Ocean Acidification across bivalve life-history stages: Relevant outcomes for the OR shellfish industry

Cameron Allen, Iria Gimenez, Jessamyn Johnson, Steve Pacella
Dr. George Waldbusser's Lab

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OSU

NSF

Sea Grant Oregon
Coastal Science Serving Oregon

USDA
WRAC

NOAA
National Oceanic and Atmospheric Administration
U.S. Department of Commerce

Oregon State University
Hatfield Marine Science Center
Newport, Oregon

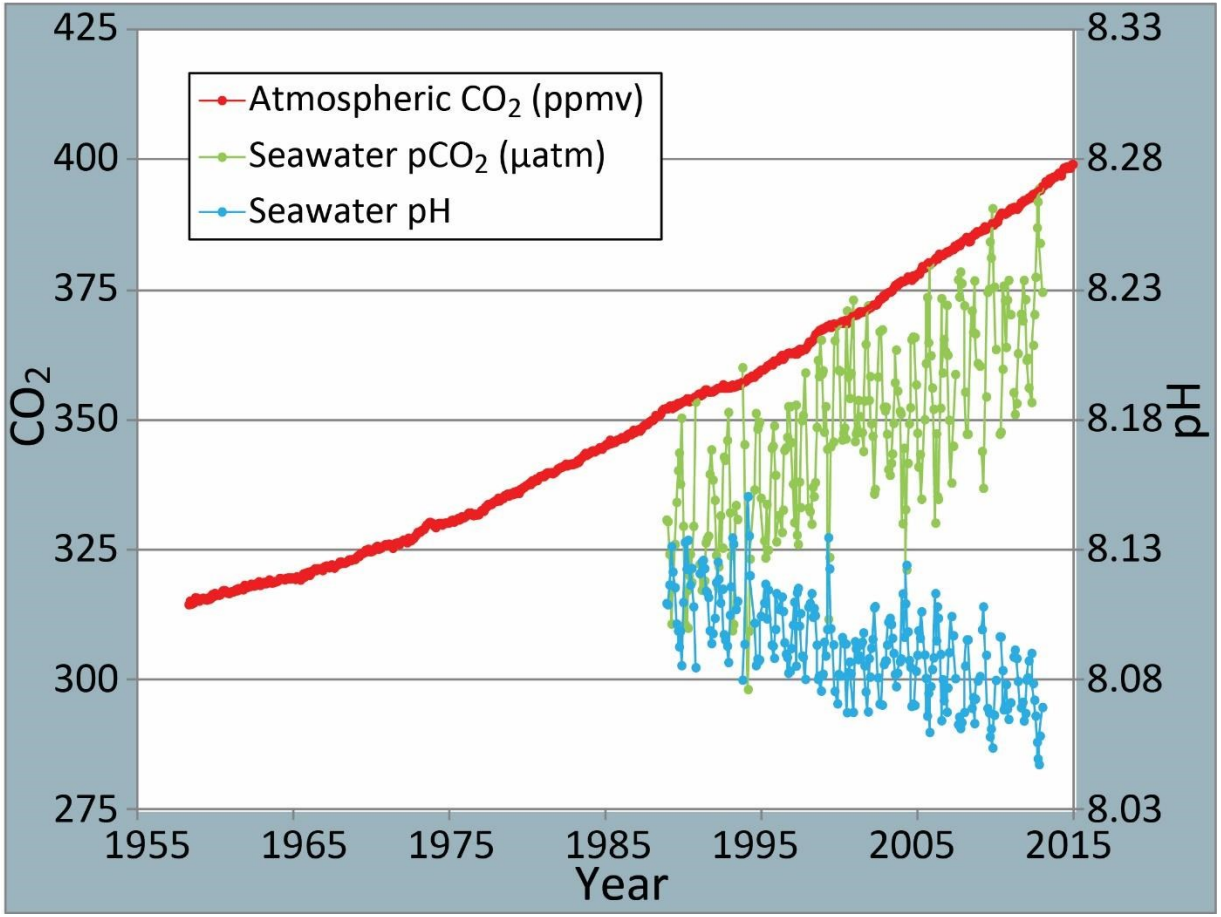
The U.S. West Coast Shellfish Industry's Perception of and Response to Ocean Acidification

Understanding an ocean stakeholder

B. Mabardy, F.D.L. Conway, G.G. Waldbusser, C.S. Olsen

- Over 80% of Industry consider OA has consequences for people today, compared to 20% of US public
- Over half of industry experiencing OA, and a third not sure.
- Roughly 5/6 respondents believed either they could adapt (60%) or weren't sure
- 90% of Industry though University partnerships were useful and a high priority to adapt to OA

Ocean Acidification (OA) in a nutshell



PMEL (2016)

