

Semi-annual Program Performance Report for NA11NOS0120020
FY 2011 Alaska Regional Coastal and Ocean Observing System
For reporting period June 1, 2015 – November 30, 2015

Prepared by Molly McCammon, Project PI on December 30, 2015

1.0 Project Summary

The Alaska Ocean Observing System (AOOS) is the regional association for Alaska, managing the statewide and three regional coastal and ocean observing systems for the Alaska region. The mission of AOOS is to provide coastal and ocean observations, forecasts and data and information products to meet agency and stakeholder needs. This project builds upon efforts begun with our initial funding, and takes into account the paucity of real-time observations in Alaska by relying extensively on collaborations and leveraging with other programs. The project represents the priorities identified by stakeholder workshops and adopted by the AOOS Board: 1) Increase access to existing coastal and ocean data; 2) Package information and data in useful ways to meet the needs of stakeholders; and 3) Increase observing and forecasting capacity in all regions of the state, with a priority on the Arctic and the northern Gulf of Alaska (GOA). AOOS has four thematic priorities: sustainability of marine ecosystems and fisheries and tracking of climate change and trends; safety of marine operations; mitigation of natural hazards and their impacts on coastal communities, especially inundation, coastal erosion, and changing sea ice conditions; and regional ocean and coastal partnerships and planning.

2.0 Progress and Accomplishments

2.1 AOOS Regional Management

2.1.1 AOOS Board and Committees

- The AOOS Data Management Advisory Committee (DMAC) met informally by teleconference on June 25 to review and comment on the conceptual draft of the 5-year NOAA proposal submitted on August 31.
- The AOOS Board met on June 29 to review and approve the conceptual draft of the 5-year NOAA proposal. The board also approved funding for two new water level sensors in the Beaufort Sea and support of a new Coastal Resiliency specialist at Alaska Sea Grant.
- The AOOS Board met for its regular fall meeting on November 3. Two new prospective board members attended, Mike Miller of the Indigenous People's Council for Marine Mammals (IPCOMM) and Buddy Custard from the Marine Exchange of Alaska. The board accepted \$160K in new grants.
- The AOOS DMAC met on November 4 to review the Axiom work plan for 2015-2016 and prioritize activities for the next 6 months.

2.1.2 Participation in national IOOS activities

- Executive Director Molly McCammon joined other IOOS regions on July 9 at a Congressional briefing on the Integrated Coastal Ocean Observing System, sponsored by the Senate Ocean Caucus and Senator Wicker, lead sponsor of the ICOOS Act Reauthorization. McCammon moderated the briefing, which was attended by more than 80 Congressional staffers, agency and NGO representatives. McCammon also updated Alaska's congressional staff on the AOS and IOOS programs, and briefed Beth Kerttula, director of the National Ocean Council.
- McCammon met in Chicago August 3-5 with other members of the IOOS Association Executive Committee and IOOS program Deputy Director Carl Gouldman to prepare for the IOOS Association meeting in Florida in mid-September and to strategize on long-term funding options.
- McCammon and new AOS Operations Director Carol Janzen attended a day-long IOOS RA Director Retreat in Gulfport Florida on September 14.
- McCammon and Janzen attended the fall IOOS Association meeting Sept 15-16 with the IOOS Program Office in St. Petersburg FL. McCammon was re-elected to another 2-year term as IOOS Association Treasurer.
- Holly Kent participated in regular IOOS Education and Outreach calls.

2.1.3 Partnerships and external affairs - Alaska

- AOS provided a hands-on workshop on June 10 for resource managers on the Cook Inlet Response Tool (CIRT) in Kenai funded through a grant from the Kenai Peninsula Fish Habitat Partnership
- AOS staff met with Cook Inlet Regional Citizens Advisory Council Science Director Sue Saupe, Port of Anchorage Deputy Director Sharen Walsh and Crowley representative Greg Pavellas to discuss future observational needs in Cook Inlet and the potential for data sharing. When?
- The Yukon Delta Chinook Timing Outlook and Forecast for 2015 was released on June 1 through a partnership between AOS, NOAA Fisheries, and the Alaska Dept. of Fish & Game.
- On July 21, Darcy Dugan and the AOS data team hosted an advisory group meeting for a new Cook Inlet Beluga Ecosystem Portal. The project is being funded by the National Fish and Wildlife Foundation with the goal of integrating and visualizing Cook Inlet beluga sighting data with other biological, physical and socio-economic data in the region.
- McCammon attended the first planning meeting, July 23, for a developing UAF project, A-OK: Alaska Arctic Observatory and Knowledge Hub, to support community observations and information sharing in a changing cryosphere (sea ice, lake and river ice, snow cover, and permafrost).
- McCammon and Dugan joined the first meeting of the NOAA Kachemak Bay Habitat Blueprint implementation team on July 27.
- AOS and Arctic ERMA (Environmental Response Management Application) staff met July 27 for the quarterly update agreed to in their Letter of Agreement.

