AOOS

Alaska Ocean Observing System

2019 Impact Report

Patrick Debroisse

Letter from Executive Director

Alaska's coasts and oceans are changing more rapidly than ever anticipated, and we in the ocean research and management community are scrambling to figure out how to respond to these changes. In 2019,

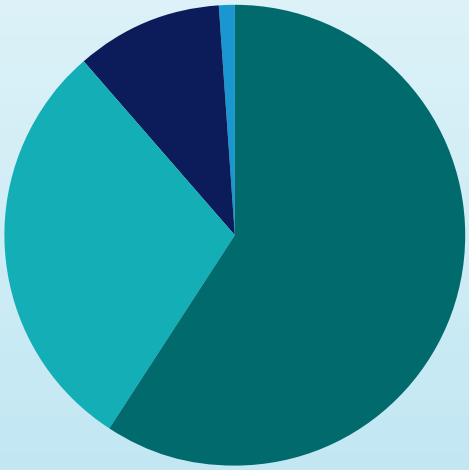
- *AOOS continued efforts to build observing capacity in the Bering Strait Region with funding to add high frequency radars to provide near real time mapping of surface currents. These will help the US Coast Guard and communities respond in the event of a search and rescue event or a potential oil spill.*
- *We are also kickstarting a new underwater glider program to support the commercial fishing industry in the Gulf of Alaska and the Bering Sea.*
- *AOOS was awarded a grant from the US Office of Naval Research and the Bureau of Ocean Energy Management to host the national Animal Telemetry Network. Check out the cool tracks made by tagged animals worldwide.*
- *We successfully concluded the second year of a demonstration project compiling ocean acidification data along the route of the Alaska ferry from Bellingham, WA to Skagway, AK. The new data can be used to highlight OA "hotspots" in southeast Alaska.*

We are grateful for our partnerships with the private sector and other federal, state and local entities. These allow us to provide Alaskans with the scientific information and tools they need to wisely manage and use our resources.

Sincerely,

Molly McCammon

Income by Source



● IOOS ● Other NOAA ● Other Federal
● Other – tribal, state, private, EVOS settlement, etc.
Total: **$4,897,069**

Members

State Agencies
- Alaska Department of Environmental Conservation
- Alaska Department of Fish and Game
- Alaska Department of Natural Resources

Federal Agencies
- Bureau of Ocean Energy Management
- NOAA
- U.S. Coast Guard
- U.S. Geological Survey

State/Federal Agencies
- Alaska Sea Grant

Research Entities
- Alaska SeaLife Center
- NOAA Alaska Fisheries Science Center
- North Pacific Research Board
- Prince William Sound Science Center / Oil Spill Recovery Institute
- University of Alaska
- U.S. Arctic Research Commission

Industry
- North Pacific Fishery Management Council
- Marine Exchange of Alaska
- Hilcorp Alaska

Non-Governmental Organizations
- World Wildlife Fund

Tribal
- Indigenous Peoples Council on Marine Mammals

AOOS Board Officers
- Chair: Katrina Hoffman, Prince William Sound Science Center / Oil Spill Recovery Institute
- Vice Chair: Ed Page, Marine Exchange of Alaska
- Secretary: Cheryl Rosa, U.S. Arctic Research Commission
- Treasurer: James Kendall, Bureau of Ocean Energy Management

AOOS Staff
- Molly McCammon, Executive Director
- Carol Janzen, Director of Operations and Development
- Holly Kent, Director of Administration and Outreach
- Darcy Dugan, Director of Alaska Ocean Acidification Network
- Marta Kumle, Coastal Mapping Strategist

AOOS
Alaska Ocean Observing System

1007 West 3rd Avenue, Suite 100
Anchorage, AK 99501
907-644-6753
www.aoos.org

Observing Changes in Ecosystems, Fisheries & Climate

Ecosystem change in Alaska is a key focus area for AOOS. It has direct social and economic implications that are likely to profoundly affect people and the biological resources they depend on with the advances of climate change.

