Semi-annual Program Performance Report for NA11NOS0120020
FY 2011 Alaska Regional Coastal and Ocean Observing System
For reporting period June 1, 2014 – November 30, 2014

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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 proposal 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 proposal 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

- AOOS celebrated its 10th anniversary at a special event November 19 at the Anchorage museum. Board chair Ed Page and IOOS program director Zdenka Willis helped with the festivities.
- AOOS Data Management Advisory Committee met by teleconference July 11 to review the annual Axiom work plan. The committee met September 25 in Anchorage to review current activities. IOOS Data Lead Derrick Snowden attended – his first visit to Alaska – and discussed data certification issues.
- AOOS Board met in Anchorage October 17 to review and re-elected Ed Page as board chair and Ed Fogels as vice-chair, and elected Cheryl Rosa as secretary and Jim Kendall as treasurer. IOOS Association Executive Director Josie Quintrell attended and discussed annual budget and planning initiatives.

2.1.2 Participation in national IOOS activities

- McCammon attended the IOOS Association fall meeting in Washington D.C. November 5-6. Due to family medical issues, she was unable to attend the RA

Director retreat in August. She participated in all the IOOS Association monthly and Executive Committee teleconferences.

- Darcy Dugan participated in regular IOOS Education and Outreach calls.

2.1.3 Partnerships and external affairs - Alaska

- McCammon participated in meetings of Alaska Center for Climate Assessment and Policy Steering Committee (National Oceanic and Atmospheric Association's Alaska Regional Integrated Sciences and Assessments Program), member; NOAA's regional collaboration team, member; and Cook Inlet Regional Citizens' Advisory Council.
- AOOS partnered with Alaska Sea Grant to host sessions of the Alaska Marine Policy Forum on July 23, September 24 and November 12, 2014.
- McCammon participated in the October 21-22 Alaska Sea Grant Advisory Committee meeting in Anchorage.
- McCammon met as an advisor to the new Northwest Arctic Borough Science Program in Kotzebue August 7-8.
- As lead PI for AOOS in a joint project with the USFWS Aleutian Bering Sea Islands Landscape Conservation Cooperative and the USGS Alaska Climate Science Center to conduct a climate vulnerability assessment for the ABSI region, Tyler participated in a workshop in Unalaska September 18-19.
- AOOS hosted a webinar September 16 with Allison Allen, program manager of NOAA's Ecological Forecasting Roadmap.
- AOOS facilitated a panel discussion on navigation safety on October 6 in Nome as part of Week of the Arctic.

2.1.4 Partnerships and external affairs – national & international

- The AOOS data team (Will Koeppen) participated in the 4th Ecosystem Approach to Management workshop convened by the Arctic Council's Protection of the Arctic Marine Environment working group in Vancouver BC June 16-18.
- Koeppen and Chris Turner attended the Pacific Arctic Group and Distributed Biological Observatory Program meetings in Seattle October 28-31.
- McCammon attended the final meeting of the NAS Gulf Program Advisory Group in Tampa, Florida June 11-13, 2014.
- McCammon met with Admiral Robert Papp, the new U.S. Special Representative for the Arctic on August 14 in Anchorage. She also briefed National Ocean Council and Office of Science and Technology Policy staff in Washington DC on November 5.

2.1.5 Program management, administration, fundraising and financial oversight

- The 2014 AOOS work plan and budget was approved by IOOS and all subawards issued.
- Proposal action:
    - Marine Biodiversity Observing Network, with UAF group on Arctic MBON was APPROVED.
    - NSF Data Infrastructure Building Blocks proposal with University of Colorado was NOT APPROVED.

    - Cook Inlet Beluga Ecosystem Data Portal proposal to National Fish and Wildlife Foundation was submitted.
    - Marine Arctic Research Ecosystem Study (MARES) proposals submitted to BOEM with AOOS as data manager for 2 of them; proposal lead by Stantec was APPROVED.
    - Enhanced Data Management Services for Gulf Watch AK and Herring Research and Monitoring Programs was submitted to the *Exxon Valdez* Oil Spill Trustee Council and APPROVED.
- Contract with Alaska SeaLife Center for fiscal sponsorship was finalized.

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 (NRCS).