- AOS launched the “Blob Tracker” on July 29, a Blog on the Pacific sea surface temperature anomalies and their impacts on Alaska.
- McCammon and the AOS Data Team attended the first MARES project PI meeting in Boston on August 7.
- McCammon attended the The Alaskan Arctic. A Summit on Shipping and Ports conference August 23–25.
- McCammon has been asked by Governor Walker to participate in the Alaska Host Committee for upcoming Arctic Council events to be held in Alaska during the next 2 years.
- McCammon attended the recent Alaska Climate Change Executive Roundtable meeting September 10.
- Janzen attended The Arctic Energy Summit held in Fairbanks, Alaska September 27-30.
- McCammon participated as a member of the Alaska Arctic Council’s Host Committee, in several public events during the Council’s Senior Arctic Officials meeting in Anchorage the week of October 19-23.
- Axiom’s Chris Turner participated on behalf of AOS October 19 in a roundtable discussion with the Arctic Council’s Emergency Prevention, Preparedness and Response Working Group in Anchorage.
- Kent and Axiom’s Stacey Buckelew gave a presentation and live website demonstration at the Alaska Association of Harbormasters and Port Administrators conference on October 15.
- Janzen attended the Arctic Marine Protected Areas (MPA) working group on November 9-10.
- Kent attended the 2 day Alaska Sea Grant Advisory Committee meeting November 16-17 on behalf of Director McCammon.
- AOS partnered with Alaska Sea Grant to host sessions of the Alaska Marine Policy Forum on July 15, September 23 and November 18, 2015.

2.1.4 Partnerships and external affairs – national & international

- A number of AOS Board members and partners joined AOS staff in Anchorage June 9 in briefing Dr. Russell Callender, NOAA’s National Ocean Service Acting Assistant Administrator, and Vice Admiral Michael Devany, NOAA’s Deputy Under Secretary for Operations, on how ocean observing is making a difference in Alaska in regards to navigation safety, coastal hazards, and environmental intelligence.
- McCammon participated in the August 31 GLACIER conference on climate change with a number of AOS board members and partners.
- AOS and board members World Wildlife Fund and the US Arctic Research Commission, joined by a host of other agencies and organizations, many of them also AOS board members, hosted a Climate Science Expo for the Media on August 30 prior to the GLACIER conference.
- Janzen represented AOS at the Symposium on the Impacts of an Ice-diminishing Arctic on Naval and Maritime Operations July 14-16 in Washington DC.

- McCammon and Janzen traveled to Victoria, B.C. August 20-21 for a long-planned meeting with Ocean Networks Canada, including CEO and President Kate Moran, to discuss potential collaborations between Canada observing programs and Alaska.
- McCammon attended a dinner with the President's Science Advisor Dr. John Holdren, hosted by National Ocean Council director Beth Kerttula, in Juneau on September 1. The event provided an opportunity to discuss ocean observing with other representatives of the ocean community.
- Bob Rich stopped by the office Sept 9 and met with McCammon to discuss potential collaborations with the Arctic Research Consortium of the U.S.
- The AOS data portal was a key component in prototype decision support tools displayed at the official launching October 21 of the US Department of Homeland Security's (DHS) Arctic Domain Awareness Center (ADAC) at the University of Alaska Anchorage. McCammon participated in the ADAC-sponsored workshop December 14-15 to explore U.S.-Canada opportunities for collaboration.
- McCammon presented on AOS data tools and capabilities at the Arctic Zephyr International Search and Rescue Tabletop Exercise in Anchorage October 19-22 sponsored by the US Northern Command.
- Janzen gave an IGNITE talk on how AOS supports Alaska's Blue Economy at the Marine Technology Society (MTS) and IEEE Oceans '15 conference October 20 in National Harbor MD.
- McCammon and Kent attended the 23rd Biennial Conference from November 8-12 in Portland, Ore.
- McCammon and Janzen attended and presented at the Arctic Observing Open Science Meeting held in Seattle Nov 17-19, 2015.

2.1.5 Program management, administration, fundraising and financial oversight

- Carol Janzen joined the AOS staff as Operations Director on June 29.
- The descope proposal for the FY 15 AOS budget was approved by the NOAA grants office following their request for some additional information.
- Proposal action:
 - AOS/Axiom partnered with Agnew Beck Consulting in submitting a proposal in June to provide communication tools and training for Coastal Resilience and Adaptation in Alaska, in response to an RFP from the US Fish and Wildlife Service's Landscape Conservation Cooperatives. This proposal was funded in July.
 - AOS submitted a proposal to engage stakeholders and develop new planning tools in preparation for increased shipping and marine transportation in the Arctic and through the Bering Strait. The proposal was in response to a NOAA Coastal Resilience funding opportunity and will be considered for possible 2016 funding.
 - AOS also supported a proposal submitted by the Alaska Dept. of Natural Resources to improve flood forecasting and community planning capabilities for western and northern Alaska.
 - AOS submitted the 5-year grant proposal to NOAA on August 31.

2.2 Marine Operations

2.2.1 Maintain Snotel stations in Prince William Sound (PWS) and Cook Inlet (CI)

- Subaward to PWS Science Center.
- Annual maintenance conducted by National Resources Conservation Service.
- Final report for the Hydrographic Model Validation project was received.
- Mooring retrieval system built to recover nonfunctional acoustic sensors.
- Historic ADCP data placed on the Prince William Sound Science Center Research Workspace.
- The thermosalinograph is installed in the vessel, but still needs to be wired for power and data.

