean literate" people.

Grades K-4

- Ocean is big.
- Ocean affects us.
- Ocean life is fascinating.
- Coasts are important.

Grades 5-8

- Ocean affects weather.
- Organisms adapt to their environment.
- Organic matter can be formed by photosynthesis or chemosynthesis.
- Mankind is affecting the ocean.
- Water has unique properties.

Grades 9-12

- Life evolved in the ocean.
- The ocean plays a critical role in climate change.
- Ocean resources are limited.

- Technology allows us to "see" (or observe) the ocean better.

Response 10:37 (Whitley):

Grades K-4:

- The ocean covers 3/4 of the Earth's surface and has a variety of names.
- The ocean is a source of life ranging in size from whales to plankton and many microscopic lifeforms.
- There are consequences in the misuse of the ocean in the forms of pollution, mismanaged fishing and hunting, and destruction of food chains.
- The ocean affects weather and climate. (I also like Bob Chen's simpler way of expressing most of these concepts)

Grades 5-8:

- Oceans have physical and biotic characteristics which are used to define habitats and regions.
- Organisms adapt to their environment.
- Physical processes drive global systems in which oceans are fundamental (this includes weather and climate).
- Humans affect all marine ecosystems.

Grades 9-12:

- Basically concepts above but with more detail, such as:
 - Ocean life is microbe based.
 - Changes in the ocean's circulation can cause climate change (and how that circulation works).
 - Organic matter can be formed by photosynthesis or chemosynthesis.
 - Life evolved in the ocean.
 - Ocean resources are limited.
-

The wealth of data entered into the NSES matrix is not summarized here due to the time and thoughtfulness needed to digest and organize those postings. Those items will be presented at future venues (possibly NMEA).

The collective discussion suggested a direction for promoting ocean literacy:

- Start with national science standards (upon which many state standards are based) and align ocean content to current standards (note: a goal of this workshop). Teachers would be burdened with another set of standards.
- Be prepared for a future revision of the national science standards (and state standards) with ocean literacy standards/statements/examples. Test questions and textbooks might then follow.
- Develop activities/lessons/examples that help teachers cover science standards (as well as reading, writing and math) using ocean content.
- Provide teacher professional development/workshops (pre-service and in-service) on ocean content to get them enthused about teaching science, as well as showing them how ocean content helps meet all content standards (not just science).
- Engage education professors/science methods professors in the use of ocean content to enliven teacher preparation.

- Promote research findings and/or support research to show the positive impact of ocean content on learning reading, writing, math and/or science.

Part 3: A Few Closing Thoughts (Room #16)

Most of the participants placed their closing thoughts and suggested next steps in the final survey (which will be posted shortly).

In the last meeting room, some posted final comments, which were positive. Participants were excited and enthusiastic about sharing with one another during this workshop and continuing this conversation in person, in workshops and possible online again. Some regretted not being able to contribute more, either because of work, travel or family. Several stated that the time commitment to keep up with/contribute to the postings was greater than anticipated. There were several who stated they preferred being “captive” for such a discussion, as in a meeting, so that they could focus on the discussion.

Many participants thanked the workshop hosts for organizing the workshop and bringing together this community. Quite a few participants eagerly anticipated the products of this workshop. Many said the discussions were informative. Participants viewed the workshop as a great step forward in infusing ocean content into K-12 teaching, and offered to continue with this worthwhile endeavor.

Section 2. Workshop Process

For a summary of the content see Section 1 above.

The second week of the workshop opened with an e-mail to all participants on Monday, October 25, 2004, encouraging a review of the Week 1 Summary and inviting contributions to the Week 2 task “to collect examples of topics, subjects, concept, issues, etc., that enable science standards to be met using ocean content.”

The Week 1 Summary (posted in Room #12), included a summative definition of ocean literacy and participants continued that discussion with 31 additional comments.

To aid the Week 2 discussion and familiarize participants with the current national science standards, workshop hosts offered an Introduction to Science Standards (Room #11) and set up a meeting room for General Discussion on Concepts and Issues (Room #10). There were 41 postings here by the end of the week.

Hosts also provided two organizing schemes for imbuing national science standards with ocean content. One was via grade-band meeting rooms: Grades K-4, Grades 5-8 and Grades 9-12; the other was via National Science Education Standards (NSES) content categories: Unifying Concepts & Processes, Science as Inquiry, Physical Science, Life Science, Earth & Space, Science & Technology, Personal & Social Perspectives, History & Nature of Science, plus an Other Topics category. Both of these schemes led to a “box” for each NSES category where participants could add ocean-related content.

On the last day of the workshop, participants received a final e-mail announcing the rapidly approaching close and a last chance to add/prioritize ocean content. The e-mail also asked participants to complete a short survey on their satisfaction with the workshop and offer

recommendations for next steps.

During Week 2, several new participants joined in and introduced themselves (for a total of 69 introductions in Room #2). In addition, by week's end we had 33 observers. Throughout the week the discussions were again cordial, thoughtful, challenging and thought provoking. The workshop organizers ended the week buoyed by their experience with this format and thrilled with everyone's participation and progress in meeting the goals.

This workshop's "proceedings" are open indefinitely for reading and anyone can join as an observer by visiting <http://www.coexploration.org/oceanliteracy>.

Grades K - 4 Matching Ocean Content to Science Standards

Item 13 [Peter Tuddenham](#) Oct 25, 2004 09:19

A goal of this workshop is to match ocean subjects and content to the science standards.

We encourage you to help us all by adding your input to this activity. You can approach this either by each category of standard:

[| Unifying Concepts and Processes |](#) [Science As Inquiry ^{NEW} |](#) [Physical Science ^{NEW} |](#) [Life Science ^{NEW} |](#)
[| Earth & Space |](#) [Science & Technology |](#) [Personal & Social Perspectives ^{NEW} |](#) [History & Nature of Science ^{NEW} |](#) [Other topics |](#)

Or by specific standard from a copy of the table found on page 109 of the NSES publication. Below you click on the standard and add your content directly.

CONTENT STANDARDS, GRADES K-4

UNIFYING CONCEPTS AND PROCESSES	SCIENCE AS INQUIRY	PHYSICAL SCIENCE	LIFE SCIENCE
Systems, order and organization	Abilities necessary to do scientific inquiry	Properties of objects and materials	Characteristics of organisms
Evidence, models and explanation	Understandings about scientific inquiry	Position and motion of objects	Life cycles of organisms
Change, constancy and measurement		Light, heat, electricity, and magnetism	Organisms and environments
Evolution and equilibrium			
Form and function			

EARTH AND SPACE SCIENCE	SCIENCE AND TECHNOLOGY	SCIENCE IN PERSONAL AND SOCIAL PERSPECTIVES	HISTORY AND NATURE OF SCIENCE
Properties of earth materials	Abilities of technological design	Personal health	Science as human endeavor
Objects in the sky	Understandings about science and technology	Characteristics and changes in populations	
	Abilities to distinguish		

Changes in earth and sky	between natural objects and objects made by humans	Types of resources	
		Changes in environments	
		Science and technology in local challenges	

Other K-4 ocean subjects, topics, issues that do not fit a science standard

Response 13:1 Margaret Gorcyca Oct 25, 2004 10:54

These are very broad topics. In Texas when the TEKS came out we had a difficult time interpreting what the teachers were to actually teach. We kept going to Texas Education Agency with many many questions. Many teachers are still confused.

Response 13:2 Gerald Lieberman Oct 25, 2004 12:19

The same comment applies in each grade range about how we should relate this work to content standards.

Having worked intensively with 16 state's departments of education over the past ten years I want to clarify that it is not sufficient to "match" ocean literacy with the science standards, or any other academic standards.

The goal of teachers, in a standards-based education system, is to help their students achieve mastery of the academic content presented in the standard. Achieving mastery requires the development of a variety of skills and knowledge for each content standard.

This endeavor needs to do more than "match" national science standards, it needs to specify exactly how any given ocean literacy concept can be used to help teachers help students to achieve mastery of specific standards.

If we do not work toward this specificity, we are just making the next laundry list of what we would like students to learn.

Response 13:3 Peter Tuddenham Oct 25, 2004 12:39

thanks Gerald, that is indeed what is needed. I hope that can we can make a start on that here.

Response 13:4 Bob Stewart Oct 25, 2004 18:07

I don't know how to fit key concepts into the straight jacket you have proposed. Why not get some egreement on what aught to be taught, then see if it fits into the scope and sequence boxes.

Here is my first cut:

- 1) oceans dominate earth. They cover the greatest area, have the most plants and animals, and have the greatest influence on most earth systems.
- 2) Earth is good for life because it has oceans. oceans moderate temperature, they are a source of food and oxygen.
- 3) Oceans are full of life: Fish, sharks, turtles, whales, small animals like jellyfish, tiny plants and animals such as plankton, and tiny-tiny things like bacteria, all live in the ocean.
- 4) People use the ocean, they like to live near the sea, they surf and swim at the beach, big boats carry freight from country to country.
- 5) If too many people use they ocean, they hurt the ocean.

Response 13:5 Sarah Schoedinger Oct 25, 2004 18:49

Thanks, Bob for being willing to post (13:4) for everyone to see what you think students ought to know by the time they leave grade 4 (as well as in other grades in the other sections). The NSES strands and individual

content standards were not intended to be a straightjacket, but instead to provide some guidance for how we might organize key ocean concepts.

And, while I agree with Jerry (13:3) that ultimately we don't want simply to develop a list of what students ought to learn, realistically in the few days of left to us, we're not going to do more than that. We have to start somewhere in this process and well over a year ago the NMEA Ad Hoc Committee members recommended that key concepts be identified as a starting point.

Somehow, we have to put on paper (or virtual paper) what students ought to know and right now that may not be more than a laundry list. After the workshop, it sounds as if we ("we" may include all of us, a sub-set of us, or another group that includes some participants here and others not participating) will need to further articulate how each of those concepts is employed to help students achieve a certain level of understanding or knowing that is consistent with our emerging definition of ocean literacy.

Response 13:6 [Francesca Cava, Nat. Geo. Society, Santa Barbara, California](#) *Oct 25, 2004 18:58*

Bob,

I recognize your frustration with the way we are approaching the process of attempting to get ocean content into the classroom. If you look at the education standards, or Oceans for Life as an example of tying ocean content to Geography standards, we are trying to work within the education system by listing specific concepts or topics that should be taught by standard and by grade. It can be confusing.

Once ocean concepts are identified they then need to be "aligned to standards" by grade bands which is what we are asking folks to help us do in items 13, 14 and 15, where the actual science standards are listed.

Of course, there are many more steps required after this, such as how do we assess the knowledge levels of students for these topics. But we believe the step of identifying ocean concepts is an important step and that aligning them to existing standards is a necessary part of getting them included in k-12 classrooms.

What we are attempting to do in this workshop, is work within the parameters that are already set up in education policy, recognizing that this is not a perfect approach and also that there is some debate on how best to do this. In order to make some progress with getting ocean content into the classroom, we are working with a strategy that is outlined in the conference graphic listed in the workshop.

I hope this help.

Response 13:7 [Francesca Cava, Nat. Geo. Society, Santa Barbara, California](#) *Oct 25, 2004 19:24*

Hi Gerry [re item 13:2],

Yes, we agree that we need to get to a level of specificity that is both descriptive and measurable. The following examples identified in the California process are the types of things we are trying to identify here.

1. Humans affect all marine ecosystems.
2. Human population growth has resulted in unsustainable demands on marine resources.
3. Human land use practices have large-scale impacts on marine ecosystems (i.e., dead zones).

These are the kinds of specific concepts or topics that we need to identify here and align to the standards.

Response 13:8 [Frank Muller-Karger](#) *Oct 25, 2004 19:32*

I like Bob's first cut but (of course) have some comments.

