

The West Coast Ocean Acidification and Hypoxia Science Panel: An Investment in a Healthy Ocean for California

Workshop Key Messages

Hosted by the Ocean Protection Council and the California Ocean Science Trust

Wednesday, July 29, 2015, 10:00 to 11:30 AM
California Environmental Protection Agency, Klamath Training Room
1001 I Street, Sacramento, CA 95812

[Agenda](#) (PDF)

[Link to Workshop Audio and Video Archive](#) (WMV file, 305 MB)

Speakers:

- **Catherine Kuhlman**, Deputy Secretary for Ocean and Coastal Policy, California Natural Resources Agency, and Executive Director, California Ocean Protection Council
- **Skyli McAfee**, Director for North American Oceans and Coasts, The Nature Conservancy, and West Coast Ocean Acidification and Hypoxia Science Panel Convener
- **John Largier**, Professor, University of California Davis, and West Coast Ocean Acidification and Hypoxia Science Panel Member

This workshop was moderated by Liz Whiteman, Interim Executive Director, California Ocean Science Trust, Science Advisor to the Ocean Protection Council, and West Coast Ocean Acidification and Hypoxia Science Panelist.

Overview

Ocean acidification and hypoxia (OAH), often coupled due to biological and oceanographic processes, have the potential for profound impacts to marine and coastal environments. West Coast governments, tribes, and citizens are expressing concerns about the threats to marine resources and the livelihoods that depend on them. A compelling catalyst for meeting this challenge is the [West Coast Ocean Acidification and Hypoxia Science Panel](#) (Panel), an interdisciplinary collaboration of 20 esteemed scientists from California, Oregon, Washington, and British Columbia, convened by the Ocean Science Trust at the request of the Ocean Protection Council. This workshop was an opportunity to publicly highlight the Panel's emerging messages, and discuss how their findings are shaping ocean and coastal management and policy in California and beyond.

Opening Remarks



The Honorable John Laird
Secretary, California Natural Resources Agency
Chair, California Ocean Protection Council

Addressing the challenges posed by ocean acidification and hypoxia is about taking risks and providing leadership. Each time there is an event like this, I gain more information. The position I am in is one to not only help communities understand the problems we're facing, but also to help the State prioritize our limited resources. Ocean acidification and the related issue of hypoxia are two of the biggest ocean issues we are facing. Climate change challenges us to take



risks, be bold, and to think about environmental issues more creatively. To that end, California convened the West Coast Ocean Acidification and Hypoxia Science Panel. Through the Panel, we put science first, and built a collaboration across west coast state and provincial governments to understand the challenges we are facing, and what we as a region must do. Now, other states are looking to us as a model.

Through the Ocean Protection Council and the Ocean Science Trust, we have the structure in place to bring the best available science to bear on all the ocean and coastal issues we face.

With phenomena like ocean acidification and hypoxia, decision-makers are challenged with a lot of uncertainty and rapidly evolving scientific information. What is crucial is that in California we have a starting point. Through the Ocean Protection Council and the work of the Ocean Science Trust, we have the structure in place to engage the scientific community and solve problems.

Through the Panel, we are building momentum at the state, regional, and federal levels to prepare for the climate of the future.

We have made ocean acidification and hypoxia coast-wide priorities, allowing us to bring new audiences together around the science and co-produce real solutions. That is critical to building political momentum, and now we are gaining traction at the federal level. Ocean acidification and hypoxia occur against a backdrop of other changing conditions, which brings a lot of different agencies into the conversation. Our challenge now is that much of our current decision-making infrastructure is based on our present climate, and we're not equipped yet for the climate of the future. We must face this reality and apply a climate change lens through everything we do.

Panel Presentations



Skyli McAfee

OAH Panel Convener

Director for North American Coasts and Oceans, The Nature Conservancy

The purpose of convening the Panel was to take a sober look at ocean acidification and hypoxia.

The alarm bell on ocean acidification on the West Coast was initially rung by the shellfish industry, creating concern among decision-makers and drawing media attention. In that resulting political momentum, California recognized an important opportunity to take a step back and understand ocean acidification and the often linked issue of hypoxia. That is why the Ocean Protection Council asked for the Panel - to frame in a more comprehensive way the challenges the State is facing from ocean acidification and hypoxia.

By grounding the Panel's work in decision-makers' needs, Ocean Science Trust put in place a "science to decision-making" framework.

In building the Panel, Ocean Science Trust interviewed decision-makers at the state, regional, and federal levels to understand their science needs. The information collected in these interviews was used to scope a range of panel products (see Box 1), both scientific and visionary. Taken together, these products will provide insight into the multiple stressor nature of ocean acidification and hypoxia, speak to management and policy opportunities to build resilience, and lay out future research and monitoring to track the impacts of changing ocean chemistry in service of decision-making across jurisdictions.