2.2.2 Pilot AIS dissemination of weather data

- Subaward to Marine Exchange of Alaska (MXAK).
- AtoN (Aids to Navigation) AIS (Automatic Identification System) installations were completed at Gustavus, Haines, Middleton Island, and Valdez.
- Five marine weather station installations were completed at Dead Horse/Prudhoe Bay, Haines, Juneau AJ Dock (City of Juneau funded), Middleton Island and Valdez.
- Authorization to transmit from all AIS AtoN stations was granted by the United States Coast Guard (USCG) and Federal Communications Commission. Continued improvement and updates to the control and parsing software for this project.
- MXAK has provided a number of test AIS Data Reports to AOOS and came to an agreement on future report formatting, intervals and reporting areas. All quarterly reports should be up-to-date through September 30th, 2015.
- Additional equipment has been procured for new installations to be completed in the winter and spring of 2016

2.2.3 Provide public access to High-Frequency Radar (HFR) data in Chukchi Sea & plan for future HFR

- Successfully deployed and maintained long-range High Frequency Radar (HFR) equipment at Icy Cape, Wainwright, Point Barrow, and Cape Simpson.
- Point Barrow, Icy Cape, and Cape Simpson are remotely powered utilizing wind and solar energy, while the Wainwright site is grid powered.
- Throughout the open water season, all data was made freely available and posted to the NOAA IOOS National HFR Data Server in real-time, as well as on project websites: www.chukchicurrents.com and <http://dm.sfos.uaf.edu/chukchi-beaufort/>.

2.2.4 Weather Research and Forecasting (WRF) wind model for PWS and CI

- This subaward concluded.

2.2.5 Maintain operational Regional Ocean Modeling System (ROMS) model for GOA

- Subaward with YI Chao for maintenance with daily update schedule.
- Continued to run real-time PWS ROMS modeling system on daily basis and uploaded daily output to AOOS data portal. Supported AOOS DMAC team for web interpretation and visualization.

- Tested the ROMS sensitivity to a new fresh-water forcing provided by Prof. David Hill and his team at Oregon State University.

2.2.6 *Validate hydrological model for PWS*

- Subaward to Prince William Sound Science Center.
- Model evaluations are ongoing although funding is complete.

2.2.7 *Ingest ROMS models for Bering Sea into JPL data assimilation system*

- This project has been completed.

2.2.8 *Beaufort Sea wave measurements*

- UAF retrieved the mooring in late summer 2015 with a damaged release mechanism. While attempting to retrieve data it was determined that the instrument failed two days after deployment and has been sent back to the manufacturer for repair.
- Due to delays the mooring was not redeployed in 2015.

2.2.9 *Kenai River web cam*

- Cook Inlet Regional Citizens Advisory Council, city of Kenai, and Marine Exchange of AK provided ongoing maintenance.

2.3 Coastal Hazards

2.3.1 *Monitor prior Alaska Harbor Observation Network (AHON) pilot projects in Seward and Kodiak and assess further expansion of AHON*

- Prior award with Alaska SeaLife Center.
- Equipment is in process of being transferred to the Marine Exchange.

2.3.2 *Maintain Coastal Data Information Program (CDIP) wave buoy in Cook Inlet*

- Buoy deployed in April and is now streaming real-time data.
- Buoy will remain moored over the winter season.

2.3.3 *Produce electronic sea ice atlas*

- Subaward to ACCAP.
- The script for updating the Atlas has been developed, and the first increment of information (2013-2014) has been added to the ice atlas.
- Obtained access to the Shell digital sea ice data, inventoried it in terms of spatial and temporal coverage, and currently developing a procedure to incorporate data into the primary database.
- Work continues on a publication summarizing Alaskan sea ice variations of the past 160 years based on the Alaska sea ice atlas.

2.3.4 *Develop coastal flooding, storm surge and sea level rise products.*

- Subaward continued with ADNRR/DGGS to provide coastal hazard and vulnerability tools and products.
- Seeding data into the Alaska Coastal Profile Tool continues.
- Color-indexed elevation maps have been completed for: Shishmaref, Kivalina, Unalakleet, Shaktoolik, and Golovin (<http://www.dggs.alaska.gov/pubs/id/29129>).
- A DGGS/UAF graduate student intern established DGPS measurements of water levels at project sites to validate Chuckchi/Beaufort tide data.
- Completed installation of 3 water level sensors at Kotzebue, Goodnews Bay/Platinum, and Wales, Alaska.

2.4 Ecosystems/Fisheries and Climate Trends

2.4.1 Maintain Arctic Research Assets Map

- Continued to maintain.

2.4.2 Support sampling along Seward Line

- Subaward to University of Alaska Fairbanks (UAF).
- Anomalously warm temperatures from spring 2015 have persisted but weakened during the summer along the Seward Line.
- Average upper-100m temperatures for the GAK stations were 0-0.9°C above the 18-year mean for those stations, with the largest anomalies at the offshore end. The average anomaly across the line was 0.5°C. Surface water temperatures had even greater anomalies, with stratification more intense than normal along the line.
- Li, K.Z., Doubleday, A.J., Galbraith, M.D., Hopcroft, R.R., *in press*. High abundance of salps in the coastal Gulf of Alaska during 2011: a first record of bloom occurrence for the northern Gulf. *Deep-Sea Res. II*.

