Contact Darcy Dugan, dugan@aoos.org

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.

Corey Arnold

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.

Darcy Dugan

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 Bering Sea Crabbers
- Alaska Center for Climate Assessment and Policy
- Alaska Department of Fish & Game
- Alaska Marine Conservation Council
- Alaska Marine Highway System
- Alaska Native Tribal Health Consortium
- Alaska Ocean Observing System
- Alaska Trollers Association
- Alaska Sea Grant – Marine Advisory Program
- Alaska Seafood Marketing Institute
- Alaska Shellfish Growers Association
- Alutiiq Pride Shellfish Hatchery
- Armstrong-Keta Hatchery
- Bering Sea Aleutian Island LCC
- Blue Evolution
- Bristol Bay Regional Seafood Development Association
- Hakai Institute
- InletKeeper
- Kachemak Bay Research Reserve
- Kasitsna Bay Lab
- NANOOS
- National Park Service
- NOAA Alaska Fisheries Science Center
- NOAA Arctic Program
- NOAA Ocean Acidification Program
- OceansAlaska Marine Science Center & Hatchery
- Prince William Sound Science Center
- Sitka Sound Science Center
- Sitka Tribe
- UAF Ocean Acidification Research Center
- UAF School of Fisheries and Ocean Sciences
- UAS Alaska Coastal Rainforest Center
- UAA Institute for Social and Economic Research
- United Fishermen of Alaska
- U.S. Arctic Research Commission

Interested in collaborating?
Email Darcy at dugan@aoos.org.

Jennifer Questel

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How and Where are We Monitoring?

UAF OARC

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 were added in Southeast Alaska in 2017.

NOAA

Unmanned Vehicles: SailDrones and 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.

GulfWatch Alaska

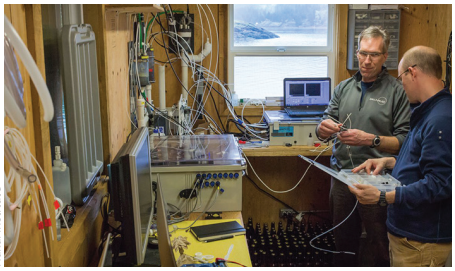
Ship-based Water Samples: For the last 10 years, water samples from a transect extending into the Gulf of Alaska near Seward have been analyzed for OA parameters. NOAA also completes a ship-based monitoring effort in Alaska every 4 years.

AMHS

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

KBNERR

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.



Hakai Institute

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, Ketchikan, Sitka and Kodiak.

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 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. Initial studies on coho salmon show this response.
- 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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