

Public Comments Received 1/12/2012-2/03/2012

Fishermen of Grays Harbor.....	3
Matt Herman.....	4
The Vacation Lane Group, Inc.....	5
Kirk Fay.....	6
USDA Forest Service.....	7
Tom Lucas.....	8
Gayle Sweeney.....	9
Jessica H.....	10
Radio Silence Fishing.....	11
San Mateo County Harbor District, California.....	12
San Mateo County Harbor District, California.....	13
Prattsburgh Central School.....	14
Consulting.....	15
Puerto Rico DNER.....	16
Conservation Science Institute.....	17
Brett Weinburg.....	18
John Koster.....	19
Tom Wilson.....	20
FSFA & SAFMC.....	21
Frederick LaCorte.....	22
Mary-Jean Stevenson.....	23
Bellingham, MAP Public Schools.....	24
Tyngsborough Middle School.....	25
Cheryl Terranova.....	26
West Warwick High School.....	27
Andy Dumaine.....	28
Mellie Bukovsky-Reyes.....	29
Thomas Siedle.....	30
The Sportfishing Conservancy.....	31
Austin Cox.....	32
Mellie Bukovsky-Reyes.....	33

NATIONAL OCEAN COUNCIL

Lawrence Gifted Magnet	34
University of Maine, Orono	35
University of Maine, Orono	36
Lawrence Hall of Science, UC Berkeley	37
Attachment: Lawrence Hall of Science, UC Berkeley.....	38
Burrell School District.....	55
Bloomsburg University of Pennsylvania	56
Tom Matych	57
Oregon Coast Aquarium	58

NATIONAL OCEAN COUNCIL

Name: **Steve & Cynthia Bova**

Organization: Fishermen of Grays Harbor

Path:

Comment: To Whom it may concern and, Senators Murray and Cantwell and Representative Dicks, Please cease our governments eradication policy and let spartina grasses protect our west coast! Stop falling for the spin by special interests on spartina! We are two people against wasting our tax dollars to eradicate/control an erosion controlling and oxygen producing marsh grass on the Pacific coast. They claim this grass will cause an economic disaster on non-indiginous oyster farming. Please protect our shorline from erosion, NOT a non-native oyster!!! As long as birds, mammals and logs carry seeds to the waters edge it will never be eradicated only chemically controlled forever with never ending taxpayer dollars! Let the oyster growers hire workers to weed their beds only! Don't fall for their spin! Ask the ex-residents of wash-away beach if a mud flat is a better erosion barrier during winter storms than a healthy stabilizing invasive spartina marsh! Don't fall for their spin! Help protect our shore!

It really doesn't matter if we disagree on climate change or rising seas. We might also disagree on health care reform and other issues. But, perhaps we can all agree that spraying thousands if not millions of gallons of the chemicals carbaryl, glyphosate and imazapyr to benefit non-indigenous oysters by sacrificing native shrimp, crab, spartina, salmon and SHORELINE is just plain wrong and obscene. (And yes, according to WDFW some spartina species from South America could of naturally migrated north, thus becoming a native protector of our SHORELINE!) Don't fall for their spin! Do the research! 14 yrs of spraying spartina in Wa state evidently did not help wildlife and probably helped cause a record wrack!

So in closing we ask all citizens to call your Elected Leaders demanding an immediate moratorium. Tell them you want an unbiased independent investigation concerning Miranda Wecker's recent record spraying blitz and the ensuing record wrack two years ago in Wa state.

In Wa CALL; Representative Norm Dicks 800-947-6676; Senator Maria Cantwell 888-648-7328; Senator Patty Murray 866-481-9186; Governor Chris Gregoire and State Elected Officials 800-562-6000

Just one more thing to add, although we would love to save the world, my wife and I know that's not possible. But if we can slow the rapid spiral spin down by injecting some "common sense" like our shoreline is more important than an invasive non-indigenous oyster.

Protect our shore not special interests!

Thank You Steve and Cynthia Bova
229 toleak
Ocean Shores, WA 360-580-5534
98569

NATIONAL OCEAN COUNCIL

Name: **Matt Herman**

Organization:

Path:

Comment: i am extremely pleased that someone is actually taking a stand for the well-being of our citizens and our economy and our environment over the long term

Name: **William Cumming**

Organization: The Vacation Lane Group, Inc.

Path:

Comment: No federal bailouts for nonpublic beaches and in particular no federal disaster relief for restoration of nonpublic beaches. Also the NFIP [National Flood Insurance Program] should have its mapping and mitigation efforts [programs, functions, and activities] transferred from DHS to NOAA. Mitigation is stepchild in DHS but would not be in NOAA in particular with the CZM efforts [coastal zone management]! The Banking Committees in Congress favor this transfer.

Name: **Kirk Fay**

Organization: Tax paying US citizen

Path:

Comment: Why would you even open it up for comments. Lets be realistic. NOAA and this administration couldn't care one bit about our American culture. All that this plan will do is reduce Recreational fisherman and places for them to fish. Please wake up America our very own Gov't is destroying this country.

Name: **Pamela Stachler**

Organization: USDA Forest Service

Path:

Comment: I think this is a wonderful and much needed document. However, I am surprised that protecting one of our principal resources...GROUNDWATER is not addressed. The hydraulic connection between groundwater and surface water is not well understood. I know that the Forest Service has a "technical guide" for managing groundwater that is referencable, but the actual policy is on the desk of the Chief of the Forest Service. Just wanted to understand why groundwater is not mentioned when it is such a critical resource to manage and protect.

Name: **Tom Lucas**

Organization:

Path:

Comment: I can appreciate the efforts going on here and the need to collect more data to determine next steps on some of these issues. What I would like to see is an end to offshore drilling. As we've seen, the companies involved in this practice outsource portions of the work and there is a lack of accountability when that happens. The ocean and the lives it supports is too vital to take chances with. Please end the drilling going on now and prevent any new drilling from taking place. We will never move from fossil fuels unless we make it a priority to do so and not continue to drill and extract them from the earth.

Name: **gayle sweeney**

Organization:

Path:

Comment: I read part of the plan and am excited about the estuary council and website. I live at hampton beach NH in summer and the estuary there needs more protection. There is a state park nearby that needs further deveelopment and I believe an inter agency program would be wonderful. There are piping plovers and seals protected on the federal level. There are Monarch butterflies an endangered phenomenon sometimes in the fall by the dunes and estuary. The estuary is nestled between parker River and Great Bay and coul dpossibly be added to the Wildlife refuge Sysytem. Hampton beach NH is a major resort that has just undergone an upgrade. Inter agency support of the piping plover etc could possibly bring additional funding. The estuary is also part of NH Audubon's Important Bird Area program of global significance. Thank you Gayle

Name: **Jessica H**

Organization:

Path:

Comment: As a surfer who lives by the coast, I see the problem of marine debris first-hand. My local beaches are littered with plastics and I often encounter plastic waste in the water. On days after rainfall and storms, it is common knowledge that the water is too polluted to enter because of run-off from contaminated waterways. The plan needs to take a much more aggressive stance towards reducing marine pollution and debris. Also, to my knowledge there is very little research on the impacts of frequent swimming in this contaminated water on human health. This is an issue that affects swimmers, surfers, divers, and families who live by the coast and make frequent use of the beaches. The National Ocean Policy should encourage research to this end.