2.4.3 Use AOS glider for high-latitude observation node in Chukchi & test glider use for monitoring marine mammals

- Subaward to UAF/Woods Hole/University of Washington to record, detect, classify, and remotely report marine mammal calls in real time from autonomous platforms. Calls are picked up by a digital acoustic monitoring (DMON) instrument and the low-frequency detection and classification system (LFDCS), using previously developed (AOS funded) Arctic-specific call library.
- Slocum G2 glider with DMON/LFDCS ran zig-zag transect in Chukchi Sea from 11 Jul – 8 September 2015 covering over 1000 km in 2 months
- Concurrent continuous acoustic and oceanographic (temperature, salinity, current speed and direction) data were collected
- Preliminary results indicate that killer whales, humpback whales, walrus, fin whales and bearded seals were recorded.
- This deployment represented the longest glider mission in the Pacific Arctic to include near real time monitoring of marine mammals.
- Based on the successes of past AOS-supported years, the PIs were recently awarded an NPRB grant to purchase a dedicated marine mammal glider and operate it in 2016.

2.4.4 Support Distributed Biological Observatory

- Subaward to University of Alaska Fairbanks (UAF) for NE Chukchi mooring.
- Completed construction of 2015 mooring frame, rigging, instrument wiring, and programming.
- Successfully recovered the 2014-2015 mooring on 20 August.
- Successfully deployed two 2015-2016 moorings on 20 August.

2.4.5 Maintain ocean acidification (OA) sampling along Seward Line; support OA sensors on moorings in Chukchi, Gulf of Alaska and Bering Sea; conduct OA monitoring at Alutiiq Shellfish Hatchery; and develop OA forecast for Gulf of Alaska.

- Subaward to UAF.
- Large scale coastal OA cruise in Gulf of Alaska was completed in July. This was an unprecedented OA survey of the northern Gulf of Alaska coastal waters. A number of manuscripts are in preparation, with Jessica Cross leading an overview paper.
- The network of moorings deployed around Alaska continue to collect data in real-time and are providing valuable insights into the processes that control coastal ocean acidification.

2.4.6 Test use of conductivity sensors at Cordova tide station

- Subaward to PWSSC.
- The conductivity sensor was replaced and cleaned.

2.4.7 Support mooring turnovers for biological monitoring

- Subaward to PWSSC.
- The mooring retrieval system will be used to collect 10 acoustic receivers in Port Gravina. Those receivers will be updated and prepared for deployment in the OTN array..

2.4.8 Conduct Conductivity/Temperature/Depth (CTD) surveys in Kachemak Bay and lower Cook Inlet

- Conducted monthly shipboard oceanographic surveys with CTD profiler at mid-Kachemak Bay transect (Homer Spit line).
- Conducted seasonal shipboard oceanographic surveys with CTD profiler at outer Kachemak Bay transect on 21 July, 13 August and 13 October 2014 (1 extra).
- Conducted additional intensive (along-bay and sub-bay) Kachemak Bay oceanographic survey with CTD profilers in August 2014 to assess response of the estuary to anomalously warm summer temperatures.
- Provided CTD data to NOS/NCCOS researchers for PSP studies, to AOS for upload to Gulf of Alaska data portal and to CSDL for model validation.

2.5 Regional Ocean and Coastal Partnerships and Planning

2.5.1 Expand data management capacity to integrate data

- Ongoing. See Section 2.6 below.

2.5.2 Create spatial visualization tools for AK through STAMP project - "Spatial Tools for Arctic Mapping and Planning"

- Added additional data layers to Arctic Portal.
- Submitted project's final report September 25 and closed out project.

2.6 Data Management & Products – Subaward to Axiom Consulting

2.6.1 Support AOS website, data portal & applications. Maintain & provide access to products developed in this project. Explore developing multi-regional products with other RAs.