Ocean acidification and hypoxia are multiple stressor problems that threaten species, ecosystems, industries, and communities along the West Coast.

Through the Panel, we are able to take a West Coast-wide view, leverage each others' resources, assets, and knowledge, and as a result, develop more coordinated and informed responses. A key message of the Panel is that ocean acidification and hypoxia are multiple stressor problems. They are not single states - rather they are processes of changing ocean chemistry occurring within a warming environment, and depending on the fluctuations of various

corresponding chemical parameters, will impact species, ecosystems, industries, and communities along the West Coast in different ways.

The Panel emphasizes the importance of building resilience into ecosystems so that they are better able to withstand the changes ahead.

A key message of the Panel is to support resilience, which means building changing ocean chemistry considerations into our existing management and policy frameworks. If you are a water quality manager, you are an OAH manager. If you are a fishery manager, you are an OAH manager. We must explore the variety of tools and processes available that can help us reduce other stressors, and brace for the change that is coming. The scientific community must help decision-makers understand how, where, and when such actions can help, and opportunities for adaptive capacity in species.



John Largier
OAH Panelist
Professor, Bodega Marine Lab,
UC Davis

The Panel represents scientists working across disciplines in new ways.

Ocean acidification and hypoxia are not just isolated problems for chemists, biologists, and physicists. The ocean is a complex biogeochemical environment; changing ocean chemistry requires working together across disciplines to advance our understanding and develop strategic responses.

The west coast region may be particularly vulnerable to impacts from acidification and hypoxia.

The U.S. west coast is a key upwelling region and has an extensive coastline with diverse inland waterways that contribute added variability in carbonate chemistry and oxygen levels. The interplay of both anthropogenic and natural processes makes this region particularly vulnerable to the impacts of changing ocean chemistry.

Box 1: Panel Products

Now Available

- [*Multiple stressor considerations: ocean acidification in a deoxygenating ocean and warming climate*](#) – July 2015
- [*Ocean acidification science needs for natural resource managers of the North American west coast*](#) – June 2015
- [*Envisioning a future science landscape*](#) – February 2015
- [*Today's need for a coast-wide approach*](#) – October 2014

Forthcoming

- *Executive summary for decision-makers* – expected November
- *What do exchanges in the carbonate system, oxygen availability, and temperature portend for coastal ecosystems? A physiological perspective* – Somero et al.; in review
- *Monitoring framework: Tracking the impacts of changing ocean chemistry to inform decisions* – Translational product; expected September
- *Oceanographic drivers of changing ocean chemistry* – expected September
- *Managing ecosystem effects of ocean acidification and hypoxia: Perspectives from an early-impact large marine ecosystem* – expected September
- *Defining resilience* – expected September
- *Scientific approaches to making a 303(d) assessment for near coastal acidification* – expected September
- *Modeling tools: summary of needs to enhance understanding of ocean acidification and hypoxia in coastal oceans* – expected October
- *Exploring research priorities for changing ocean chemistry* – expected October

Panel products are available at
www.westcoastOAH.org



Ocean acidification and hypoxia occur against a backdrop of changes in other ocean conditions that cannot be ignored as decision-makers develop responses.

Acidification and hypoxia are part of a system of [multiple, interacting stressors](#) facing marine ecosystems. Effectively mitigating and adapting to changes ahead requires coordinated action by natural resource, water and air managers and policy-makers.

The primary driver of acidification is global carbon dioxide emissions, but there are also local contributors that may exacerbate the issue.

The Panel's [latest publication](#) identifies management actions that can be taken at local scales as well as information needs that can support decision-making, including:

- Monitoring is key to understanding how the systems are changing. We need to tease apart slow, persistent long-term trends from “natural” fluctuations.
- Parsing out the drivers will help determine whether the observed changes are human-induced. This highlights the need for modeling. If you can model the system, you can look at cause and effect and identify which components can be controlled.
- Identifying spatial and temporal variability will help managers understand ecosystems and species that are likely to be most vulnerable. This information can assist decision-makers in prioritizing these areas for management and policy action.



Cat Kuhlman

*Deputy Director for Ocean and Coastal Policy
Executive Director, California Ocean Protection Council*

California is ready to take ownership of what we are learning from the Panel and turn it into action. Key messages based on the Panel's work are informing management and policy responses going forward. The Panel has done a great service for California, Oregon, Washington, and British Columbia and now, collectively, resource managers and policy makers have the ability to put the science into action. Because of this, I have adapted the key messages from the Panel to help policymakers comprehend what has been bubbling up from the past couple years of interdisciplinary scientific inquiry:

1. Ocean acidification is a regional intensification related to globally elevated atmospheric CO₂. Both mitigation and adaptation are needed.