Year-Round Ecosystem Moorings

The Gulf (of Alaska) Ecosystem Observatory was deployed in fall 2019, joining the Chukchi Ecosystem Observatory in providing year-round biological, physical and chemical measurements throughout the water column. The GEO is a partnership with UAF, the Murdoch Foundation, and NSF's Long Term Ecological Research Program. Two Bering Sea ecosystem observatories will be implemented in 2020.

Ship Surveys Used for Time Series

AOOS is a consortium partner supporting the twice-annual cruises conducted from Seward, AK across the shelf break in the Gulf of Alaska, documenting ecosystem change. The cruises are the longest time series in Alaska and are now part of the Northern Gulf of Alaska Long Term Ecological Research Program, as well as Gulf Watch Alaska, the long-term monitoring program of the *Exxon Valdez* Oil Spill Trustee Council. They are complemented by monthly and quarterly cruises in Kachemak Bay and Cook Inlet.

Gliders for Ecosystem and Fisheries Management

AOOS began a new glider program in 2019 as part of the IOOS Fill the Gaps program to support a period of unprecedented ecosystem change in Alaska. Increased glider operations will provide critical spatial information of marine conditions necessary for fisheries management, improved storm forecast models, mapping the extent and duration of marine heat waves, and detecting marine mammal interactions with these changes.

Bering Sea Data Sharing Initiative

Using funding from a White House Regional Ocean Partnership Data Sharing initiative, AOOS is developing a Bering Sea data portal and dashboard and facilitating increased information sharing between Bering Sea researchers and local Bering communities and Indigenous residents.

Monitoring Water Quality

AOOS supports monitoring of ocean acidification and harmful algal blooms while providing decision support tools and community networks as one of the key focus areas for our program.

Alaska Ocean Acidification Network

Alaska's cold water and other factors create conditions naturally more susceptible to ocean acidification (OA). In response to growing concern and a need for coordinated monitoring and education, AOOS launched the Alaska Ocean Acidification Network which is now in its fifth year. The network supports researcher collaboration, information sharing, and stakeholder engagement. A 2019 "State of the Science" update is available on the web.

Community OA Sampling

As of 2019, over 20 communities from Ketchikan to Utqiagvik are taking weekly water samples to establish nearshore baseline conditions for OA. This effort is mostly carried out by local Tribes and the Alaska OA Network hosts a Tribal Monitoring Network to help strengthen and grow the initiative.

Ferry for Science

In October, the M/V *Columbia* Alaska ferry finished its second year of OA data collection along its weekly 1,800 mile route between Bellingham, WA and Skagway, AK. The data clearly illustrate seasonal cycles in ocean chemistry and begin to identify OA "hotspots". The Columbia will return to service in April.

Long-term OA Monitoring

OA sensors on moorings in the Bering Sea and Resurrection Bay are in their sixth year of providing continuous monitoring data on ocean conditions. AOOS funding also supports the maintenance of four Burke-o-Lators which continuously measure the carbon chemistry of incoming seawater at hatcheries and research labs in Seward, Sitka, Ketchikan and Kodiak. These systems also analyze community samples collected by citizen scientists.

Alaska Harmful Algal Bloom Network (AHAB)

AHAB has grown to 80 members across the state, hosting monthly calls and coordinating working groups on research and monitoring, and education and outreach. Documentation of toxic algae in the water column, cysts in the sediment, and concentrations in marine mammal samples in the Bering and Chukchi Seas has given new attention to this topic in the Arctic and highlighted the need for further monitoring and education. AOOS is leveraging partnerships to collect and analyze subsistence food samples.

Enhancing Marine Safety

Marine operations are a key focus area for AOOS with the goal of improving marine safety through sustaining weather and sea state observations, more effective dissemination of weather information to users, and the development of related information and decision support tools for stakeholders, especially related to the emerging Arctic Marine Highway.

HFR Real-time Surface Current Mapping

Two new shore-based radars were added to AOOS in summer 2019, thanks to additional "Fill the Gaps" funding from Congress. A third radar will be added in summer 2020 to help safeguard communities and marine resources in the Bering Strait region as the emerging Arctic Marine Highway becomes a reality. Radar data is used for search and rescue models, oil spill response, harmful algal bloom tracking and forecasting, water quality monitoring, and safer port and harbor navigation.