Name: **Justin Reynolds**

Organization: www.radiosilencefishing.com

Path:

Comment: As a tax paying citizen of the U.S. I support a RESPONSIBLE stewardship of all bodies of water on the ENTIRE PLANET! I would like to know if there will be any documentation made public of the information used to draft this Implementation Process-including sources. ie-Public, Private or Stakeholder groups? There should be sufficient SOLID scientific evidence used to develop this plan and made visible to the public. How can I trust that any science or information given by any party and used in this plan is in fact SCIENCE? Too many conflicts of interest arise when privatization makes it's way into "what's best for our oceans, lakes and our health!"

Will there be an official summary of the plan of execution that is readable and left for the people of this entire country to form opinions about? How will this inter-agency initiative communicate with the public?

Thanks for the opportunity to voice concerns.

When will these 12 listening sessions occur?

Name: **Peter Grenell**

Organization: San Mateo County Harbor District, California

Path:

Comment: Actively promote collaboration and cooperation regarding mapping, research, and information dissemination between agencies and research institutions with local port and harbor administrations to facilitate these activities; including provision of locations and facilities for carrying on these activities.

Name: **Peter Grenell**

Organization: San Mateo County Harbor District, California

Path:

Comment: Actively promote collaboration and cooperation regarding mapping, research, and information dissemination between agencies and research institutions with local port and harbor administrations to facilitate these activities; including provision of locations and facilities for carrying on these activities.

Name: **Mark Barone**

Organization: Prattsburgh Central School

Path:

Comment: To Whom This Would Concern,

It is a decisive time to move forth with the focus and the details of the draft National Ocean Policy Implementation Plan. In my generation, I have seen the contrasting effects of stewardship and neglect. As Americans we are responsible for our consumption of products through our purchase power. The release of chemicals through extraction and manufacturing, all too frequently results in a "chemical redistribution" with synergistic impacts on many of planet Earth's watersheds. In essence, the health of the ocean is a reflection of the health of our American society. Ultimately, this worthwhile investment into this National Ocean Policy Implementation Plan is an undeniable investment for future generations to come. In closing, the integration of ocean policy into the science content of our educational institutions is necessary.

Name: **Cave Man**

Organization: Consulting

Path:

Comment: I have an Urgent Global Initiative on liners for oil tankers tanks to PCAST!

Name: **Craig Lilyestrom**

Organization: Puerto Rico DNER

Path:

Comment: Page 43: "An estimated 27 percent of coral reefs have already been lost, and an estimated 60 percent are threatened by ocean warming and reef bleaching, as well as human impacts." Do we mean by this that ocean warming and reef bleaching are unrelated to human impacts? Maybe I'm oversensitive...

Page 49: "They provide important fish, areas of natural beauty, recreational opportunities, and effective shoreline protection. Under threat from multiple environmental stressors, coral reefs are deteriorating worldwide at an alarming rate." It would sound better to say "They provide important fish habitat, ..." and "Under threat from multiple environmental stressors and human activities..."

It was interesting to do a search in the document for "Puerto Rico", "Caribbean" and "USVI". None of these searches produced a single hit. However, Gulf of Mexico was on several pages, as was Louisiana, etc. How can this be a "National Plan" if the US Caribbean is not even considered? It would be a courtesy to appear on at least one page, and a recognition of a political, legal and ecological reality.

Name: **Bruce Wright**

Organization: Conservation Science Institute

Path:

Comment: The best thing we can do for our oceans is to control or reverse ocean chemistry changes by getting the acid out. The increase of CO₂ into the world's ocean from anthropogenic carbon emissions has resulted in a pH decline of about 0.1 units since the beginning of the Industrial Revolution. Ocean acidification results from the chemical interactions of CO₂, water and the carbonate system of the ocean and results in a decline in the concentration of the carbonate ion, essential for many phytoplankton and zooplankton. Alaska is expected to experience exacerbated effects of ocean acidification since cold northern upwelling waters of Alaska are already laden with CO₂. Ocean acidification could reduce CaCO₃ deposition rates of key calciferous plankton enough that we expect shifts in the food web. Increased ocean acidification could easily result in loss of ocean productivity which would have a direct negative effect on subsistence and commercial marine resources. Some species of shellfish (shrimp, clams, oysters, crab) are already having difficulties maintaining their shells in high acid oceans; if ocean acidity increase too much these species may perish.

As the oceans become more acidic they are less reliable as a sink for CO₂; they are becoming saturated with CO₂. The Southern Ocean has been absorbing less CO₂ from the atmosphere since 1981 even though CO₂ levels have increased 40% due to burning of fossil fuels. Oceans once absorbed half of all human carbon emissions, but the Southern Ocean is taking up less and less and is reaching its saturation point. This is evidence of a positive feedback that could rapidly accelerate the rate of climate change. Climate models predict that this kind of feedback will continue and intensify; as the oceans reach their saturation point more CO₂ will stay in our atmosphere.

The Solution: Remove CO₂ from the biosphere by deacidifying the oceans: We need to get the acid out of our oceans. Researchers have described a technology to reduce the accumulation of atmospheric carbon dioxide (CO₂) caused by human emissions. The process electrochemically removes hydrochloric acid from the ocean and then neutralizes the acid with a silicate reaction using volcanic rocks; this simulates and accelerates natural chemical weathering. The new technology de-acidifies the ocean's waters. As a result, the ocean's alkalinity would increase, enabling the uptake and storage of more atmospheric CO₂ in the form of bicarbonate. This process may be able to safely and permanently remove excess CO₂ in a matter of decades. This process could be run in remote locations and powered by stranded energy, such as geothermal in Alaska and especially near volcanoes. To deacidify the oceans would involve building dozens of facilities on coasts of volcanic. The Aleutian Islands are on the Ring of Fire, have many sites with abundant renewable energy (geothermal, wind, hydro and tidal) and the chemistry needed to process the acid in the ocean to an inert byproduct.

Name: **Brett Weinberg**

Organization: None

Path:

Comment: To whom it may concern,
As a child growing up in this country in NYC in the 1980's i was exposed to a horrible drug epidemic, gangs...everything that can lead to a child going down the wrong path. What saved me from this was my the trips I took to sheepshead bay, huntington etc.. to go fishing. I stayed away from the terrible things in my area because they would have taken me away from ocean.

During that time our oceans were under siege ... we were destroying our oceans and that was just being recognized. Since that time Fisherman have given up their livelihood and passions in the hope that things would improve and improve they have. The biomass of fish in this country has increased since I was a child to unprecedented levels as is the case with Striped Bass.

Despite the sacrifices and unthinkable improvements made the anti fishing setiment in this country propugated by terrorist like anti fishing groups have continued to minimize the success and continue to take away from fisherman. Just this year my current home state of Califonia closed fishing to as much of 50% of the fishable areas on the coast. These were all implemented using lies and horrible have read all the article about MPA's.

I spent an inordinate amount of time reading about them as I would obviously be for them if they actually were beneficial to fisherman. The concept as pitched to fisherman was that the biomass in these preserves would increase to a point where they would help populate other areas. While it may increase bio mass in that very area it does nothing to preserve overall stocks of fish. Fish that live on rocks aren't all of a sudden going to be to move and live on sand. But that misinformation is how it was pitched. This is no big deal to fisherman... in fact it's going to help them. Nothing could be further from the truth. Rather would it not have made sense to look at bag limits or reduction in size if there was some problem with our fish stocks...and please point out to me where it shows our coastal fish stocks are in dire need. To close the ocean FOREVER to human hunting gathering is scary scary precedent to set.