2.2.2 Pilot AIS dissemination of weather data

- Subaward to Marine Exchange of Alaska (MXAK).
- Final permitting/approval received from Coast Guard headquarters and FCC to install and operate six ATON (Aids to Navigation) AIS (Automatic Identification System) WX sites in Alaska at Anchorage, Dutch Harbor, Wales, Barrow, Homer and Juneau.
- Field tested range of transmitters and quality of data transmitted with Coast Guard icebreaker HEALY as it operated in Western and Arctic regions of Alaska in summer 2014.
- Twelve marine weather stations installed during this period in Aleutian Islands (Port of Adak and Adak mountain), Southcentral Alaska (Port of Anchorage, Kenai, Nikiski), the Arctic (Barrow and Wales) and Southeast Alaska (Guard Island, Gustavus, Little Island, Scull Island and Tenakee Springs). All data provided on AOOS data portal, in NWS products and to vessels via AIS and/or the pda and smartphone display products.
- MXAK entered into joint project with Cook Inlet Regional Citizens' Advisory Council (CIRCAC) to install weather system in Kenai at mouth of Kenai River in conjunction with new web cam installed with AOOS funding.
- Phase II development of AIS/WX software configuration underway to provide interface for system monitoring and configuration management.

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

- Subaward with University of Alaska Fairbanks.
- 4 sites successfully deployed during open water season.
- All data posted to NOAA IOOS National HFR Data Server (http://cordc.ucsd.edu/projects/mapping/maps/) in real-time, as well as on AOOS Ocean Data Explorer and 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.
- Obtained preliminary results for pilot study (demonstration) of "multi-model explorer" using four different ocean circulation models over lower Cook Inlet and Shelikof Strait.

2.2.6 Validate hydrological model for PWS

- Subaward to Prince William Sound Science Center.
- Hydrological model development and testing nearing completion. Second summer of flow data collected for model. Data used to provide flow estimates to Cordova Electric Cooperative to evaluate hydro-energy potential.
- Collaborated with USGS to conduct CTD surveys in Columbia Bay.

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

- Subaward to UAF (Weingartner).
- Bottom mounted mooring deployed during BOEM-funded ANIMIDA III cruise, July 30, 2014 at 70.63285 N, 150.2331333 W.
- Mooring is a bottom mounted "Sea Spider" fiberglass mooring frame, containing the AOOS funded acoustic Doppler current profiler (ADCP, a 1000 kHz Nortek 5 beam, Signature 1000 current profiler) as well as a Seabird 16+ CTD and transmissometer. The Sea Spider, CTD and transmissometer were contributed to project from UAF equipment pool. ADCP will measure surface wave direction, height and period as well as current speed and direction throughout water column, acoustic backscatter and when ice is present, ice draft and ice velocity.
- Mooring will be in place for 1 year and was placed strategically in Colville River Delta in order to overlap with the spring ice sampling campaign scheduled for 2015. The height of the water column above the mooring surveyed at the time of deployment used precision GPS so that the CTD can serve as a water level sensor.

2.2.9 Kenai River web cam

- A new web cam was installed at mouth of Kenai River for sea ice monitoring and fishing activities in collaboration with Cook Inlet Regional Citizens Advisory Council, city of Kenai, and Marine Exchange of AK (who also installed an AIS and weather sensor on camera pole).

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. Other funding now being used.
- Decided to disband projects due to lack of funding and local support, but will continue to explore other options.

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

- Repairs took longer than anticipated.
- Survey conducted to determine optimal deployment time period – and decision made to wait until spring 2015.

2.3.3 Produce electronic sea ice atlas

- Subaward to ACCAP.
- Weekly sea ice grids for 1953-2012 (augmenting monthly grids of full 1850-2012 period) provided to Axiom and made available for download at Alaska Sea Ice Atlas website.
- Script for updating Atlas developed, and the first increment of information (2012-2013) will be added to the Atlas in early 2015.
- Obtained access to Shell digital sea ice data and now assessing value that could be added by this high-resolution information.
- Conducted survey of atlas users.

