CALIFORNIA OCEAN SCIENCE TRUST

Ocean Protection Council Science Advisory Team Working Group:

Harmful Algal Blooms and California Fisheries

California Ocean Science Trust, July 2016

Overview

In 2015 and 2016, elevated levels of domoic acid were observed in major commercial and recreational shellfisheries in California, including Dungeness crab, rock crab, and razor clams, leading to health advisories and fishery closures during the 2015/16 season. Given California's changing ocean conditions and increasing threats to coastal economies, the State is interested in exploring opportunities to bolster its existing seafood biotoxin sampling and harmful algal bloom (HAB) monitoring programs, as well as advance our understanding and ability to predict HAB events and mitigate fishery impacts.

In response to these events, the California Ocean Protection Council (OPC)[1] and the Interagency Marine Harmful Algal Bloom Task Force (Task Force)[2] have asked California Ocean Science Trust to both lead the development of an FAQ document as well as convene an OPC Science Advisory Team (SAT) working group to:

- Explore the science supporting California's existing HAB and biotoxin monitoring in the marine environment along the coast of California; and
- Provide scientific guidance on how to add capacity and support state needs, as described below.

Goals

Ocean Science Trust recognizes the importance of this information to many groups - consumers, members of the fishing industry, NGOs, and California State Agencies and Legislature. In the short term, Ocean Science Trust and the SAT working group will provide clarity on some of the science being utilized in the State's current HAB monitoring and biotoxin sampling protocols. Additionally, over the course of the next year, the SAT working group will provide longer-term recommendations that can help State agencies and the Legislature prioritize future actions, and inform future work focused on better understanding and predicting fishery and human health impacts related to HABs.

Products

Timeline: June - September 2016

Two products will be made publicly available upon completion:

1. **A "Frequently Asked Questions" (FAQ) document.** Because of our unique role as a boundary organization, Ocean Science Trust was asked to develop an FAQ document based on questions submitted by fishing leadership, agencies, managers/regulators, and others. Many of these questions originated during public comment, email, or phone calls from constituents to agency or legislative staff. The FAQ will clearly explain

[1] Funding for this project was provided by the California Ocean Protection Council

[2] The Interagency HAB Task Force membership includes representatives from California Department of Public Health, California Fish and Game Commission, California Department of Fish and Wildlife, Ocean Protection Council, and the Office of Environmental Health Hazard Assessment.

The Interagency HAB Task Force membership includes representatives from California Department of Public Health, California Fish and Game Commission, California Department of Fish and Wildlife, Ocean Protection Council, and the Office of Environmental Health Hazard Assessment.

CALIFORNIA OCEAN SCIENCE TRUST

California's current HAB monitoring and biotoxin sampling efforts, how it compares to other States and countries, and where possible, the scientific rationale behind the protocols. This document will synthesize information on four topical areas:

- HABs and seafood toxin monitoring efforts in California
- Domoic acid and California fisheries
- Human health and seafood safety concerns
- California's fishery and seafood toxin management

Ocean Science Trust will prepare responses to the questions based on existing scientific literature and consultation with representatives from the Task Force, SAT working group members, and additional scientific experts (university researchers, and state and federal agency scientists). This FAQ will prioritize addressing questions that do not require additional research.

Target Release date: *August 5, 2016*

2. **Scientific Guidance Document**. The SAT working group, Ocean Science Trust, will develop scientific guidance and options for understanding HAB events in California, their impact on fisheries, and adding capacity to the State's existing HAB monitoring and sampling efforts to better respond to HAB events in the future. This document will address the following topics:

   - ***State of the Science on West Coast HABs****.* This group will lay out the latest scientific thinking about HAB events along our coastline and begin to identify additional capacity within the scientific community.
   - ***Guidance on bolstering existing HAB and biotoxin monitoring in California****.* The working group will explore options to bolster California's existing monitoring and sampling protocol, including identifying additional capacity, tools, data sets and online networks that the State may draw from. The group will also discuss emerging toxins and HAB species, as well as other impacted species or habitats that the State should be thinking about going forward.
   - ***Looking forward: Addressing information needs and gaps between government and science.*** The group will begin exploring how we can better link independent science and the needs of California managers. How can the State utilize predictive modeling efforts and move away from being reactionary? What are existing knowledge gaps and science needs? How do current modeling efforts consider additional stressors of interest to the region, such as ocean acidification and hypoxia?

