



Alaska Ocean Acidification Network

Working to Understand Ocean Acidification to Help Alaskans Adapt

Why is Ocean Acidification a Concern for Alaska?

Scientists estimate that the ocean has increased in acidity by 30% over the last 300 years due to increased carbon dioxide in the atmosphere from human activities. Higher acidity water affects the ability of shell-building organisms to develop and maintain their shells, and may also affect the behavior of some fish species. Since the most susceptible species are often key components of the food chain, researchers expect the effects of ocean acidification (OA) to be felt throughout the ecosystem. Alaska is predisposed to OA due to its colder water temperature, making it likely that we will feel the effects sooner and more intensely than other regions. This could dramatically affect the lives and livelihoods of Alaskans, including the \$5.8 billion Alaska seafood industry.

What is the Network?

The Alaska Ocean Acidification Network was developed to expand the understanding of OA processes and consequences in Alaska, as well as potential adaptation and mitigation actions. The network helps connect scientists and stakeholder communities to identify knowledge gaps, recommend regional priorities, share data, and determine best practices for monitoring in Alaska.

What You Can Do

- Browse the website to learn about OA, including the current state of the science
- Join the list serve to stay up on the latest Alaska OA news and activities
- Connect with OA experts using the 'Expertise Database'
- Participate in an OA working group ranging from policy to K-12 education
- Host a speaker in your community
- Let your elected officials know you care about these issues
- Reduce your carbon footprint!

www.aoos.org/alaska-ocean-acidification-network

Who We Are

- Alaska Ocean Observing System (coordinator)
- NOAA Alaska Fisheries Science Center
- Alaska Sea Grant
- Alutiiq Pride Shellfish Hatchery
- Alaska Marine Conservation Council
- Alaska Shellfish Growers Assoc.
- Alaska Native Tribal Health Consortium
- Alaska Bering Sea Crabbers
- Alaska Department of Fish & Game
- Alaska Marine Highway System
- Univ. of Alaska Southeast
- US Arctic Research Commission
- Aleutian and Bering Sea Islands LCC
- NOAA's Ocean Acidification Program
- United Fishermen of Alaska
- UAF Ocean Acidification Research Program
- Alaska Center for Climate Assessment & Policy
- National Park Service
- Hakai Institute
- Sitka Tribe and more.



Corey Arnold



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How and Where are We Monitoring?



Fixed Moorings: OA sensors tethered to the ocean floor are located in the northern Gulf of Alaska, Bering Sea, Chukchi Sea, and Beaufort Sea. Two new platforms will be deployed in Southeast Alaska in 2017.



Autonomous Gliders: Resembling yellow surf-boards, wave gliders can cover large geographic areas over weeks and months at relatively low cost. These have been used in Prince William Sound and the Bering and Chukchi Seas.



Ship-based Water Samples: For the last 10 years, water samples from a transect extending into the Gulf of Alaska near Seward have been analyzed for OA parameters. NOAA also completes a ship-based monitoring effort in Alaska every 4 years.



Sensor-equipped Vessels: Starting in 2017, the Alaska Marine Highway ferry M/V *Columbia* will collect OA data during its 1,854-mile roundtrip weekly run between Bellingham, WA and Skagway, AK.



Shore-side Sampling: Community-based efforts in the Southcentral region have produced weekly water samples in 7 communities. Southeast communities are also expected to begin water sampling to help provide local level data at a regional scale.



Burke-o-Lators: Often co-located at hatcheries, these high-accuracy systems analyze multiple OA parameters and provide a clear picture of real-time conditions. Burke-O-Lators are located in Seward and Ketchikan and will be installed in Sitka and Kodiak in 2017.

What Are We Learning?

- The Chukchi and Bering Seas are currently experiencing seasonally corrosive conditions and the Beaufort Sea is starting to experience more sustained corrosive conditions.
- Glacial runoff can influence water chemistry to create more corrosive conditions, as was observed during a comprehensive study in Prince William Sound in 2014.
- Lab studies have measured how Alaska red king crab, blue king crab, southern tanner crab, and snow crab respond to more acidic waters. The results varied among species and among life stages. However, crab survival went down at every life history stage as they were exposed to more acidic water.
- Lab research on groundfish shows winners and losers. Pollock eggs and early larvae appear resilient to OA. Northern rock sole appear more sensitive. Research on Alaska salmon, halibut, cod, and prey fishes has not been conducted.
- Some fish species have shown negative behavioral responses such as reduced sense of smell or inability to distinguish between chemical cues, such as the smell of a predator.
- Research on the response of Alaska bivalves (such as clams) to OA is in the early stages. An initial study showed no effect on shell length or height, but a negative impact to leading growth bands at juvenile stages.
- Long term lab studies are challenging to conduct and may not reflect natural conditions. Additionally, there is large natural variability in OA drivers in Alaska waters. A commitment to long-term monitoring and research is needed to understand trends and guide future responses.



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