I think we need to restate item #1. Ocean's don't really dominate Earth, indeed the problem is that they are a thin skin over about 71% of the Earth. We need to make sure we don't mix up perceptions.

I think we need to demystify science and the scientific method - a concept I think we need to teach is that we are all scientists in the way we approach problems (make a model in our head, observe, come up with answer and conclusion - then act).

Indeed, the idea of "change" and "uncertainty" are also important to understand. Things change and people tend to forget this in very short times. We also need to live with uncertainty and still be able to make decisions.

Response 13:9 Jaime Malwitz Oct 25, 2004 21:17

Not living near an ocean, but rather bordering on the Great Lakes, we here in Wisconsin would expect our 4th grade students to know, and I write this as an extension of what would be expected of them in regard to the Great Lakes and then applied to Ocean Standards:

The ocean covers 3/4 of the Earth's surface and has a variety of names including Atlantic, Pacific, Indian, Arctic, (etc.)

The ocean is a source of life for a large number of plants and animals ranging in size from whales to plankton and many microscopic lifeforms.

The ocean is a source of many of the Earth's minerals.

The ocean affects weather and climate.

The ocean provides people with food, industry, transportation, and recreation.

There are consequences in the misuse of the ocean in the forms of pollution, mismanaged fishing and hunting, and destruction of food chains.

All of the above can certainly be expanded upon, but I would hold to having no more than a half dozen or so at grade 4.

Response 13:10 William Bragg Oct 26, 2004 00:20

Yes, I agree with Jaime. I taught 4th grade for 7 years... that looks like a very good list - as to their level and capacity, etc...

and, of course, it can be altered slightly for each K, 1, 2, 3, 4 - as the statements allow for that quite well.

Response 13:11 Mellie Lewis Oct 26, 2004 13:52

Well said Jaime 13:9. I believe the same holds true for our students in Maryland.

Response 13:12 Bob Stewart Oct 26, 2004 17:38

Francesca (13.6) Thanks for the kind works. I having worked with many Texas teachers, and they don't use the table above, nor do the Texas standards, nor does the AAAS Benchmarks, so for me it is frustrating.

Frank (13.8) I really do think the oceans dominate earth, from the atmosphere to the bottom of the mantle. O₂ in the atmosphere for 2GYr has transformed the chemistry of the rocks and mantle, as has the extraction of thousands of meter thick sections of calcium carbonates, changing the viscosity of the mantle, and altering plate tectonics. I did not make the claim lightly. I have discussed this with Ted Moore, and I think we agree. See also Oldroyd (Thinking About the Earth, 1996: 297). Is there good evidence that the earth's composition, mantle composition, and rock properties have not been changed by ocean life?

Jamie (13:9) I like the statements, they are more elegant than mine.

Response 13:13 Al Plueddemann Oct 26, 2004 17:41

13:9 Jaime Malwitz sounds just about right to me. At this level the list can not be very long or very complex.

Response 13:14 Frank Muller-Karger Oct 26, 2004 19:25

I agree that the items as listed by Jamie, refined from Bob's, are well stated. To make sure the effects described by Bob in 13:12 of 10/26 are reflected, perhaps add another item:

[The ocean affects the world from the atmosphere to the center of the earth, through chemistry, gravity and friction on the world.](#)

Also:

The ocean has barely been explored and much adventure awaits those that enter them

Perhaps add that:

The ocean was key in the "creation" of life

and

The ocean supports life forms that require sunlight to grow, and some that don't need the sun to derive energy for food or even to stay warm

We should add something about "processes":

Ocean currents move energy (heat) and materials (nutrients, plants, boats) around, and this is what affects where and how climate changes and where food grows.

One, two, vs. three dimensions - and add time:

The three-dimensional nature of the ocean has deep implications for nature and how people deal with the ocean, and change happens in time (a fourth dimension)

We also need to cast the last item in both negative and positive lights:

There are consequences in the misuse of the ocean in the forms of pollution, mismanaged fishing and hunting, and destruction of food chains.

can be:

There are consequences in the misuse of the ocean in the forms of pollution, mismanaged fishing and hunting, and destruction of food chains, but understanding the oceans can help humans support life on the planet

One can certainly go on.

Bob S.: - thanks for the clarification on what part of the world dominates any other. I do agree also with all you have stated as impacts by the ocean, friction being another one you can add because the oceans slow down the rotation of the earth).

I think however that stating oceans dominate the world is a bit of a circular argument - anything that affects something else, even if slightly and needing over to billion years to be felt therefore should be considered "dominant"?. The same claim could be made about any part of the crust, or of atmosphere, on the ocean. Or for that matter any small part of society that bothers a larger section but does not truly dominate (nuisance comes to mind, but these days this may be a political statement). I still don't see that as a definition of "dominating", but definitely something important that requires "awareness".

We need to step back and look at this process away from our ocean-centric perspective, if we want to make a difference.

Response 13:15 [Al Plueddemann](#) Oct 27, 2004 09:38

Thanks Frank, something bothered me about the "consequences" statement (red sentence in 13:14). Your more balanced version is a lot more palatable.

Response 13:16 [Francesca Cava, Nat. Geo. Society, Santa Barbara, California](#) Oct 27, 2004 09:45

The following basic ocean concepts are taken from Oceans for Life, grades k-4, and I believe can be also used to align to national science standards. I will list them here both as examples and also to ask if there are other concepts missing. Some these concepts can be taught in multiple science standards, depending on the focus and complexity. The sentence is the underlying concept, the bullet is the objective.

USES OF OCEANOGRAPHY:

Knowledge of oceanography enables people to develop an understanding of the relationships between life, habitats, and environments over space and time—that is, of Earth as it was, is, and might be.

- Changes in ocean/land area distribution over time (e.g. sea level change, plate tectonics)
- Influence of oceanography on past events (e.g., circumnavigation of Earth, naval warfare, ship groundings)
- Influence of oceanography on current and future events (e.g., marine mammal groundings, climate and weather predictions)

- Ocean themes in literature, art, and music (e.g., fish prints, sea chanties, aquaria)

ENVIRONMENT AND SOCIETY

Oceans are modified by human activities, largely as a consequence of the ways in which human societies value and use Earth's natural resources, and human activities are also influenced by the oceans' physical features and processes.

- Introduction to marine resources (e.g., fishing, aquaculture, minerals, oil, sustainability)
- Human influences on oceans (e.g., beach closures, marine debris, overfishing, loss of habitat, water quality)
- Ocean influences on humans (e.g., weather and climate, tidal waves, hurricanes)
- Water as a resource (e.g., potable water, recreation)

HUMAN SYSTEMS

Oceans and human systems are interconnected politically, economically, and culturally.

- Oceans as providers of goods and services (e.g. fisheries, transportation)
- Oceans as barriers and conduits for trade and transportation (e.g. Panama canal, intercoastal waterways, distance and climate)
- Ocean resources as a focal point in shaping political and geographic policies (e.g. ocean management at local to global scales, EEZ, fishing and whaling rights, global oceanic interdependence)
- Exploration and settlement (e.g. immigration patterns, 1% of ocean explored, underwater habitats)

PHYSICAL SYSTEMS

Physical processes drive global systems in which oceans are fundamental.

- Relationship of rivers, estuaries and oceans and the concept of watersheds (e.g., interconnectedness of land and sea; changes in one part affect another)
- The hydrologic cycle—relationship to the ocean (e.g., evaporation, transpiration, condensation, etc.)
- Ocean influence on weather and climate (e.g., connections to the water cycle)
- Biodiversity (e.g., classification, interaction of organisms)
- Ocean habitats (e.g., effects of depth and temperature on habitats)
- Simple ocean dynamics (e.g., tides and currents, salinity, density, waves)
- Changes in shorelines (e.g., effects of tides, beach transport, erosion)

PLACES AND REGIONS

Oceans have physical and biotic characteristics which are used to define habitats and regions.

- Characteristics of ocean habitats (e.g., shorelines, water column, habitats and ocean life)
- Characteristics of oceans and ocean ecosystems and habitats (e.g., salinity, density, temperature, ph, food webs)
- Similarities and differences among the world's oceans (e.g., salinity, depth, size, volume, temperature, organisms)
- Concept of regions as applied to oceans (e.g., watersheds, continental shelves)

THE WORLD IN SPATIAL TERMS

Oceanography studies the relationships between life, habitats, and environments by mapping information about them into a spatial context.

- Location of nearby bodies of water and watersheds (e.g., ponds, streams, lakes, rivers, inlets, etc.)
- Location of significant rivers, estuaries, and watersheds (e.g., Ohio/Missouri/Mississippi, Amazon, Chesapeake Bay)
- Location of major world oceans, seas and gulfs (e.g., Atlantic, Pacific, Mediterranean Sea, Gulf of Mexico)
- Oceans as three-dimensional habitats (e.g., area, depth, volume)
- Distribution of water (e.g., more than 70% of the Earth's surface; relative amounts, location, ice vs. fresh vs. salt)

Now the task is to place them, align them, with the correct national science standard and also consider if these concepts can be taught at these grades.

Response 13:17 **Craig Strang** Oct 27, 2004 11:18

I want to remind everyone in this meeting that we're talking about K-4 here only. Some of the concepts mentioned, especially some that Frank suggested, might be more appropriate at higher grade levels. We also need to be careful about using words like "creation of life." Let's not go there.

I like both Jaime's and Bob's concepts and think that the two can be wordsmithed into something about the right grain size. I think they have captured the most important ideas.

I also want to reiterate Gerald's comments (13:2) that it won't serve us to create a long list of dozens of things we want teachers to teach. Then it appears that we're creating a separate set of ocean standards. We need to identify the most important concepts without which a person could not build toward basic science and ocean literacy. Think modest and think really important!

Finally, can I suggest that in these concepts we universally refer to the ocean in the singular. This indicates an important idea--that there is only one interconnected ocean, though we call it different names in different places. This is important in building conceptual understanding of some important ideas later: about circulatory systems, global/systems management of resources, etc. Kids and adults universally have the elaborate and thoughtful misconception that there are many oceans like many lakes, each separate from the other, containing different resources, some polluted, some not, etc. Our use of precise language can help to address this pervasive misconception.

Response 13:18 Sonya Dyhrman Oct 27, 2004 11:21

I have been absorbing and synthesizing much of the content and responses generated from the course of this workshop. Thus, this is my first set of comments.

First, I actually like the "laundry list" approach. If you take the definition of an ocean literate person to be (as drafted in Week 1 summary) someone who understands: 1) oceans matter to all life 2) oceans are complex systems 3) oceans and humans are interconnected 4) oceans are a finite resource then perhaps it is better to sub-bullet these components and ask 'how?' for each one. For example, how do oceans matter to all life? Well, they cover ~71% of the Earth's surface, provide food and moderate climate, etc. For each component, designate key areas of learning specific for each grade. I think Bob Stewart (response 13:4 and 14:5) and Jaime Malwitz (response 13:9) have provided great ideas to this effect.

Second, as many of the responses noted, the oceans are dynamic and interesting (look at the appeal of the movies Finding Nemo and Shark Tale). For this reason, it would be very easy to generate interest in the oceans (and science) at an early age. It would be ideal to designate time for students to learn specifics about the world's oceans. However, there are many key concepts shared between the oceans and terrestrial systems (climate, photosynthesis and respiration, food webs, etc.). Presumably, some of these could be addressed with a discussion of the oceans and others could be addressed with a discussion of terrestrial systems. It seems to me that this type of approach would lend itself greatly toward true understanding of a particular concept and ultimately build problem solving skills.

