

IMPLEMENTATION & DEVELOPMENT OF ALASKA REGIONAL COASTAL OCEAN OBSERVING SYSTEM (AOOS): Year 2 Core Work Plan

A. Governance and Management

Goal: To support a governance and management structure that meets the requirements of Integrated Ocean Observing System (IOOS) certification.

Objectives: AOOS will (1) support activities of the AOOS Board and Executive Committee; and (2) provide robust programmatic and, with our fiscal sponsor the Alaska SeaLife Center (ASLC), grant administration.

Activities:

1. Support Board and Executive Committee orientation, training, and meetings.
2. Support administrative and programmatic staff.
3. Provide programmatic and grant administration according to AOOS Operating Procedures and IOOS certification requirements.

Milestones:

- At least two (2) Board meetings held per year.
- Semi-annual reports submitted on time (January 31, 2023 and July 31, 2023).
- Financial reports submitted on time.
- Annual audit conducted.

B. Statewide Engagement, Education, and Outreach

Goals: To increase awareness of ocean and coastal issues in Alaska and partner agency missions, and to engage with stakeholders and respond to their needs for ocean and coastal observations and information products.

Objectives: AOOS will (1) facilitate stakeholder engagement and outreach activities and products, including with Alaska Sea Grant (ASG) and IOOS Outreach Committee and (2) seek to expand Diversity, Equity, and Inclusion (DEI) and use of local workforces.

Activities:

1. Support AOOS website, Facebook, and publications.
2. Engage regularly with stakeholders.
3. Pilot use of ASG community liaisons as key collaborators on the local level and provide support for identified outreach activities – *University of Alaska Fairbanks (UAF)/ASG (Eckert) Community Outreach Support*.
4. Participate in IOOS Outreach Committee.
5. Partner with marine education and outreach partners to support education and curriculum materials.
6. Support bi-monthly Alaska Marine Policy Forum with ASG.
7. Collaborate on workforce development initiatives with other IOOS regions, IOOS Program Office, and IOOS Association.
8. Support AOOS and IOOS Association/IOOS Program Office DEI initiatives.

Milestones:

- Outreach and engagement activities conducted, including those with ASG.
- Bi-monthly Alaska Marine Policy Forums held.
- DEI and workforce initiatives tracked with AOOS participation.

C. Statewide Data Management and Cyberinfrastructure

Goal: To serve as the federally certified Alaska regional data assembly center and provide broad access to Alaska coastal and ocean data.

Objectives: AOOS' data contractor (Axiom Data Science [Axiom]) will (1) provide technical support for the AOOS cyberinfrastructure, data portals, and ingest data streams; (2) support the AOOS website and other programmatic websites; (3) collaborate with other regional, national, and international data initiatives; and (4) provide data management services to IOOS Program and other NOAA programs.

Activities: *Axiom (Bochenek) – Core DMAC:*

1. Support the AOOS Data Assembly Center (DAC) and its underlying cyberinfrastructure.
2. Maintain, enhance, and quality control the Ocean Data Explorer (ODE) and other data portals.
3. Maintain and provide access and archiving to existing and new datasets.
4. Support AOOS website and other programmatic websites.
5. Collaborate with other state, regional, national, and international data management activities.

Milestones:

- AOOS DAC, ODE, datasets, and website supported.
- Staff collaborate with State, regional, national, and international data management initiatives, including follow up on recommendations from statewide data capacity assessment completed with prior funding.

Metrics:

- Product Usage Statistics - Monthly summaries of usage statistics for the data portal, website, and products (number of sessions, page views, etc.) using Google Analytics to be included in semi-annual reports.

D. Statewide Modeling Analysis, Products, and Services

Goal: To increase the utility of Alaska ocean and coastal observation data for user products, models and forecasts, and decision support tools.

Objectives: AOOS will (1) support and enhance existing models and data products; (2) develop new products and services; (3) serve as a modeling testbed; and (4) support regional ocean data sharing Initiatives (RODSI) using national ocean partnership program funding.

Activities:

1. Support existing models, data products and applications developed with prior AOOS funding and described under thematic products and services – *Axiom (Bochenek) Core DMAC*. This activity is also partially funded through other NOAA drawlines such as the Regional Ocean Partnership (ROP), Harmful Algal Blooms (HABs), Ocean Acidification Program (OAP).
2. Continue to develop a climate signal dashboard/ "State of Alaska's Coasts and Oceans Report" – *Axiom (Bochenek) Core DMAC*.

