

Impacts of Ocean Acidification on Washington's Marine Species

Science information sheet

Understanding the effects of ocean acidification on marine species – including those that are economically and ecologically important – is critical to responsive and effective management of Washington's marine ecosystems (Washington State Blue Ribbon Panel Action 7.3.2). Realizing this, the Washington State Legislature gave \$170,000 to the Washington Ocean Acidification Center (WOAC) for laboratory studies to assess the effects of ocean acidification on Washington's species and ecosystems and to study their ability to adapt to ocean acidification.

What species are being investigated?

WOAC, working with partners at Western Washington University and NOAA's Northwest Fisheries Science Center, has started laboratory studies on Dungeness crab, geoducks, Olympia oysters, and krill. These species were identified by resource managers as being critical to Washington State's economy and marine ecosystems. Studies from other regions have revealed significant negative effects of low pH and low dissolved oxygen on these and similar species.

How has the state investment been leveraged?

A highly skilled team of researchers has come together to conduct these experiments. Working at specialized facilities at the University of Washington, Western Washington University, and the National Oceanic and Atmospheric Administration's (NOAA) Mukilteo facility these researchers have leveraged federal funds and resources.

Continued research on ocean acidification impacts to species is needed in 2015-17

Funds are needed to investigate ocean acidification impacts on other vital Washington species. Our native fish species are of great economic and ecological importance in Washington, and little is known about their response to changes in pH, CO₂ concentration, or oxygen concentration. In other regions, fish species have been shown to be highly sensitive to changes in these variables. New experiments in the 2015-17 biennium will help to illuminate the impacts of ocean acidification on fish species in Washington.



Juvenile krill

What you need to know

- \$170,000 provided by State Legislature for laboratory studies to assess the effects of ocean acidification on species and ecosystems
- Studies conducted on Dungeness crab, geoducks, Olympia oysters, and krill
- Initial results indicate these species are negatively impacted by higher levels of CO₂ and ocean acidification conditions
- Research has leveraged federal partnerships and funds

What are we learning about the impacts of ocean acidification on these species?

These laboratory experiments are on schedule to be completed in June 2015. Preliminary results from experiments on one species of krill showed that survival was lower among individuals exposed to higher levels of CO₂. This result is surprising given that the levels of CO₂ used in the experiments were not particularly high compared with those found in the local environment, suggesting that krill may already be experiencing negative effects of increasing levels of CO₂ in Washington waters.

Preliminary results from experiments on Dungeness crab and a closely related species suggest that higher levels of CO₂ and lower levels of oxygen cause delayed development in early life stages. The slowest development was observed when both high CO₂ and low oxygen occurred together, a condition that is common in bottom habitats in Washington. The consequences of delayed development can translate into lower survival because of predation and other factors.

How do these results help us move forward?

Data collected from these experiments are critical to understanding how ocean acidification may impact Washington's marine ecosystem as changes in pH, CO₂ concentration, and oxygen concentration persist into the future. The preliminary results indicate the species vital to Washington's economy and marine environment are negatively impacted by higher levels of CO₂, and that these effects are intensified under conditions of low oxygen. These studies also show that some species are affected by conditions that we are seeing in Washington waters now, not decades in the future.



Juvenile Dungeness crab



Conducting experiments to test how ocean acidification impacts species in Washington State

For more information

See the Washington Ocean Acidification Center website:

<http://coenv.washington.edu/research/major-initiatives/ocean-acidification/>

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