Weather Sensors Added to AIS Stations

Alaskans depend on weather information for their lives and livelihoods. AOOS partners with the Marine Exchange of Alaska to increase local weather observations by adding weather sensors to existing and new land-based vessel tracking (AIS) stations. Recent weather/AIS stations were installed at Kodiak, within Prince William Sound, and Southeast Alaska in 2019, bringing the total to 37 new weather stations. Five new stations will be installed in 2020.

Increased Wave Observations

A new wave buoy southeast of Kodiak Island was added to the AOOS system in fall 2019. The buoy was initially installed as part of a Department of Energy wave energy project. AOOS will take over operation and maintenance of the buoy to support the Kodiak maritime community, in addition to the existing Nome and Cook Inlet wave buoys.

Developed Tools Using AIS Ship Traffic Data for Arctic Planning

AOOS worked with the Marine Exchange of Alaska to develop a searchable database of historic ship traffic data. Partnerships with NOAA, the Arctic Domain Awareness Center and the National Academy of Sciences supported development of tools using this data for prioritizing hydrographic surveys of Alaska coastal waters, tracking trends of vessel usage of the Bering Strait region, and assessing risks of oil spills and possible impacts to Beaufort Sea subsistence users.

Responding to Coastal Flooding and Erosion

Improving the ability to forecast and plan for changing storm, sea ice and tsunami conditions and their impacts on coastal communities and habitats is the goal of AOOS' Coastal Hazards and Inundation key focus area.

Alaska Water Level Watch

The Alaska Water Level Watch (AWLW) was convened by AOOS in 2017 as a collaborative group of agencies and industry representatives working to improve the quality, coverage, and accessibility to water level observations in Alaska's coastal zone. The AWLW group communicates through annual meetings and a website hosted by AOOS that features resources, meeting and workshop summaries, links to water level observation data and products, as well as a build-out plan and associated story map. The build-out plan would greatly increase public access to an expanded coastal water level observation network in Alaska, through innovative technologies and collaborative partnerships.

