

## PEPH webinar focuses on the health of our oceans

By Audrey Pinto

The NIEHS Partnerships for Environmental Public Health (PEPH) program hosted a webinar July 10 highlighting some of the cutting-edge marine research being conducted at two Centers for Oceans and Human Health (COHH), funded by NIEHS and the National Science Foundation (NSF). NIEHS Program Administrator [Fred Tyson, Ph.D.](#), led the webinar.

Scientists leading the research teams at these centers -- [John Stegeman, Ph.D.](#), (<http://www.whoi.edu/page.do?pid=82520&tid=4462&id=jstegeman>) of the Woods Hole Oceanographic Institution and [Bradley Moore, Ph.D.](#), ([http://moorelab.ucsd.edu/personal\\_Brad.html](http://moorelab.ucsd.edu/personal_Brad.html)) of the Scripps Institution of Oceanography - presented their objectives, reported preliminary data, and proposed ways to meet future challenges.

### Linked Video

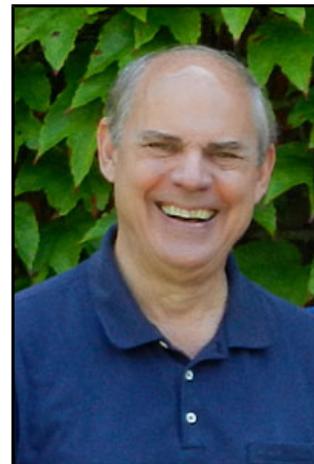
[Watch a video about the Scripps Center for Oceans and Human Health \(04:05\).](#)

Both presentations captured the immediacy of issues involving oceans and human health, and pointed to effects of global climate change that will almost certainly increase the impact of the aquatic environment on humans. The more scientists learn about the oceans, Stegeman and Moore agreed, the more they realize how much still remains to be learned about its mysteries, including naturally occurring neurotoxins and hazardous compounds that may be created in the oceans themselves.

In the spirit of the NIEHS mission to take a multidisciplinary approach in public health research, the centers are engaging diverse teams of basic, translational, and applied scientists, ranging from chemists, biologists, and environmental health scientists, to physicians, pharmacists, and public health professionals. Using this meta-disciplinary approach, both teams are attempting to answer some perplexing questions regarding harmful algal blooms (HABs) and halogenated organic compounds (HOCs), to understand the interconnections between human health and marine environments.

### Understanding the dynamics of toxic *Alexandrium*

Stegeman began his presentation by observing, "Human health and well-being are fundamentally and inextricably linked to the oceans." To identify potential threats to marine and human health, his NSF and [NIEHS-funded](#) ([http://projectreporter.nih.gov/project\\_info\\_description.cfm?aid=8388954&icde=17043417&ddparam=&ddvalue=&ddsub=&cr=3&csb=default&cs=ASC](http://projectreporter.nih.gov/project_info_description.cfm?aid=8388954&icde=17043417&ddparam=&ddvalue=&ddsub=&cr=3&csb=default&cs=ASC)) team is studying [population dynamics of HABs](#), ([http://projectreporter.nih.gov/project\\_info\\_description.cfm?aid=8388954&icde=17043417&ddparam=&ddvalue=&ddsub=&cr=3&csb=default&cs=ASC](http://projectreporter.nih.gov/project_info_description.cfm?aid=8388954&icde=17043417&ddparam=&ddvalue=&ddsub=&cr=3&csb=default&cs=ASC)) by modeling the biological and physical processes of two key species - *Alexandrium fundyense*, which produces [saxitoxins](#) ([http://www.nwfsc.noaa.gov/hab/habs\\_toxins/marine\\_biotoxins/psp/index.html](http://www.nwfsc.noaa.gov/hab/habs_toxins/marine_biotoxins/psp/index.html)) and *Pseudo-nitzschia spp.*, which produce [domoic acid](#). ([http://www.nwfsc.noaa.gov/hab/habs\\_toxins/marine\\_biotoxins/da/](http://www.nwfsc.noaa.gov/hab/habs_toxins/marine_biotoxins/da/)) These species are responsible for different types of shellfish poisoning, and may have the potential to significantly impact human health worldwide.