Response 13:19 Rebecca Bell Oct 27, 2004 13:54

<http://www.project2061.org/tools/sfaaol/sfaatoc.htm> which is the link to AAS Project 2061, provides text and concept maps that track the development of major concepts from PreK-12. The sample maps that are posted are unfortunately not the best ones for our task here, but the text can be used as well. If you look at, for example, The Physical Setting, it discusses the major concepts from simplest to more complex, i.e. from PreK to 12. The maps are extremely helpful, since they already split out the ideas and show the interconnections from the various areas (Living Environment, Technology etc). I think by combining these ideas/maps with Francesca's outline, we could more quickly produce our document. The outline has already been thought through for ocean content, and the framework for grade-level appropriateness is already built (Standards). Can they be combined to achieve our goal?

Response 13:20 Lynn Whitley Oct 28, 2004 03:32

Great ideas here!

I also agree with a combination of Bob Stewart's (13:4) and Jaime Malwitz's (13:9) suggested concepts. While they are very similar, I like the way Jaime has phrased some of them and would add "oxygen" (from Bob's contribution) to the description of what the ocean provides. I also like the change Frank Muller-Karger (13:14) suggested. to make the 'consequences' statement more positive.

So Jamie's would then be:

The ocean covers 3/4 of the Earth's surface and has a variety of names including Atlantic, Pacific, Indian, Arctic, (etc.)

The ocean is a source of life for a large number of plants and animals ranging in size from whales to plankton and many microscopic lifeforms.

The ocean is a source of many of the Earth's minerals.

The ocean affects weather and climate.

The ocean provides people with oxygen, food, industry, transportation, and recreation.

There are consequences in the misuse of the ocean in the forms of pollution, mismanaged fishing and hunting, and destruction of food chains, but understanding the oceans can help humans support life on the planet

I also like Rebecca Bell's idea of looking closely at the concepts Francesca Cava listed and aligning them with the science standards. Also those same concepts might work to amplify and build on the basic concepts (Bob and

Jamie's contributions) that we are discussing above.

And finally, Julie Lambert has posted a table in the 9-12 grade section that she has created aligning national standards and key concepts (her table includes the Florida standards, but that is another level of doing it by state ---which I think is out of our range at the moment!) Julie's document can be found at: Lambert [standards_topics].pdf Maybe that is a model as well? (I just copied and pasted the pdf so if this link doesn't work it is posted in the 9-12 grade section (Item 15))

Response 13:21 William Bragg Oct 28, 2004 07:45

Hi Lynn

(Yes, you have to actually UPLOAD into the response you are typing in... or link to it within Caucus... but, I'll upload it here.)

It is a helpful example. (Julie had it in WORD, and I made it into a PDF file... her Word doc is in the section Lynn referred to)

[Lambert\[standards_topics\].pdf](#)

Response 13:22 George Matsumoto Oct 28, 2004 16:55

Just a minor clarification/change that I would like to suggest (and acknowledge that all the previous discussion has been excellent).

I would like to see the statement

The ocean is a source of life for a large number of plants and animals ranging in size from whales to plankton and many microscopic lifeforms.

be modified to either

The ocean is a source of life or The ocean is a source of life ranging in size from whales to plankton and many microscopic lifeforms.

It's just a minor point, but there are not very many plants (by current definitions) in the oceans (lots of protists and bacteria that are primary producers).

Response 13:23 William Bragg Oct 28, 2004 16:59

That would seem like an excellent change in wording...

> Just "source of life" as opposed to specifically saying "source of life for a large number of plants and animals" --

Response 13:24 Bob Chen Oct 29, 2004 10:29

OK--Here are some simple concepts. I think anyone can think of 10s of examples of how to teach these. Remember, 4th grade teachers are mostly science and math-phobic. Lots of ways to support these folks surrounding these concepts.

Ocean is big.
Ocean affects us.
Ocean life is fascinating.
Coasts are important.

More detail:

Ocean is big. 70% of earth--look at a globe. How big is one meter? How big is 4000 meters? How big is a liter? How big is a swimming pool? How big is a million? Global model comparing mid-ocean ridges with Himalayas, Mount Washington, or your local know mountain.

Ocean affects us. Have you ever eaten fish or shellfish? How does that fish grow? What does it eat? How would life be without fish?

Ocean life is fascinating. Bring in a jellyfish. Models of deep sea lantern fish. Shark teeth. Whales are the biggest organisms on earth. Copepods are the most abundant.

Coasts are important. Have you ever been to a beach? Have you ever been to the same beach twice? Was it the same? Why or why not? What happens if you build a house there? Did you see any pollution? Where did it come from? Where does it go?

When I get into the office and if I have time, I will try to list some examples under the NSES.

This happens to map to our original 3 definitions of OS literacy pretty well and is simple enough a message to teach. If all K-4 students get this in some manner or another, I am happy.

Response 13:25 [Francesca Cava, Nat. Geo. Society, Santa Barbara, California](#) Oct 29, 2004 11:13

Bob C.,

Thanks so much for identifying these simple concepts and your input overall. I think this is very helpful and also it allows us to bring some consensus between the various groups on this workshop. I really appreciate the time you are taking on this. Linking any of your ideas to the standards will also be very helpful.

Response 13:26 [Paula Keener-Chavis](#) Oct 30, 2004 16:00

I have seen some of this as I have briefly scanned comments listed here, and they are all great ones. Thanks to all. I really want to see us address the fact that the ocean is largely unexplored, and that it covers most of the surface of the earth. For this grade level, that it can be very hot, very cold, very light, very dark, and that it changes over time is important.

Response 13:27 [Paula Keener-Chavis](#) Oct 30, 2004 16:05

It's me again. Other concepts to be considered would be adaptations for life in extreme deep-sea environments, human exploration of the ocean (human-occupied submersibles and AUVs/ROVs), and begin to introduce the concept of oceans and human health.

Grades 5 - 8 Matching Ocean Content to Science Standards

Item 14 [Peter Tuddenham](#) Oct 25, 2004 09:24

A goal of this workshop is to match ocean subjects and content to the science standards.

We encourage you to help us all by adding your input to this activity. You can approach this either by each category of standard:

[| Unifying Concepts and Processes](#) | [Science As Inquiry](#) ^{NEW} | [Physical Science](#) ^{NEW} | [Life Science](#) ^{NEW} | [| Earth & Space](#) | [Science & Technology](#) | [Personal & Social Perspectives](#) ^{NEW} | [History & Nature of Science](#) ^{NEW} | [Other topics](#) |

Or by specific standard from a copy of the table found on page 110 of the NSES publication. Below you click on the standard and add your content directly.

CONTENT STANDARDS, GRADES 5 - 8

UNIFYING CONCEPTS AND PROCESSES	SCIENCE AS INQUIRY	PHYSICAL SCIENCE	LIFE SCIENCE
Systems, order and organization	Abilities necessary to do scientific inquiry	Properties and changes of properties in matter	Structure and function in living systems
Evidence, models and explanation	Understandings about scientific inquiry	Motions and forces	Reproduction and heredity
Change, constancy and measurement		Transfer of energy	Regulation and behavior
Evolution and equilibrium			Populations and ecosystems

Form and function			Diversity and adaptations of systems
EARTH AND SPACE SCIENCE	SCIENCE AND TECHNOLOGY	SCIENCE IN PERSONAL AND SOCIAL PERSPECTIVES	HISTORY AND NATURE OF SCIENCE
Structure of the earth system	Abilities of technological design	Personal health	Science as human endeavor
Earth's history	Understandings about science and technology	Populations, resources, and environments	Nature of science
Earth in the solar system		Natural hazards	History of science
		Risks and benefits	
		Science and technology in society	

Other 5-8 ocean subjects, topics, issues that do not fit a science standard

Response 14:1 [Melissa Demetrikopoulos](#) Oct 25, 2004 09:57

Many of these topics lend themselves to using marine examples to teach to the standard. Overall, I think that the specific content is somewhat less important than learning to think and appreciate science. I am not sure it is important if a student is exposed to specific content but rather that they are "indoctrinated" with the love and excitement of the ocean. Thus, I do not think it matters if one uses fish or clams as examples to teach the life science areas as long as the example that is chosen is one that will capture the imagination of students. Marine science can serve as a tremendous hook to teach a wide range of topics and I hope that this portion of the discussion will not get cluttered with debates surrounding which specific examples are key.

Response 14:2 [Peter Tuddenham](#) Oct 25, 2004 09:59

I hope so too.. we really want to collect ideas and contributions in the appropriate sections. Debate on the concepts and issues can occur in that item above.

There is a need we think for pragmatic examples which should be entered in the appropriate item in the categories of science standard.

Response 14:3 [Margaret Gorcyca](#) Oct 25, 2004 10:58

Middle School is some times where we lose our students in science. I agree with Melissa about the hook. The examples you are talking about, Peter would help guide the teachers. There are many who haven't use the wonderful topic of the ocean to teach science.

Response 14:4 [Gerald Lieberman](#) Oct 25, 2004 12:23

The same comment applies in each grade range about how we should relate this work to content standards.

Having worked intensively with 16 state's departments of education over the past ten years I want to clarify that it is not sufficient to "match" ocean literacy with the science standards, or any other academic standards.

The goal of teachers, in a standards-based education system, is to help their students achieve mastery of the academic content presented in the standard. Achieving mastery requires the development of a variety of skills and knowledge for each content standard.

This endeavor needs to do more than "match" national science standards, it needs to specify exactly how any given ocean literacy concept can be used to help teachers help students to achieve mastery of specific standards.

If we do not work toward this specificity, we are just making the next laundry list of what we would like students to learn.

Response 14:5 Bob Stewart Oct 25, 2004 18:14

Middle-school big ideas:

- 1) Ocean life is microbe based. There are more bacteria in the ocean than stars in the universe.
- 2) People have killed most of the big animals in the sea. The number of sharks, whales, turtles, and fish are 1-30% of their original numbers.
- 3) The hydrological cycle, meteorology, and oceans are connected in many ways. Most of the rain that falls on land comes from the tropical ocean.
- 4) Changes in the ocean's circulation can cause abrupt climate change. (Day after tomorrow)
- 5) The concept of the tragedy of the common. Ultimately we will destroy the oceans unless we change our laws and behaviors.

Response 14:6 Francesca Cava, Nat. Geo. Society, Santa Barbara, California Oct 25, 2004 19:25

Hi Gerry [14:4],

Yes, we agree that we need to get to a level of specificity that is both descriptive and measurable. The following examples identified in the California process are the types of things we are trying to identify here.

1. Humans affect all marine ecosystems.
2. Human population growth has resulted in unsustainable demands on marine resources.
3. Human land use practices have large-scale impacts on marine ecosystems (i.e., dead zones).

These are the kinds of specific concepts or topics that we need to identify here and align to the standards.

Response 14:7 Jaime Malwitz Oct 25, 2004 21:33

Although this is not my content area, I would like to see something indicating the interdependence of land and oceans similar to Bob's #3 and #5 above but identifying effects of pollution from land and rivers on the ocean, and effects of the moon on tides and the effects of tides on land.

Response 14:8 Melissa Demetrikopoulos Oct 26, 2004 10:36

Coming at this from outside the content area, I use marine science to teach items that need to be taught. However, it is my understanding that we are trying to identify what needs to be taught to be literate. I am wondering if this section of the discussion will lend itself to this process since it is set up in the opposite direction. It seems that very few posts have occurred in the specific content sub-sections. Perhaps we need a space to compile a list of what should be taught and then try to fit these into the subsections of the standards. I am sure that we could come up with a marine example for each of the standards listed but I am not sure that this is the point of what we are trying to do.

Response 14:9 Bob Stewart Oct 26, 2004 17:50

Jamie (14:7) I agree, we need some statements about the coastal zone and coastal pollution, although I would not list pollution of the ocean, it is very small well away from the coast. How about:

- 1) Estuaries and salt marshes are important parts of the marine ecosystem. They are home to many plants and animals, and they are the nursery for many types of coastal and open ocean invertebrates, fish, and wildlife.
- 2) Storm waves and currents erode the coasts, and most coasts move slowly inland at a rate of a few feet per century along rocky coasts, and several meters per year along low, sandy coasts.
- 3) Most beach sand is carried to the coast by rivers and redistributed by currents. Damming rivers, and building structures along coasts interrupt the flow leading to increased coastal erosion.
- 4) The moon and the sun are responsible for making tides, causing sea level to rise and fall every 12 to 24 hours depending on location along the shore.
- 5) Perhaps something on coastal law: All countries control access to resources within 200 nautical miles of their shores. This area is called the Exclusive Economic Zone. All ships have the right to free passage through this

zone.