Setting Priorities for Coastal Mapping

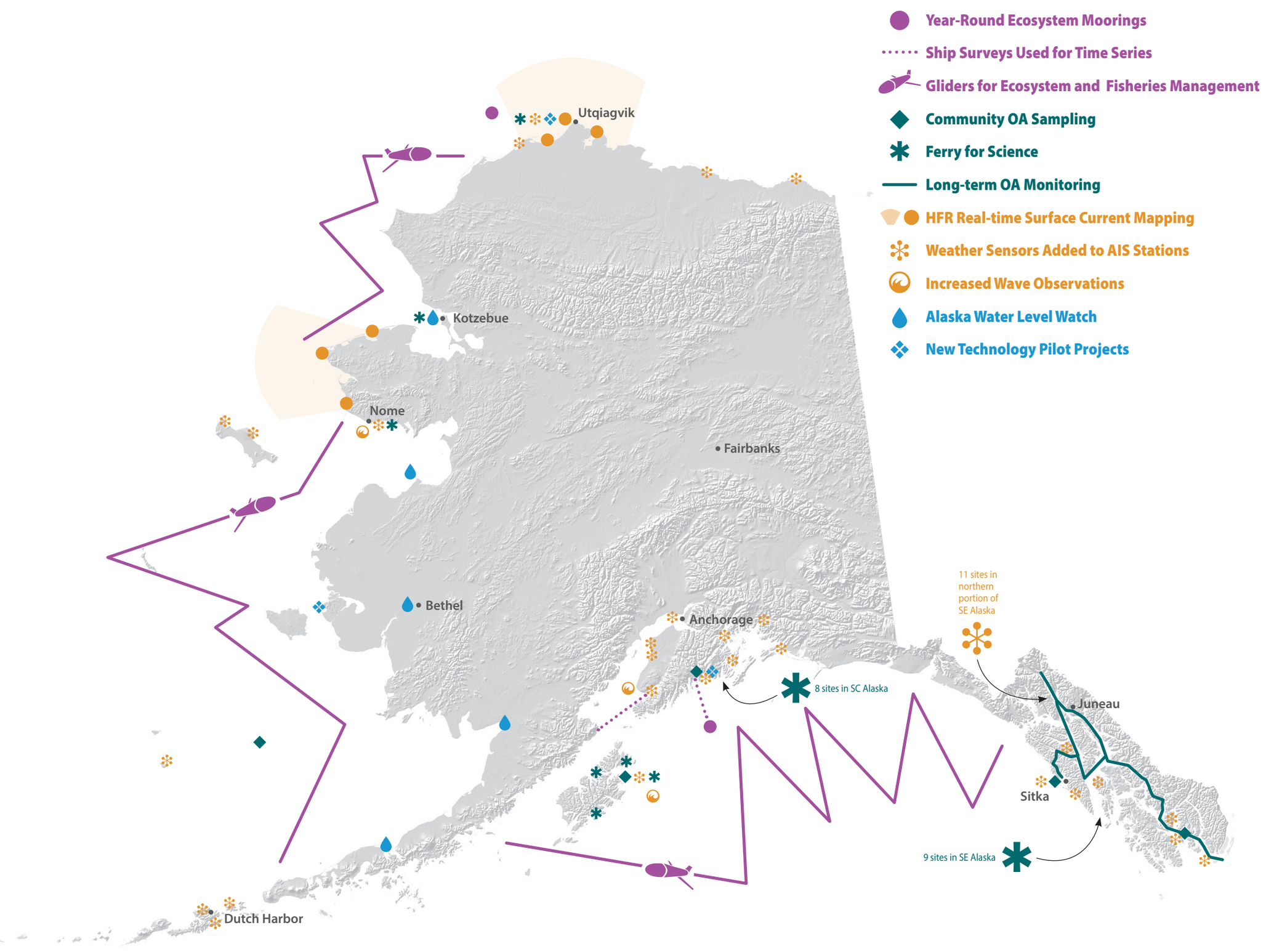
AOOS is helping develop a cohesive statewide strategy for prioritizing collection and mapping of baseline geospatial data in the Alaska coastal and nearshore areas, a priority for the State of Alaska. The strategy is a partnership with the Alaska Department of Natural Resources, NOAA, and USGS, and will be used to set priorities in response to the November 2019 Presidential Memorandum calling for enhanced efforts to map Alaska's coast and EEZ.

New Technology Pilot Projects

AOOS initiated pilot projects in 2017 to assess land-based GPS/Global Navigation Satellite Systems (GNSS) using a reflectometry water level measurement approach to providing water level data. Projects with ASTRA LLC and UNAVCO are being assessed for their potential use as less expensive alternatives to traditional NWLON tide gauges along remote, low-infrastructure regions across the state. Since its inception, the AWLW has increased the amount of water level observations by more than 50% in Western Alaska through the use of non-standard technologies such as these.

Accessing the Data

AOOS and its data team at Axiom Data Science have developed a new data portal as a water level data management system and associated interface to house data from NOAA and the AOOS Water Level Watch Program. This system mirrors the critical functionality of CO-OPS's Tides Online. However, it is designed to accommodate a wider range of observational water level data acquired from external partner sources that may be less "robust" than the Tier A NWLON data.


Year-Round Ecosystem Moorings
Ship Surveys Used for Time Series
Gliders for Ecosystem and Fisheries Management
Community OA Sampling
Ferry for Science
Long-term OA Monitoring
HFR Real-time Surface Current Mapping
Weather Sensors Added to AIS Stations
Increased Wave Observations
Alaska Water Level Watch
New Technology Pilot Projects
Utqiagvik
Kotzebue
Nome
Fairbanks
Bethel
Anchorage
Juneau
Sitka
Dutch Harbor
8 sites in SC Alaska
11 sites in northern portion of SE Alaska
9 sites in SE Alaska