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

- Wave buoy in Norton Sound deployed in July and retrieved in September using other funds.
- Discussion with Norton Sound Economic Development Corporation to support future deployments.
- Subaward continued with ADNR/DGGS to provide coastal hazard and vulnerability tools and products.
- DGGS released live online prototype of Alaska Coastal Profile Tool for stakeholder evaluation. Archive datasets now being added to interactive database on rolling basis (approximately 2 sites added per month).
- With NWS and local community leadership, DGGS released pilot Color-Indexed Elevation Map Series for Coastal Communities publication in advance of 2014 fall storm season. Now actively in use by NWS to improve storm surge warnings in 5 western Alaska communities and has laid the groundwork for additional maps of this type.
- Geodetic Leveling of Chukchi/Beaufort Coast Community Tide Gauges completed with fieldwork in October at Barrow, Wainwright, Point Lay and Point Hope sites; sites were instrumented by a Coastal Marine Institute-funded project earlier in fall.
- In preparation for Y-K Delta water level station development discussions in spring 2015, DGGS used AOOS funding to leverage NWS equipment and expertise for opportunistic installation of 3 prototype instruments at 2 sites in western Alaska (Unalakleet and Tununak). These real-time sensors now available on AOOS website.

2.4 Ecosystems/Fisheries and Climate Trends

2.4.1 Maintain Arctic (now Statewide) Research Assets Map

- Transitioned map to HTML. Continued to maintain.

2.4.2 Support sampling along Seward Line

- Subaward to University of Alaska Fairbanks (UAF).

- September cruise conducted with anomalously warm temperatures encountered exceeding 13°C at most stations. The entire line was the warmest on record: 0.5°C above the next-warmest and 1°C above the long-term September mean. High temperatures appear related to anomalous winter in central Gulf of Alaska that left those waters warmer than normal during spring.
- Microzooplankton sampling and seabird/marine mammal observations now formally part of the Seward Line program with NPRB funding.
- Both Wave Rider gliders and the Slocum glider deployed for PMEL during the spring were successfully recovered.
- Water samples collected during both May and September cruises to monitor Cesium -137 fallout from 2011 Fukushima reactor disaster.
- New CTD carousel purchased with partial support from AOOS worked perfectly on the fall cruise. Two of 3 components for Murdock-funded instrument package deployed successfully at all stations.
- Samples were taken for ocean acidification – *see OA report by Mathis.*

2.4.3 Use AOOS 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 (AOOS funded) Arctic-specific call library.
- Improved Arctic call library, including lowering frequency sensitivity due to ambient and glider-generated noise.
- Successfully deployed one AUV glider in Northeastern Chukchi Sea with two-week mission.
- Maintained real-time detection website during mission.
- Recovered glider and completed raw acoustic and oceanographic data within.

2.4.4 Support Distributed Biological Observatory

- Subaward to University of Alaska Fairbanks (UAF) for NE Chukchi mooring.
- Readied equipment for deployment and shipped equipment to Deadhorse, AK. Loaded gear onto R/V Norseman II and sailed from Prudhoe Bay into the Chukchi Sea. Deployed mooring at 71° 35.980'N, 161° 30.3221'W on 20 September 2014.
- Received approval and supplemental funding for sediment trap to be incorporated into 2015 mooring deployment. Ordered second AZFP instrument and sediment trap.
- Supported travel for DBO investigators to DBO PI meeting in Seattle in October 2014.

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.

- Conducted September 2014 Seward Line cruise with expanded sampling. Now have 7 years (14 cruises) of data from Seward Line demonstrating definitive evidence of increasing inventories of anthropogenic CO2 in northern GOA and subsequent changes in ocean carbonate chemistry.
- Four moorings statewide equipped with surface and bottom sensor packages measuring pCO2, pH, temp, salinity, nitrate, oxygen, chlorophyll, and turbidity. We also expanded our observational strategies to include autonomous gliders and vessels-of-opportunity during a coordinated project to investigate the impacts of glacial melt over a broad expanse of the PWS and GOA coastal ocean for 135 days from May through September.
- Collected more than a year's worth of carbonate system data at the Alutiiq Pride Shellfish Hatchery in Seward. The new Burkolator system, installed in August, provides direct measures of pCO_2 and TCO_2, and is part of a larger project to examine carbonate chemistry in hatchery intake water at a number of facilities along the Pacific coast of North America.
- Postdoctoral scientist Samantha Siedlecki has made good progress in modeling efforts aimed toward projecting OA trends in the Gulf of Alaska. She and partners have developed a regional model that provides high-resolution information at scales finer than can be achieved with global simulations and that detail hot spots and trends in a number of locations. This regional model holds promise as a powerful diagnostic and projection tool for this region.