I liken it to the movement to make Bluefin Tuna illegal in the U.S. You realize that the stock of Bluefin tuna is managed internationally correct? You do realize the demise of this fish has been caused by foreign nations complete disregard for the quotas and size limits on these fish? You do realize that U.S. fisherman commercial and recreational alike have followed incredible stringent rules to help improve the stocks of these fish. You do realize that in closing bluefin tuna for sale in the U.S. our quota simple be sent to the foreign nations like Mexico that are destroying the populations? When will you stop hurting hard working U.S. citizens to help what you believe in?

These groups lie and say only 3.7% of the coast is closed? Do you realize that closing

Name: **John Koster**

Organization: citizen

Path:

Comment: **BOLSTERING THE U.S. FLAG**

The American merchant marine was once the world's largest, but our ocean going deep draft commercial fleet is now amongst the smallest. Truth be known, the U.S. was actually hugely culpable for the whole "flag of convenience" (http://en.wikipedia.org/wiki/Flag_of_convenience) situation that precipitated flight from the ship registries of the traditional maritime nations and eventually necessitated the wholesale worldwide shift in the 1990s to a costly port State control based enforcement posture (this was due largely to the flag administrations of certain, if not all, open registries failing to properly fulfill their regulatory obligations). Another workaround to try to crack down on rampant substandard shipping is the UN International Maritime Organization's Member State Audit Scheme, which will become mandatory in 2015.

Shortly after the opening of the U.S. controlled canal, Panama in 1917 became the world's first open ship registry. Significantly later, during the Truman administration, Edward Stettinius, U.S. Secretary of State, "together with colleagues in the U.S. government" "saw the need" for a private, commercial open ship registry. What they really saw was a slick way of sticking a knife in the back of the strong U.S. maritime unions (who didn't foresee the ultimate consequences), and a means of making a lot of money for themselves. So in 1949, immediately after his retirement from the federal government, The Liberian flag ship registry opened its doors in NYC with Stettinius as its helm (<http://www.register-iri.com/index.cfm?action=page&page=158>). This was the first true "flag of convenience".

I perceive this development as having been traitorous and entirely unethical. Former Secretary Stettinius and his cronies compromised our national security via the subsequent radical decline in the size of the U.S. merchant fleet (except for protected segments of the industry, e.g., the fleet in domestic service and cabotage/Jones Act trade), loss of shipbuilding capacity & capability and steep reductions in flag administration resources (i.e., the U.S. Coast Guard has since allowed 3rd parties, the Authorized Classification Societies, to take over much of its flag administration work and act on its behalf through the Alternate Compliance Program and as Recognized Organizations for Int'l Safety Management Code purposes - which the USCG is however still responsible for properly overseeing!), the seemingly ever expanding Maritime Security Program (accepting foreign built ships as equivalent to U.S. standards, thereby allowing reflagging directly to the U.S.), etc., etc. Stettinius and his ilk have been raking in the money ever since and additional open registries proliferated (including in such countries as The Republic of the Marshall Islands and Mongolia).

As well, most the "U.S. owned" companies (as they they are required to be in order to register ships with the U.S.) are no longer truly so (for example Maersk Line, Limited and its link back to the parent company in Denmark, and American President Lines nowadays with Singapore, etc.). Yet they enjoy preferential foreign aid and military cargoes, substantial subsidies and protection from the U.S. Navy.

Name: **Tom Wilson**

Organization: citizen

Path:

Comment: Thank you for the opportunity to comment. However, this looks like another, large, unmanageable Federal Agency that will have to be funded through new taxes. It looks like implementation will pre date current scientific data that would likely call for different implementation strategies. This looks like a job killer for those folks who make their living on the water or in water dependant vocations, without current and complete scientific information.

Implementation must be regional. Despite the interconnectivity of the ocean environment, rules and regulations for regional implementation will necessarily be different, if they are to be most effective.

A better program would be to develop the scientific data, and then implement only what the current collected data reveals is necessary.

Name: **Ron Rico**

Organization: FSFA & SAFMC

Path:

Comment: The real challenge as I see it, is to formulate a plan to modify the Magnuson Stevens Act of 2006 and instill some flexibility in managing fish stocks. As it stands now several species of ocean reef fish off the US East Coast are closed to harvest due to the rigid and inflexible rules in the Magnuson Stevens Act regarding fishery management!

Name: **Frederick LaCorte**

Organization: none individual

Path:

Comment: my Comment is in deep concern that we, or rather this administration is creating policy that eliminates input from Congress. Giving too much power to a single Government entity. I have seen under this administration for the first time in American history the implementation of a recreational fishing fee. Once again sidestepping the authority of Congress. Now another program with broad powers, is contradictory to what the American people want. There must be oversight.

Name: **Mary-Jean Stevenson**

Organization: NOAA

Path:

Comment: This definitely spells out how each part of our natural resources, and watersheds will be protected. The various stakeholders share their responsibilities with others and no one is left out.

Name: **nancy geller**

Organization: Bellingham, MA Public Schools

Path:

Comment: URI Bay Campus host a huge weekend workshop for public school teachers to educate them about their activities and share their appreciation for where we have directed our youth in the sciences, particularly in the marine genre. They also provide a wetlands graduate course on a local R.I. tidal river in conjunction with a local preservation group.

Name: **Sara Andrews**

Organization: Tyngsborough Middle School

Path:

Comment: In reference to: Complete a study of environmental knowledge of middle school students and use study results to refine educational programming. (NOAA; 2017)
What is the procedure for this? Funding will come from? And how much time will it take in the classroom?

Name: **cheryl terranova**

Organization: teacher who has attended your workshops

Path:

Comment: STEM, I was surprised that you didn't incorporate that into your delivery of education
(huge buzz word)

Name: **Christine Kirch**

Organization: West Warwick High School

Path:

Comment: "Execute formal and informal education strategies for the Chesapeake Bay region that build on Federal and non-Federal education resources. (NOAA, DOI; 201"

I teach Oceanology in Rhode Island where Narragansett Bay makes up a majority of the state. I am concerned that the focus is only on Chesapeake Bay. I think the focus should be more general citing all estuaries rather than just one.

Name: **Andy Dumaine**

Organization: shrinkingfootprint

Path:

Comment: The opportunity the plan seems to be missing is inspiring better ocean/lake stewardship through active public engagement and information.

The vast majority of threats to oceans and lakes can be traced back to citizens unknowingly making harmful choices.

It is cheaper and faster to correct unwanted behavior through information than trying to clean up the results.

While I applaud this effort, I'd like to see the ideas that didn't make it into this draft. Given the stakes, this plan plays it safe.

Name: **Mellie Bukovsky-Reyes**
Organization: USDA National Forest Service Volunteer Cape Perpetua/Hopeful Further Teacher At Sea &
Path:
Comment: Upon review of the 'Draft' and in reading the 'Statements' made, I would like to add that:

Although the statements below does address the "how?" NOC plans to "Actions 5 and 6 in the Inform Decisions and Improve Understanding section (pp. 23-25) focus on developing a skilled workforce and increasing ocean and coastal literacy, respectively."

It does not provide specifics. For example, what means would a Middle School in the community of Fresno, CA have for understanding on making "...inform[ed] decisions and improve understanding..." ocean and coastal literacy? Technology can only carry you so far. You can see the Ocean "on-line", but you can't feel the Ocean magnitude, unless you are there. Caring for something happens when it 'touches' you. Changing you perspective on how you view the ocean, our coasts and Great Lakes only happens when it have impacted you.

How will NOC do that for the children of our Nation? We have children who live along the Central Oregon Coast, who have never been to the Coast-line or to a our Coastal Parks. We have children who because they live here, that the Ocean is no big deal to them. They have no connection or understanding of its importance. That is why with I teach children, from Toddlers to High School age children, I teach with a "personal purpose", in order to make a connection and a memory.

