

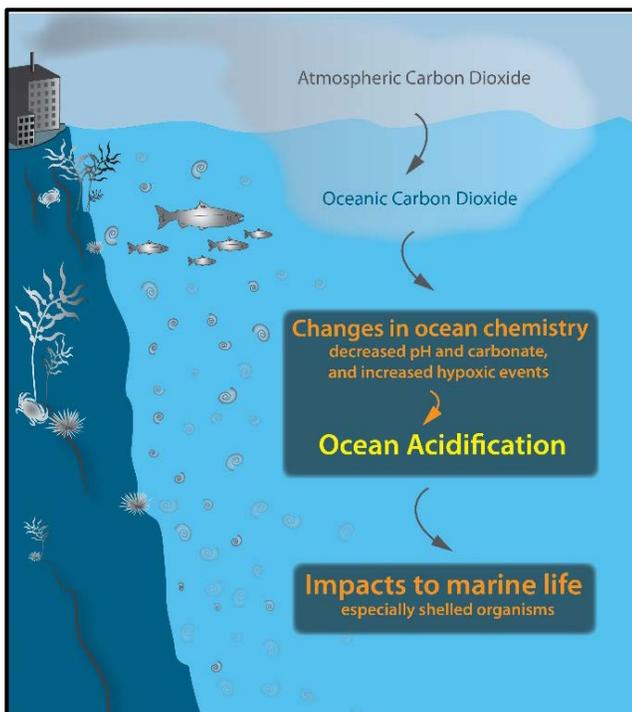


## Understanding Ocean Acidification and Hypoxia

Oregon Department of Fish and Wildlife, 10/30/2017  
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**The problem: Ocean acidification and hypoxia (OAH) is already occurring on our coast.** Oregon and the West Coast are seeing acidification levels that will not be seen globally for another 50 years. **The take-home: There is mounting evidence of existing and anticipated harm to marine species and our economy.**

**Oregon is on the front lines.** OAH events impact ocean health worldwide. Oregon has the dubious honor of being the locale that first documented OA impacts – the *Whiskey Creek Shellfish Hatchery* story that is now renowned world-wide. The good news is Oregon's universities and agencies have premier scientists working at the forefront of OAH research, focused on understanding why, when and how OAH events and their impacts occur. The bad news is that economic impacts have already occurred in our oyster culture industry and we anticipate – but cannot yet predict – impacts to Oregon's precious wild ocean fisheries in coming decades.



As atmospheric carbon dioxide dissolves in the ocean, it undergoes a chemical change. This process is referred to as "Ocean Acidification," and leads to corrosive conditions that can impact marine life. Shelled organisms are particularly vulnerable to these changes.

**Oregon's nearshore waters are critical to resources and the economy—and are especially vulnerable.**

We are observing extreme OAH events in Oregon's highly productive nearshore waters (0-12 miles offshore) and estuaries. This region is home to major fisheries (eg., crab) all of the State's mariculture operations, and contains critical nursery grounds for economically important species (rockfish, salmon, pink shrimp and Dungeness crab, among others). The dynamic and variable nearshore environment makes it a uniquely challenging area for conducting research, and has typically pushed coast-wide studies further offshore (e.g. NMFS' annual trawl survey). The result is a precarious *information gap* for the area that is currently experiencing OAH.

**West Coast leaders and researchers are strengthening cross-jurisdictional partnerships regionally and abroad.** Universities and governments (state, provincial, and tribal from Oregon, Washington, California, and British Columbia have responded to our region's acute vulnerability to OAH and research challenges by pulling together to seek proactive, solution-oriented approaches to this issue. Initial efforts resulted in the West Coast Ocean Acidification and Hypoxia *Science Panel* (included 5 researchers from Oregon), which produced final recommendations for natural resource managers in April 2016. The Pacific Coast Collaborative governments, which include British Columbia, Washington, Oregon and California, both supported the Science Panel and have been a continued driving force nationally and internationally to take actions to address ocean acidification since 2008.