- As CO2 in the atmosphere increases, roughly between 20%-30% is absorbed by the ocean.
- The increase of dissolved CO2 results in decreased pH and saturation state (Omega)
- Saturation state is a measure of how corrosive the water is for calcium carbonate (shells)

OA at local/regional spatial scales

Oregon is an OA hotspot

Natural processes like upwelling and photosynthesis/respiration exacerbate OA by further increasing dissolved CO_2 . OA happening at a faster rate than in open ocean

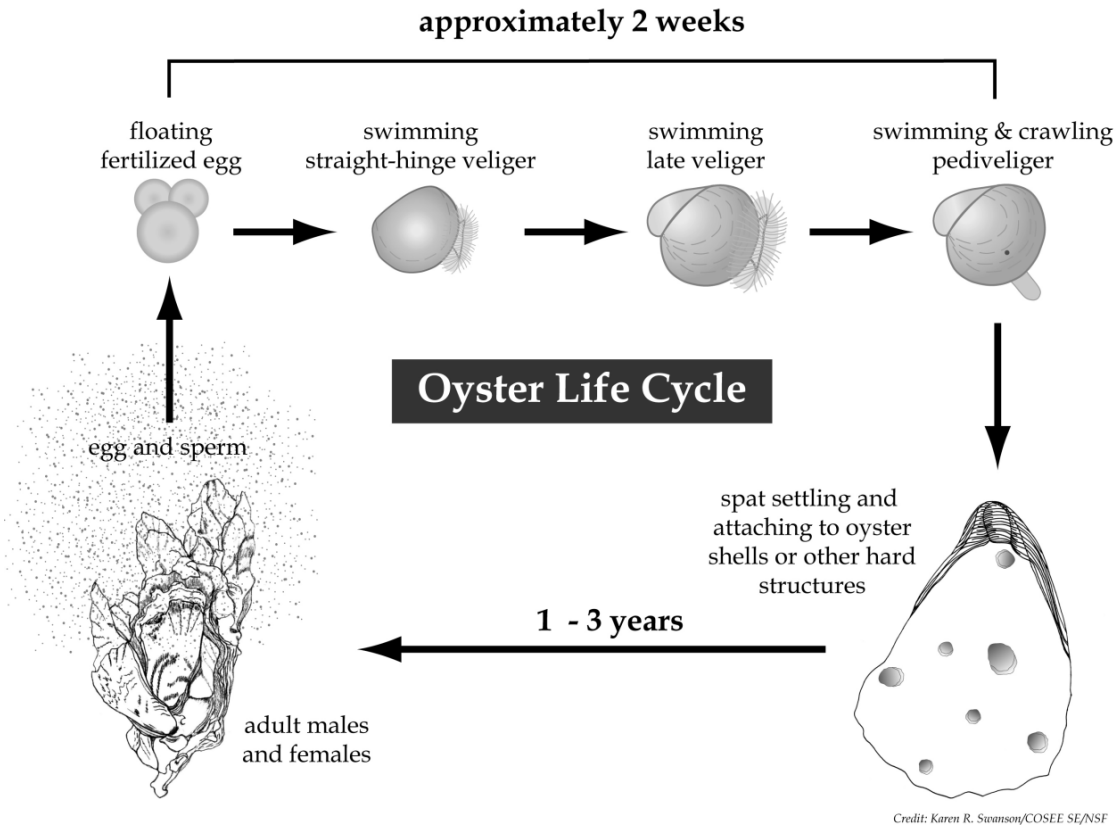
The carbonate chemistry in coastal OR is highly variable but a shifting baseline of dissolved CO_2 results in:

- Extreme negative events are more frequent, more intense and longer in duration
- Windows of "good" conditions become shorter and less frequent.

What does it mean for shellfish?

- ~80% of bivalves studied show negative responses to increasing dissolved CO_2
- Windows of vulnerability across and within life-stages

General Bivalve Life History and Sensitivity Bottlenecks



- Life cycle of bivalves is complex
- Differential sensitivity to OA among and within life-stages leads to Sensitivity Bottlenecks
- Various research projects designed to study and address different bottlenecks

More Resources:

- Ocean Acidification- Changing waters on the Oregon Coast (OSU) : https://www.youtube.com/watch?v=7h08ok3hFSs

- NOAA Pacific Marine Environment Laboratory (PMEL) – Carbon Program : http://www.pmel.noaa.gov/co2/story/Ocean+Acidification

Contact us:

Cameron Allen: allencam@oregonstate.edu
Iria Gimenez: igimenez@coas.oregonstate.edu
Steve Pacella: spacella@coas.oregonstate.edu
Jessamyn Johnson: johnjes7@oregonstate.edu

George Waldbusser: waldbuss@coas.oregonstate.edu