Furthermore, I agree with the following comments raised.

"Several comments raised the importance of ocean education and literacy, including integrating ocean literacy into science education guidelines, and targeting K-12 or early childhood-adult age groups. What tools will the NOC provide the next generation of leaders in terms of education about the oceans and Great Lakes? Educating the public about the pressing issues facing our oceans is vital. Recognize the value of informal education programs in raising awareness, improving the public's abilities to assess risk and trade-offs, and to make informed and responsible decisions based. The NOC should increase collaboration with its aquarium and zoo partners.

This last part of this comments is just not enough.

Sincerely,
Mellie Bukovsky-Reyes
Volunteer Nature Educator/Integrated Science Teacher
Cape Perpetua Visitor Center
USDA National Forest Service
Siuslaw National Forest - Cape Perpetua
Yachats, OR

Name: **Thomas Siedle**

Organization:

Path:

Comment: Platitudes. Your entire "plan" is nothing but platitudes. Nice words which none could ever hope to effectively put into action.

Two questions go unanswered in this rambling, 98-page control-freak wish-list. The first is, "How?" How do you propose anyone may meet these sophomoric goals? The second question you fail to answer is, "Why do you think you have the power to do any of this?" There is an eleven page document you all should refer to -- The Constitution of the united states. This plan is null. The executive order providing for it is void. The international treaties calling for it are null and void as they were not ratified by the several states.

We free people do not exist for you to control.

Name: **Tom Raftican**

Organization: The Sportfishing Conservancy

Path:

Comment: Taking a comprehensive approach to the way in which we utilize, manage and conserve both our ocean resources and spacial constraints is essential given mounting challenges in a shrinking world. The draft implementation plan is a great starting point. I hope all note that the picture on page one is that of an individual fishing in the surf. Nicely done.
Tom

Name: **Austin Cox**

Organization:

Path:

Comment: It is important to the survival of our ocean life to manage it's resources responsibly the same way we manage our forest and it's animals. A lot goes unnoticed with the ocean because we can't see the damage from were we stand on shore and the sealife has no voice.

Name: **Mellie Bukovsky-Reyes**

Organization:

Path: http://edit.whitehouse.gov/sites/default/files/webform/film_flyer_john.pdf

Comment: National Ocean Policy Implementation Plan (Draft) sounds wonderful. However, it is 'moments' such as the one shared in this fly which have me asking..."How will what one agency does be shared with another agency? How will agencies know what the other one is doing? How will the efforts attempted or made by agencies be shared with one another? And, how will this information be shared with the public, so that they may take part in cause?"

Name: **Mia Kang**

Organization: Lawrence Gifted Magnet

Path:

Comment: Ocean education has to start from the time that students enter school. The problem with this is that there are so many standards that teachers must cover that this valuable topic is very likely to get pushed aside. What is needed is an entire restructuring of our science standards from kindergarten to grade 12 to include ocean and climate literacy. These new standards have to be realistic and developmentally appropriate for our students. Middle and high schools should receive federal economic incentives for offering electives that are targeted towards ocean and climate literacy. Young people are very concerned about these issues, but rarely get to explore these in the traditional curriculum.

Name: **Kim Meuse**

Organization: University of Maine Orono

Path:

Comment: There are tidal power turbine prototypes being tested in Maine's Cobscook Bay by ORPC, Ocean Renewable Power Company. What safeguards will be put in place to insure the integrity of the species living in this bay? There appears to be no organization or policy written to enforce monitoring to determine the impact these turbines will have on the marine life in this important area.

Name: **Kim Meuse**

Organization: University of Maine, Orono

Path:

Comment: I am concerned with the lack of monitoring of the ORPC tidal power generators that are being put in place in Maine's Cobscook Bay. There does not appear to be any organization in place or any policy being followed to protect marine life or ecosystems.

Name: **Craig Strang**

Organization: Lawrence Hall of Science, UC Berkeley

Path: <http://edit.whitehouse.gov/sites/default/files/webform/commentstosciframework.doc>

Comment: Action 6 on p. 24: Include ocean concepts in the Next Generation Science Standards. This is absolutely essential to ensure that every American has opportunities to improve their understanding of the vital role that the ocean plays in all our lives. Implementation of a sound and sustainable ocean policy depends on improving public understanding of the ocean. I encourage further action items related to reaching out to Achieve and the 26 Lead States to ensure that a coherent representation of the Ocean Literacy Framework (not just "ocean concepts") is included in the NGSS. There are several principals of Ocean Literacy that should be included, but also many examples of general science concepts that should be worded in such a way as to not exclude the ocean aspect of that concept (e.g., referring to organisms as plants and animals precludes students from exploring algae and photosynthetic microorganisms; referring to primary productivity as photosynthesis precludes students from being introduced to chemosynthesis; when referring to biological diversity, it should be noted that most of the diversity of life on Earth occurs in the ocean).

July 22, 2010 Gatlinburg, Tennessee

To: The National Research Council Committee on K-12 Science Education
Fr: The Ocean Literacy Community
Re: Comments on the Draft NRC Framework for K-12 Science Education

We, the scientists and educators on the Board of Directors of the National Marine Educators Association (NMEA), and on the NMEA Ocean Literacy Committee, are pleased to offer our comments on the recently distributed DRAFT "Framework for Science Education." NMEA, the National Oceanic and Atmospheric Administration, the NSF Centers for Ocean Sciences Education Excellence, the College of Exploration, National Geographic Society and the Lawrence Hall of Science at UC Berkeley have worked diligently in a nationwide, grassroots, collaborative effort for several years to develop and publish *The Ocean Literacy Framework*, comprised of two key documents, "Ocean Literacy: The Essential Principles of Ocean Sciences K-12," and "The Ocean Literacy Scope & Sequence for Grades K-12." These documents were developed slowly, iteratively and thoughtfully with significant and substantive participation by hundreds of scientists, science educators and classroom teachers around the country. Over 150 participants were involved in working groups on the actual development of the documents while another 200 were involved in the iterative review of the documents. Thus, they represent a solid, uncontroversial, community consensus regarding the few essential ideas in ocean sciences that we think all students should understand by the end of Grade 12. To learn more about the process we used to develop the Ocean Literacy Framework, and the people who were involved, please see, "NMEA Special Report #3 on Ocean Literacy, Featuring the Ocean Literacy Scope and Sequence for Grades K-12," March 2010. It can also be found at <http://www.oceanliteracy.net>. Our comments in this letter are submitted on behalf of the entire Ocean Literacy community.

We recognize that this draft Framework represents a major evolutionary step forward in science education and that it applies many of the principles and research findings about the learning and teaching of science that have arisen over the last decade. We especially applaud your effort to overcome the mile wide, inch deep syndrome by including a limited number of core ideas, and so, want to be clear that we are not simply recommending the addition of our "favorite science topics" (Chapter 1, p. 14) to an already overstuffed curriculum. Our intent is to adjust the core ideas and their components that you have identified so that they reflect the true complexity of the natural world, including the tremendous influence of the ocean on living things, Earth systems and Earth processes. We also recognize and applaud your commitment to the notion of learning as an ongoing developmental progression. We hope that "The Ocean Literacy Scope and Sequence for Grades K-12" will support this research-based vision, especially as you complete the "Prototype Learning Progressions," and as Achieve

begins to develop grade-by-grade Common Core Science Standards. While we do not yet have the evidence to claim that the Scope and Sequence is a learning progression, it represents a carefully thought out, viable and plausible hypothesis of how learning might progress from Kindergarten through Grade 12 related to each of the seven Essential Principles of Ocean Literacy. We also support the balancing and intertwining of science knowledge with the practices of science, and we recognize that unique practices are often required in exploring remote and extreme environments in the ocean. Allowing time for students to engage in investigations and argumentation will be a significant advancement in science teaching and learning.