2.4.6 Test use of conductivity sensors at Cordova tide station

- Subaward to PWSSC. Sensor maintained.

2.4.7 Support mooring turnovers for biological monitoring

- Subaward to PWSSC. Data from Ocean Tracking Network acoustic array downloaded. Additional receivers deployed by Stanford University were recovered. Tagged herring data used in Herring Research and Monitoring Program funded by Exxon Valdez Oil Spill Trustee Council.

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) in June, July, August, September, October and November 2014. Months of August, September and November 2014 all set record high average monthly air temperature records at Homer Alaska airport station.
- 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 AOOS 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"

- Assessed April 2014 Stakeholder Workshop recommendations to develop metadata enhancement plan and data ingestion priority list.
- Began working with data providers to transfer data, including ShoreZone imagery and characteristics, Canadian data, and AIS data.

2.6 Data Management & Products – Subaward to Axiom Consulting

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

- Improved data catalog usability by grouping logical data layers into coherent modules (model parameters and multiple GIS data sets).
- Developed and implemented improved keyword scheme.

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

- BSSN subsistence data layers for two communities exposed through AOOS Arctic Portal.
- PacMARS data products and RUSALCA time series phytoplankton data set ingested for exposure in near future through AOOS systems.
- Finalized AI Seabird Vulnerability Assessment data layers (not yet released).
- BASIS data set acquired from NOAA and data ingested (not yet released).
- Approximately 89 new sensors, 3 model ensembles (36 variables) and 142 marine GIS data layers added to AOOS data system.
- Cook Inlet beluga sightings database augmented by 4 additional sources.
- Single Species Important Bird Areas (IBAs) imported
- Arctic Regional Climatology and SNAP historical Sea Ice Atlas data ingested.

2.6.3 Continue ADF&G (Alaska Department of Fish & Game) partnership

- Ran successful 2014 Annual Yukon River Chinook forecast powered by AOOS data feeds with communication and outreach through AOOS website.
- Spatially enabled AYK fisheries datasets loaded onto ADF&G systems.
- Working with ADF&G programmers to expose services for AOOS data system for easier state access.

2.6.4 Support of 2014 APOP portal for support of the BSAI LLC

- Alaska Portal of Opportunity supported through 2014 field season.
- Transferred over to HTML5.

2.6.5 Collaborate with other state, regional, national and international data management programs

- Participated in ADIWG (Alaska Data Integration Working Group) meetings to assist in data integration across Alaska entities.

2.6.6 Continue to develop IOOS SOS service and assist other RAs in deployment and begin work on IOOS Systems Integration Test.

- Worked with several RAs (GLOS and SCCOOS) to develop implementation strategy for QARTOD.
- First milestone of Scalability Experiment met in October.
- Supported bug fixes and cultivation to 52 North software stack.
- IOOS Systems Integration Test completed.

2.6.7 Develop new products and applications

- Hex Binning visualization technique optimized for large spatial time series and taxonomic filtering.

2.6.8 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; RUSALCA program; Arctic Ecosystem Integrated Survey; and Distributed Biological Observatory.

- Supported programs with Research Workspace application.
- Participated in monthly and other PI meetings as needed.
- Visualized PACMARS and RUSALCA phytoplankton data made available on AOOS portal.
- Gulf Watch Alaska project data exposed through AOOS catalog.
- Established new contract for funding from NMFS for Arctic Ecosystem Integrated Survey.

2.6.9 Serve up oil & gas industry data on AOOS portal

- Annex 2 data submitted to NODC archives.
- Data updates received and processed in October 2014 and being served out through Research Workspace.
- Currently 78 users have requested access to industry-provided datasets.