- Developed new prototype 4 D capability to visualize Gliders, CTD cruises and animal telemetry data sets through (x, y, z, t).
 - Developed new capabilities to visualize biodiversity species richness with hex binning analytics. Deployed to AOOS, SECOORA and CeNCOOS biological data sets (BASIS, Arctic Eis, CSESP, RUSALCA, CalCOFI and Florida SEFSC Reef Fish dataset)
 - Developed ability to run GNOME oil spill trajectories driven by wind and ocean circulation models in real time through ADAC project.
- 2.6.2 *Ingest prioritized datasets, support warehouse and archive functions & provide access through query and mapping tools*
- Ingested and exposed all Shorezone HD video for all of Alaska.
 - BASIS data sets in third cycle of revision.
 - Prototype next generation AIS data analytics complete.
 - Cook Inlet ecosystem layers acquired and integrated (salmon abundance, habitat and AIS).
- 2.6.3 *Continue ADF&G (Alaska Department of Fish & Game) partnership*
- Meeting held to finalize and wrap up project.
- 2.6.4 *Collaborate with other state, regional, national and international data management programs*
- Draft next 5 year proposal in coordination with SECOORA and CeNCOOS
 - Established relationship with UAA DHS Center of Excellence.
 - Work with IOOS and NODC to develop improved submission pathway based upon latest CSESP data sets.
- 2.6.5 *Continue to develop IOOS SOS service and assist other RAs in deployment and begin work on IOOS Systems Integration Test.*
- Processed Tiffany Vance CTD data sets into netCDF compliant packages.
 - Project scoping complete for Scalability Experiment.
 - Development on 52 north SOS 2.0 specification initiated
 - Added additional data sources to IOOS scalability map (missing NDBC stations and RA providers).
 - Exposed high level application programmer interface (API) to scalability map.
 - Attended meeting (August 2015) in Silver Spring to define requirements for scalability map integration.
 - Working with ATN data providers (MARES and Josh London at NMML) to develop submission pathway for ATN DAC.
 - Converged upon HFR group requirements for data transfer and archive.
 - Supporting national MBON effort with research workspace and data coordination activities.
- 2.6.6 *Develop new products and applications*
- Transition of AOOS portal to next generation HTML5/WebGL framework complete.
 - Implemented multidimensional data model (Ocean in 4D).
 - Enabled complex GIS datasets (ones with large numbers of feature types) to provide intelligent information for users during roll over events.

- Implemented new search indexes to support more advanced querying by space, time, taxonomy and parameter.

2.6.7 Provide Data Management services for integrated research programs with separate funding: EVOSTC Long Term Monitoring & Herring Research and Monitoring Programs; NPRB's Gulf of Alaska Integrated Ecosystem Research Program; BOEM MARES; RUSALCA program; and Arctic Ecosystem Integrated Survey.

- NPRB Annual Program added to Research Workspace
- MARES year 1 DM activities wrapping up
- AMBON field season 1 data sets acquired and posted on Research Workspace.

2.6.9 Serve up oil & gas industry data on AOS portal

- Annex 4 datasets acquired and sent to NCEI.

2.7 Modeling & Analysis

2.7.1 Initiate statewide circulation model exchange & ensemble modeling

- Proposed Alaska Modeling Testbed in 5-year proposal.

2.8 Communication, Education & Outreach

2.8.1 Support COSEE Alaska partnership

- Continue to support Community Based Monitoring page on AOS website.
- Closed out COSEE project.

2.8.2 Support AOS website, Facebook and publications

- Continued to add content to website and Facebook page, including news, featured stories, and explanations for new data tools.
- Produced monthly updates.
- Circulated quarterly e-newsletter to list-serve of over 500 recipients.
- Produced hard copy summer newsletter.
- Held 2015 AOS film contest.

2.8.3 Scope out potential Alaska Oceans & Coast Report

- Funding for report is included in next 5-year proposal.

2.8.4 Interact with stakeholders and partners

- Will Koeppen presented a hands-on workshop for resource managers on the Cook Inlet Response Tool (CIRT) in Kenai June 5.
- AOS staff met June 1 with Cook Inlet Regional Citizens Advisory Council Science Director Sue Saupe and Port of Anchorage Deputy Director Sharen Walsh and Crowley representative Greg Pavellas to discuss future observational needs in Cook Inlet and the potential for data sharing.
- A number of AOS Board members and partners joined AOS staff in Anchorage June 9 in briefing Dr. Russell Callender, NOAA's National Ocean Service Acting Assistant Administrator, and Vice Admiral Michael Devany, NOAA's Deputy Under Secretary for Operations, on how ocean observing is making a difference in Alaska in regards to navigation safety, coastal hazards, and environmental intelligence.
- On July 21, Darcy, Rob Bochenek and Stacey Buckalew from the AOS data team hosted an advisory group meeting for a new Cook Inlet Beluga

Ecosystem Portal. The goal of the project is integrating and visualizing Cook Inlet beluga sighting data with other biological, physical and socio-economic data in the region.

- Director McCammon and Darcy Dugan joined the first meeting of the NOAA Kachemak Bay Habitat Blueprint implementation team on July 27. Kachemak Bay was one of three locations in the U.S. chosen to receive NOAA funding for restoration projects, long-term monitoring and research activities, habitat mapping, salmon habitat studies, and training and education programs in the area.
- Director McCammon and AOS Operations Director Carol Janzen traveled to Victoria, B.C. for a long-planned meeting with Ocean Networks Canada, including CEO and President Kate Moran, to discuss potential collaborations between Canada observing programs and Alaska.
- Director McCammon attended the recent Alaska Climate Change Executive Roundtable meeting September 10
- Operations Director Carol Janzen attended The Arctic Energy Summit held in Fairbanks, Alaska September 27-30. Carol presented a slide demo of the AOS Arctic Data Portal and provided examples of what kinds of data plots and products are available.
- Director McCammon presented on AOS data tools and capabilities at the Arctic Zephyr International Search and Rescue Tabletop Exercise in Anchorage October 19-22 sponsored by the US Northern Command. Axiom's Chris Turner participated on behalf of AOS October 19 in a roundtable discussion with the Arctic Council's Emergency Prevention, Preparedness and Response Working Group in Anchorage.
- Operations Director Janzen gave an IGNITE talk on how AOS supports Alaska's Blue Economy at the Marine Technology Society (MTS) and IEEE Oceans '15 conference October 20.
- Holly Kent and Stacey Buckelew gave a presentation and live demo of the Ocean Data Explorer to a group of 35 people at the Alaska Association of Harbormasters and Port Administrators conference on October 15.
- AOS staff met with Arctic ERMA staff November 6 to share current and planned work for the two organizations. Both AOS and ERMA agreed to quarterly meetings to ensure that resources are leveraged.
- Director McCammon briefed the Exxon Valdez Oil Spill Trustees Council November 12 on the status of the Gulf Watch Alaska Program. The Council approved funding for year 5 of the 20-year program. Molly is the overall program lead and AOS provides data management services for both Gulf Watch and the Herring Research and Monitoring Program.
- Directors McCammon and Janzen attended and presented at the Arctic Observing Open Science Meeting held in Seattle Nov 17-19.
- As the Municipality of Anchorage representative on CIRCAC, Director McCammon briefed new mayor Ethan Berkowitz and attended the December 3-4 meeting in Anchorage.