Milestones:

- Ongoing support for existing models and products.
- New products and services developed.
- Iteration of climate signal dashboard/State of Alaska's Coasts and Oceans Report developed.

E. Marine Operations

Five Year Goal: To improve safety at sea for maritime, aviation and coastal operators, and emergency responders using real time data, information products, and decision support tools.

Objectives: AOOS will: (1) sustain existing assets and increase new weather and sea-state observations; (2) promote new observations to improve regional forecasts; and (3) share data and products through the AOOS data portals to support related decision support tools.

Engagement Activities: AOOS staff (Janzen and Wisdom) will work closely with Alaska's maritime stakeholders to ensure their needs are incorporated into AOOS plans, including regular briefings of Waterways Safety Committees, Alaska Eskimo Whaling Commission, Prince William Sound and Cook Inlet Regional Citizen Advisory Council (PWSRCAC and CIRCAC), Alaska Pilots, the Department of Homeland Security Arctic Domain Awareness Center, NOAA's Alaska Regional Navigation Manager, and the Alaska United States Coast Guard (USCG) offices. Staff will also conduct focused outreach and solicit feedback with fishermen consortiums, maritime tourism operators, and harbor masters.

Observational Assets and Activities:

1. Sustain eight (8) snow telemetry (SNOTEL) weather and climate observations in Prince William Sound (PWS) and Cook Inlet (CI) with the Prince William Sound Science Center (PWSSC) – *PWSSC (Pegau) Weather & Fish Monitoring*.

Milestone:

- Eight (8) real time SNOTEL stations operating, maintaining, and providing real time data to the AOOS data portal.
2. Continue to partner with Marine Exchange of Alaska (MXAK) to install, operate, maintain, and upgrade/recapitalize co-located weather stations and sea-state observations from Automatic Identification System (AIS) sites, with real time data shared on the AOOS data portal – *MXAK (Mauldin) AIS & Harbor Safety*.

Milestones:

- Ongoing maintenance of existing AIS weather stations.
 - New stations and sensors installed.
3. Provide logistical and contractual staff support to help operate and maintain three existing Coastal Data Information Program (CDIP) wave buoys in Cook Inlet, the Port of Nome, and off Kodiak Island, and to support installation, operation, and maintenance of a new buoy in Bristol Bay (to be installed 2021-22) – *AOOS Staff and Regional Contract(s) (TBD) Wave Buoy Support*.

Milestones:

- Three (3) existing wave buoys operated and maintained on an ongoing basis.
 - One (1) new wave buoy in Bristol Bay installed, operated, and maintained.
 - Acoustic releases, antennas, and other mooring hardware purchased for wave buoys.
 - Scope regional buoy support contract(s).
4. Map surface currents with high frequency and short-range radars at three (3) HFR sites on the Chukchi and Beaufort Sea coasts, and two (2) sites in the Bering Strait region. Add third site in Bering Strait region as funding and logistical feasibility allow - *UAF (Danielson) Arctic HFR, and UAF (Danielson) Bering Strait HFR*.

Milestones:

- Chukchi and Beaufort Seas HFRs operated for open water seasons.
- Two (2) Bering Strait HFRs operated for open water seasons. Third site in Bering identified and permitting begun.

Products and Services:

1. Sustain annual updates to historical Arctic AIS vessel tracking database – *MXAK (Mauldin) AIS & Harbor Safety* and *Axiom (Bochenek) Core DMAC*.

Milestone:

- Annual Arctic AIS updates provided for inclusion on the AIS Prioritizing Arctic Charting (PAC) and AOOS data portals.
2. Support webcam operations on existing infrastructure and host AOOS and other publicly available webcam imagery as the Alaska Webcam Network on the AOOS data portal – *Axiom (Bochenek) Core DMAC*.

Milestone:

- Webcams operated and imagery available on AOOS data portal.
3. Provide access to Shorezone maps and visualizations for use in AOOS data portal – *Axiom (Bochenek) Core DMAC*.

Milestone:

- Shorezone updates available on AOOS data portal.
4. Initiate development of new mariners dashboard or app – in coordination with existing Whale Alert and MXAK – *Axiom (Bochenek) Core DMAC*. This activity is also partially funded through other NOAA drawlines such as the ROP.