*Both Stegeman, above, and Moore concluded that collaborative research and effective communication strategies are the fundamental components needed to address the complexities of marine environments and global climate change, and to determine the long-term health consequences for humans and marine organisms. (Photo courtesy of Common Good Productions)*



*Along with his grant to research HOCs, Moore is also lead researcher for the Center for Marine Biotechnology and Biomedicine at Scripps, which has the meta-disciplinary advantage of being located adjacent to a university with a medical school and school of pharmacy. (Photo courtesy of Bradley Moore)*

As Stegeman explained, "Factors affecting the distribution, survival, proliferation, and toxicity of HAB species are still poorly understood." To better understand these factors, his research team is applying state-of-the-art remote sensor technology -- imaging flow cytometry and an Environmental Sample Processor that detects DNA sequences -- in two different locations in New England - a marsh environment and the Gulf of Maine. The center studies are yielding new information about HAB processes and the mechanisms of toxin action that are accompanied by, and compared with, important toxicants introduced by humans that are common in marine environments.

### **Evidence of naturally occurring PBDEs with a marine connection**

With [NIEHS support](#),

([http://projectreporter.nih.gov/project\\_info\\_description.cfm?aid=8412956&icde=17043448&ddparam=&ddvalue=&ddsub=&cr=4&csb=default&cs=ASC](http://projectreporter.nih.gov/project_info_description.cfm?aid=8412956&icde=17043448&ddparam=&ddvalue=&ddsub=&cr=4&csb=default&cs=ASC))

Moore's research team at Scripps is advancing the knowledge of the biology and chemistry of marine contaminants of emerging concern. They are [tracking naturally occurring HOCs](#), ([http://projectreporter.nih.gov/project\\_info\\_description.cfm?aid=8412956&icde=17043448&ddparam=&ddvalue=&ddsub=&cr=4&csb=default&cs=ASC](http://projectreporter.nih.gov/project_info_description.cfm?aid=8412956&icde=17043448&ddparam=&ddvalue=&ddsub=&cr=4&csb=default&cs=ASC)) which, until recently, were presumed to be manufactured by humans in the form of persistent organic pollutants (POPs) used in electronics and flame retardants - specifically polybrominated diphenyl ethers (PBDEs) and polybrominated biphenyl ethers.