3.0 Scope of Work (Priorities for next 6 months, December 1 2015 – May 30, 2016, and anticipated changes to SOW)

3.1 AOOs Regional Management

3.1.1 AOOs Board and Committees

- Full board meeting planned for March 16, 2016.
- Data Management Advisory Committee informal meeting planned for spring 2016.

3.1.2 Participate in national IOOS

- Continue to participate in IOOS Association activities.

3.1.3 Partnerships and external affairs – in Alaska

- Continue to participate in partnership activities.

3.1.4 Partnerships and external affairs – national & international

3.1.5 Program management, administration, fundraising and financial oversight

- Work on additional funding proposals.
- Continue to work on certification submission.

3.2 Marine Operations

3.2.1 Maintain Snotel stations in PWS and CI

- Contract for maintenance of Snotel stations.

3.2.2 Pilot AIS dissemination of weather data

- Upgrade power supply to remote weather station in Southcentral Alaska (Rocky Island) where solar power alone is insufficient to meet power demands in winter.
- Install AIS AtoN transceivers in Ketchikan, Kodiak, Sitka, Cordova and Seward.
- Install weather sensors in Kodiak, Sitka, Cordova and Seward.
- We were unable to install a remote weather station on any Prudhoe Bay barrier islands this summer due to land-use issues. We will continue to identify all stakeholders and property owners to secure the necessary permissions for an installation during the summer of 2016.

3.2.3 Provide public access to HFR data in Chukchi & plan for future HFR

- Assess how many field sites can be run next year with current funding.
- Renew permits and indemnity for landowners at field site locations.
- Plan logistics and field site locations for the 2015 field season.

3.2.4 Maintain WRF wind model for PWS and CI

- This project is completed.

3.2.5 Maintain operational ROMS model for GOA

- Continue to run the real-time PWS ROMS modeling system on the daily basis.
- Continue to upload the ROMS model output daily to the AOOs DMAC web site and support the AOOs DMAC team for web interpretation and visualization.
- Complete the test the ROMS sensitivity to a new fresh-water forcing provided by Prof. David Hill and his team at Oregon State University.

3.2.6 Validate hydrological model for PWS

- Complete winter hydrographic survey of Prince William Sound.
- Complete thermosalinograph installation.

3.2.7 Ingest ROMS models for Bering Sea into Jet Propulsion Laboratory (JPL) data assimilation system

- No activity. Completed.

3.2.8 Deploy bottom-mounted pressure sensors in Beaufort

- There are plans to deploy the mooring in 2017.
- Use of the wave observations for validation of area WaveWatch III forecasts will be investigated further.

3.2.9 Install Kenai River web cam

- Monitor.

3.3 Coastal Hazards

3.3.1 Monitor prior AK Harbor Observation Network pilot projects in Seward and Kodiak and assess further expansion of AHON

- Implement MXAK takeover.

3.3.2 Maintain CDIP wave buoy in Cook Inlet

- Monitor.

3.3.3 Produce electronic sea ice atlas

- Next major update (through December 2015) will be completed in March 2016, upon receipt of the satellite passive microwave data from the National Snow and Ice Data Center (NSIDC).
- All passive-microwave-derived gridded fields in the historical atlas as well as the updates will be quality-controlled to eliminate spurious coastal strips of sea ice.

3.3.4 Develop coastal flooding, storm surge and sea level rise products.

- Assist NSEDC in deployment of Norton Sound buoy.
- Contact has been extended to Axiom so that DGGS can provide the coastal profile data in an ingestible format for the AOOS portal.
- Extend this map series to more communities in flood-vulnerable locations.
- Complete white paper on water level data gaps in Alaska, agency-specific priorities and sensor type/location feasibility following the May 2015 Integrated Water Level workshop.

3.4 Ecosystems/Fisheries and Climate Trends

3.4.1 Maintain Research Assets Map

- Continue to maintain.

3.4.2 Support sampling along Seward Line

- Process Spring 2015 samples and move on to September 2015 samples.
- Present Seward Line data at AMSS, Pacific Anomalies Workshop #2, and Ocean Sciences Meeting (New Orleans).
- Work on manuscripts describing the first 18 years of Seward Line Zooplankton Data and the 2014/15 anomaly.
- Next Seward line cruise is scheduled for early May – this will be the 19th consecutive spring cruise.