2.7 Modeling & Analysis

2.7.1 Initiate statewide circulation model exchange & ensemble modeling

- Continued to discuss possible opportunities for AOOS to add value to existing modeling efforts
- Reviewed Conceptual Design and Pilot Demonstration of Multi-Model Explorer developed by Yi Chao.
- Compiled statewide inventory of current needs and existing capabilities for ecological forecasts of HABs, vibrio, pathogens, species and habitat distribution and change throughout the state.
- Hosted webinar on ecological forecasting in Anchorage in September in cooperation with NOAA's Ecological Forecasting Roadmap.

2.8 Communication, Education & Outreach

2.8.1 Support COSEE Alaska partnership

- Supported planning for Communicating Ocean Sciences Workshop at AMSS January 19 2015.
- Supported Community Based Monitoring handbook developed as product of CBM Workshop held in April 2014.

2.8.2 Support AOOS 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 bi-monthly e-newsletter to lisserve of over 500 recipients.
- Produced hard copy summer newsletter.

2.8.3 Scope out potential Alaska Oceans & Coast Report

- Continue to refine draft white paper with Alaska Sea Grant Program and explore funding options.

2.8.4 Interact with stakeholders and partners

- Worked with steering committee to develop plans for 2014 AOOS 10th Anniversary events.
- Sponsored 10th Anniversary AOOS Short Film contest; received 32 entries. Held judging session and selected 7 awards that were handed out at 10th Anniversary Celebration.
- Conducted presentations with demos to receive feedback on new AOOS Arctic and Gulf of Alaska portals. Audiences included:
- Gave presentations at these events:
    - Rob Bochenek demonstrated the updated Cook Inlet Response Tool at the CIRCAC Environmental Monitoring Committee Sept 5
    - Molly McCammon co-hosted a 2 hour informational webinar Sept 30 on the Gulf Watch Alaska Program geared toward agency managers.
    - McCammon gave an overview of AOOS capabilities to NOAA National Weather Service visitors John Murphy and Helmut Portmann on October 21.
    - McCammon participated in AK Arctic Policy Commission Research Needs Listening Session October 27.
    - Chris Turner (Axiom) presented the AOOS Arctic portal to the World Wildlife Fund's Russian Arctic contingent on Nov 14.

3.0 Scope of Work (Priorities for next 6 months, December 1 2014 – May 31, 2015, and anticipated changes to SOW)

3.1 AOOS Regional Management

3.1.1 AOOS Board and Committees

- Full board meeting planned for spring.
- Data Management Advisory Committee meeting planned for February 2015.

3.1.2 Participate in national IOOS

- Participate in IOOS Association spring meetings in Washington DC in March 2015.
- Continue to participate in IOOS Association activities.

3.1.3 Partnerships and external affairs – in Alaska

- Conduct stakeholder workshops in anticipation of next 5-year proposal.
- Hold ocean acidification workshop with ACCAP in December 2014.
- Conduct user survey of AOOS products and stakeholder needs.

3.1.4 Partnerships and external affairs – national & international

- Hold follow-up with meetings with Admiral Papp and Beth Kerttula.

3.1.5 Program management, administration, fundraising and financial oversight

- Work on additional funding proposals.
- Continue consideration of possible 501(c)(3) once ICOOS Act is reauthorized.
- Develop plan for certification implementation.

3.2 Marine Operations

3.2.1 Maintain Snotel stations in PWS and CI

- Conduct annual maintenance. Consider moving station in CI.

3.2.2 Pilot AIS dissemination of weather data

- Install weather environmental sensors/AIS WX stations in Skagway and Ketchikan to assist cruise ships with safe moorage of vessels in increasingly tight waterways.
- Upgrade power supply to remote weather stations where solar power alone is insufficient to meet power demands in winter.
- Explore options for taking over abandoned weather sites in Seward Harbor and Kodiak.

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

- Winterize sites.
- Funding secured from North Slope Borough/Shell Baseline Studies program to relocate Point Lay field site northward to Icy Cape, where it will be remotely powered by solar and wind energy.

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 operating ROMS model at basic level.
- Collect more comments and feedback on "multi-model explorer" pilot project.

3.2.6 Validate hydrological model for PWS

- Report results.

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

- Work with NCEP to ensure data is used to validate WaveWatch III model.

3.2.9 Install Kenai River web cam

- Provide camera access on AOOS website.

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

- Removing most equipment. Leaving towers in place for future use.
- Exploring options of possible MXAK takeover.

