

Ocean Acidification in Washington State

From Knowledge to Action

Washington State Blue Ribbon Panel on Ocean Acidification

Photos (left to right): Neil Banas, Minette Layne, Benjamin Drummond

What is Ocean Acidification?

A prolonged reduction in seawater pH, driven by increasing levels of carbon dioxide (CO_2) in seawater.

25% of CO_2 generated from human activities has been absorbed by the oceans

Ocean acidification is happening very quickly

Ocean acidification is making seawater more corrosive to shell-forming organisms

Photo: Oran Viriyincy

Washington is Particularly Vulnerable to Acidification

Ocean acidification is appearing in Washington decades *sooner* than anticipated. 2005-2009 massive die-offs of oyster larvae in NW hatcheries

A combination of regional factors can exacerbate acidification caused by global CO_2 emissions:

- Coastal upwelling of CO_2-rich waters
- Runoff of nutrients and organic carbon from land
- Decay of organic matter in subsurface waters
- Emissions of acidifying gasses (NO_X and SO_X)

Washington Coast; Photo: Russ McMillan

Implications for Calcifiers

Slower growth and higher mortality for shell-forming organisms *(calcifiers)*

- Calcium carbonate, a mineral used to make shells and other hard body parts, dissolves more easily as acidity increases.
- More than 30% of Puget Sound's marine species are calcifiers. Ex: oysters, crabs, geoducks, sea stars, plankton

Photo: Jon Rowley

What's at Stake for Washington's Economy?

The most productive commercial shellfish industry on the West Coast – over $270 million annually, and directly and indirectly supports 3,200 jobs.

Impacts to marine food webs could affect seafood industry – over $1.7 billion and 42,000 jobs

Recreational oyster and clam harvest – over $27 million

Washington's coastal tribes depend upon shellfish for food, income and connection to their cultural heritage

Photos: Benjamin Drummond (left and right); Bryan Penttila (center)

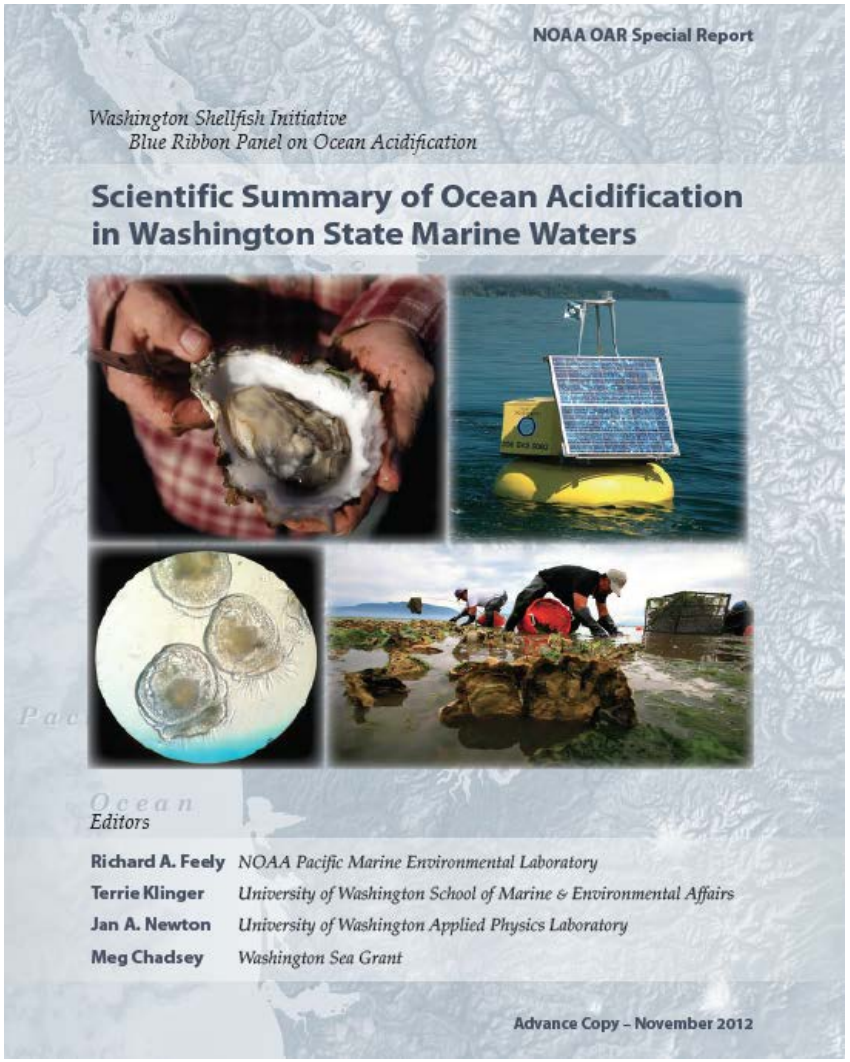
Developing the Response: The Blue Ribbon Panel on Ocean Acidification