3.4.3 Use AOS glider for high-latitude observation node in Chukchi & continue testing use of gliders for other uses

- Raw acoustic data will be analyzed for all occurrences of marine mammal and anthropogenic sounds.
- Acoustic and oceanographic data (or links thereto) will be provided to Axiom for inclusion in the AOS website.

3.4.4 Support Distributed Biological Observatory: Chukchi Ecosystem mooring

- Hold Chukchi Mooring PI meeting at AMSS to plan for upcoming mooring turnarounds and discuss options for results publication.
- Purchase batteries and equipment and then construct the 2016 mooring.

3.4.5 Maintain OA sampling along Seward Line & OA mooring sensors

- OARC will coordinate with the Hakai Institute to install a second BoL system at OceansAlaska in Ketchikan.
- In May of 2016, we will conduct the spring Seward Line cruise.

3.4.6 Test use of conductivity sensors at Cordova tide station

- Calibrate sensor.

3.4.7 Support mooring array for biological monitoring

- Ongoing.

3.4.8 Conduct CTD surveys in Kachemak Bay and lower Cook Inlet

- Conduct monthly CTD surveys at mid-bay transect in Kachemak Bay.
- Conduct 1-2 seasonal CTD surveys at outer bay transect in Kachemak Bay.
- Provide processed CTD data to AOS data contractor (via Ocean Workspace) for inclusion in public AOS Ocean Data Explorer.

3.5 Regional Ocean and Coastal Partnerships and Planning

3.5.1 Create data management capacity to integrate data

- Ongoing. See section 3.6 below.

3.6 Data Management & Products

3.6.1 Support AOS website, data portal & applications. Maintain & provide access to products developed in this project. Explore developing multi-regional products with other RAs.

- Implement AOS lite application for lower bandwidth users.
- Optimize methods for visualizing gliders and floats.
- Deploy prototype Smartphone application.

3.6.2 Ingest prioritized datasets, support warehouse and archive functions & provide access through query and mapping tools

- Acquire North Slope Borough data sets and make available via workspace.
- Work with Shell to acquire and curate legacy of Arctic data collection.
- Expose Western Alaska unstructured grid models from Rob Grumbine through AOS portals

3.6.3 Continue ADF&G partnership

- Wrap up project.

- 3.6.4 *Collaborate with other state, regional, national & international data management programs*
- Explore relationship with UAA ADAC.
 - Work with MBON community to develop cross regional biodiversity standards.
 - Work with Arctic cyber infrastructure groups on collaborative proposals.
 - Continue to develop Scalability Experiment and integrate into IOOS catalog.
 - Work with RAs to develop QARTOD implementation strategy.
 - Work with IOOS and NCEI to develop improved submission pathway.
- 3.6.5 *Continue to develop/support IOOS SOS service and assist other RAs in deployment and conduct System Integration Test.*
- Complete development on 52 north SOS 2.0 specification.
 - Add additional isolated data sources to IOOS scalability map.
 - Complete integration Scalability map into IOOS catalog.
 - Integrate ATN datasets into relevant RA and ATN DACs using standards that have been created.
 - Establish RSYNC process and centralize radial data sets fro HFR group.
 - Continue to support national MBON effort with research workspace and data coordination activities..
- 3.6.6 *Develop new products and applications*
- Complete development on multidimensional data model (Ocean in 4D).
 - Finalize Cook Inlet beluga Sightings DB layer..
 - Develop seasonal averages (climatology tool) for long-term sensor time series.
- 3.6.7 *Develop advanced visualization system for time series (RUSALCA, Seward Line, GAK 1, Fisheries Data).*
- Process and stage additional zooplankton data sets for RUSALCA and other CBMP Arctic datasets for next generation data visualization.
- 3.6.8 *Provide Data Management services for integrated research programs: EVOSTC Long Term Monitoring & Herring Research and Monitoring Programs; NPRB's Gulf of Alaska Integrated Ecosystem Research Program; BOEM's MARES; RUSALCA program; Arctic EIS program; and Arctic Marine Biodiversity Observing Network – all with separate funding*
- Cultivate and expand capabilities of AOOS Research Workspace.
 - Attend all PI meetings.
 - Deploy annual report tool for NPRB annual program research workspace project.
 - Curate Arctic Eis data sets.
- 3.6.9 *Serve up oil & gas industry data on AOOS portal*
- Manage access to industry data and facilitate updates to the resource.
 - Make data publicly available with simple search tool..
 - Acquire legacy Shell data that hasn't been acquired through CSESP program.
 - Continue to Work with NCEI to streamline archive process.

3.7 Modeling & Analysis

3.7.1 Initiate statewide circulation model exchange & ensemble modeling

- Continue discussion on future AOOS modeling efforts.

3.8 Communication, Education & Outreach

3.8.1 Support AOOS website and publications

- Produce summer newsletter, bi-monthly e-news, and monthly ED updates.
- Implement observing project pages on website.
- Work with partner institutions to include link to AOOS on their website.

