



FROM THREATS TO OPPORTUNITIES: AN OVERVIEW OF WEST COAST EFFORTS TO ADDRESS OCEAN ACIDIFICATION AND HYPOXIA AND A ROADMAP FOR ADVANCEMENT

Introduction

Ocean acidification and hypoxia (OAH) have already disrupted West Coast ocean chemistry in unprecedented ways and the impacts are expected to escalate. The occurrence of OAH on the West Coast has prompted a coordinated and collaborative approach to better understand the science and identify best practices for managing the threat across state and jurisdictional boundaries. Due to the complexity and potential severity of OAH impacts, West Coast jurisdictions have combined efforts to share, advance and coordinate management-relevant research and monitoring, as well as mitigate and manage the issue. California, Oregon and Washington, along with British Columbia, have been leaders in attempting to understand and take action to limit the ecological and economic harm caused by OAH.

Regional Advances on Ocean Acidification

Washington responded first to the impact of ocean acidification on the oyster industry. In 2011, Governor Gregoire created the Blue Ribbon Panel on Ocean Acidification, a multi-stakeholder panel that included a number of top scientists, industry, tribal, local government and state and federal agency representatives, along with a number of legislators. After a year of deliberations, the Panel issued a report that included a comprehensive description of the current science of ocean acidification and 42 key recommendations pertaining to research, monitoring and actions to mitigate and adapt to changing ocean conditions.

In 2013, the legislature implemented two Blue Ribbon Panel recommendations by creating the Marine Resource Advisory Council (MRAC), a state agency charged with ensuring implementation of the Panel's recommendations and the University of Washington's Ocean Acidification Center, which is charged with coordinating and delivering high priority ocean acidification research and monitoring.

The West Coast Ocean Acidification & Hypoxia Science Panel

Building on the Washington Blue Ribbon Panel, the West Coast Ocean Acidification and Hypoxia Science Panel (the Panel) is a multi-state, bi-national collaboration of 20 esteemed scientists from California, Oregon, Washington and British Columbia. The Panel embodies regional cooperation on this issue and demonstrates the willingness of Governors and Premiers to work collaboratively to achieve best outcomes. The Panel is

laying the scientific foundation for understanding increasing acidity, which, along with increasing temperatures, increasing nutrient loading and corresponding decreases in dissolved oxygen (hypoxia) and many other changes in the marine environment, is causing an unprecedented change in ocean chemistry. The Panel is also recommending strategies for policy and management action at multiple levels, and is currently tailoring this information for a range of decision-makers.

The Panel is producing a suite of products: (1) peer-reviewed publications addressing topical themes identified by decision-makers, (2) translational 'science-to-policy' documents tailored to specific agency needs, (3) visionary translational documents that describe innovative ideas for how science can inform management now and in the future, and (4) an Executive Summary for Decision-makers which will encapsulate the key messages and insights that are emerging from this effort.

The Pacific Coast Collaborative

In 2007, the Governors of California, Oregon and Washington and the Premier of British Columbia, representing together the 5th largest economy in the world, signed an agreement creating the Pacific Coast Collaborative (PCC). The Governors and Premier selected climate and energy as two primary areas of focus. In 2013, the PCC issued a West Coast Climate and Energy Agenda, a progressive set of actions committed to by each jurisdiction, designed to reduce greenhouse gas emissions. Ocean acidification was included in the West Coast Agenda, and the primary task outlined was for the states to engage with federal government partners and stakeholders to build a combined program that is capable of dealing with challenges as complex, wide spread and high risk as ocean acidification.