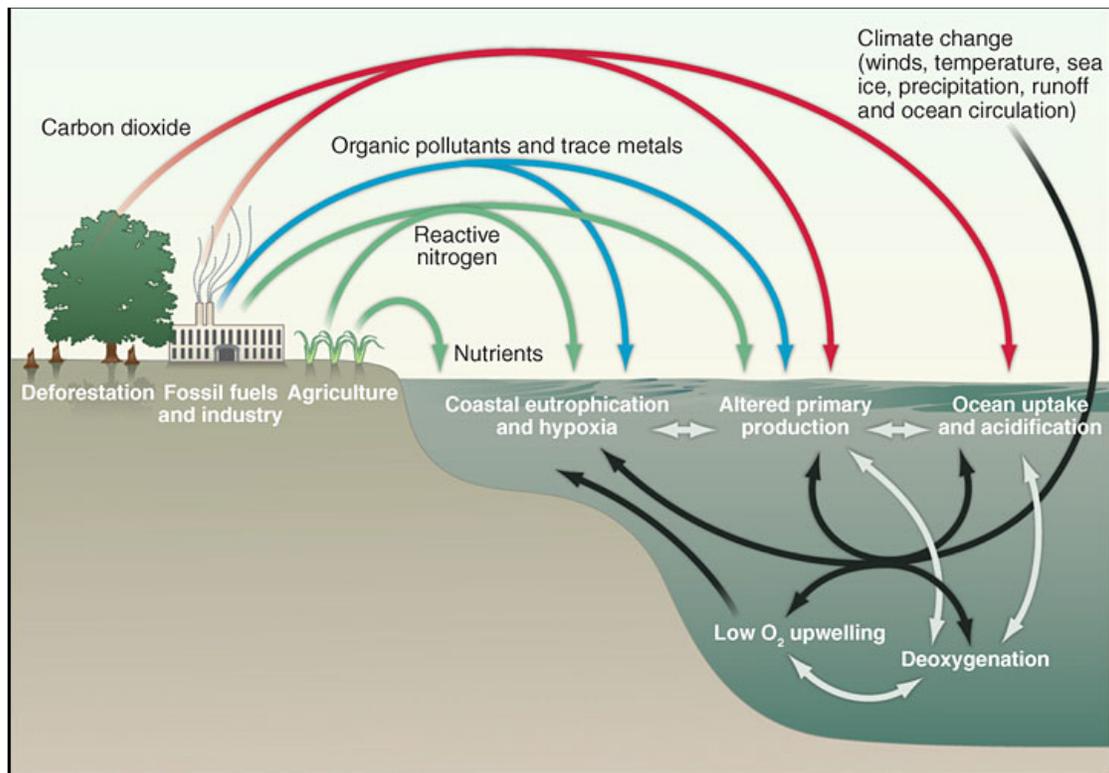
Now, evidence suggests that there may be natural versions of HOCs that are structurally related to man-made PBDEs, but form a new class of compounds. These new chemicals have been identified in marine mammals, such as seals and dolphins, and fish, such as tuna and swordfish - food sources consumed by humans.

Although the toxic effects of man-made PBDEs are well known and linked to different human diseases, the origin and transmission of natural POPs in marine environments are poorly understood. Moore went on to point out that no natural sources, or sinks, for POPs have yet been identified, but, because of global climate change, they may be increasing, and may become more important in terms of the suite of POPs people ingest through seafood in their diets.

(Audrey Pinto, Ph.D., is technical editor for the journal Environmental Health Perspectives.)



*Along with his lead in the COHH program, Tyson also serves as the NIEHS program administrator for the [NIH Roadmap Epigenomics Program](#) (<http://www.roadmapepigenomics.org/>) and the Toxicant Exposures and Responses by Genomic and Epigenomic Regulators of Transcription (TaRGET) Program. (Photo courtesy of Steve McCaw)*



*Stegeman used this schematic to illustrate the human impacts on ocean biogeochemistry, either directly via fluxes of material into the ocean (colored arrows), or indirectly via climate change and altered ocean circulation (black arrows). The gray arrows denote the interconnections among ocean biogeochemical dynamics. Note that many ocean processes are affected by multiple stressors, and the synergistic effect of human perturbations is a key area for further research. (Originally published in [Doney SC](#).*

*(<http://www.ncbi.nlm.nih.gov/pubmed/?term=Doney+%5Bau%5D+Science+%5Bjour%5D+2010>)*

*2010. The growing human footprint on coastal and open-ocean biogeochemistry. [Science](#) 328(5985):1512-1516.*

*This image is used for educational purposes only. Courtesy of Scott Doney and Science)*

The Environmental Factor is produced monthly by the [National Institute of Environmental Health Sciences \(NIEHS\)](#)

(<http://www.niehs.nih.gov/>)

, Office of Communications and Public Liaison. The content is not copyrighted, and it can be reprinted without permission. If you use parts of Environmental Factor in your publication, we ask that you provide us with a copy for our records. We welcome your [comments and suggestions](#). ([bruskec@niehs.nih.gov](mailto:bruskec@niehs.nih.gov))

This page URL: NIEHS website: <http://www.niehs.nih.gov/>

Email the Web Manager at [webmanager@niehs.nih.gov](mailto:webmanager@niehs.nih.gov)