6) The solutions to serious environmental problems will elude us unless we are all aware of, and respect the profound differences between the world of science and human affairs.

Response 14:10 [Francesca Cava, Nat. Geo. Society, Santa Barbara, California](#) Oct 27, 2004 09:40

The following ocean concepts and objectives are listed both as examples from Oceans for Life, grades 5-8, and also to ask if you can identify other concepts that should be included. I also believe they can be aligned to science standards, the job will be to align them to specific standards. The first sentence is the underlying concept, the bullets are the objectives to teach under that concept.

THE WORLD IN SPATIAL TERMS

Oceanography studies the relationships between life, habitats, and environments by mapping information about them into a spatial context.

- Latitude/longitude/depth (e.g., bathymetry, map and chart reading, navigation)
- Spatial representations and technology (e.g., ocean atlases, Geographic Information Systems [GIS], Global Positioning Systems [GPS])
- Location of oceanic features (e.g., seamounts, coral reefs, atolls, deep-sea trenches, ridges)
- Location of major U.S. ports (e.g., New York, Los Angeles/Long Beach, San Francisco, New Orleans, Houston)
- Location of major ocean resources (e.g., fish stocks, whale migration routes, oil and gas deposits)

PLACES AND REGIONS

Oceans have physical and biotic characteristics which are used to define habitats and regions.

- Changes in places and regions over time (e.g., coastal erosion, sea level change, sea surface temperature)
- Marine protected areas (e.g., National Marine Sanctuary system, marine protected area network, National Estuarine Research Reserves)
- Characteristics of shorelines (e.g., rocky coast, mudflat, sandy beach)
- Characteristics of the water column (e.g., shallow, mid-water, deep water—major ocean currents, waves and tides)
- Characteristics of near shore habitats (e.g., coral reefs, kelp beds, mangrove swamps, sea grass beds)
- Characteristics of the sea floor (e.g., intertidal zone, continental shelf, continental slope, islands, deep ocean, deep ocean trenches)
- Characteristics of ocean biomes (e.g., major ecological communities, biodiversity, deep sea)

PHYSICAL SYSTEMS

Physical processes drive global systems in which oceans are fundamental.

- Relationship of rivers, estuaries and oceans and the concept of watersheds (e.g., interconnectedness of land and sea; changes in one part affect another)
- The biological ocean—processes and interactions (e.g., Ocean ecosystems, interdependence of life on Earth to the oceans, food webs, carbon cycling, animal behavior, e.g. bioluminescence)
- Seafloor features and processes (e.g., general plate tectonics, names of major plates, seafloor spreading, past / present ocean levels, hydrothermal vents, volcanoes)
- Earth/Sun and Earth/Moon relationships (e.g., rotation, global winds, tidal connection to lunar cycle, gravity, Coriolis effect, carbon sequestration)
- Ocean physics (e.g. climate, dynamics, atmospheric/ocean linkages, waves)

HUMAN SYSTEMS

Oceans and human systems are interconnected politically, economically, and culturally

- Oceans as providers of goods and services (e.g. fisheries, transportation)
- Oceans as barriers and conduits for trade and transportation (e.g. Panama canal, intercoastal waterways, distance and climate)
- Ocean resources as a focal point in shaping political and geographic policies (e.g. ocean management at local to global scales, EEZ, fishing and whaling rights, global oceanic interdependence)
- Exploration and settlement (e.g. immigration patterns, 1% of ocean explored, underwater habitats)

ENVIRONMENT AND SOCIETY

Oceans are modified by human activities, largely as a consequence of the ways in which human societies value and use Earth's natural resources, and human activities are also influenced by the oceans' physical features and processes.

- Human influences on the oceans (e.g., resource competition, overfishing; loss of habitat, spread of non-indigenous species, agricultural runoff, shoreline impacts, water quality)
- Ocean influences on humans (e.g., ecotourism, economic development, sustainability, and careers)
- Ocean resources (e.g., fisheries, mining)
- Watershed management (e.g., dams, forestry practices)
- Fresh water resources (e.g., urbanization, aquaculture, agriculture, fresh water distribution)
- Interconnections between atmospheric, land and ocean issues (waste disposal, global climate change, nonpoint

source pollution)

USES OF OCEANOGRAPHY

Knowledge of oceanography enables people to develop an understanding of the relationships between life, habitats, and environments over space and time—that is, of Earth as it was, is, and might be.

- Impact of ocean processes on the location of and outcome of historic events (e.g., exploration, migration and settlement, naval activity)
- Applying oceanography to understand the past (e.g. ocean exploration, shipwreck histories)
- Environmental issues (e.g. global climate change, effects of ozone, modeling)
- Ocean themes in literature, art, and music (e.g. fish prints to study anatomy, Jules Verne)

Response 14:11 [Susan Snyder](#) Oct 27, 2004 09:56

Francesca, I began plugging in the “Oceans for Life” concepts to the grid above on Monday. I am still working on this. But, as you can see if you click on the grid items, things are aligning themselves quite well. I’ve also added a few things to the grid concepts that I taught when I was teaching 8th grade. Folks reading over my additions may think that I am getting too detailed, but I wanted to get them on the table to be discussed.

Response 14:12 [Francesca Cava, Nat. Geo. Society, Santa Barbara, California](#) Oct 27, 2004 10:01

Susan,

Thanks so much for telling me. This is exactly what we need!! I missed what you had already one.

Response 14:13 [Rebecca Bell](#) Oct 27, 2004 13:56

Susan's approach should work, I think. The pieces are here and "just" need to be put together. What can I do to help?

Response 14:14 [Francesca Cava, Nat. Geo. Society, Santa Barbara, California](#) Oct 27, 2004 15:56

Rebecca, We need help identifying any concepts that are missing from what has been listed to date. Also, there may be different opinions on which concepts can be taught to meet a particular standard. In fact, some ocean concepts can be related to several standards. Getting your opinion on what concept should be aligned with what standard, would be a great help. Thanks so much for asking!

Response 14:15 [Susan Snyder](#) Oct 28, 2004 19:15

This week, I’ve been trying to fit science concepts from “Oceans for Life” and my own former curriculum into the national standards using the grid above. I’ve had some trouble inputting some of the content topics into the grid because there are a few glitches in the grid. For example, when I click on Science and Technology: Understandings about science and technology: it takes me to Abilities of technological design. When I click on Physical Science: Transfer of energy, it takes me to 9-12 Interactions of energy and water.

As a result of running out of time and not being able to work through the glitches, I decided to retype my list below and make some refinements in my statements.

Unifying concepts:

Systems, order and organization: Content topics: 1) In the ocean, organisms are generally classified as plankton or nekton, benthic or pelagic, and sessile or motile. 2) Shorelines are classified as rocky coasts, mudflats, or sandy beaches.

Evidence, models and explanation: Content topic: Satellites and sonar are used to collect data about topographic features on the ocean floor. Using this data, models of the ocean floor (eg. bathymetric maps) are constructed.

Change, constancy, and measurement: Content topic: The characteristics of places and regions change over time because of urbanization, coastal erosion, sea level change, and sea surface temperature change.

Evolution and equilibrium: Content topics: 1) Ocean basins evolve over time. Although basins spread where crustal plates diverge and disappear where crustal plates converge (trenches), the total amount of crust remains about the same. Earth is not getting bigger or smaller. 2) Coastal regions evolve over time. While sediments erode from some shores, they are deposited on others.

Science as Inquiry:

Abilities necessary to do scientific inquiry: Content topic: Observations, inferences, and experimentation are important skills used in studying the ocean. Many observations about the ocean are made using shipboard instruments, remotely operated vehicles, and satellite sensors.

Understandings about scientific inquiry: Content topic: As new information is collected using observations, inferences, and experimentation, knowledge about the ocean increases. Although people have learned a lot about the ocean, only about 1% of the ocean has been explored; there is a lot left to be discovered.

Physical Science:

Properties and changes of properties in matter: Content topics: 1) An important property of water is that it absorbs and releases heat more slowly than soil. Because of this property, oceans and large lakes modify the temperature of surrounding regions. (eg. regions along coasts are warmer in the winter and cooler in the summer than more inland regions.) 2) Important chemicals and compounds (eg. carbon, water, and nitrogen) cycle among the ocean, atmosphere, and land.

Motions and forces: Content topics: Several different forces produce motion within the ocean: Winds blowing on the ocean's surface create surface waves. Tsunami waves are generated by sudden seismic activity in earth's crust. Tides result from gravitational attraction within the moon-earth-sun system. Surface currents are affected by global winds and Coriolis force. Deep water currents are created as a result of water density differences.

Transfer of energy: Content topics: 1) There are many atmosphere/ocean linkages in the transfer of energy. (eg. heat from ocean water powers hurricanes, heat powers the water cycle). 2) There are many land/ocean linkages (eg. convection currents within the mantle move crustal plates, creating new ocean basins, trenches, and mountains; energy produced during photosynthesis and chemosynthesis is transferred within marine and terrestrial environments through food webs.)

Life Science

Structure and function in living systems: Content topic: The ocean contains many overlapping biomes (major ecological communities). Organisms within a biome are interdependent. (eg: food webs, gases [carbon dioxide and oxygen] are recycled).

Regulation and behavior: Content topics: 1) Many symbiotic relationships exist in the ocean: (eg. competition, predation, parasitism, and mutualism). 2) Some marine animals migrate to feed, regulate temperature, and reproduce (eg. whales). 3) Aquatic organisms have behaviors and other adaptations that help them survive predation (eg. schooling, mass migrations, camouflage).

Populations and ecosystems: Content topics: 1) There is an interdependence of life on land and in the ocean. 2) Ocean ecosystems are distinct and yet many overlap with each other and with terrestrial ecosystems (eg. rocky coasts, mudflats, sandy beaches, coral reefs). 3) As in all ecosystems, energy is transferred in the ocean through food webs. 4) Populations of ocean creatures fluctuate. Natural and human activities affect these populations (eg. hurricanes, overfishing, oil spills).

Diversity and adaptations of systems: Content topics: 1) There is great biodiversity in the ocean because it has many habitats (eg. rocky shores, coral reefs, kelp forests, mangrove swamps, sea grass beds, sandy beaches, deep plains and trenches). 2) Organisms have adapted to these habitats (eg. below the zone of light penetration, many organisms are bioluminescent; barnacles glue themselves to rocks).

Earth and Space Science

Structure of the earth system: Content topics: 1) Some structures of the seafloor include an intertidal zone, continental shelf, continental slope, islands, abyssal plains, and ocean trenches. 2. Plate tectonics causes seafloor spreading, the formation of mid ocean ridges, and trenches.

Earth's history: Content topic: There is a record of a rising and falling sea level (eg. marine fossils on continents, submerged beaches and beach terraces)

Earth in the solar system: Content topic: Earth/Sun/Moon relationships affect the oceans (eg. Earth's tides are caused by the gravitational attraction between the earth and moon and are affected by the relative positions of the earth, moon, and sun in space).

Science and Technology

Understandings about science and technology: Content topic: Much has been learned about the science of marine organisms, ocean bottom topography, and currents by using technologies (eg. satellites, submersibles, remotely controlled vehicles, buoys, computers).

Science in Personal and Social perspectives

Personal health: Content topics: 1) The ocean is a source of drugs. 2) Plankton is important for its production of oxygen. 3) Good water quality is important to health. (eg. pollution affects sea food and recreation).