3.3.2 Maintain CDIP wave buoy in Cook Inlet

- Buoy to be deployed in February/March 2015.

3.3.3Produce electronic sea ice atlas

- Atlas will be updated on semi-annual basis.
- Next update planned for January 2015.
- User survey results to be finalized.

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

- Plan for deployment of Norton Sound buoy.
- Seed Interactive Coastal Profile Tool with remaining archive database at DGGS and solicit format feedback from stakeholders.
- Present pilot Color-Indexed Elevation Map Series for Coastal Communities at AMSS.
- Post-process 2014 field calibration measurements of Chukchi/Beaufort Coast Community Tide Gauges.
- Select 2015 sensor sites for Pilot Development of Short-Term Water Level Stations and design sensor specs and formulate 2015 installation plan.

3.4 Ecosystems/Fisheries and Climate Trends

3.4.1 Maintain Research Assets Map

- Determine continued need for product.

3.4.2 Support sampling along Seward Line

- Next cruise: May. Hope to add nitrate sensor.

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

- Complete detailed analysis for 2014 data and continue to fine tune call library further based on our analysis.

3.4.4 Support Distributed Biological Observatory

- Order additional equipment and construct mooring frame for 2015 deployment.
- Invite C. Lalande to Seward to train UAF mooring technicians on operation of sediment trap
- Finalize plans for 2015 recovery/deployment operations at sea given changes in oil industry plans for environmental research.

3.4.5 Maintain OA sampling along Seward Line & OA mooring sensors

- Continue processing mooring data in preparation for Alaska Marine Science Symposium, finish synthesis paper based on 6 years of data from the Seward Line cruises for submission to the Journal of Geophysical Research, and submit paper describing carbonate chemistry trends at Alutiiq Pride Shellfish Hatchery.
- Continue supporting OA monitoring activities at the Alutiiq Pride Shellfish Hatchery in Seward, at 4 mooring sites and on May 2015 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

- Download data.

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 two seasonal CTD surveys at outer bay transect in Kachemak Bay.

- Provide CTD data to CSDL, AOOS and others as requested.
- With funding from BOEM, add more oceanographic monitoring.
- Use results to develop new decision support tools for resource management and habitat restoration, leveraging additional support from and collaborations under NOAA's Habitat Blueprint program that has designated Kachemak Bay as the Habitat Focus Area for Alaska.

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.

3.5.2 Create spatial visualization tools for AK: STAMP

- Continue adding relevant data layers to the STAMP/Arctic portal.
- Augment and refine metadata for Arctic data.
- Produce an "AOOS lite" version tailored for Arctic communities.
- Close out project.

3.6 Data Management & Products

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

- Improve data catalog usability by refining metadata page for compound data layers.
- Continue to improve indexing of AOOS data assets so users can search by space, time and taxonomy.
- Implement advanced dynamic legend for grids and models.
- Develop AOOS lite mockup.

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

- Continue to ingest data sets to support STAMP tool and Arctic Portal with focus on fisheries, marine mammals, subsistence use and habitat.
- Ingest and expose Shorezone HD video for all of Alaska, updated Marine Arctic Synthesis data layers, and AIS dataset from Marine Exchange of Alaska.

3.6.3 Continue ADF&G partnership

- Continue to support and prepare for next salmon season.
- Implement AYK salmon study interactive GIS data layer through AOOS interface.

3.6.4 Collaborate with other state, regional, national & international data management programs

- Develop partnership with UAA DHS Center of Excellence.
- Work with Arctic cyber infrastructure groups on collaborative proposals.

3.6.5 Continue to develop/support IOOS SOS service and assist other RAs in deployment and conduct System Integration Test.

- Continue to support IOOS 52 North SOS server.
- Complete IOOS SOS scalability experiment and integrate into IOOS catalog.

- Work with IOOS and NODC to develop improved submission pathway for archiving RA data.

3.6.6 Develop new products and applications

- Continue to improve Ocean Portal Framework in HTML 5 to enable AOOS applications to run on iPad/iPhone.
- Implement multidimensional data model.

