



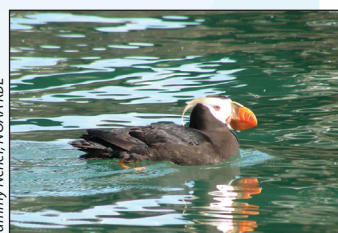
Sonia Barten, SAHFOS

Monitoring copepods using a continuous plankton recorder helps scientists understand what environmental conditions contribute to ecosystem variability in the Gulf of Alaska. Copepods are important for many animals including seabirds and juvenile salmon.



Mayumi Arimitsu, USGS

Three forage fish commonly found in Prince William Sound and the Gulf of Alaska are, from top to bottom: Pacific sand lance (*Ammodytes* spp.), Pacific herring (*Clupea pallasii*), and capelin (*Mallotus villosus*).



Tammy Neher, NOAA KBL

Both nearshore and pelagic marine birds play important roles in the Gulf of Alaska ecosystem as predators of forage fish and zooplankton. Both groups are monitored under the Gulf Watch Alaska program.

Gulf Watch Alaska Program Making New Discoveries in the Gulf of Alaska

Now entering the fourth year of what is expected to be a 20-year monitoring program, Gulf Watch Alaska investigators are documenting a changing Gulf of Alaska. Nearly 40 scientists from state and federal agencies and universities are collecting data in the Gulf of Alaska at sites in Prince William Sound, lower Cook Inlet and along the outer Kenai Peninsula coast. AOOS Executive Director Molly McCammon is leading the Program Management Team, and the AOOS data team at Axiom Consulting is providing data management services.

The program is organized into the monitoring components of nearshore species, pelagic species, environmental conditions, and lingering oil, with centralized data management, conceptual modeling, and science synthesis. Data from ongoing observations are integrated with historical information to provide a holistic understanding of the marine ecosystem over multiple decades. The following are some recent highlights from the program:

Environmental Condition Changes

- Waters in the upper 100m of the Gulf of Alaska shelf have shown warming temperatures (1.4 degrees Fahrenheit over 40 years), with intermittent multi-year periods of cooler temperatures. Warmer ocean temperatures can affect the metabolism of a host of marine species. The fall of 2014 was particularly warm with temperatures 1 to 5 degrees Fahrenheit warmer than the recorded average
- Salinity has decreased in the upper part of the water column (0-100m) and increased in waters deeper than 100m on the shelf, which indicates a long-term increase in water column stability (also known as stratification). The decrease in upper ocean salinity is consistent with increased freshwater runoff along the Gulf of Alaska coast.
- Changes in water temperatures and stability can affect the magnitude, timing and duration of primary production in the spring, which in turn affects fish, seabirds and marine mammals.
- These changes have important implications for nutrient availability, biological production and ocean acidification, both in the Gulf of Alaska and, through ocean current connections, on Bering Sea marine ecosystems.

Nearshore Ecosystem Observations

- Mussel abundance declined significantly from 2007 to 2013 across the Gulf of Alaska, and the decline is correlated with changes in sea otter and black oystercatcher diets.
- Sea star wasting disease has not yet been detected at any of the program's monitoring sites in the northern Gulf of Alaska through 2014, in contrast to infected areas identified further south.
- Community structure in rocky intertidal ecosystems is driven by static environmental factors, with significant contributions from the presence of tidewater glaciers, wind fetch, and wave exposure.



The 2014 GulfWatch Alaska program principal investigators met in Anchorage in November to report findings and synthesize results.

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AOOS Gathers Input for 5-year Plan



AOOS is in the process of drafting its next 5-year IOOS funding proposal and is soliciting input from stakeholders and partner organizations. The proposal, due in June, will provide base funding for the AOOS program from 2016-2021.