We applaud the inclusion of water (and so, ocean sciences) in the Earth and Space Science section, particularly under the framing question, “Why do we call Earth the Water Planet?” We have made several recommendations to further strengthen this section. We are concerned, however, that the essential role of the ocean in influencing and shaping all systems, living and non-living, on Earth has, as in previous standards and benchmarks, been largely overlooked in other sections of the Draft Framework. There are aspects of life in the ocean and of ocean processes that are quite unique and unlike their counterparts on land and in the atmosphere. There appears to be a default assumption that science exists exclusively in a terrestrial environment. In some cases, using ocean examples can simply provide a more full understanding of a complex concept; in other cases, the omission of ocean examples can lead to misconceptions or even factual incorrectness, e.g., referring to “organisms” as “plants, animals and microorganisms” might lead learners to ignore the important ecological role of macro-algae or to think that algae are plants, or worse yet, to never know that algae exist. Similarly, referring to only photosynthesis when discussing primary productivity denies learners the opportunity to understand the critical global ecological importance of chemosynthesis in deep sea hydro-thermal vents. While considerable attention is finally and rightfully being placed nationwide on understanding the causes and consequences of climate change, we have observed that many climate change education efforts have ignored the critical importance of the influence of the ocean on the climate, and vice-versa, the influence of the changing climate on the ocean. We hope that this Framework for Science Education will reflect the most current research by climate and ocean scientists, showing the inextricable interconnections between the two. Our ability as a race to respond to climate change depends on our accurate and full understanding of this complex relationship.

We provide specific, section-by-section comments below, but first some general summary thoughts and recommendations:

- 1) Ocean sciences are not limited to Earth and Space Science. We are not suggesting that the Science Framework should be packed with ocean sciences or that ocean sciences should claim a separate strand of the

curriculum. Rather, in a few key places, simple editing and the addition of a word or two can give a much richer and more accurate description of a concept, and can avoid the inescapable default of having learners think only from their human-centric, terrestrial perspective.

- 2) We hope that one or more of the many ocean scientists who have been so deeply involved in thinking about K-12 education over the last decade can play a role on each of your Framework design teams, and on the Achieve team that will write the standards themselves. In this time of melting ice caps, increasing ocean temperatures, crashing fisheries, ocean acidification, and dramatic increase in the national effort toward ocean exploration and research, it is critical to have ocean sciences fully represented by people with special expertise in this area. Ocean exploration and research are advancing at an unprecedented rate, and have been acknowledged as a matter of great national importance, akin to the space program of the 1960s. Ocean observing, remote sensing, advanced robotics and computer modeling are daily revising what we thought we knew and influencing our lives and futures. The discipline must be represented by those conversant with these advances.

Congratulations on your excellent work so far!

Specific Comments:

Core Disciplinary Ideas

Life Sciences

LS 1 Organisms have structures and functions that facilitate...

p. 3-2 Line 13-17 should be:

In most cases, the energy needed is ultimately derived from the sun (photosynthesis), though in some ecologically important cases, energy is derived from reactions involving inorganic chemicals in the absence of sunlight (chemosynthesis). Plants, algae and other energy fixing organisms, such as microbes, use sunlight and chemical compounds from the air, water and soil to facilitate a chemical process that stores energy. These organisms form matter and maintain activities that sustain the rest of the food web. Most of the photosynthesis and chemosynthesis on Earth take place in the ocean. Most of the oxygen in the atmosphere originally came from the activities of photosynthetic organisms in the ocean.

LS 3 Organisms and populations of organisms obtain necessary resources...

p. 3-4, Lines 7-12 should be:

Materials cycle within ecosystems through the predator/prey interactions of different organisms in complex food webs. Some organisms are primary

producers, some are consumers, some are predators and some are decomposers. Ecosystems are continuously changing. Changes in environmental factors can result in changes in populations and species, in the maintenance or extinction of species in the ecosystem, or in migration of species into or out of the region. Ecosystems with a wide variety of species tend to be more resilient to change than those with few species. Most of the living space on Earth, and so most of Earth's ecosystems are found in the ocean. As a result, there is a tremendous diversity of organisms in the ocean, and many major groups (Phyla and Classes) of organisms occur only in the ocean.

p. 3-5, Line 1 should be: How can we explain many different kinds of plants, algae, animals and microorganisms?

p. 3-6 Line 6: add: "...surroundings (from species to landscapes and seascapes)..."

LS3.A. Should be: How do organisms depend on the other members of their food web, and on the physical (abiotic) environment?

LS3.B. Should be: How do organisms in an ecosystem get the materials and energy they need? Do organisms accomplish this differently in the ocean compared to how they do it on land?

LS3.C. Should be: What happens to organisms and ecosystems when there are changes in the environment? What environments and ecosystems are most susceptible to change?

LS 4, p. 3-5 Line 1 Should be: How can we explain the many different kinds of plants, algae, animals, and microorganisms?

Lines 10-11 are incomplete. Should be: Organic evolution, and the net result of speciation minus extinction has led to the planet's biodiversity and ecosystem functioning. Sustaining biodiversity is essential for the maintenance and enhancement of the human population's quality of life. Most of Earth's different ecosystems and most of Earth's biodiversity reside in the ocean.

LS 4, p. 3-5 Line 13 is incomplete. Should be: Fossil record provides evidence of different life forms at different periods of geologic history. The earliest evidence of life is found in the ocean.

Earth and Space Science

ESS 2 Earth is a complex and dynamic 4.6-billion year-old system of rock, water, air and life.

p. 3-8 Lines 9-11 are incomplete. Should be: These plates are the top parts of giant convection cells that bring hot materials from the deep mantle up to the

surface to cool off at seafloor spreading centers, then fall back into subduction zones.

p. 3-8 Line 15 is incomplete. Should be: Earth's rocks and other materials provide a record of its 4.6 billion-year-old history, which can be deciphered from fossil-bearing layers and radioactive and other dating methods. The ocean and life in the ocean continually shape the features of Earth. Most rock formations now exposed on land were formed in the ocean.

ESS 3: Line 22 is incomplete. Should be: "Earth's surface continually changes from the movement and cycling of water and rock driven by sunlight and gravity.

This sentence should read, "...by gravity and energy from the sun."

p. 3-9 Line 1: The question, "Why do we call Earth the Water Planet?" Should be re-phrased as, "Why do we call Earth the Ocean Planet?" We now know that water does exist on other planets and on our moon. No other planet that we know of, however, has an ocean. It is this large reservoir of water that defines our planet and allows for life to exist.

p. 3-9 Line 4: Add after "...surface systems": Nearly all water, which covers over 70% of Earth's surface, resides in one interconnected reservoir called the ocean. This large reservoir makes Earth unique among all known planets.

Physical Sciences

PS 3 p. 3-12 and 3-13 Lines 19 - 4

"In everyday language we speak of producing, using or wasting energy. This is because energy that is in concentrated form is useful for running machines, generating electricity for heat and light etc., while dissipated energy in the environment is not readily recaptured. Most processes tend to dissipate energy. Food, fuel and electric power are concentrated energy resources that can be moved from place to place to provide energy where needed. Food and fuel contain carbohydrates. These substances react with oxygen in burning or digestive processes to release thermal energy and carbon dioxide and other by-products. This process is a key energy provider for most animal life and for many forms of electrical generation, transportation and industrial machines."