Populations, resources, and environments: Content topics: 1) Oceans are providers of goods & services (eg. fisheries, recreation, transportation). 2) Oceans are barriers & conduits for trade and transportation (eg. Panama Canal, Intercoastal waterways.) 3) Ocean resources are a focal point in shaping political & geographic policies (eg. ocean management at local to global scales, EEZ, fishing & whaling rights, global oceanic interdependence.)

Natural hazards: Content topic: There are several natural hazards that occur in the ocean. (eg. hurricanes, tsunamis, global climate change, atmospheric ozone depletion and its effects on plankton and other marine organisms.)

Risks and benefits: Content topics: 1) Risks: resource competition, overfishing, loss of habitat, spread of non-indigenous species, agricultural runoff, shoreline impacts, water quality. 2) Benefits: ecotourism, economic development, sustainability, careers, ocean resources--fishing and mining.

Science and technology in society: Content topic: There are many interconnections among atmospheric, terrestrial, and ocean issues (eg. waste disposal, global climate change, point and non-point source pollution.)

History and Nature of Science

History of science: Content topic: Early explorers of the oceans studied wind, waves and currents as they related to sailing. More recent ocean explorers have studied specific organisms, currents, hydrothermal vents, and many other ocean topics. Famous ocean scientists and explorers include, but are not limited to, William Beebe, Auguste Piccard Matthew Maury, Jacques Cousteau, Eugene Clark, Robert Ballard, and Sylvia Earle.

Since this is the last opportunity I have to join the discussion (I'm flying from Ohio to Washington State tomorrow) , I wanted to tell everyone how refreshing these discussions have been. It has been wonderful "rubbing shoulders" with you all. I wish we had more time to work on this project.

Response 14:16 Mellie Lewis *Oct 29, 2004 09:20*

I like the match Susan has made. Would it be possible to elaborate a little on the ocean as a system. I think it's important for the learner to understand the interrelationship of the biological, chemical, geological and physical ocean - that a change in one of these subsystems affects the other.

Response 14:17 Francesca Cava, Nat. Geo. Society, Santa Barbara, California *Oct 29, 2004 10:17*

Susan,
Thanks so much for this great effort. This is extremely helpful.

Response 14:18 Bob Chen *Oct 29, 2004 10:53*

I like Susan's examples. Thank you for your efforts.

I would again (check K-4 13:24) like to offer some simple grade 5-8 ideas. I think a simple guide is powerful for middle school teachers (less than 50% of whom have an appropriate science background--"highly qualified"). The simpler the better--I think a short list is more effective than a long list at reaching large numbers.

Ocean affects weather.
Organisms adapt to their environment.
Organic matter can be formed by photosynthesis or chemosynthesis.
Mankind is affecting the ocean.

More detail:

Ocean affects weather. Energy moves from sunlight to heat to wind. Seabreezes. Hurricanes. Local weather phenomenon.

Organisms adapt to their environment. (Evolution and Biodiversity) What is life like in the ocean? Deep, dark, high pressure. Vast, little food. Intertidal, changing quickly, dry then wet, salty. Sewage introductions. Overfishing.

Organic matter can be formed by photosynthesis or chemosynthesis. (Energy Flow) How do trees work? How does phytoplankton work? Hydrothermal vents can create energy-rich food as well. Studying both processes is much more powerful to learning primary productivity than just photosynthesis.

Mankind is affecting the ocean. Overfishing--what happens to populations when you add another pressure on an ecosystem? What happens to a plastic 2-liter bottle that is dropped in the ocean? How do we make laws to control mankind's impact on the ocean?

Again, I can try to map these to NSES.

Response 14:19 Paula Keener-Chavis *Oct 30, 2004 16:22*

Having just seen the IMAX film *Volcanos of the Deep* last week during a PD for teachers at the New England Aquarium, I cannot help thinking that the content in that film would capture the imagination of any middle schooler without a doubt. So the content that comes to mind here as I look over the standards consists of vents - how they are formed and how they are transitional communities, vent organisms (chemosynthesis vs. photo. The story of the discovery of the tube worms and other life at the vents is an incredible way to teach form and function and diversity as well as science as a human endeavor and history of science. Submersibles brings in technology and working in extreme environments. Of course the Challenger Expeditions tell a beautiful story related to the history of science as well. Important that students know that the ocean is largely unexplored. Again, I think we need to weave a thread of oceans and human health through here as well.

Grades 9 - 12 Matching Ocean Content to Science Standards

Item 15 Peter Tuddenham Oct 25, 2004 09:27

A goal of this workshop is to match ocean subjects and content to the science standards.

We encourage you to help us all by adding your input to this activity. You can approach this either by each category of standard:

| [Unifying Concepts and Processes](#) | [Science As Inquiry](#)^{NEW} | [Physical Science](#)^{NEW} | [Life Science](#)^{NEW} |
| [Earth & Space](#) | [Science & Technology](#) | [Personal & Social Perspectives](#)^{NEW} | [History & Nature of Science](#)^{NEW} | [Other topics](#) |

Or by specific standard from a copy of the table found on page 111 of the NSES publication. Below you click on the standard and add your content directly.

CONTENT STANDARDS, GRADES 9 - 12

UNIFYING CONCEPTS AND PROCESSES	SCIENCE AS INQUIRY	PHYSICAL SCIENCE	LIFE SCIENCE
Systems, order and organization	Abilities necessary to do scientific inquiry	Structure of atoms	The cell
Evidence, models and explanation	Understandings about scientific inquiry	Structure and properties of matter	Molecular basis of heredity
Change, constancy and measurement		Chemical reactions	Biological evolution
Evolution and equilibrium		Motions and forces	Interdependence of organisms
Form and function		Conservation of energy and increase in disorder	Matter, energy, and organization in living systems
		Interactions of energy and matter	Behavior of organisms

EARTH AND SPACE SCIENCE	SCIENCE AND TECHNOLOGY	SCIENCE IN PERSONAL AND SOCIAL PERSPECTIVES	HISTORY AND NATURE OF SCIENCE
Energy in the earth system	Abilities of technological design	Personal and community health	Science as a human endeavor
Geochemical cycles	Understandings about science and technology	Population growth	Nature of scientific knowledge
Origin and evolution of the earth system		Natural resources	Historical perspectives
Origin and evolution of the universe		Environmental quality	
		Natural and human induced hazards	
		Science and technology in local, national, and global challenges	

[Other 9-12 ocean subjects, topics, issues that do not fit a science standard](#)

Response 15:1 Margaret Gorcyca *Oct 25, 2004 11:01*

Many of these topics may be address in Biology, Chemistry, and Physics classes. Reference may be made to the ocean as they are being taught. An oceanography or marine science class needs to be very specific to certain topics that are not addressed the the other subject areas.

Response 15:2 Gerald Lieberman *Oct 25, 2004 12:23*

The same comment applies in each grade range about how we should relate this work to content standards.

Having worked intensively with 16 state's departments of education over the past ten years I want to clarify that it is not sufficient to "match" ocean literacy with the science standards, or any other academic standards.

The goal of teachers, in a standards-based education system, is to help their students achieve mastery of the academic content presented in the standard. Achieving mastery requires the development of a variety of skills and knowledge for each content standard.

This endeavor needs to do more than "match" national science standards, it needs to specify exactly how any given ocean literacy concept can be used to help teachers help students to achieve mastery of specific standards.

If we do not work toward this specificity, we are just making the next laundry list of what we would like students to learn.

Response 15:3 Francesca Cava, Nat. Geo. Society, Santa Barbara, California *Oct 25, 2004 19:27*

Hi Gerry [re item 15:2],

Yes, we agree that we need to get to a level of specity that is both descriptive and measurable. The following examples identified in the California process are the types of things we are trying to identify here.

1. Humans affect all marine ecosystems.
2. Human population growth has resulted in unsustainable demands on marine resources.
3. Human land use practices have large-scale impacts on marine ecosystems (i.e., dead zones).

These are the kinds of specific concepts or topics that we need to identify here and align to the standards. It would be great if you would add the types of content identified through your process here in our workshop.

Response 15:4 Jaime Malwitz *Oct 25, 2004 21:36*

Even if we cannot get ocean standards placed into national science standards, teachers do have the opportunity of teaching ocean literacy under the guise of life science, earth science, and inquiry. Just a thought.

Response 15:5 Julie Lambert *Oct 26, 2004 09:22*

[Lambert\[standards_topics\].doc](#)

I posted this table in the participants' section, but it seems to fit best here. It has a list of the NSES and Florida's Sunshine State Standards matched to specific marine science concepts/topics. I think we need different versions - one with a list of marine science concepts and another with statements, both aligned to the NSES.

Response 15:6 Sarah Schoedinger *Oct 26, 2004 17:26*

Julie:

This table is an excellent start to identifying ocean concepts that match/map to NSES for grades 9-12 as well as showing. What do the rest of you think?

Response 15:7 Tina Bishop *Oct 26, 2004 17:53*

Thanks Julie for sharing this table that you have drafted. I think it identifies and correlates a number of major topics/concepts and should serve as a good foundation for further discussion.

Response 15:8 Bob Stewart Oct 26, 2004 18:00

Julie (15:5) I had difficulty reading the table, and I didn't have time to reformat it. Could you post it as a pdf file? From what I read, it seems too terse. What do we mean by the single word bullets such as "density"? I prefer statements.

In addition to the concepts stated in earlier grades, I would add something on modeling (NSTA has a wonderful book on teaching modeling)

1) The ocean is so complex oceanographers must use computer models to help understand the ocean. The models process observations; they calculate currents, temperature, and density; and they describe the interactions among systems. "Modeling has become a mainstream activity. Today's biological oceanography student is more likely to have a model than a microscope."(Barber and Hilding, 2000)

2) Oceanographers are relying more and more on satellites, drifters, subsea observatories and unmanned submersibles to study the ocean. Fewer and fewer are going to sea. Most do not scuba dive.

3) The sea floor is poorly mapped, although recent global maps based on satellite altimeter observations are much better than older maps. Still, we have better maps of Moon, Venus, and Mars than we have of the sea floor.

Plus more on climate:

4) Earth's climate has been very different in the past. By collecting information about past climates and climate change we are much better able to understand our present climate and how it might change as we add CO2 to the atmosphere.

5) Forty times more carbon dioxide is stored in the ocean than in the atmosphere. The carbon cycle in the ocean and the calcite compensation depth greatly influence earth's climate.

6) Chemical studies of the distribution of isotopes and trace chemical in water and sediments is leading to a new understanding of climate change over the past hundreds to hundreds of million years.

Response 15:9 William Bragg Oct 27, 2004 00:18

>> **Here is Julie Lambert's document in PDF format - from response # 15:5 above:**

[Lambert\[standards_topics\].pdf](#)

Hope that helps.

Response 15:10 Francesca Cava, Nat. Geo. Society, Santa Barbara, California Oct 27, 2004 09:49

The following ocean concepts and objectives are listed both as examples from Oceans for Life, grades 9 - 12, and also to ask if you can identify other concepts that should be included. I also believe they can be aligned to science standards, the job will be to align them to specific standards. The first sentence is the underlying concept, the bullets are the objectives to teach under that concept.

THE WORLD IN SPATIAL TERMS

Oceanography studies the relationships between life, habitats, and environments by mapping information about them into a spatial context.

- Use of spatial representations and technology (e.g., apply mapping and GIS/GPS skills to observe and analyze ocean relationships, including distribution of ocean organisms, to map local watersheds, to understand distribution of biomass, changes in shorelines, animal migration)
- Use of other ocean measurement technology (e.g., underwater acoustics to measure global and physical parameters)
- Location and patterns of ocean characteristics (e.g., zonation, currents, eddies, sediment transport, physiochemical characteristics, oxygen minimum layer, calcium carbonate)
- World patterns of extreme ocean events (e.g., El Nino, hurricane intensity)

PLACES AND REGIONS

Oceans have physical and biotic characteristics which are used to define habitats and regions.