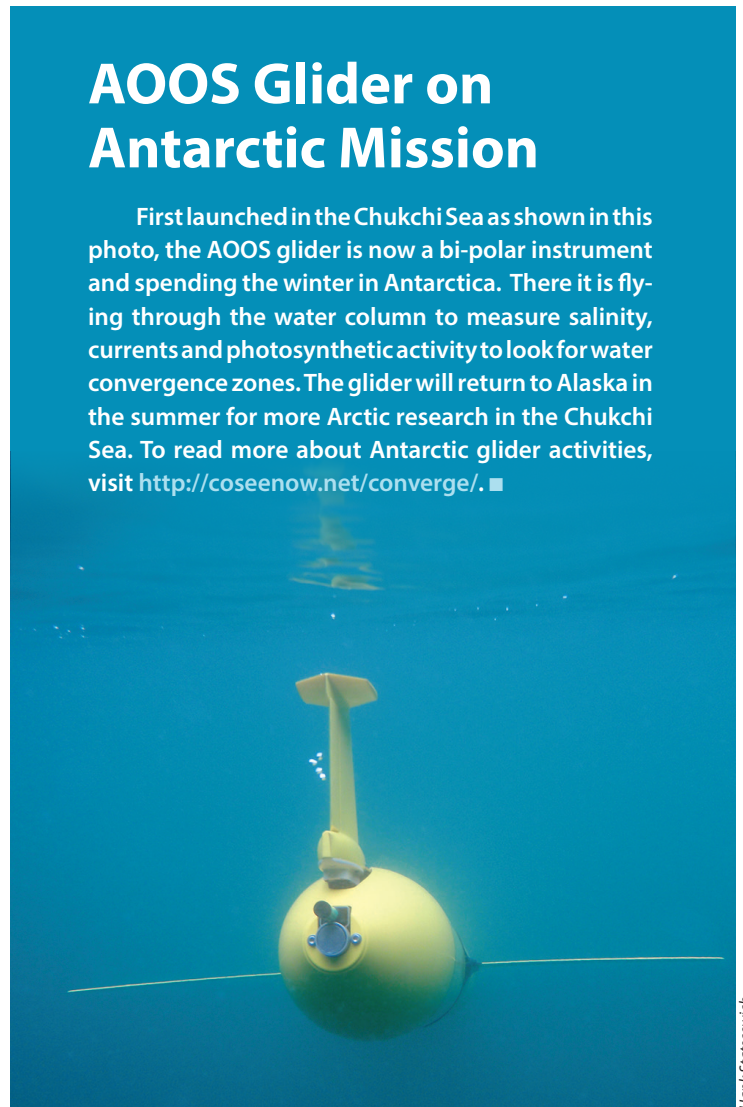
In recent years, AOOS has focused on four priority areas – marine operations, coastal hazards, climate and ecosystem trends, and data management/products. This winter, we are reviewing current program activities and listening to suggestions for new projects. A number of AOOS-sponsored events this fall have helped generate ideas, including a marine operations panel in Nome, a project addressing climate vulnerability and research priorities for the Bering Sea Large Marine Ecosystem, and sessions in Anchorage on eco-forecasting, ocean acidification, and Gulf of Alaska climate & ecosystems. AOOS will also be listening and meeting with stakeholders during the Alaska Marine Science Symposium, Kachemak Bay Research Symposium, and other venues.

You can help provide direct input to AOOS future activities by:

- Participating in an online survey to gauge existing use of AOOS data tools and monitoring tools, user priorities, and new ideas for the future. Keep an eye out for a survey link in January.
- Submitting feedback through the AOOS data portal.
- Talking to an AOOS staff or board member. ■

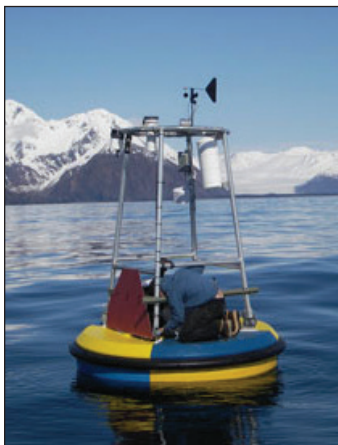
AOOS Glider on Antarctic Mission

First launched in the Chukchi Sea as shown in this photo, the AOOS glider is now a bi-polar instrument and spending the winter in Antarctica. There it is flying through the water column to measure salinity, currents and photosynthetic activity to look for water convergence zones. The glider will return to Alaska in the summer for more Arctic research in the Chukchi Sea. To read more about Antarctic glider activities, visit <http://coseenow.net/converge/>. ■



Hank Starcewicz

AOOS Co-sponsors Ocean Acidification Workshop



A buoy network throughout Alaska measures ocean parameters to document trends in ocean acidification.

