WASHINGTON'S SPECIES AT RISK

Ocean acidification threatens key species in Washington waters. **Oysters, crabs, razor clams, salmon,** and other species of importance are at risk from declining pH and carbonate saturation. Evidence reveals that young stages may incur higher risk via impaired development and early mortality.

What We're Doing

Agencies and others in Washington continue to advance scientific research to address the biological and ecological risk of ocean acidification in Washington waters.

- The **Washington Ocean Acidification Center** coordinates research to address priority areas. Current areas of focus include 1) how ocean acidification affects Dungeness crab larvae in Puget Sound, 2) the relationship between ocean acidification conditions, harmful algal blooms, and fisheries closures in Washington, 3) new information gained through the use of environmental DNA, and 4) analyzing long-term sampling of plankton communities and water chemistry to reveal long term patterns.

- The **Washington Department of Natural Resources** also conducts focused research experiments in a laboratory setting to understand the types of impacts ocean acidification has on our nearshore marine species (e.g., eelgrass and kelp). The Acidification Nearshore Monitoring Network (ANeMoNe) tracks environmental conditions and biological indicators (e.g., shellfish spat settlement, eelgrass distribution, density and morphology, and bird use) at sites around Puget Sound and in the coastal estuaries. Long-term tracking of these indicators will reveal how different parts of the ecosystems respond to the changing nearshore environment.

Why This is Important

Ocean acidification is threatening the health of species our communities depend on.

Oysters, pteropods, and other calcifying species are especially at risk, with ocean acidification causing shell dissolution. Ocean acidification can damage the shells of young **Dungeness crab**, and laboratory studies show ocean acidification can interfere with **salmon** sensory behavior. Laboratory studies also show ocean acidification can **increase toxin production by harmful algae**.

These impacts have worrying consequences for food-webs, communities, economies, and ecosystems. Understanding the scope and magnitude of biological effects can help Washington plan and implement adaptation strategies to protect livelihoods and human well-being.

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What Still Needs to Happen

Washington's political and scientific leadership Expanding our understanding of ocean acidification effects on marine resources in Washington will help serve the needs of resource managers, tribes, coastal communities, and the fisheries and aquaculture sectors. Doing so requires continued investment in monitoring, laboratory studies, and field experiments.

Key priorities include:

- Better understanding of how ocean acidification impacts populations, harmful algal blooms (HABs), and the intersection with fisheries management.
- Better understanding of ecosystem impacts and health, including:
    - Continuing to develop environmental DNA (eDNA) as a tool.
    - Focusing research on plankton species at the base of the food web.
- Prioritizing protection, restoration, and pollution control to build resilience for marine species that are at risk.

See the Marine Resources Advisory Council's **Adapting and Building Resilience** one-pager for additional priorities to support resilience for species at risk.

This work supports Washington's strategy to invest in Washington's ability to monitor and investigate the effects of ocean acidification

Visit **www.oainwa.org** to learn more about Washington's strategic response and the Marine Resources Advisory Council

Contact **mrac@oainwa.org** for more information

Recent Learnings

A recent study coordinated by the Washington Ocean Acidification Center revealed that 12 key species of regional importance—including razor clams, Dungeness crab, salmon, and rockfish—all will be negatively affected by climate-change induced shifts in ocean conditions over the next eight decades.

While the negative effects of ocean heating and loss of oxygen were important drivers of this result, **ocean acidification consistently had the largest effect on these species**. Species inhabiting Washington's outer coastal waters and in Puget Sound were shown to be particularly at risk of changing ocean conditions.

This modeling study calls out the need to fill information gaps to help reduce harm to human communities.

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