Milestones:

- Decision on use of phone app or web-based dashboard.
- Prototype developed.

F. Coastal Hazards

Five Year Goals: To improve forecasts and planning for changing storms, waves and water levels, and sea ice conditions and their impacts on coastal communities and habitats; and to support the Alaska Coastal Mapping Initiative with nearshore mapping.

Objectives: AOOS will focus on (1) increasing water level and wave observations and nearshore bathymetry and (2) providing access to data and developing related products for decision-making.

Engagement Activities: AOOS staff (Janzen) and Alaska Department of Natural Resources (ADNR) will continue to lead the Alaska Water Level Watch (AWLW) coordination efforts and participate in the Alaska Mapping Executive Committee (AMEC) and its Coastal Subcommittee. Staff and ADNR will also engage with NWS Anchorage and Fairbanks forecast offices, Department of Homeland Security and Emergency Management annual coastal storm preparedness meeting, Alaska Association of Port and Harbor Administrators annual meeting, Alaska Silver Jackets, and others.

Milestone:

- Ongoing engagement activities.

Observational Assets and Activities:

1. Implement AWLW and other Coastal Hazard priority projects for Alaska including maintaining the AWLW Build-Out plan, leading the AWLW coordination including access to data through the AWLW data portal, installing alternative water level technologies in remote areas, and working with local communities on mapping strategies and community observing – *ADNR (Overbeck) Coastal Hazard Projects*.

Milestones:

- Coordinate AWLW activities.
 - Operate and maintain community flood staffs, and up to nine (9) iGage and two (2) webcam coastal-change monitoring sites.
 - Operate and maintain two (2) Hydroballs (purchased in prior years) for nearshore bathymetry surveys and report on survey progress.
2. Provide water level technical support including ongoing operations and maintenance of two (2) existing non-National Water Level Observation Network (NWLON) water level installations in Naknek and Dillingham, and the 2022 Utqiagvik Global Navigation Satellite System Reflectometry (GNSS-R) installation, operation, and maintenance; and support other AWLW initiatives as needed – *JOA (Wardwell) Water Level Tech*.

Milestones:

- Subaward implemented for as-needed operations and maintenance of water level stations listed above.
- Data handling and quality control for Naknek and Dillingham station data, providing data for display on the AOOS hosted AWLW data portal.

Products and Services:

1. Continue to support annual upgrades to the Historical Sea Ice Atlas – *UAF (Walsh) Sea Ice Atlas*.

Milestone:

- Annual upgrade.
2. Continue to support the Arctic Oil Spill Risk Assessment Tool on the AOOS data portal for integrated data products describing vessel traffic patterns, estimated oil spill impacts, and community subsistence use data from the Beaufort Sea coast – *Axiom (Bochenek) Core DMAC*.

Milestone:

- Annual update to Arctic AIS database (see Marine Operations, Products and Services (1)).
3. In collaboration with NOAA, continue supporting operation and maintenance of the AWLW Data Portal – *Axiom (Bochenek) Core DMAC*.

Milestone:

- Ongoing operation and maintenance of AWLW data portal, including adding new station data pages and updating functionality as needed.
4. Develop Cook Inlet decision support tools to improve response planning and Ocean Acidification (OA) and Harmful Algal Blooms (HABs) and *NOAA (Holderied) Lower CI Observing*

Milestone:

- Progress on development and presentation of decision support tools for inclusion in the AOOS data system.

5. Coordinate with NOAA bathymetric data products using data delivered from Hydroball surveys – *ADNR (Overbeck) Coastal Hazards Project* and *Axiom (Bochenek) Core DMAC*.

G. Ecosystems, Fisheries, and Climate Trends

Five Year Goal: To document and disseminate data about current and future ocean conditions, ocean and coastal ecosystem productivity and change, and climate trends.

Objectives: AOOS will: (1) build upon and leverage existing programs to support an integrated network of physical, chemical, biological, and community-based ocean and coastal observations in Alaska’s Large Marine Ecosystems (LMEs) including the Gulf of Alaska (GOA), Bering Sea/Aleutian Islands, and Arctic, with a new focus on ocean sound; (2) partner with management agencies and partners to help maintain long time series data collection with new sensors and consistent data collection protocols; and (3) synthesize new and existing data and ensure that data are accessible and usable for priority information products and decision support.