Add light to list of energy resources in line 22, page 3-12 because light is a vital concentrated energy resource.

Fuel is an imprecise term and equates fuel to carbohydrates inappropriately. For example, animal fats are used as fuels, but are not carbohydrates – they are lipids.

Replace "animal" with "living organisms" in line 3 of page 3 – 13. The implication is that other organisms, including plants, do not respire.

We recommend the inclusion of the existence of life in extreme environments and the energy processes found there as it is a fundamental concept of both energy transfer and the basis for theories of the beginnings of life.

Engineering and Technology

ET 1 Page 3-15, line 7:

A tool is a physical or cyber object that improves people’s abilities to design, build and utilize products, processes and systems; to cut, shape, or put together materials, to move things from one place to another, to grow and process food, and to explore the planet’s land, water, and space.

Et 4 Page 3-18, line 7 and 8: insert:

...how long people live. Exploration technology has dramatically affected our understanding of space and will continue to affect our understanding of our planet, land and ocean. Understanding our planet and all of its currently unknown resources will also influence the future of mankind.

Prototype Learning Progressions:

Life Sciences

LS1.A. p. 7-9

Grades 3-5

The internal and external structures of plants, animals and other organisms serve...

Grades 6-8

...and chloroplasts in plants **and algae** use light...

Grades 9-12

remove “molecular concentration” and replaces with: ...”(e.g., **light**, temperature, **nutrients**, **salinity**, and pH).”

LS1.B. p. 7-10

Grades K-2

Most animals have offspring, usually with two parents involved. (NOTE to authors: Not “all,” e.g., colonial anemones clone...)

Grades 3-5

Plants, animals, and other organisms have unique and diverse life cycles that include being born (sprouting in plants)... The details of the life cycle vary greatly for different groups of organisms.

Grades 6-8

All organisms reproduce sexually or asexually and transfer their genetic information to their offspring.

Grades 9-12

This question seems unnecessarily exclusive of other reproductive processes. Perhaps it could be, How is genetic information transmitted from one generation to the next.

LS1.C. p. 7-11

Sub-question text

...In most cases, the energy needed is ultimately derived from the sun...

Grades K-2

...Organisms meet their needs for survival in different ways. Organisms need to take in water and, animals need to take in food. In addition, plants and plant-like organisms need light and minerals.

Grades 6-8

...For an organism to use food energy and building materials...

In many groups of animals, oxygen is needed for the combustion of food, and may be absorbed from the environment by an organism's lungs, gills, skin, or outer membrane. Carbon dioxide must also be eliminated.

In living things, molecules from food react with oxygen to provide energy...

Plants, algae and many micro-organisms use the energy from light to make...

Last sentence should read: Plants need minerals and other nutrients from the soil to make complex molecules from the sugar they make. Algae need minerals and nutrients dissolved in ocean water for the same purpose.

Grades 9-12

Paragraph 4 should begin: Plants, algae and photosynthetic micro-organisms take energy from light to form sugar molecule. ...Through processes like photosynthesis and chemosynthesis, plants algae and bacteria take energy from one source (either sunlight or chemical reactions) to form sugar...

LS2A. p. 7-12

Grades K-2

...(e.g., numbers of legs, eye color, fur type, fin shape, gender)

6-8

Humans and all other organisms have genes...

LS3A. p. 7-15

Grade K-2

Animals depend on plants, algae and other animals for food...

Plants and algae depend on...

Grades 6-8

...with similar requirements for food, water, oxygen, or other resources... (ED – Middle-schoolers are old enough to refer to oxygen instead of “air.” It is also more inclusive of marine and aquatic organisms.)

LS3B. p. 7-16

Grades 3-5

...From food, people and many other organisms obtain fuel...

Organisms are related in food webs, with plants and other plant-like organisms, animals that eat...

Grades 6-8

...In organisms, molecules from food...

Grades 9-12

...therefore, a continuous source of external energy is needed – this is provided by the sun, or geothermal sources.

...Most of the energy stored in that food ultimately comes from the sun. (ED – You would think there should always be this kind of disclaimer at least, if we don’t always want to add reference to chemosynthetic processes.)

LS3.C. p. 7-17

Grades 3-5

What happens to living things when environments change?

When environments change, some organisms survive and reproduce; others move to new locations; some die.

LS4.A. p. 7-18

Grades K-2

ED – This is an example of a spot where “plants and animals” is fine.

Grades 3-5

The first two sentences (Scientists have identified...fungi. And There are also...a microscope.) don’t make sense in this context about fossils. At any rate, algae should probably be included.

Grades 6-8

...Earth and changes in organisms whose fossil remains...Recently deposited sedimentary rock layers are most likely to contain fossils resembling existing species of plants and animals. The earliest fossil evidence of life is found in the ocean.

LS4.B. p. 7-19

Grades 9-12

ED – Should there be a mention of asexual reproduction in here? I’m not sure how to appropriately incorporate it.

LS4.C. p. 7-20

Grades K-2

The world has many environments on land, in the ocean and in the atmosphere. Distinct environments support different types of living things.

Grades 3-5

For any particular environment, some kinds of organisms survive well...

LS4.D. p. 7-21

Grades K-2

There are many different kinds of living things in any region.

Different kinds of living things live in different place on land, in the ocean and in the sky.

ED – Can live with the last “plants and animals” reference.

Grades 3-5

The first two sentences are identical to those on the previous page. Appears that they belong here and not on previous page?

...have identified many plants, animals, **algae** and fungi...

Organisms and populations of organisms live in a variety of habitats. Most of the living space on Earth, and so, most of the habitats on Earth, are in the ocean.

Grades 9-12

ED – Great last paragraph. It establishes a “value” for biodiversity that humans can relate to.

Earth and Space Science

ESS1.C. p. 7-25

Grades K-2

How does the sun affect the Earth? “Light from the sun helps keep Earth’s surface warm, give us light, and allows plants and algae to grow.

Grades 6-8

What causes tides?

On Earth, daily tides on the ocean and other large bodies of water are caused by gravitational attractions of the Sun and the Moon as the Earth rotates.

ESS2.A. p. 7-26

Grades K-2

How are the continents and the ocean arranged on the surface of the Earth? (NOTE: "ocean" should always be in the singular form to indicate that there is one interconnected world ocean.)

The world map shows large areas of dry land that we call continents, while other parts of our planet are covered with water in the ocean (singular). The continents and ocean basins have different shapes and sizes.

Grade 3-5

What do the shapes and arrangements of the continents and ocean basins suggest about their histories?

Grades 6-8

What happens when tectonic plates pull apart?

Where plates pull apart, the ground cracks open making earthquakes and hot molten rock rises to fill the crack as it cools. All of the world's ocean floors were made by this process, called sea floor- spreading.

What happens when tectonic plates collide?

As an oceanic plate runs into a continental plate, the oceanic plate is forced under the continental plate, down into the Earth's mantle.

-.....

When two continents collide into each other, they fold up their fronts to form mountain ranges. The world's tallest mountains are found along plate boundaries where continental plates are colliding.

ESS2.A. p. 7-27

Grades 9-12

Why does Earth have a magnetic field and how does it help us?

Rock records of ancient magnetic field directions help scientists determine the history of continental drift and sea floor spreading.

ESS2.B. p.7-28

Grades K-2

Where does the soil come from?

Sand and soil comes from the breaking down of rock. Sand and soil contain not only rock, but also decayed organisms. It also provides a habitat for many living organisms.