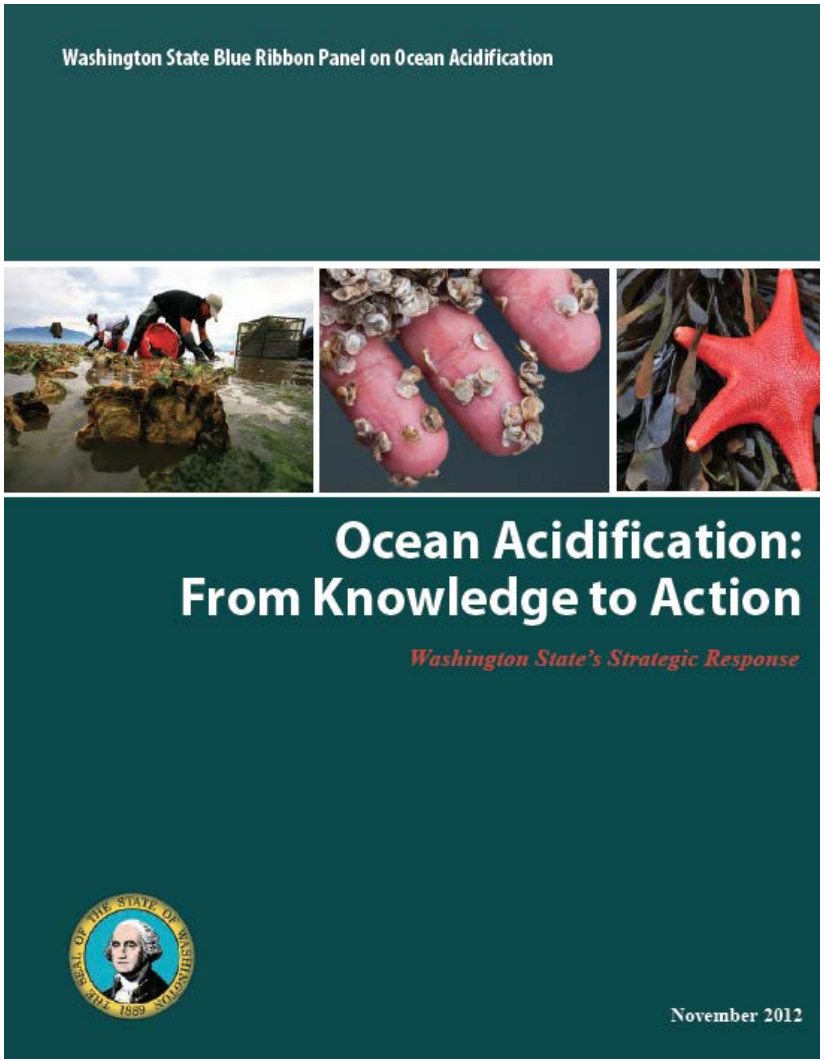
- Convened by Governor Christine Gregoire in February 2012.
- A first-of-a-kind comprehensive state-level effort to address ocean acidification.
- Charged with reviewing the best available science, and producing a set of recommendations to guide Washington's response.
- Scientists, decision makers, industry stakeholders, tribal representatives, and conservation community representatives worked together to produce a comprehensive set of recommendations.

Gov. Gregoire and Bill Dewey of Taylor Shellfish Company discuss growing and harvesting techniques for oysters in the tide flats in Samish Bay.

Photo: Puget Sound Partnership

Washington State Panel Reports





http://www.ecy.wa.gov/water/marine/oceanacidification.html

Panel Recommendations

42 recommendations, including 18 *Key Early Actions*, that will:

1. Address the root cause of acidification by reducing CO_2 emissions;

2. Reduce local land-based pollutants that worsen acidification;

3. Foster adaptation and remediation to protect the shellfish industry and marine ecosystems;

Photos: Benjamin Drummond (top); Bern Harrison (lower right); Jim Culp (lower left)

Panel Recommendations – cont'd

42 recommendations, including 18 *Key Early Actions*, that will:

4. Increase research and monitoring of acidification in state waters;

5. Inform, educate, and engage the public, stakeholders, and decision makers in responding to ocean acidification; and

6. Maintain a sustained and coordinated focus on ocean acidification.


Capitol Building, Olympia

Photo: Washington Secretary of State

Governor's Response: *Executive Order 12-07*

Directs the Department of Ecology and other cabinet agencies to:

- Advocate for reductions in emissions of carbon dioxide;
- Implement the recommendations of the Blue Ribbon Panel;
- Work with the University of Washington and others to coordinate and conduct scientific investigations and science/policy collaborations;
- Request that the EPA assess water quality criteria relevant to ocean acidification;
- Increase public understanding of ocean acidification and its consequences.

Signing Exec Order 12-07, Nov 27, 2012

Governor's Response: *Proposed Funding and OA Center*

$3.31 million in proposed 2013-2015 biennial budget to implement the Panel's key early actions.

Establishes a new **Ocean Acidification Impacts and Adaptation Center** at the University of Washington. The Center will:

- Advance the Panel's research and monitoring recommendations;
- Lead and foster ongoing decision-relevant science regarding ocean acidification;
- Enhance and maintain research coordination and collaboration; and
- Engage a range of stakeholders


Shucked Pacific oyster

Photo: Dan Bennett

Conclusions

- Ocean acidification is a well-documented consequence of rising CO_2 emissions
- Ocean acidification results in low pH and other changes that make marine waters more corrosive to shell-forming organisms. Impacts on non-calcifiers have also been observed.
- Ocean acidification is affecting Northwest shellfish and carries potentially significant economic and ecological risks.
- Actions proposed by the Blue Ribbon Panel are a starting point for addressing the near-term and long-term risks of ocean acidification.

Photo: Jon Rowley