Engagement Activities: Two AOOS staff (Janzen and Prewitt) will engage with government partners, fishery organizations, local communities, and the research community as they respond and adapt to a rapidly changing ocean and coastal environment. Program partners include NOAA (NCCOS, Alaska Fisheries Science Center [AFSC], and Pacific Marine Environmental Laboratory [PMEL]), Tribal governments and organizations, CIRCAC and PWSRCAC, North Pacific Fishery Management Council (NPFMC), the Distributed Biological Observatory (DBO), Arctic Marine Biodiversity Observing Network (AMBON), National Science Foundation (NSF) Long Term Ecological Research (LTER) sites in the GOA and the Beaufort Sea, PWSSC, and others.

Observational Assets and Activities:

Focus Area 1: Sustain long ecosystem time series

1. Support three cruises a year along the Seward Line to continue ecosystem time series documentation and assessments along this long-term GOA transect – *UAF (Hopcroft) Seward Line*.

Milestones:

- Three (3) successful cruises conducted.

2. Support monthly shipboard surveys for oceanographic observations in Kachemak Bay and lower Cook Inlet to aid climate change, OA, and HABs risk assessments – *NOAA (Holderied) Lower CI Observing*.

Milestone:

- Monthly and quarterly cruises conducted.

3. Support annual glider surveys to simultaneously monitor marine mammal acoustic detections and oceanographic parameters in the Chukchi Sea – *UAF (Danielson) Chukchi Glider, Woods Hole Oceanographic Institute (WHOI; Baumgartner) Chukchi Glider, and Oregon State University (OSU; Stafford) Chukchi Glider*.

Milestone:

- Annual survey conducted and days at sea reported.

4. Continue piloting glider surveys in GOA and Bering Sea to develop real time ecosystem indices to inform fisheries management – *UAF (Danielson) EAFM Gliders*.

Milestones:

- Fall and winter glider surveys conducted in the GOA and days at sea reported.
 - Real time data dashboard developed and operational.
5. Support Moored conductivity, temperature, and depth sensors (CTDs) at NOAA Tide Stations in Cordova to understand changing coastal freshwater inputs to PWS – *PWSSC (Pegau) Weather & Fish Monitoring*.

Milestones:

- Ongoing operational support for CTD in Cordova.

Focus Area 2: Support ecosystem mooring build-out plan by enhancing existing or new moorings

6. Support ongoing build-out, addition/replacement of sensors and maintenance of ecosystem mooring network, including the Chukchi Sea Ecosystem Observatory (CEO), the GOA Ecosystem Observatory (GEO), the southern (M2), and northern (M8) Bering Sea ecosystem moorings – *UAF (Danielson) Eco-Moorings* and *NOAA (Stabeno) M2 & M8 Moorings*.

Milestones:

- Purchase new equipment for GEO and CEO moorings, including second benthic camera as part of AMBON.
- Purchase nutrient sensors for Bering Sea moorings.
- Support field logistics and operations and maintain in-use instrumentation at GEO and CEO.

Focus Area 3: Support sound and acoustic moorings to begin build-out of an ocean soundscape

7. Support six (6) acoustic arrays in PWS Ocean Tracking Network (OTN) to track acoustic-tagged fish and marine mammals moving into and out of PWS – *PWSSC (Pegau) Weather & Fish Monitoring*.

Milestones:

- Service network and provide access to data.
8. Expand OTN to the GOA with new acoustic fish, shark, and mammal tracking arrays in Kenai Fjords – *Wildlife Technology Frontiers (WTF; Horning) Kenai Fjords OTN*.

Milestone:

- Install and maintain new acoustic tracking receivers.
9. Support long-term passive acoustic moorings (PAMs) and soundscapes monitoring and analysis at DBO Regions 1-5 and at the M2 eco-mooring for detection of marine mammal species and anthropogenic noise source presence – *NOAA (Berchok) DBO & M2RW Soundscapes*.

Milestones:

- Contribute to support for mid-frequency species and noise data analysis from raw PAM data from 2020-21 DBO and M2 mooring deployments.