The West Coast Governors' Alliance on Ocean Health

The West Coast Governors' Alliance on Ocean Health (WCGA), founded in 2006, is a state-federal regional ocean partnership recognized by NOAA. In 2013 the WCGA adopted ocean acidification as the fourth of its regional priorities. The WCGA partnered with the Integrated Ocean Observing Systems (IOOS) West Coast regions (SCCOOS, CeNCOOS and NANOOS) to connect oceanographic data collected by IOOS to a broader West Coast audience through a California Sea Grant fellowship. The fellow is helping to tie OOS real-time oceanographic data and time-averaged data products into the WCGA, including via the WCGA's West Coast Ocean Data Portal. The WCGA has also partnered with the California Current Acidification Network (C-CAN), a West Coast-wide collaborative network that aims to increase understanding of ocean acidification along the California Current System. The WCGA is currently engaged in a conversation anticipated to conclude by early 2016 to establish a new collaboration, with the working name of West Coast Ocean Partnership, representing a convergence of tribes, states, and regional federal partners that seamlessly integrates with the National Ocean

Policy Regional Planning Body for the West Coast. At this writing, ocean acidification is a top shared priority for this anticipated unified collaboration among sovereigns.

A Vision For The Future

The West Coast states are committed to advancing ocean science and management decisions that improve our understanding of OAH and our ability to mitigate its impacts, adapt to changes that cannot be avoided and build resilience. Findings from the Panel are giving decision makers the information they need to act, and the West Coast states understand the following: 1) Ocean acidification is a regional intensification related to globally elevated atmospheric CO₂ and both mitigation and adaptation are needed; 2) Resource managers must apply adaptation measures now to reduce and delay the effects of ocean acidification and protect ecosystems and our seafood supply; 3) Taking actions to support resilient ecosystems should be an underlying strategy; 4) Scientists and resource managers must accelerate the development and integration of knowledge required to improve management choices; 5) Actions will be most effective with a coordinated regional and national response; and 6) There is a cost to inaction.

The partnership between federal agencies and the states has been positive and constructive. As the threat posed by OAH worsens, it is urgent that we articulate a more robust state/federal strategy to fully understand the OAH challenge and develop and implement a suite of actions. In conjunction with the “Strategic Plan for Federal Research and Monitoring of Ocean Acidification” and other federal plans, the Panel products can provide the basis for identifying research and monitoring gaps, further policy development, and help shape shared funding priorities. For example, the Panel will soon release its strategy for monitoring and research priorities, which will serve as a foundation for a West Coast monitoring and research plan. Given the IWG-OA’s central role in coordinating research and monitoring across federal agencies and its own strategic plan, the PCC jurisdictions believe this important new work should be a valuable resource to refine the federal strategy and prioritize and coordinate implementation.

There are a number of important questions that need to be answered: how can regional bodies most effectively advance federal interests and vice versa? Can and should we develop mutual priorities? Should PCC jurisdictions and federal OAH agencies be meeting regularly? Could state and federal collaboration increase budgets and build bridges across programs? The Panel products are a resource to help inform and advance these discussions.

There is already overlap in state and federal socioeconomic considerations, technology development, and integrated and ecosystem-wide monitoring. In fact, many of the products from the IWG-OA and the West Coast Science Panel echo similar themes about the next phase of research prioritization and actionable

outcomes. Further commitment to collaboration in this area will help decision-makers at the federal and state level integrate OAH actions into all programs applicable to ocean health.

The Work Ahead

The PCC jurisdictions invite a more structured collaboration with federal partners and other states with a potential joint goal, over time, being the development, of an effective and efficient combined state and federal OAH and changing ocean conditions strategy. Structured collaboration could take the form of a committee or working group and could be charged with developing:

- 1) A joint research strategy that identifies critical gaps in our knowledge of OAH and prioritizes future research;
- 2) Identification of local and regional actions to mitigate and build resiliency, from intensified restoration of eelgrass and kelp refugia, to nutrient management, to monitoring and enhanced protections for marine protected areas;
- 3) Identification of critical species of economic significance, necessary research regarding these species and development of protection/resilience strategies;
- 4) Prioritization of current and future work that helps maximize present budget allocations at the state and federal levels while building towards more robust investment that can best impact prioritized efforts; and
- 5) A shared vision for evaluating data and taking subsequent actions based upon evaluation.

The PCC jurisdictions look forward to meeting with our federal partners in mid-July to discuss strategies going forward and plans for sustained engagement.