- Interdependence of land areas and the ocean (e.g., erosion, watershed issues, anadromous fish: salmon, trout)

- Physical and human processes that shape the ocean and coasts (e.g., erosion, damming rivers, barrier islands, construction of ports and marinas)
- Political and historical characteristics of ocean regions (e.g., pirates, Japanese Yellow Sea/Korea, whaling, EEZs, fishing rights, Law of the Sea)
- Analysis of regional ocean issues and problems (e.g., overfishing—Grand Banks/cod, Klamath/salmon; introduced/exotic species; pollution)

PHYSICAL SYSTEMS

Physical processes drive global systems in which oceans are fundamental.

- Plate tectonics (e.g., plate names, plate boundary interactions, and evidence for the theory of plate tectonics; Earth layers; Wilson Cycle)
- Processes of ocean physical systems (e.g., Coriolis effect, thermohaline circulation, chemical cycles, carbon sequestration, ocean physics)
- Ecosystem processes (e.g., biodiversity / productivity in salt marshes, estuaries, mangroves, coral reefs, hydrothermal vents; nutrient flows, reproduction, dissipation of energy in food chains)
- Processes of extreme ocean events (e.g., El Niño, hurricane intensity)
- El Niño and impact on organisms (e.g., fisheries collapse, unusual migrating species, effects of weather changes on all organisms, including humans)

HUMAN SYSTEMS

Oceans and human systems are interconnected politically, economically, and culturally.

- The role of oceans in economic development (e.g. tourism, oil and mineral resources)
- Cooperation and conflict in the division and control of oceans and their resources (e.g. Antarctica, EEZ, marine protected areas)
- Role of oceans in human demographics (e.g. demographic shift to coastal cities and increase in coastal commerce)
- Global economic interdependence (e.g., regional ocean resources, trade, transportation)

ENVIRONMENT AND SOCIETY

Oceans are modified by human activities, largely as a consequence of the ways in which human societies value and use Earth's natural resources, and human activities are also influenced by the oceans' physical features and processes.

- Human influences on a global scale (e.g., global warming, "tragedy of the commons", population growth)
- Ocean influences on a global scale (e.g., climate, ocean health / human health relationships, exotic species)
- Ocean policy and regulations (e.g., fisheries, whaling rights, ocean dumping, oil drilling, coastal development)
- Effects of technology (e.g., research and exploration, commercial operations)
- Changes in world ocean resources and distribution over time (e.g., species biodiversity, endangered species)

USES OF OCEANOGRAPHY

Knowledge of oceanography enables people to develop an understanding of the relationships between life, habitats, and environments over space and time—that is, of Earth as it was, is, and might be.

- Influence of ocean features in past events (e.g., volcanic island formation, continental drift, Siberian land bridge)
- Influence of oceanography in understanding future uses of the sea (e.g., modeling)
- Using oceanography to integrate multiple disciplines (e.g., hydrothermal vents, Darwin)
- Ocean themes in literature, music, and art (e.g. science competitions, compositions, essays, drama)

Response 15:11 [Beth Jewell](#) Oct 27, 2004 11:15

I am attaching a work in progress. This document is something that my district started to put together a couple of years ago. We (two of us) brainstormed on what we thought was important for students to know, then began to match national standards. This was written for an 11/12th grade full year oceanography class. The national standards were taken from all disciplines. Hope it helps.

[contentstandards3.doc](#)

Response 15:12 [Sonya Dyhrman](#) Oct 27, 2004 11:35

I think what Francesca has provided looks great. Whatever is decided for each grade set, I think the key is continuity. I mentioned this before, but I think having a core definition to "follow" to achieve ocean literacy will allow educators to design a curriculum specific for each grade. For example, let's consider the 4th "tenet" of the posed definition for an ocean literate person which states that the oceans are a finite resource. If you teach students in K-4 that the oceans are interesting and need protection, then this idea should not be lost when students work their way through to 12th grade. All the ideas should merely be expanded upon without losing the original, or core, idea. I think this kind of continuity is essential for not only maintaining interest in oceanography but also being able to get to the point where current topics, etc can be introduced (and appreciated).

Response 15:13 [Rebecca Bell](#) Oct 27, 2004 14:04

Here is Maryland's draft for high school ecology only...This illustrates general ideas that can easily use marine topics as the venue for instruction.

Expectation 3.5. Ecology: The student will investigate the interdependence of diverse living organisms and their interactions with components of the biosphere.

Indicator 1. Analyze the relationships between biotic diversity and abiotic factors in environments and the resulting influence on ecosystems.

- a. Recognize and explain that greater diversity increases the stability of an ecosystem.
- b. Recognize and describe that the distribution and abundance of organisms and populations in ecosystems are limited by the available energy, water, oxygen, and minerals, and the ability of the ecosystem to recycle materials.

- space - availability, population density, species diversity
 - latitude, altitude, depth
 - water availability, concentration of dissolved and suspended materials, salinity, pH
 - light intensity, duration, frequency
 - temperature range and rate of decomposition
 - pressure
 - air concentration of oxygen and carbon dioxide, humidity, wind, pollutants
 - soil composition, pH, salinity
 - food abundance and number of sources
 - organisms- number of species, population density, relationship to other organisms
- c. Recognize and describe how specialized interactions among organisms influence an ecosystem.
- Recognize and explain how predator and prey interactions maintain the stability of an ecosystem.
 - Recognize and explain how competition for resources maintains the stability of an ecosystem.
 - Recognize and explain how symbiotic relationships maintain the stability of an ecosystem.
 - o identify three types of symbiosis- parasitism, commensalism, and mutualism
 - o give examples of each.
 - o that relationships arise through coevolution
 - o that an evolutionary change in one organism must result in a change in its partner

Indicator 2. Analyze the interrelationships and interdependencies among different organisms and explain how these relationships contribute to the stability of the ecosystem.

- a. Recognize and explain how the flow of matter through an ecosystem maintains the stability of the ecosystem.
 - Equilibrium of biogeochemical cycles on a global scale
 - o role of biogeochemical cycles in recycling and storage of inorganic substances as a source of nutrients
 - Role of decomposers in recycling of organic materials
 - Flow of matter which accumulates or passes among trophic levels
 - Pyramid of biomass
 - Bioaccumulation of chemicals such as lead, mercury, and DDT passing through a food chain
 - Chemical elements that make up the molecules of living things pass through the food web and are combined and recombined in different ways
- b. Recognize and explain that sometimes environmental conditions are such that plants and marine organisms grow faster than decomposers can recycle them back into the environment, resulting in an accumulation of stored energy.
- c. Explain how the flow of energy maintains the stability of the ecosystem.
 - There is a continuous one-way input of energy from the sun to the food web
 - The rate of photosynthesis determines the amount of energy available to other trophic levels
 - A stable ecosystems contain a variety of organisms at various trophic levels based on how they obtain energy

§ producers are all green plants that occupy the first trophic level

§ all other levels are consumers

§ herbivores or primary consumers occupy the second trophic level

§ secondary consumers are smaller and larger carnivores and scavengers occupy the third and/or fourth trophic levels

§ decomposers act at all levels

§ omnivores are primary or secondary consumers

- energy is used, transferred, stored, or dissipated as heat through the trophic levels of the food web
- matter and energy are conserved at each change of trophic level.
- pyramids of energy and biomass graphically depict relationships among organisms in a food web
- why there is a limit to the number of trophic levels in a food chain.

- d. Recognize and explain how a greater diversity of genes, organisms, and habitats contribute to the stability of an ecosystem.
- greater genetic diversity within a population increases the likelihood that at least some members of a species will survive under changing environmental conditions.
 - greater diversity of organisms contributes to an uninterrupted flow of matter and energy through the food web
 - § greater diversity of habitats provides a variety of niches that reduce competition for specific resources
- e. Recognize and explain that each organism within an ecosystem occupies a specific niche which contributes to the stability of the ecosystem
- niche is determined by abiotic and biotic factors
 - is the role of the organism within an ecosystem
 - a greater number of niches permits greater diversity
 - niche overlap leads to competition and specialization into available niches
 - a species' success within a particular niche is a result of natural selection
 - each species, by its anatomy, physiology, and behavior, is adapted to occupy its own particular niche.
- f. Recognize and explain that, although ecosystems tend to have cyclic fluctuations around a state of equilibrium, ecosystems always change when climate changes or when one or more new species appear as a result of migration or local evolution.
- g. Recognize and describe that an ecosystem that is disrupted by natural disasters is likely to recover in stages that eventually result in a system representative of the original one, depending on the scale of the disruption.
- patterns of terrestrial and aquatic succession
 - natural disasters lead to temporary changes in diversity
 - as succession occurs, more niches become available
 - as more niches become available biodiversity and biomass increase

Indicator 3. Investigate how natural and human-made changes in environmental conditions will affect individual organisms and the dynamics of populations.

- a. Recognize and explain that, although organisms have the capacity to produce populations of infinite size, and may even temporarily exceed the carrying capacity of a given environment, population growth is limited by environmental factors and resources.
- exponential growth pattern
 - carrying capacity
 - limitations
 - o availability of space
 - o availability of resources
 - o number of competing organisms
- b. Recognize and explain that environmental problems arise when human activities and technology interfere with the natural carbon, nitrogen, water, and mineral cycles, or disrupt the equilibrium in the food web.
- decreasing the amount of available land for other organisms through habitat destruction and fragmentation
 - changing the rate at which matter recycles
 - moving species from one ecosystem to another
 - interference with others' food supply
 - changing the temperature and chemical composition of habitats
 - altering organisms through selective breeding and genetic engineering
- c. Identify and describe changes in the global environment that may affect individuals and populations.
- natural changes such as fire, flood, volcano, disease, glaciation, climate change, population increase, depletion of food
 - human-made such as intentional and unintentional introduction of exotic species; depletion of food; pollution such as industrial discharge, farm run-off, overharvesting, greenhouse gases, ozone destruction, acid rain; large scale destruction of habitat such as deforestation, urbanization, population increase
- d. Recognize and explain that individuals and populations respond positively and negatively to natural or human changes in an environment.
- Changes in birth and death rates
- Immigration/emigration
- Extinction

- Migration
- Adaptations of some species to human presence

Indicator 4. Illustrate how all organisms are part of and depend on two major global food webs that are positively or negatively influenced by human activity and technology.

- Recognize and explain that the global distribution and abundance of organisms and populations in ecosystems are limited by the availability of matter and energy and the ability of the ecosystem to recycle materials.
- Recognize and explain that all of Earth's ecosystems can be categorized within two global environments-terrestrial or oceanic- that interface with each other.
- Recognize and explain how the terrestrial and oceanic environments each contain a unique set of variables that affect the distribution and relative abundance of organisms within them, such as differences in availability, duration, and intensity of light; temperature range; availability and distribution of nutrients; depth or altitude; pressure, water chemistry and availability, and other abiotic factors.
- Recognize and explain how technology and human

Response 15:14 [Francesca Cava, Nat. Geo. Society, Santa Barbara, California](#) Oct 27, 2004 15:57

Wow, Rebecca, thanks so much!

Response 15:15 [Julie Lambert](#) Oct 28, 2004 22:31

Hello,

Bob, I do agree with you that the standards table is very terse. I really prefer the statements too that clarify what someone should know about a particular concept. I'm am finding that often someone wants to see a list to quickly see alignment of concepts. I just think we need both types of documents. Or maybe we use statements and highlight concepts within them??