3.8.2 Scope out potential Alaska Oceans & Coast Report

- Begin scoping phase for this report.

3.8.3 Interact with stakeholders and partners

- Continue providing demos of AOOS tools to interested organizations and agencies.
- Reach out to local media contacts to improve frequency of earned media.
- Publicize the third annual AOOS Ocean Film Contest.

4.0 Personnel and Organizational Structure

Nothing planned.

5.0 Budget Analysis

All financial reports are up to date and have been submitted on time.

6.0 Issues

None at this time.

7.0 Special Report: Products and Services

7.1 New or improved regional products or services

- Spatial Tools for Arctic Mapping and Planning (STAMP) portal updated with additional data layers and existing layers and metadata refreshed.
- New prototype 4 dimensional visualization capability implemented and applied to gliders, animal telemetry and CTD cruise data for Seward Line, MARES ATN data, RUSALCA and Arctic EIS.
- Working with University of Alaska Anchorage on the Arctic Domain Awareness Center (ADAC) to develop improved tools for emergency response in the Arctic.
- Developed capability to run next generation NOAA GNOME oil spill trajectory model driven by HYCOM (ocean currents) and NCEP (surface winds).
- Working with Defenders of Wildlife to develop Bering Strait emergency response tool
- Next generation historic AIS database prototype developed for Cook Inlet and Bering Strait historic AIS data sets (120 million AIS records).
- 69 additional real time sensors being exposed through the AOOS Real Time Sensor Map.
- 12 new operational model/remotely sensed data sets established as

additional real time import to the backend AOS data system.

- Continued to cultivate a platform (Research Workspace) to support integrated research programs.
- Supported access to Arctic Industry Data through the secured Research Workspace.

7.2 New or improved national products or services

- National Scalability map continues to be expanded and hardened to integrate all national sensor network feeds.
- HF Radar working group project to centralize all range files has been initiated.
- MBON DMAC support activities are in full swing working with Florida, California and Alaska groups.
- Participated in ODIP meeting in Paris to isolate SOS tasks. Further developed the SOS software stack based upon IOOS requirements and published code base for use by all RAs and the national IOOS office.

8.0 Special Report: Data Management

8.1 Progress towards standards-based foundation for DMAC capabilities

- AOS data management staff have made progress on defining requirements for the SOS 2.0 specification.
- Data Management team at AOS has been working with OBIS and the IOOS office to implement and refine standards for the IOOS Biological Data Services to support the MBON effort.
- AOS staff are also working with the animal telemetry community to develop standards for metadata and transfer formats

8.2 Demonstrated progress towards:

8.2.1 Open data sharing

- Several integrated research programs are using the AOS ocean workspace to centralize, document and publish out data sets via AOS portals.
- AOS data archive has increased its data and metadata holdings considerably and improved its user access tools. Larger amounts of data are much more accessible by the general public. AOS website metrics show increased numbers of users who stay longer on the AOS web portals.

8.2.2 Provision of data to WMO GTS

- Much of AOS data is exposed through interoperability protocols and is also available to WMO GTS systems from the source that AOS acquires it from.

8.2.3 Implementation of a service-oriented architecture

- ERDAP servers have been added to the AOS cyber infrastructure stack.
- Interoperability enhancements including increased quality of metadata for higher levels of discoverability.

8.2.4 Use of common vocabularies and identifiers

- ITIS and WORMS taxonomic entities have been applied to biological data sets
- CF Conventions have been applied across gridded and sensor metadata. ITIS has been integrated into the Research Workspace to assist with taxonomic association of project metadata.

8.2.5 *Improved use of metadata conventions*

- ACDD best practices applied to ncML structures

8.2.6 *Data storage and archiving*

- Next generation storage cluster fully functioning now in Portland. AOS is a high availability Data Assembly Center with geo-replication of data and services.
- Annex 4 CSESP program data submitted to NCEI.

8.3 *On-going program-level participation in:*

8.3.1 *Data management planning and coordination*

- Participated in MBON DMAC planning activities.
- Participated in IOOS Biological Data Services calls with the IOOS office.
- Participated in bi-monthly calls when they occur.
- Participate in several ad hoc working groups to strategize on key IOOS efforts such as metadata, SOS and vocabularies.
- Worked directly with Derrick Snowden via ad hoc teleconferences assisting in developing IOOS core technical strategies.

8.3.2 *IOOS maturity levels and certification standards*

- Data Manifest developed to document sources and prepare AOS staff for requirements of certification.

9.0 Special Report: Observing Assets

9.1 *Hatcheries included in monitoring of ocean acidification*

- AOS contributes funds to a consortium to support OA monitoring at the Alutiiq Pride Shellfish Hatchery in Seward, AK.

9.2 *Western AK Norton Sound wave buoy*

- AOS collaborated with USFWS Western AK Landscape Conservation Cooperative to deploy a wave buoy in Norton Sound for summers of 2013 and 2014. AOS is now developing an agreement with the Norton Sound Economic Development Corporation in Nome for them to take over winter storage and summer deployment of the buoy with AOS picking up data transmittal costs.

9.3 *Current inventory of all regional observing assets*

- See updated Attachment A: 2015 RA Inventory for AOS.