3.6.7 Develop advanced visualization system for time series (RUSALCA, Seward Line, GAK 1, Fisheries Data).

- Process and stage additional RUSALCA and other CBMP Arctic datasets for next generation data visualization.
- Explore data visualizations for Seward Line, ocean moorings and ocean acidification data.
- Publish NOAA fisheries data (BASIS), RUSALCA and CBMP datasets for public use.

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.
- Kick off MARES and MBON projects.

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.
- Work with NODC 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 COSEE Alaska partnership

- Assist with closing out COSEE Alaska.
- Collaborate on Communicating Ocean Sciences workshop in January 2015.

3.8.2 Support AOOS website and publications

- Produce winter 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.

3.8.3 Scope out potential Alaska Oceans & Coast Report

- Circulate white paper to potential partners.

3.8.4 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.

- Produce touch-screen exhibit for use in Anchorage Museum's 2015 sea ice exhibit.

4.0 Personnel and Organizational Structure

Developed position descriptions for a new Operations Director position and to fill the Program Coordinator position currently held by Ellen Tyler.

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

- All AOOS user interface applications transitioned to HTML 5 and now work on tablets and smart phones.
- AOOS Ocean Explorer – Flagship instance of the AOOS Ocean Portal framework which provides access to the entire catalog of data resources contained within AOOS data system.
- Working with NMFS to develop Cook Inlet beluga sighting database and interactive web application.
- Bering Sea Sub Network subsistence survey data set exposed through custom interactive hex binning layer.
- General methodology being developed to display four-dimensional physical and biological data sets for several research programs (RUSDALCA, DBO, Artcic EIS, PacMARS and BASIS).
- Additional real time sensors being exposed through the AOOS Real Time Sensor Map.
- 16 new operational model/remotely sensed data sets have been established as additional real time import to the backend AOOS data system.
- Continued to cultivate a platform (Research Workspace) to support integrated research program. The tool provides a secure collaborative environment for scientists in geographically distributed agencies to share and document datasets.
- Supported access to Arctic Industry Data through the secured Research Workspace.

7.2 New or improved national products or services

- 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

- AOOS data management members have played a key role in the IOOS Systems

Integration Test activity. Several Python notebooks were developed which explore the feasibility of performing analysis on large climate models over IOOS web service standards. The results of this assessment are being developed into a report.

- AOOS data management staff are involved in implementation of the IOOS Scalability Experiment, a project to assess the scalability of IOOS back end technology. A prototype of a national sensor map integrating all known national sensor networks was demonstrated in September of 2014.
- AOOS has contributed heavily towards development and support of SOS 1.0 suite of specifications in addition to manifesting those specifications into the 52 North SOS Core, ncSOS and other modules of the IOOS SOS stack.

8.2 Demonstrated progress towards:

8.2.1 Open data sharing

- Developing and implementing the SOS 1.0 spec has greatly improved the ability of AOOS and other RAs to openly share sensor data sets. AOOS data management staff played a key role in authoring the IOOS SOS templates.
- AOOS 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. AOOS website metrics show increased numbers of users who stay longer on the AOOS web portals.

8.2.2 Provision of data to WMO GTS

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

8.2.3 Implementation of a service-oriented architecture

- Interoperability enhancements including load balancing for performance and increased quality of metadata for higher levels of discoverability.

8.2.4 Use of common vocabularies and identifiers

- 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

- Improved ncML and SensorML to be compliant with IOOS best practices.

8.2.6 Data storage and archiving

- East Coast data center fully functioning now. AOOS is a high availability data assembly center with geo-replication of data and services
- Continued talks with NODC to develop semi-automated data and metadata transfer.

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 Hassan W. from 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.

- Work directly with Derrick Snowden via ad hoc teleconferences assisting in developing IOOS core technical strategies.

8.3.2 IOOS maturity levels and certification standards

- Internal strategy discussions have started concerning certification and requirements.

9.0 <u>Special Report: Observing Assets</u>

9.1 Hatcheries included in monitoring of ocean acidification

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

9.2.1 Western AK Norton sound wave buoy

- AOOS collaborated with USFWS Western AK Landscape Conservation Cooperative to deploy a wave buoy in Norton Sound for summers of 2013 and 2014. AOOS 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 AOOS picking up data transmittal costs.

9.3 Current inventory of all regional observing assets

- See updated Attachment A: 2014 RA Inventory for AOOS.