**Research is essential to allow us to anticipate and adapt to future increase in OAH.** When the OA problem was discovered at the Whiskey Creek Shellfish Hatchery, managers and scientists were able to solve the problem by modifying the chemistry and flow of the hatchery's water system. While this type of solution is practical in a closed system such as a hatchery, we are not able to engineer solutions to

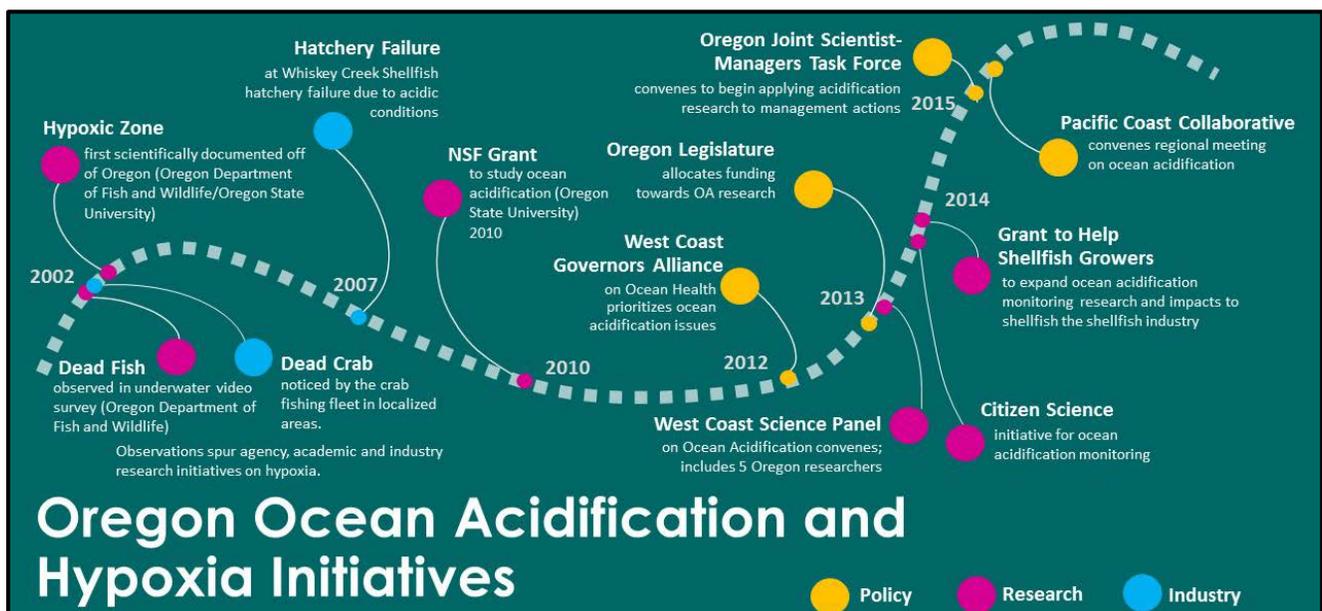
OAH in the open ocean. While we cannot stop increasing intensity and frequency of OAH, we can adapt to the effects by altering resource management and dependent industries to minimize the economic effects of OAH. However, this will only be possible if we understand OAH well enough to anticipate and understand potential impacts, through strategic research investment.

**Oregon is a prime locus for research, and is poised to employ strategic research investment** and turn it into national and global successes in OAH science. Oregon is ground-zero for OAH events and has the cutting edge-technology and top-tier academic expertise to understand the events and their impacts. We are home to the newest Ocean Observatory – one of an elite group of permanent long-term oceanographic and biological monitoring installations that are part of the national Ocean Observatories Initiative, and the largest single ocean monitoring equipment investment in U.S. history. This offshore buoy network collects valuable ocean data, including pH, to track changing ocean conditions. Oregon is also home to a system of world-class marine laboratories (Hatfield Marine Science Center, Oregon Institute of Marine Biology), a system of marine protected areas dedicated to scientific investigation, and long-term ecological monitoring sites both nearshore and offshore.

**Alignment of West Coast information needs and federal priorities will result in greater success for both.** While OAH is occurring globally, there are hotspots where impacts are strongest. These hotspots, which include coastal Oregon, provide opportunities to focus research efforts and learn about OAH impacts that will affect other U.S. and global marine regions in coming decades. To address this, the PCC and the U.S. federal agencies, convened as the Interagency Working Group on OA, have been working collaboratively on the Joint Monitoring Inventory Task Force, since 2016. This Task Force is nearly completion of a GIS-based inventory of OAH-related monitoring on the West Coast, so that subsequent gaps analysis and prioritization of monitoring investments can occur strategically.

Oregon Coordinating Council on Ocean Acidification and Hypoxia (OAH Council) will begin to convene in 2018, pursuant to Senate Bill 1039 (2017). The OAH Council brings together agencies, stakeholders, NGOs and others to develop recommendations on actions for Oregon to take, to address this growing issue.

The OAH “experiment” is unfolding on the West Coast, providing opportunities to strategically monitor this process. Since it is currently impossible to predict how ocean acidification will cascade through food webs, this valuable information can be used to gain a global understanding of future conditions and how to mitigate them.



For more information on OAH in Oregon: <http://oregonocean.info/>