Anyway I am attaching my update version as of today as a pdf. Julie [Lambert.NSES.Standards.pdf](#)

Response 15:16 [Bob Chen](#) Oct 29, 2004 11:13

Hi All,

As I have been reading, I have come to the conclusion that we are being very demanding on teachers to learn a whole lot of ocean science, and I do not think we have the resources to help these thousands of teachers to learn this--nor do I think we should. The state frameworks (I am familiar with Massachusetts) are too many and too detailed leading to mile wide inch deep coverage by teachers who know some things better than others. I think we are better served with fewer, larger concepts that are repeated (or built upon) as students progress K-16. With increase critical thinking skills (and conceptual knowledge) students will be able to receive information (media), process it better (our goal?) and make decisions about the ocean (our definition of ocean literacy).

Good curriculum, and professional development aligned with curriculum can help teacher meet national standards (that is the trend due to high stakes testing). We need to integrate ocean science into the pre-service courses as well as inservice professional development, but not as a separate course (oceanography). Those that offer these courses are usually not oceanographers (or even ocean lovers) as we all are.

There is no AP Oceanography course that I am aware of. No help here in vertically aligning curriculum for some students to succeed in advanced courses.

All this said to argue for a shift in emphasis (at least on the front line) to a simpler set of "standards" or better, concepts. The more complete listing or mapping of ocean science to NSES is a good exercise, and will be very useful for the 10% (Or 1% or whatever) who already want it, but I do not think this approach will impact the vast majority of K-12 teachers.

Guiding questions might be--How can we help these teachers? How can ocean sciences help students learn science?

Response 15:17 [Francesca Cava, Nat. Geo. Society, Santa Barbara, California](#) Oct 29, 2004 11:22

Hi Bob,

It is easy to become discouraged when you look at the magnitude of what we are trying to accomplish in the setting that we are working in. However, consider that 30 years ago, ocean content was in the classroom and now it is not.

It is not that the ocean concepts are that complicated, but we have a system that doesn't allow the time to teach them and also many times we have teachers who don't have the background to feel comfortable including them. The only way to make a change in the system, is to look for systematic changes. One thing to do is to make the topic of oceans important, critical to learning. Another is to show how it can be used to increase knowledge required. Another is to use it to inspire both teachers and students. Yet another is to look at a multi-discipline approach that infuses ocean/science concepts in many different ways -- look at Finding Nemo and the inclusion of ideas like the East Australian Current, bioluminescence, etc., in that show [of course there were some bad messages also, but some concepts were conveyed in some very simple ways to a huge audience.]

We need to not lose focus on the larger picture. We need a stronger community that works together. It will help us to have some common approaches, common messages, and links between our efforts. I appreciate all your thoughts and help and feel your contributions, and others, can make a difference.

Response 15:18 **Bob Chen** *Oct 29, 2004 11:24*

Here is an attempt at grade 9-12 big concepts.

Life evolved in the ocean.
The ocean plays a critical role in climate change.
Ocean resources are limited.
Technology allows us to "see" (or observe) the ocean better.

More detail (examples of how one might teach the big concept):

Life evolved in the ocean. Why is there life on earth? Is there life on Mars? Where did oxygen come from?
Fossil records. Marine biodiversity from bacteria to whales.

The ocean plays a critical role in climate change. Composition of the atmosphere affects global temperatures.
Greenhouse warming. El Nino. Energy flow. Heat capacity of water.

Ocean resources are limited. Fisheries trends. Marine pollution. Coral reefs.

Technology allows us to "see" (or observe) the ocean better. We are learning about the ocean quickly as better observation capabilities are developed. Sonar for ocean bottom. Observation systems for episodic events.
Water quality monitoring for coastal impacts. Deep sea submersibles for hydrothermal vents.

Response 15:19 **Sarah Bednarz** *Oct 29, 2004 11:35*

Greetings! I have been lurking in this discussion from afar but feel compelled to agree with Bob Chen. As much as I hate it, the curriculum is already very full. Moreover, educators by and large will not know how to integrate ocean examples into their curricula because they simply do not have the degree of fluency/knowledge themselves. As a geographer I am well aware that what stands as a barrier to high quality geography education is, too often, teachers who simply do not have sufficient content knowledge to implement geography-rich Standards. As Bob Chen suggests, pre-service education may be a strategic first area of emphasis, followed by a concurrent development of a framework of a very stripped down, essentialist set of ocean literacy concepts/generalizations and rich, engaging curriculum materials to support teachers. The old hierarchical scheme of awareness, understanding, guided practice, and implementation may help us develop a "campaign" for ocean literacy.

This has been a fascinating conference. I wish it could go on.

Thanks--Sarah Bednarz

Response 15:20 **Francesca Cava, Nat. Geo. Society, Santa Barbara, California** *Oct 29, 2004 14:39*

Bob, Sarah and others,

I think that your conclusions to simply our message in order to take into account the reality of the educational system is one of the most important conclusions of the workshop. It is sometimes easy to think that because something is simple it may not be enough. Actually, I think simplicity really reinforces the importance of the ocean

and will allow us to do a better job in our communications and development of what is next, including finding ways to better support teachers.

Thanks again for these thoughtful discussions.

Response 15:21 Tom Greene *Oct 29, 2004 20:57*

The NY State Dept. of Education approved a standards based marine science curriculum with mandatory labs ,which is offered in schools throughout the State of New York¹.The major content themes are the following:

1. The Ocean as a Living System (biology)-taxonomy, anatomy and physiology, adaptations
2. The Ocean -Its Physical Setting(chemistry, physics) water chemistry, pressure,temperature, sound and light in the sea
3. Planet Ocean -(earth science)-ocean floor topography,ocean geography, plate tectonics, origin of ocean
4. The Ocean and Beyond (Space Science and Meterology)- Tides, Earth origin , Weather
5. Human Impact on the Oceans (Environmental Science) Interdependence, pollution, conservation

This framework contains content from all the sciences making marine science a truly interdisciplinary science. The major science standards of inquiry(lab activities), math infusion, technology, relevance to real world, relationship with other sciences,and historical development of ideas are included in each of the themes.

Response 15:22 Paula Keener-Chavis *Oct 30, 2004 16:35*

Chemosynthetic communities in the deep sea - interdependence of organisms

Gas hydrates and cold seeps

Incredible examples of biological evolution in the deep sea

Ocean is largely unexplored and findings can fundamentally change our understanding of life on the planet. The ocean continually changes.

Ocean and human health connection through cell standards - genomics

Response 15:23 Rebecca Bell *Oct 31, 2004 14:26*

I like the topic/framework outlined above for NY (Tom 15:21). Tom- Is it possible to share the curriculum with us?

Closing thoughts and recommendations for next steps

Item 16 Peter Tuddenham *Oct 29, 2004 12:35*

Thank you all for your participation. We are planning on closing this workshop at 5pm Eastern on Sunday 31 October for active participation. Everything with remain open for reading only.

We would be grateful if you would complete a short survey to give us some feedback on the workshop.
<http://www.betaresourcesinc.com/nc/olit2004eval>

Please add any recommendations for next steps here as responses to this item.

Response 16:1 Margaret Gorcyca *Oct 29, 2004 13:09*

It would be better if you give us a survey to see if we were able to meet your needs. You had us fill out a survey at the beginning and now you want to see what we learned.

Response 16:2 Peter Tuddenham *Oct 29, 2004 13:40*

There is a short survey at <http://www.betaresourcesinc.com/nc/olit2004eval> which does help us do that Margaret.

Response 16:3 Dean Allen *Oct 29, 2004 14:56*

I just completed the survey form, but wanted to add that I think the information shared and the expert opinions provided by the participants were to the point and extremely valuable in accomplishing the workshop goals during a limited 2 week timeline.

Moving forward, I hope we will continue to be updated on future discussions and actions taken.

Thank you again for inviting me to be part of this important Ocean Literacy Workshop. I only regret that my travel and work schedule did not allow me to devote more time to the discussions.

Response 16:4 Lynn Whitley *Oct 29, 2004 15:47*

I also just completed the survey form and put all my thoughts in there. wish I had copied it! But in a nutshell----this was a wonderful and I think, a very successful workshop. The sharing and --by having this format--the documenting of the ideas were excellent. I think we have made a very solid first step along the path of defining ocean literacy and weaving ocean content into existing standards. I would welcome continuing this process in future online workshops or in a small group face to face workshop that builds on this work. It was wonderful to be involved with such a knowledgeable, passionate, and interesting group of people who took the time to contribute and be an intergral part of this important process. I enjoyed it and learned a lot, too, can't ask much more than that!

Response 16:5 Gene Williamson *Oct 29, 2004 16:04*

I've learned a great deal, and I'm encouraged by what is coming out of this effort. For those of you who are not members of the National Marine Educators Association, I encourage you to think about joining us. There is strength in numbers. . .and of course next summer the conference is on Maui. No time like the present. :-)

Response 16:6 William Bragg *Oct 29, 2004 16:49*

Good thought, Gene!

Here is the link:

<http://www.marine-ed.org/>

Response 16:7 Fritz Stahr *Oct 29, 2004 20:42*

I would like to see an executive summary of the workshop (basic conclusions, status of process, etc.) from the conveners that we could pass around to those who didn't participate to encourage more thought on this from others. Is there a plan for such? Also, if this site can be left up in read-only mode for longer than just through Dec it might be useful in fostering whatever group wants to take next steps. Thanks for the work in putting this on!

Response 16:8 Beth Jewell *Oct 30, 2004 11:38*

Have enjoyed this experience, I would like to see a venue where this can be discussed further. Would like to see an opportunity to get some teachers together to dive into some of the thoughts. Maybe a session in Maui?

Response 16:9 Tom Greene *Oct 30, 2004 11:47*

The NY State Dept. of Education approved a standards based marine science curriculum with mandatory labs ,which is offered in schools throughout the State of New York.
NOAA and NMEA needs to keep the momentum going by crafting a "marine science" or "oceanography" curriculum from all recommendations made here and send it to the Federal and State Education departments for inclusion into the schools.If this is not done marine education as we know it, will at best, be taught piecemeal in only some schools.

Response 16:10 Paula Keener-Chavis *Oct 30, 2004 16:47*

Although I am not quite finished with the workshop and will try to jump back in today and some tomorrow before it closes, from what I have seen it has been most productive and I only wish my schedule would have enable me to participate more than it has. Would love to see some follow-ups on this. Although the def of ocean literacy has closed out (I think), as I read through all of the iterations that were discussed last week, I kept thinking about the fact that ocean literacy to me should somehow encompass not only all the things you all discussed and came to some concensus on, but also possibly an acknowledgment of just how much we don't know about the world ocean.

Response 16:11 Mellie Lewis *Oct 30, 2004 16:58*

Beth - will you be writing an abstract for Maui like you did for NSTA Richmond? Sounds like a great idea to me, but I would really like to see us keep the momentum going and meet/discuss/plan/ whatever before July.

Response 16:12 Laura Francis *Oct 30, 2004 19:10*

Thanks for the opportunity to participate. The discussions have been excellent and thought-provoking. I hope that this is just the beginning and we all continue to work towards achieving ocean literacy. I look forward to seeing a final report and strategy with next steps and actions so we can keep the momentum going.

Response 16:13 Melissa Demetrikopoulos *Oct 31, 2004 01:06*

This has been very informative. I, too, put my comments in the survey. Perhaps they could be moved to the public area. One thing that I will mention is that I believe this process could have benefited from a conference call after the first week and a follow up conference call. Perhaps the follow up call can still be arranged. I am not sure that we have come up with a short list of essential items that every person MUST know about marine science. I would like to see this short list developed in addition to ideas of how to incorporate ocean science into the standards. Thanks so much for including me in this process!

Response 16:14 Francesca Cava, Nat. Geo. Society, Santa Barbara, California *Oct 31, 2004 08:18*

Thanks again to all of you for your time and thoughts. I believe the workshop did help us continue the discussion on what we mean by ocean literacy and many excellent suggestions have been made on how we continue to mount our Ocean Literacy campaign.

There will be an executive summary of the workshop available next week posted on this site. We will keep this site open as a "read only" reference. There will certainly be a session on our efforts at NMEA next year. I encourage you to let us know what the best format and content would be for that session.