Focus Area 4: Support for community-based ecosystem observations

10. Support training for Coastal Observation and Seabird Survey Team (COASST) community observers and continue support for ingesting annual updates of seabird mortality survey data into AOS data portal, started as Darwin Core historical COASST data rescue project – *UW (Parrish) Coastal Seabird Surveys*.

Milestones:

- In-person and virtual trainings for COASST Alaska community observing participants.
- Ongoing annual data and metadata ingestion into historical COASST database in AOS data portal.

11. Leverage the capacity and resources of the Indigenous Sentinels Network (ISN) and provide resources for AOOS data contractor (Axiom Data Science) to explore ways to manage and make accessible Indigenous-collected data – *Aleut Community of St. Paul (ACSP; Divine) Indigenous-led Monitoring*.

Milestone:

- Axiom to provide technical data management advice to ISN.

Products and Services

1. Continue annual Yukon River Chinook salmon run timing forecast, a collaboration with the Alaska Department of Fish and Game (ADF&G) and NOAA's AFSC – *Axiom (Bochenek) Core DMAC*.

Milestone:

- Annual forecast made available on the AOOS data system.
2. Provide annual updates to COASST community observed seabird data products – *Axiom (Bochenek) Core DMAC*.

Milestone:

- Annual update to data products.

H. Water Quality

Five Year Goals: To understand, document and respond to current and future changes in the quality and productivity of Alaska's marine waters and to develop Alaska's capacity for ecological forecasting.

Objectives: AOOS will focus on (1) supporting the Alaska HAB (AHAB) and Alaska OA networks; (2) sustaining and enhancing OA and HABs monitoring; and (3) developing decision support tools for stakeholders. These activities are partially funded in this core budget, but primarily through other NOAA drawlines such as the ROP, HABs, OAP.

Engagement Activities:

1. Support Alaska OA Network director, working groups and stakeholders, and provide representation in OA Information Exchange and Coastal Acidification Network coordination – *AOOS staff with core and OAP funding*.

Milestone:

- Ongoing network support and outreach activities.

OA Observational Assets and Activities and Products and Services:

1. Contribute to consortium funding for NOAA OA moorings in GOA and Bering Sea – *UAF (Monacci) OA Time Series*.

Milestones:

- Monthly water samples collected at GAKOA and GAK01.
 - Annual platform and sensors turned around at GAKOA and GAK01.
Spring and fall platform and sensors turned around at Bering Sea M2.
2. Support shore-based and community-based OA Monitoring at three (3) Burke-o-Lators – *Alutiq Pride Marine Institute (APMI; Hetrick) Seward Burke-o-Lator, NOAA (Long) Kodiak Burke-o-Lator, and Southeast Alaska Tribal Ocean Research; (SEATOR; Lanphier) Sitka Burke-o-Lator*.

Milestone:

- Continuous Burke-o-Lator data collected and uploaded to the IPACOA and AOOS data portals.
 - Analysis of discrete community samples at the Seward Burke-o-lator.
3. Maintain carbon chemistry data collection along Alaska Marine Highway M/V *Columbia* route – *UW (Mordy) OA Ferry*.

Milestone:

- Annual servicing of onboard OA instrumentation.
4. Support entry of priority OA data into the AOOS data portal, develop annual OA State of the Science Updates, and coordinate OA inputs into NOAA Integrated Ecosystem Assessments (IEAs).

Milestone:

- Annual OA State of Science Updates and annual IEA summary.

HAB Observing Assets and Activities and Products and Services:

1. Maintain mariculture siting tool to aid applicants seeking permits to site potential mariculture activities –*Axiom (Bochenek) Core DMAC*. This activity is also partially funded through other NOAA drawlines such as the ROP and HABs.

Milestone:

- Regular updates to mariculture siting tool.
2. Provide support to a UAF graduate student measuring exposure to paralytic shellfish toxins and domoic acid in northern fur seals and Steller sea lions on St. Paul Island in collaboration with the community of Aleut Community of St. Paul Island (ACSP) – *ACSP (Divine) ECOHAB student*. This activity is not part of the AOOS core funding but is being included in this work plan due to timing of disbursements.

Milestone:

- 3 field trips per year to St. Paul Island for sampling during three pupping seasons
- Participation in three scientific conferences: Alaska Marine Science Symposium, Society of Marine Mammalogy, and Symposium of Harmful Algae.