Over 100 interested citizens, stakeholders and experts came together in Anchorage on Dec 2 to discuss ocean acidification (OA) and the latest research, policy implications, community perspectives, and potential impacts to Alaska. Another 70 people joined by webinar from satellite stations hosted in Craig, Fairbanks, Homer, Seward and Unalaska.

The overall message was that ocean acidification is already affecting Alaska waters. Monitoring projects across the state are helping researchers better understand exactly how environmental drivers like temperature, salinity and currents influence OA presence and trends. Changes have been particularly noticeable around tidal glaciers and in the Bering Sea. Meanwhile in the lab, researchers are studying how marine organisms respond to lower pH levels in different ways.

Workshop participants heard from members of Washington's Blue Ribbon panel, organized to address OA after shellfish seed stock crashed due to more acidic waters affecting the hatcheries. "Acidification hurts real people, jobs, seafood suppliers, and ecosystems" said Brad Warren, of Sustainable Fisheries Partnership, "but we can do a lot to reduce its potential harm."

A smaller stakeholder group followed up the next day to define statewide needs for OA monitoring, research, education and outreach. The discussion led to a draft Call to Action and a collaborative strategy to continue OA monitoring, beef up research on impacts, and initiate an Alaska Blue Ribbon Panel.

This workshop was organized by AOOS in collaboration with the Alaska Center for Climate Assessment and Policy (ACCAP), Alaska Sea Grant, the Alaska Marine Conservation Council, Kachemak Bay Research Reserve, and UAF's Ocean Acidification Research Center. A recording of the entire Dec 2 program, summary notes of Dec 3 discussions, and the draft Call to Action are posted on the AOOS website, www.aos.org. ■

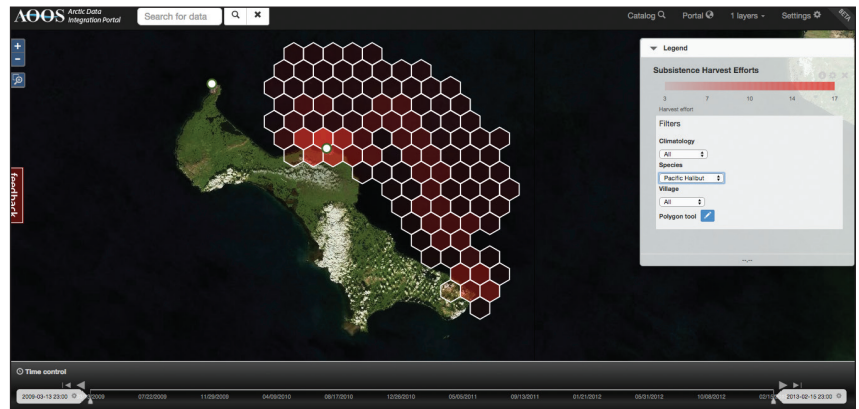
Partnership Adds Subsistence Data to the AOOS Website

This fall, AOOS and the Bering Sea Sub-Network (BSSN) partnered to bring the first wave of subsistence data into the AOOS data portal. For many years, BSSN has worked with communities in western Alaska and eastern Russia to conduct community surveys and map spatial data relating to subsistence harvest and observed environmental change.

A subset of this data – four years of harvest areas used by Gambell residents and two years of harvest areas used by Savoonga residents – is now accessible in an interactive format through the AOOS Ocean Data Explorer. Users can filter data by species (salmon, bowhead whale, dolly varden, halibut, seal and walrus), season, and community. They can also view graphs and charts of harvest effort for a specific location of interest.

The ability to map community use areas with other data layers such as habitat types, ship tracks, climate projections, and sea ice extent can provide useful tools to residents, resource managers, shippers, and others.

BSSN is hopeful that this information will help communicate areas that are particularly important to Gambell and Savoonga residents, leading to greater recognition and protection of those areas in the face of rapid change. However, they note that the data visualization is just a piece of the whole picture and shouldn't replace direct community consultation.



This screenshot shows harvest effort locations for Pacific Halibut for the village of Savoonga on St. Lawrence Island."

Among the many people that made this project possible include the BSSN community research assistants, all the residents that took the time to share their important knowledge, the IRA Councils of Gambell and Savoonga, and Lil Alessa and Andy Kliskey from University of Alaska Anchorage. If you would like more information on the project, contact Maryann Fidel at maryann_aia@alaska.net.