This may seem obvious to people that live in this world and have witnessed the rapid development and growth of this field, but it is not intuitive for all policy and decision-makers. Simply put, there is no single approach to tackling this global problem.

2. Resource managers must apply adaptation measures now to reduce and delay the effects of ocean acidification and protect ecosystems and our seafood supply.

This relates to both shellfish *and* finfish, especially as we see effects beyond shell building organisms and within a range of ocean environments. And more broadly, OAH should be considered and discussed in the suite of management decisions coastal and ocean resource managers face.

3. Taking actions to support resilient ecosystems should be an underlying strategy.

Protected and marine management areas can serve beyond their role as no-fishing zones; they can protect biodiversity and build resilience. The more we strengthen ecosystems, the more they can potentially evolve and adapt to the changes ahead.



4. The above actions will be most effective with a coordinated regional and national response.

There is immense value in the West Coast coming together around these issues. Our coordination has been critical to us getting traction and making progress in Washington, D.C. We now have federal partners who are eager to work together in more aligned ways to speed progress and action. Working at the West Coast-level has given us opportunities to take bold mitigation and adaptation steps, and to be an example for the rest of the country.

5. Scientists and resource managers must accelerate the development and integration of knowledge required to improve management choices.

To better understand changing ecosystem conditions and biological responses, we need to explore how to improve ocean observing and how it links with our protected area monitoring. For example, California invested in a modeling project with NOAA and UCLA to identify which areas of the coast are more susceptible to acidification and hypoxia than others and to look at the role of local nutrient inputs in coastal acidification and hypoxia; a similar modelling project is underway in Washington State in the Puget Sound. Projects like these help us understand local conditions and where local inputs might be driving acidification.

We must continue to assess where we are most vulnerable. Taking our marine and coastal managed areas and overlaying those with areas vulnerable to acidity could help us target where we consider adaptation and remediation measures. We also need to know places that might be more resistant and adaptable to change. This knowledge will help us decide where to invest first.

6. There is a cost to inaction.

We have a lot of work to do - we cannot wait. These issues cross scientific disciplines as well as jurisdictional boundaries. Last June, the Ocean Protection Council [started a conversation about ocean health](#) as a way to bring us together. This has presented a new paradigm: We must work across agencies in new ways and intersect closely with the emerging science due to climate change. We must take steps to protect what we value, and keep the momentum moving forward on these issues. We are in frequent contact with our colleagues in Oregon, Washington, and British Columbia, and will develop a coordinated policy response as the Panel wraps up that will have traction regionally, nationally, and internationally.

Group Participation and Discussion

Panel presentations were followed by audience questions and discussion, and comment cards were distributed and collected. Questions were raised about the immediate actions that are currently being implemented and gaps in existing policy and regulations. Another major theme arising from the group discussions and comments was the need to prioritize OAH research and knowledge needs. The value of the Panel and its associated products is clear but users, managers, and funders will need tangible guidance on how to prioritize and weight the breadth of knowledge and information presented by the Panel. There were also several questions about the fundamental science and prediction capabilities of OAH and how it is exacerbated or related to natural and manmade processes occurring in the open and coastal ocean such as harmful algal blooms. Though the group recognized we have much more learning to do and actions to take, discussion from Panelists and audience focused on:

- **Climate change and fisheries:** The [Ocean Protection Council is funding a project](#) for the Ocean Science Trust to work with the Ocean Protection Council Science Advisory Team (OPC-SAT) to develop recommendations that the Department of Fish and Wildlife and OPC can use to help inform amendments to the MLMA Master Plan and to develop updated management tools necessary for the effective management of California's ocean fisheries in the face of climate change.
- **Water quality:** A water quality discussion is needed at the national level on to use the Clean Water Act (CWA) in addressing acidification. There are things in the CWA that could be useful, including the development of water quality criteria. There is also an opportunity to look at merging Areas of Special Biological Significance (ASBS) and marine protected area monitoring.
- **Monitoring:** There is a need to link chemical and biological monitoring. We need to know if there are local levers to pull - modeling can help us get there. In the meantime, the State Water Resources Control Board is already taking positive strides to reduce nutrient runoff.

- **Building resilience:** The state needs to consider supporting not only ecosystem resilience, but also community and socioeconomic resilience. The [Marine Protected Area Collaboratives](#) are a venue for local conversation, and there are opportunities for them to grow and become the pulse points for identifying change while providing us the structure to come together.
- **Building beyond existing policies:** Many are calling for solutions in the context of existing policy, but California should think creatively about ocean solutions, including carbon sequestration, wetlands and seagrass restoration, and bringing in economists and business leaders to further analytical work and spur future projects.