Thanks again for all your contributions and Happy Halloween!!

Response 16:15 Sarah Schoedinger *Oct 31, 2004 10:07*

I'd like to echo Francesca's thanks to you all for your willingness to contribute your time and thoughts to this effort. We are definitely interested in your feedback on this workshop so please take the time to fill in the survey at:
<http://www.betaresourcesinc.com/nc/olit2004eval>

Response 16:16 Sharon Walker *Oct 31, 2004 11:31*

I can only echo many of the Ocean Literacy Online Workshop participants' accolades stated thus far. This has been an extremely successful dialogue in providing a general consensus concerning the definition of ocean literacy and the general concepts needed to become ocean literate. Further, I believe, once an Executive Summary or similar document is developed based on everyone's input, we can collectively begin our next and Herculean tasks in establishing the ocean concepts/case studies (to be incorporated in the NSES) needed at the three different grade levels for a precollege graduate to be considered "ocean literate!" Lastly, I also appreciate everyone's passion for education, particularly achievement in ocean sciences education!

Response 16:17 Frank Muller-Karger *Oct 31, 2004 11:39*

Thank you for inviting me to participate in this workshop.

I found the format interesting. I wish I could have put in more time, but I personally believe that the format did not provide the best venue for me to immerse as a participant. I may be one of those people that serves best when cloistered and retained captive (I should not be telling you this). This interface allowed for too much distraction (doing other things and getting to it as an afterthought at the end of the day); this made it difficult for me to find everyone's nuggets and keep them in mind. Especially when absences for more than a day occur, and in my case these were necessary. Typing all input also may not be the most effective for me.

I wonder if another format would be more useful for me, i.e. one that helps provide more up front and in-depth review of what concepts already have been floated to match which standards, and also helps to provide a more truly interactive experience (over perhaps a shorter but dedicated period of time). I believe that this can still be done electronically.

I do hope that the organizers found my input helpful. My closing comment is that we do need to keep the horizon broad (not just ocean centric). More importantly, we really need to energize our leaders on general education. It is not just science. I am appalled that so much has been lost and we continue to lose, while our leaders seem to state that all is great and that they do so much for education. In Florida, for example, we continue to be at the bottom of the pile, even after 20++ years of statements that education is a priority. It is not quite clear to me what the problem is - "money not where mouth is" seems to be one obvious one. On standards: Did earlier generations

have so many standards? Why did they do better at science, math and engineering? Do other societies that seem to be overtaking ours in technology base their learning on standards - or do they have other education paradigms? Is it just an issue of injecting oceans into the classroom, to get children excited about learning? Honestly?

I would like to remain engaged in this effort.

Response 16:18 [Kate Madin](#) *Oct 31, 2004 13:35*

I also hope to remain engaged in this effort, and also want to echo Frank's thought that it was difficult for me to read everyone's initial and previous comments and relate them to the current stage of discussions. Possibly a dedicated in-person meeting of the people and groups represented here would allow more clear agreement on a statement, list of concepts or whatever the form is to be.

Response 16:19 [Rebecca Bell](#) *Oct 31, 2004 14:23*

Thank you so much for inviting me to participate. I learned a great deal that helped me in my work in developing our state curriculum examples and, by participating in this discussion, called attention to oceans to our curriculum director who is now very excited about including ocean topics in the state curriculum.

Response 16:20 [Julie Lambert](#) *Oct 31, 2004 15:15*

I laughed when I read Frank's. I too can contribute more when held captive in person. I found it a little difficult to follow along and know what would be valuable enough to contribute once a few days went discussing a topic. But there is a lot to learn from this format too. Perhaps something like this prior to a "face to face" meeting would be very beneficial to producing a tangible outcome.

I think this experience reminded me of doing qualitative research - I really hope that someone will be analyzing our discussion for themes and future work and then getting our feedback. I'd even volunteer because I think the discussions were so beneficial and it was clear how much everyone cares about promoting ocean literacy. Thank you for the opportunity to participate. I too wish I had had more time, but I'm very willing to continue working on this.

Response 16:21 [Paula Keener-Chavis](#) *Oct 31, 2004 15:29*

The guilt is overwhelming and I am so comforted by the comments about the "captive audience format." As I sit here in the last hour and a half of the workshop, knowing hardly anyone will see these comments, my soon-to-be 8-year-old son (like tomorrow) is making a green tree frog out of model magic for his science project all by himself listening to the CD Holes in the kitchen calling my name CONSTANTLY and I know the trick or treaters will be knocking at the door any minute and I have one to get dressed, AFTER we construct the food web for the green tree frog. I just need to be held captive to focus on something of this magnitude and importance and will do whatever is needed to help move the next level forward. This is one of the most important things I have had the opp to be involved in the past three years and I just have not had the time to commit to it that I thought I would or that I wanted to. Thanks to all for FINALLY pulling all of this together....after all, it is the most important thing we can do for the little boy that will be a cowboy in about an hour and a half and all the other children around the world....ohmygosh....I forgot we have to carve the pumpkin....arghhhhggggghh!!!!

Response 16:22 [Kate Madin](#) *Oct 31, 2004 16:32*

Just wanted to say that Paula isn't the only one who has had to tune in too late, and I understand her guilt!

Response 16:23 [Mellie Lewis](#) *Oct 31, 2004 16:34*

Thank you Sarah and Francesca for inviting me to participate in this stimulating conference. I learned a great deal. I'm hoping to have the opportunity of working more with Rebecca Bell in bringing ocean topics into our Maryland State Curriculum. I hope many of us will get together at NSTA Richmond and at the NMEA Conference next July. If we plan early enough, we could possibly plan to meet as a group either before or after these conferences and continue this dialogue.

Happy Halloween!

Response 16:24 [Peter Tuddenham](#) *Nov 09, 2004 18:16*

This is a note from the whole organizing team.

Thanks to all of you who participated in this workshop. We believe that with your help we were able to meet our workshop goals and certainly extend the conversation on ocean literacy to a wide and diverse audience. Special thanks are also in order to the groups and organizations that allowed us to

review and comment on their ocean literacy-related efforts: the Northeast COSEE, Dr. Robert Stewart and his colleagues, the National Geographic Society and NOAA. Lastly, Dr. Elizabeth Stage provided valuable insight about U.S. education policy and national standards through her overview of the National Science Education Standards and how they relate to teaching about our oceans, coasts and Great Lakes.

What did we accomplish?

The conference enabled us to look at the progress underway by various organizations, to take a snapshot (captured in the graphic overview of the workshop process) on where we stand with defining ocean literacy, to add this workshop to the continuum of needs to promote ocean literacy and most importantly to help build consensus in the community on what is needed to define ocean literacy, to identify the most important ocean concepts to include in the classroom, and to begin to align these concepts and topics to national science education standards.

In addition, the online format of the workshop allowed a large, diverse group of people to participate in a very cost-efficient manner and will provide an archive for future use and reflection. The amount of information gained over the two-week period far exceeded our expectations and will take some time to analyze. With that in mind, we plan to have a final report on the workshop available for your review and comment in early 2005. Summaries of Week 1 and Week 2 of the workshop, along with some raw survey results are also available online. The following paragraphs highlight what we see as the key findings of the entire workshop.

Workshop Results

With a number of entries over the two-week workshop, participants came close to consensus on the definition of, and tagline about, ocean literacy, which are stated as follows:

Definition: Ocean literacy is the awareness and understanding of fundamental concepts about the functioning of the ocean-atmosphere-earth system. An ocean-literate person recognizes the influence of the ocean on his/her daily life, can communicate about the ocean in a meaningful way, and is able to make informed decisions to ensure the ocean continues to sustain a habitable planet.

Tagline: Ocean literacy is understanding the ocean's influence on you and your influence on the ocean.

In addition, although we identified a number of models for how to align ocean content to the standards, a major workshop recommendation, which was especially endorsed by the K-12 teachers, was to align ocean content with the current National Science Education Standards (NSES). The collective discussion also suggested the following directions for promoting ocean literacy:

- Start with NSES (upon which many state standards are based) and align ocean content to current standards.
- Be prepared for a future revision of the NSES (and state standards) with ocean literacy standards/statements/examples. Test questions, and then textbooks, might then follow.
- Develop activities/lessons/examples that help teachers cover science standards (as well as reading, writing and math) using ocean content.
- Provide teacher professional development/workshops (pre-service and in-service) on ocean content to get them enthusiastic about teaching science, as well as showing them how ocean content helps meet all content standards (not just science).
- Engage education professors/science methods professors in the use of ocean content to enliven teacher preparation.
- Promote research findings and/or support research to show the positive impact of ocean

content on learning reading, writing, math and/or science content/standards.

During the workshop, several participants offered lists of “fundamental concepts” that an “ocean literate” person would know. These were offered to create a bridge between the definition of ocean literacy and the alignment of ocean content with national and state science standards. The following lists are succinct examples of key concepts about which there was general agreement from the participants.

From response 10:34:

Grades K-4

- *Ocean is big.*
- *Ocean affects us.*
- *Ocean life is fascinating.*
- *Coasts are important.*

Grades 5-8

- *Ocean affects weather.*
- *Organisms adapt to their environment.*
- *Organic matter can be formed by photosynthesis or chemosynthesis.*
- *Mankind is affecting the ocean.*
- *Water has unique properties.*

Grades 9-12

- *Life evolved in the ocean.*
- *The ocean plays a critical role in climate change.*
- *Ocean resources are limited.*
- *Technology allows us to "see" (or observe) the ocean better.*

Another way of stating these concepts was offered in 10:37 as follows:

Grades K-4:

- *The ocean covers 3/4 of the Earth's surface and has a variety of names.*
- *The ocean is a source of life ranging in size from whales to plankton and many microscopic life forms.*
- *There are consequences in the misuse of the ocean in the forms of pollution, mismanaged fishing and hunting, and destruction of food chains.*
- *The ocean affects weather and climate.*

Grades 5-8:

- *Oceans have physical and biotic characteristics which are used to define habitats and regions.*
- *Organisms adapt to their environment.*
- *Physical processes drive global systems in which oceans are fundamental (this includes weather and climate).*
- *Humans affect all marine ecosystems.*

Grades 9-12 (Basically concepts above but with more detail, such as):

- *Ocean life is microbe- based.*
- *Changes in the ocean's circulation can cause climate change (and how that circulation works).*
- *Organic matter can be formed by photosynthesis or chemosynthesis.*
- *Life evolved in the ocean.*
- *Ocean resources are limited.*

In addition, there were many valuable entries that identified specific ocean concepts that align well with existing science education standards and for which ocean-related concepts are essential to meeting the content standard. It became obvious that this particular step was much more complex than envisioned and needs additional work. Nevertheless, the workshop did provide a proof-of-concept for the idea that ocean content can be aligned to the NSES and other standards.

Next Steps:

The most important next step will be to digest all the material generated by the workshop, both in the meeting rooms and in the pre- and post-workshop surveys. The workshop has certainly given us the initial data to align ocean content to the NSES and one option will be to work with a “standards expert” to synthesize this information into a first draft for further review and comment. Once that synthesis is completed, the information can be put into “final” form and shared with educators at national educational meetings.

Also, the workshop highlighted the need to continue to share information on what various organizations are doing to promote ocean literacy and to leverage our joint efforts. This information sharing should be a priority for NMEA 2005 and could perhaps be identified by grouping such presentations in a conference strand.

Lastly, we want to continue to engage you in the process of helping to promote ocean literacy. We hope to do that through the release of this workshop’s final report, solicitation for comments on the report, synthesis of recommendations for next steps identified in the workshop, and continued discussions at professional meetings. As the workshop organizers, we have been very encouraged by the dialog of this workshop and will continue to look for more opportunities to bring the community together.

Sincerely,
Craig, Francesca, Peter and Sarah