AOOS and BSSN will be working together to add additional data to the AOOS portal in 2015. ■

AOOS Film Contest Attracts Talent

Over 30 outstanding ocean-related films were submitted to the AOOS Short Film contest last fall. Films were required to be under 10 minutes and relate to some element of Alaska's coast or oceans. Topics ranged from scuba diving under 10 feet of Arctic sea ice, to the ups and downs of captaining a fishing boat in Bristol Bay for the first time, to scenes aboard the R/V *Healy*, to why the ocean is important to students in Kotzebue.

The films are now available on the AOOS website, and each one will be highlighted separately on the AOOS homepage starting in January. You can also keep an eye out for film screenings at the Alaska Marine Science Symposium, Alaska Forum for the Environment, and other venues across Alaska. Due to the great turnout of creative and insightful films, AOOS will host another film contest in 2015. ■



Winners!

YOUTH DIVISION

Winner:

Wilderness Explorers Day Cruise: Arina Filippenko and Calesia Monroe

Best treatment of a complicated subject:

Kodiak Crab Divers and Hatchery Red King Crab: Marina Cummiskey

Youth winners received go-pro cameras.

OVERALL

Judges' Choice (Grand Prize, \$1,000): *Siblings at Sea*, Charlie Ess

Honorable Mention (\$300): *Grateful for Salmon*, Margaret Bursch

Best treatment of a complicated subject: *Gyre: Art from a Plastic Ocean*, JJ Kelly

Best Editing: *The Science Behind Managing Shark Populations in Alaskan Waters*, DeAnna Morris

Best Videography: *Spring Passage*, Patrick Farrell

Gulf Watch article continued from cover page

Pelagic (open ocean) ecosystem Observations:

- One killer whale pod, depleted by the oil spill, has not recovered, despite the increase in other pods. These fish-eating resident whales were found to dive much deeper than expected, regularly reaching depths of 250m or more and probably in pursuit of Chinook salmon.
- Humpback whale numbers and diet in Prince William Sound indicate they may be capable of eating an amount of herring equivalent to the biomass level at which the state considers opening a commercial herring fishery.
- Post-spill summer populations of many offshore marine birds in Prince William Sound declined dramatically, while many nearshore marine bird populations remained stable or increased.

Lingering Oil:

- Evidence suggests that many intertidal-foraging vertebrates, including sea otters and harlequin ducks, were exposed to lingering *Exxon Valdez* oil for years to decades post-spill. These populations don't appear to be still exposed to lingering oil, and sea otter and harlequin duck populations appear to have recovered. Oil is known to currently remain in the environment, although the exact amount is uncertain.

More information about the Gulf Watch Alaska program can be found at www.gulfwatchalaska.org or by contacting GWA science lead Kris Holderied at kris.holderied@noaa.gov. ■

Farewell to Ellen Tyler

AOOS bids farewell and thank you to Ellen Tyler who has served as a program manager in the office for the past two years. We have greatly enjoyed Ellen's positive energy and appreciate the many advancements she facilitated within the program. We wish her well in her future pursuits!



CELEBRATING 10 YEARS!

AOOS would like to thank everyone who came to the Anchorage Museum on November 19 to celebrate our 10th Anniversary. The evening was highlighted by several award-winning films from the 2014 AOOS Short Film Contest and a presentation on orca predation by Gulf Watch Alaska scientist Craig Matkin. AOOS Director Molly McCammon reflected on change over the past 10 years and Zdenka Willis, director of NOAA's Integrated Ocean Observing System (IOOS), relayed a message from NOAA Administrator Kathy Sullivan acknowledging AOOS' accomplishments.

The 10th anniversary also marked the 10th year of Molly's leadership as the AOOS executive director. The AOOS staff and board presented her with a Copper River jacket sporting the AOOS logo to show their appreciation.

The AOOS team looks forward to the next 10 years of partnering in Alaska to expand ocean observing!



AOOS Film Contest grand prize winner Charlie Ess accepts his award from Board Chair Ed Page, Molly McCammon, and Darcy Dugan.



Colleagues who had worked with AOOS over the past 10 years join AOOS staff on the stage at the end of the program.