   Target Release date: September 30, 2016. The working group product will be finalized after the August 10, 2016 Joint Committee on Fisheries and Aquaculture hearing to allow for any appropriate changes or feedback from this engagement to be incorporated.

CALIFORNIA OCEAN SCIENCE TRUST

SAT Working Group: Structure of Membership

This SAT working group was established by soliciting nominations from OPC-SAT members and the Interagency HAB Task Force. Working group members have experience in the following fields: ecology and physiology of phytoplankton (with a focus on HABs), biological oceanography, biotoxins, and modeling. Membership also includes an agency scientist with intimate knowledge of the State's current HAB sampling and biotoxin testing protocols. Collaborators are individuals who informed product development or provided additional input or review. Working group membership and short bios are provided below.

Dr. Dave Caron

Professor of Biological Sciences, University of Southern California

Dr. Caron's research focuses on marine and freshwater microbial ecology, with emphasis on the trophic relationships between protists (microalgae and protozoa) and other planktonic and benthic microorganisms. Recent research programs have focused on the distribution, feeding ecology, respiration and nutrient regeneration of bacterivorous and herbivorous protozoa, the ecology of harmful algae, the physiology of Antarctic protists, feeding and growth of phagotrophic (mixotrophic) microalgae, and the development of molecular biological approaches for studying the ecology of free-living microorganisms.

Dr. WIlliam Cochlan

Senior Research Scientist, Romberg Tiburon Center for Environmental Studies, San Francisco State University

Dr. Cochlan currently heads a biological oceanography/marine microbial ecology research laboratory at the Romberg Tiburon Center, San Francisco State University. His research is centered on the utilization and dynamics of macro- and micro-nutrients, and their effects on marine phytoplankton and heterotrophic bacteria in coastal and oceanic environments. His ocean acidification and HAB research projects are laboratory and field-based efforts.

Dr. Raphe Kudela

Professor, Ocean Sciences Department, University of California, Santa Cruz

Dr. Kudela is a phytoplankton ecologist who seeks to understand the fundamental question: what controls phytoplankton growth and distribution in the ocean. More specifically, how do the multiple interactions of light, macro- and micronutrients and phytoplankton physiology determine the rates, processes, and patterns we observe in the marine environment? His approach is to combine a suite of 3 tools: (1) remotely sensed data from moorings and satellites in combination with biological models; (2) novel bio-optical methods assaying phytoplankton physiology; and (3) the refinement of stable and radio-tracer isotopes.

Dr. Gregg Langlois

Dr. Langlois is a Senior Environmental Scientist at the California Department of Public Health and a member of the Interagency Marine HAB Task Force.

CALIFORNIA OCEAN SCIENCE TRUST

Collaborators

Collaborators are providing their expertise to help answer FAQ responses and the Scientific Guidance document, where appropriate.

Robert Dickey, Director, University of Texas Marine Science Institute Chairman, Department of Marine Science, University of Texas at Austin; formerly Director, FDA Gulf Coast Seafood Laboratory and Division of Seafood Science and Technology

Kathi Lefebvre, Supvy Research Biologist, NOAA Fisheries Northwest Fisheries Science Center

Vera Trainer, Program Manager, Harmful Algal Blooms Program, NOAA Fisheries Northwest Fisheries Science Center

Stacey Degrasse, Science Advisor, Division of Seafood Safety, Office of Food Safety, Center for Food Safety and Applied Nutrition, U.S. Food and Drug Administration

Opportunities for Engagement

The Task Force, SAT working group, and Ocean Science Trust are interested in gaining insights and guidance from the fishing industries affected by HABs. To date, the Ocean Science Trust has received initial research questions from the Dungeness Crab Task Force Executive Committee, the office of Senator McGuire, the Task Force, Commercial Fishermen of Santa Barbara, and other members of fishing industries. These questions will inform the short term products (i.e., FAQ and SAT working group product). Questions submitted will be considered for both short-term and long-term products, based on the feasibility to answer and the expertise of the SAT working group. Any questions not addressed in the short-term will be logged for consideration after July when the State considers next steps for management, and identifies additional scientific guidance needed.