Grades 3 – 5

Why do we say, “There is only one ocean?”

Ocean water fills up all the lowest parts of Earth's surface, the bowl-shaped ocean basins, and covers the edges of the continents, as well (continental shelves). Each ocean basin on Earth has a different name (Pacific, Atlantic, Arctic, Indian) but all the basins are interconnected, so there is really one global ocean. Water circulates throughout the global ocean.

Grades 6 – 8

Where is the Earth's water found?

Nearly all of Earth's available water is in the ocean. Most of the freshwater is found underground as groundwater or as glaciers, rivers, streams, lakes, and wetlands. Only a tiny fraction of water is found in the atmosphere.

Grades 9 – 12

Why is water important?

Water is essential for life on Earth. Earth is unique in our Solar System because

water has coexisted at Earth's surface in three phases (solid, liquid, and gas) for

billions of years. The presence and abundance of water on Earth has allowed for the development and continuous evolution of life. The first life is thought to have started in the ocean.

What is in our atmosphere?

...Combining observations from satellites and weather balloons with what is known about the physical and chemical behavior of gases, we can model the atmosphere as a series of layers; different layers have different compositions and temperatures.

The lower part of the atmosphere interacts with the ocean and they control Earth's weather.

ESS2.C. p. 7-29

K-2

Were fossils once living?

Rocks are not living. However, fossils are made from organisms that were once living, usually long before there were people.

Grades 3-5

How old is Earth?

Earth is 4.6 billion years old and life began almost 4 billion years ago. The earliest evidence of life is found in the ocean. Thus both Earth and life have developed over a HUGE expanse of time..... (“billions of years” is a conceptually challenging time scale to introduce at this grade band.)

How far back does the Earth's rock record go?
Delete this: What are the ages of the rocks in your area?

ESS3.A. p. 7-30

Grades K – 2

Where is water found on Earth?

Water is found in lots of places: in the ocean, in lakes and rivers, underground, and in the air.

Grades 3 – 5

How are the rain, rivers, and ocean connected?

When energy from the Sun warms liquid water in the ocean, lakes, rivers and streams, some of it turns into a gas (water vapor) in the air. When that air is cooled, some of the water vapor condenses back into a liquid (fog and cloud, or rain droplets) or a solid (snow flakes). Rain and snow fall back to the surface and the water runs through watersheds back to the ocean.

Grades 6-8

Why does ice float?

Water in solid form is less dense than when it is in liquid form, the reverse of most materials. This property has many important consequences for Earth systems (e.g. surface freezing of lakes, glacial movement, formation of sea ice)

Where is water found and what drives its movement across Earth's surface?

The movements of water and its changes in form are primarily driven by gravity and energy from the sun. Energy from the sun and gravity cause ocean circulation on a global scale. Energy from the sun causes evaporation off the ocean's surface and drives atmospheric circulation that transports the water vapor around the globe.

When water-vapor laden air cools, water condenses forming clouds and fog, and eventually falls back to the surface by the force of gravity, where it either returns to the atmosphere through evaporation or transpiration or, if it fell on the land, flows downward to the ocean via a watershed in streams, glaciers, or through the ground. This repeating chain of events is known as the Water Cycle.

Grades 9 – 12

How does the ocean system operate?

..., The ocean's salinity, temperature, O₂, pH, light, nutrients, pressure, and substrate vary with depth and location. These physical factors greatly influence the wide variety of ocean ecosystems and the adjacent land ecosystems.

ESS3.B. p. 7-31

GRADES 6-8

How do geologic processes change rocks from one form to another?

Rocks can form from the cooling of molten rock, the accumulation and consolidation of sediments, and the alteration of older rocks by heat, pressure, and fluids. These three processes form igneous, sedimentary, and metamorphic rocks, both on land and in the ocean.

ESS3.C. p. 7-32

Grades 3 – 5

How do scientists predict the weather?

Scientists use measurements of the atmosphere collected at land stations, ocean buoys, and by satellites to predict the weather.

GRADES 6-8

What factors control Earth's weather and climate?

The ocean exerts a major control on weather and climate by dominating Earth's energy, carbon and water systems. It absorbs and stores large amounts of solar energy, releasing it very slowly so that it moderates and stabilizes the global climate, especially the coastal climates. Thermal energy is redistributed globally through ocean currents (e.g. the Gulf Stream).

...Temperature differences, Earth's rotation, and the configuration of continents and ocean basins establish the large-scale atmospheric circulation.

The amount and type of precipitation varies hugely from place to place on the land. Most water vapor evaporates from the ocean so precipitation is much greater where the prevailing winds come from the ocean; continental interiors, far from the ocean, tend to be dry. When winds encounter mountains, the air rises, cools, and forms clouds, so that the windward sides of mountains are extra wet and the leeward sides dry (the Rain Shadow Effect).

p. 7-33

GRADES 9-12

How does climate change over space and time in response to both natural and human causes? (please don't use "man-made")

...Changes to the climate over many millions of years are dominated by the changing configuration of continents and ocean basins.

... When ocean currents change their flow patterns, such as during El Niño (note to put tilde sign over the n in El Niño) events, some regions become warmer or wetter while others become colder or drier.

...solar heat that can enter the system. The ocean absorbs roughly half of all carbon dioxide added to the atmosphere, mitigating the effects of the increased amounts of carbon released into the atmosphere by humans.

How do global climate models predict future climate change?

... The outcomes of Global Climate Models strongly depend upon the amounts of human-generated greenhouse gases added to the atmosphere and absorbed by the ocean each year and hence the outcomes depend on human choices and behavior.

ESS3.D. p.7-34

Grades K – 2

Why do living things live where they do?

Plants, animals, and other living things depend upon the resources and conditions of their habitats to survive

GRADES 3-5

How are living things interconnected with their environments?

GRADES 6-8

How does life affect Earth's geology?

...Plants, algae, and other photosynthetic micro-organisms produced most of the oxygen in the atmosphere through photosynthesis, allowing for the existence of animals, and providing the substance of fossil fuels and many sedimentary rocks. Most of the oxygen in the atmosphere originally came from the activities of photosynthetic organisms in the ocean.

How does Earth's geology affect life?

Almost all food-derived energy comes originally from sunlight, but there are environments such as mid-ocean ridges and other volcanic regions where the energy source comes from chemicals within the Earth

Grades 9 – 12

How does life affect Earth's climate?

The abundance of carbon in the atmosphere is reduced through seafloor accumulation of marine sediments and accumulation of plant, algae, and micro-organism biomass and is increased through processes like deforestation and the burning of fossil fuels.

ESS 4.B. p. 7-36

Grades 6-8

paragraph 3. Delete: "They are likely to remain the dominant energy source for years to come." Replace with "Fossil fuels are becoming increasingly difficult to find and extract."

Physical Sciences

PS1.A.

Page 7-40 Grades 3 – 5

The avoidance of the term mass is inconsistent with the inclusion of the concept of gravity in the same grade span in ESS. We recommend the inclusion of the differentiation between weight and mass in this grade span if deemed developmentally appropriate.

PS2.C.

Page 7-45 Grades 3 – 5

Fourth sentence “Changing temperature...”. We recommend that it say “Changing temperature can cause some materials to change form.” to avoid the specific case of water implied by the existing sentence, or “Changing temperature can cause some materials to change form (e.g., water will evaporate or condense).”

Page 7-46, Grades 9 – 12

Fourth sentence, “Matter is stable...” is awkwardly worded, and confused. We recommend it be re-written which may require multiple sentences to achieve clarity.

PS3.A.