Recognizing the importance of this topic, while being mindful of a relatively short timeframe to develop the short term informational products, additional opportunities to engage with Ocean Science Trust, the SAT working group, and/or key agency representatives:

Working group information sharing and discussion opportunities:

- **Public conference call - Wednesday, July 27, 2016, 10:00 AM - 11:00 AM (PST)**
  Call-in Number: (218) 339-7800 | Access Code: 792 7150
  Join a public conference call hosted by Ocean Science Trust, moderated by Strategic Earth, featuring members from the HAB Task Force and SAT working group. During this call, participants will share information about the scientific process underway in California to better understand and address the domoic acid and HAB situation during the 2015-2016 commercial fishing season and gain an understanding of how California fishing communities would like to engaged in this process/conversation.
- **Public Webinar - Date TBD**
  Attend a webinar where in the Ocean Science Trust will share FAQ responses, present draft SAT working group findings, and be available to answer questions.
- **In-person Public Roundtable - Date TBD**
  Attend a roundtable discussion in Sacramento (date/time TBD) to be held in advance of the Joint Committee on Fisheries and Aquaculture hearing on August 10 (see timeline below). This will offer another opportunity for Ocean Science Trust and working group members to present on the draft findings and answer questions.
- Join the Ocean Science Trust HABs listserv to receive updates about the FAQ and scientific guidance document.

Contact Information

Questions about the FAQ and OPC-SAT working group products can be sent to:

Errin Ramanujam
Associate Scientist, Ocean Science Trust
errin.ramanujam@calost.org

Questions about the Interagency Marine HAB Task Force, or other questions outside the scope of the FAQ or scientific guidance document, can be sent to:

Jennifer Phillips
Program Manager, Ocean Protection Council
jennifer.phillips@resources.ca.gov

About the Interagency HAB Task Force

The Interagency HAB Task Force (Task Force) was established by the Ocean Protection Council in early 2016. Task Force members include Sonke Mastrup (Department of Fish and Wildlife), Susan Ashcraft (Fish and Game Commission), Pat Kennelly (Department of Public Health), Gregg Langlois (Department of Public Health), Susan Klasing (Office of Environmental Health Hazard Assessment), Valerie Termini (Fish and Game Commission), and Jenn Phillips (Ocean Protection Council)

The Task Force provided much of the framework and questions for the working group to address with the guidance document and the FAQ document. The Task Force will review the scientific guidance document and FAQ document, and both of these products will provide the basis for creating a process to address the long-term questions of the Task Force. Specifically, during the winter of 2016-17 the Task Force will help guide the working group in developing a longer term management document about what information is needed and what investments are needed to help to better predict and plan for future events.

In addition to informing the work and next steps of the working group, the Task Force will work together to review and provide feedback on standard operating procedures (SOP) that will be utilized by the agencies responsible for oversight of public health and the fisheries.

About California Ocean Science Trust

California Ocean Science Trust is a boundary organization bringing together government, academics, and communities using science as a gathering point. Though we are not a state agency, our relationship to California is formalized by California Ocean Resources Stewardship Act (CORSA), passed in 2000. That statute directs how our board is populated, including State agency representation and nominations submitted from both the University of California and California State University. We also submit annual reports to the State Legislature. This unique arrangement gives California an independent partner who can take the long view.

Working closely with ocean and coastal agencies, we support California's goal of maintaining a healthy, resilient, and productive ocean for the benefit of current and future generations. On behalf of our partner, the California Ocean

Protection Council, we convene and manage their Science Advisory Team. The Executive Director of Ocean Science Trust serves as the Science Advisor to the Ocean Protection Council and co-chairs the Science Advisory Team. Many other state and federal agencies work with us on the ocean issues of importance to California.

About the OPC Science Advisory Team

Assembly Bill 1056, signed by the Governor in September 2007, requires that the OPC establish a "science advisory team of distinguished scientists to assist it in meeting the purposes of the [California Ocean Protection Act]." In accordance with these mandates, the first OPC-SAT was officially adopted by the OPC in February 2008. The OPC-SAT is coordinated by the California Ocean Science Trust and co-chaired by Ocean Science Trust's Executive Director, who was designated as the OPC Science Advisor in February 2007.

Timeline

	June	July	August	September
OPC-SAT Working Group convened	X			
PRODUCT AVAILABLE **Frequently Asked Questions**			August 5, 2016	
EVENT **Public conference call**		10:00am - 11:00 am July 27, 2016 Call-in: (218) 339-7800 Access Code: 792 7150		
EVENT **Public roundtable discussion/Public webinar**			TBD	
EVENT **Joint Committee on Fisheries and Aquaculture hearing**			1:00 PM-4:00 PM August 10, 2016 Capitol Bldg., Room 3191 Sacramento, CA	
PRODUCT AVAILABLE **OPC-SAT Working Group report**				September 30, 2016