Page 7 – 47 Grades 3 – 5

Fifth sentence, “For identical objects...” We recommend that this entire paragraph be re-written as it is confusing, and implies an inaccurate meaning for the word “faster”.

Page 7-47, Grades 6 – 8

Final sentence, “The term chemical energy...” We recommend replacing the word “produced” with “stored and/or released.” to avoid the implication that energy only exists as a result of the burning of food or fuel.

PS3.B.

Page 7-50, Grades 9-12

Anaerobic energy processes are excluded, and should be included at this level.

Engineering and Technology

ET 1.A.

p. 7-55:

Sub-question: “The designed world consists of...to improve quality of life, and to better understand our environment and its many natural systems.”

Grades K-2:

...products like phones, TVs, computers, machines, cars, ships, etc., to help us do things ...

Grade 3 - 5:

...new technologies often lead to societal changes (e.g., automobiles instead of horses for transportation; and later alternative energy sources to supplement or replace fossil fuels).

Grade 6 - 8:

...many more foods available in grocery stores, and improvements in exploration technologies promote advances in medicine.

Grades 9 - 12:

Processes vary greatly.....energy, medical technologies, and exploration of our planet.

....global trade and commerce networks and exploration of our planet.

ET1.B.

Pg. 7-56

Grade 3-5:

What is technology? Any method, tool, or organizational system to fulfill human need and to better understand our natural world is a technology (e.g. wind turbines, computers, hydroelectric plants, cell phones, sonar, desalination systems, and hybrid cars.).

Grade 6 - 8:

As new technologies become available (e.g. microwaves, cell phones, cars, laptop computers, satellites and other technologies for observing the Earth and ocean) they initiate change in society, and cultivate interest for further advancements.

Grade 9 - 12:

How does technology advance?such as engineering, science, business, marketing, economics, law, and environmental studies.

ET1.C.

Page 7-57:

Grade 3-5:

What are other uses of tools? Tools can be use...to communicate, and to explore space and our vastly unexplored ocean.

ET2.B

Page 7 - 59:

Grades 9 - 12:

Often it helps to have multiple experts each with different disciplinary training and perspective working as a team, e.g. submersible engineers, marine biologists, and physical oceanographers to study ocean habitats, or space shuttle crew made up of microgravity experts as well as pilots and engineers.

ET3.C

Pg. 7-63:

Grades 9-12:

Fix sentence typos to say:

Most modern control systems include both digital and mechanical sub-components. Like any technological system usually they are designed as a subsystem during the design of the system that they regulate.

ET4.A:

pg.7-64

Grades K-2:

add “the medicines you take” to the first paragraph

Grades 3-5:

Why do technologies change?

Because people’s needs and wants change, new technologies are developed and old ones are improved to meet those changes. New technologies often change aspects of society and create new needs and wants, which need to be balanced with stewardship of the environment. (This point needs to be made throughout, and certainly before high school)

Grades 6 – 8:

Why do technologies vary from one locale to another?

Cultural beliefs and practices and social norms affect people’s decisions about technology. Consequently, technologies vary from country to country and even by region within countries (e.g. a simple efficient stove may work well for one culture’s cooking practice but not for another).

ET4.B

Pg. 7-65

Grades 6 – 8

This is a full duplication of ET4.A Grades 6-8. Was something else intended for this section.

ET4.C

Pg. 7-66

Grades K-2:

Typo: How can some technologies cause harm.

Grades 3 – 5:

How can people determine if a technology they are using may be harmful to others?

People are responsible for thinking about what may happen when they use technologies that may harm other humans and/or the environment. That means learning as much as possible about the effects of different technologies, and being open to information from others.

Grades 9 – 12:

What are the responsibilities of people who create technologies; and those who use them?

Engineers, scientists, and others who create the designed world are responsible for preventing harm to the environment and to the people who use the products, processes, and systems they design. Users of new technologies can make conscious decisions to reduce negative impacts on individuals, society or the environment.

Name: **Robert Campbell**

Organization: Burrell School District

Path:

Comment: Please consider me an advocate for the policies trying to be implemented at the federal level supporting the improvement in managing our world's waters in a sound environmentally friendly manner.

I preach the gospel to keeping our water ways clean and teaching how we all can contribute to a healthier ocean and fresh water environment

Name: **Todd Hoover**

Organization: Bloomsburg University of Pennsylvania

Path:

Comment: The items listed on pages 24-25 of the draft seem appropriate. The only caution I have is "Complete a study of environmental knowledge of middle school students and use study results to refine educational programming. (NOAA; 2017)" School-aged children are already tested extensively, and adding another test will increase this burden. I am not sure how this assessment will be implemented, but it should not take the form of yet another test. The results of any such test should be used for curricular suggestions only, and not as an assessment of the school or teacher.

Name: **Tom Matych**

Organization: Adopt a Walleye

Path:

Comment: I fully support ecosystem based management, we adapt to what's best for the ecosystem, not mould it to our wants. This plan sounds good, however with regards to Lake Michigan, The Salmon/Alewife program, is directly opposed to any EBM. We cannot have both. Native fish populations have to be restricted, to protect both the alewives and salmon from predation. This has made Lake Michigan a safe haven for all invasive species. There are many studies about Biotic-resistance, we have native predators for all invasive species including juvenile Asian carp. The key to Biotic-resistance is sufficient or healthy native fish/predator populations. Maintaining Lake Michigan as an alewife rearing pond cannot be sustained, it's about to collapse now. I'm aware it's not politically correct to talk bad about the salmon, but nature doesn't care about politics, and the results are there for all to see. The salmon/big lake fishery is the minority group, yet the entire natural ecosystem has to be sacrificed for it to exist. A switch to steelhead non-native but not dependant on alewives to survive, retains their niche big lake fishery, and would allow us to restore our native fish populations, and restore the biotic resistance to invasive species. Real biological diversity cannot include the salmon, we cannot continue to protect invasive species and expect the lakes to survive.

Name: **Kerry Morgan**

Organization: Oregon Coast Aquarium

Path:

Comment: Under inform decisions and improve understanding: Action 5 - under milestones, some emphasis needs to be on getting career information to highschools and colleges (ex. academic advisors) rather than just on internships, scholarships, etc. Very few students will learn of these career options and the opportunities for the internships without informed academic advisors.

the milestone "support periodic competitions and other activities for middle and high school...." is so vague that it does not paint a clear picture of what the milestone for success would be.

Action 6 - all of the outcomes and milestones focus on content; there is nothing that discusses actually getting people engaged with the oceans/getting them outside. There is a lot of momentum behind no child left inside and getting kids into nature. Research shows the importance of place based education for career choices, making informed decisions, etc.

the last milestone about coordinated networks of innovative exhibits is so awkwardly worded that it isnt clear what the intent is

why do we have to do one more study on middle school environmental knowledge? There are already studies out there that show us students know little about the oceans, and that environmental education/placed based education can be successful. It seems that a large scale meta-analysis would be the first step and might have the answers that you need. Waiting four more years for another study to then refine educational programing and then wait for the wheels of change to move, is just taking too long.

Ocean observing data can be really great if done well but so much right now is not - its just a bunch of stuff dumped on students and teachers. This is not what gets people excited about the oceans (or any environment) - its being engaged in a meaningful way. This one needs lots of care to develop.

Why is the Chesapeake Bay area called out specifically? And how will what is learned there be disseminated?

Milestones/verbiage missing - field trips/place based education (green ribbon schools initiative is not enough); funding opportunities for organizations to develop projects/partnerships (informal or formal). Without things like the NOAA EE grants and BWET grants, there will be little progress made in these areas.