Program Number
Gulf Watch Alaska 15120114 and 15120120

Program Title
Gulf Watch Alaska

Team Leads Submitting Proposal
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Program Website
www.gulfwatchalaska.org

Contents

FY15 PROGRAM PROPOSAL SUMMARY PAGE

Program Title: Long-term Monitoring of Marine Conditions and Injured Resources and Services

Program Period: February 1, 2015 – January 31, 2016

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Program Website: www.gulfwatchalaska.org

Abstract*: The goal of the Long-term Monitoring (LTM) program, now known as Gulf Watch Alaska, is to provide sound scientific data and products that inform management agencies and the public of changes in the environment and the impacts of these changes on *Exxon Valdez* oil spill (EVOS) injured resources and services. The five-year program includes: 1) four monitoring components (environmental drivers, benthic, pelagic, lingering oil); 2) data management services; 3) integrated syntheses of data; 4) historic data recovery and syntheses; and 5) science outreach.

The program has six primary objectives:

1. Sustain and build upon existing time series in the EVOS-affected regions of the Gulf of Alaska.
2. Provide scientific data, data products and outreach to management agencies and a wide variety of users.
3. Develop improved monitoring for certain species and ecosystems.
4. Develop science synthesis products to assist management actions, inform the public and guide monitoring priorities for the next 20 years.
5. Enhance connections between the Gulf Watch Alaska and Herring Research and Monitoring (HRM) programs.
6. Leverage partnerships with outside agencies and groups to integrate data from broader efforts.

Some highlights from our progress in year 3 of the program include:

- Completed all project sampling and program reporting
- Updated and added information to the program website (www.gulfwatchalaska.org) and data portal
- Developed and documented new protocols for certain species
- Held successful annual meeting and time series workshop, launched two new working groups, and elected the program Science Review Team
- Collaborated with the HRM program in joint synthesis reports, program meetings, and program reports

Estimated Budget:

EVOSTC Funding Requested* (*must include 9% GA)*:

FY12	FY13	FY14	FY15	FY16	TOTAL
2,904.7	2,675.3	2,993.9	2,803.2	2,405.6	$13,782.3*

**Includes a FY shift of funds from FY14 to FY15 for lingering oil 14140114-S*

Non-EVOSTC Funds to be used:

FY12	FY13	FY14	FY15	FY16	TOTAL
$1,784	$1,738	$1,823	$1,802	$1,536	$8,614

**If the amount requested here does not match the amount on the budget form, the request on the budget form will considered to be correct.*

Date: September 2, 2014

I. EXECUTIVE SUMMARY

This proposal is a continued program funding request for year 4 of the five-year funding cycle. The Gulf Watch Alaska long-term monitoring program is structured in four components with linked projects within them: Environmental Drivers, Pelagic monitoring, Benthic monitoring, and Lingering oil. The broader framework of the program also provides for administration, data storage and management services, synthesis and coordination, and public outreach. The overarching goals of the program are to collect and analyze long-term ecological monitoring information from the Gulf of Alaska Exxon Valdez Oil Spill (EVOS) affected region, to make it publicly available, and to assess it holistically in order to better understand the range of factors affecting individual species and the ecosystem.

The program is structured into the following components. We have included project highlights from this past year for each of these continuing projects. Detailed Fiscal Year 2015 proposals for each of the individual projects can be found in Appendix 1.

Integrated program management, data services, outreach, science synthesis and modeling

- *Program coordination and logistics – Katrina Hoffman and Molly McCammon, Prince William Sound Science Center (PWSSC) and Alaska Ocean Observing System (AOOS)*
  During this past six months, we have convened the program Science Review Team. This group provides review and oversight to the products and protocols developed by LTM scientists. The panel recently completed reviews of the monitoring projects' sampling protocols. The Program Management Team (PMT) has also worked with EVOSTC staff to revise reporting and proposal forms. A clean audit was completed. Program coordinators have met all meeting logistics needs and all contracts and invoice management efforts are going smoothly.

- *Outreach – Molly McCammon, AOOS*
  The GWA website (www.gulfwatchalaska.org) continues to be the program's major outreach tool and is updated regularly with new project work and data. We participated in the AOOS and Alaska Sea Grant-sponsored Community Based Monitoring (CBM) workshop held in April 2014 to identify best practices and lessons learned for CBM type activities in Alaska, and followed it with a half-day session exploring potential CBM-type activities in the GWA geographic region. That session was attended by about 20 key education, outreach, and citizen science leaders from the GWA geographic region. The 2014 Discovery Labs at the Kachemak Bay Research Reserve in Homer had 243 participants and focused on nearshore benthic ecology, oceanography, marine mammals, and a history of the *Exxon Valdez* oil spill.

- *Data management –Molly McCammon and Rob Bochenek, AOOS/Axiom Consulting*
  Data management team investigators have delivered a data system that provides the Gulf Watch Alaska LTM researchers with an internal Research Workspace to manage and share information among study teams in addition to providing them with effective pathways to make their information publicly available for further use. The GOA data portal provides resource managers and scientists outside the program access to both Gulf Watch Alaska-produced and GOA-relevant ecosystem data to improve management decisions and accelerate information synthesis. We have continued to work with LTM researchers to improve both the Research Workspace storage system and the data portal.

- *Historical data management and synthesis – Matt Jones, National Center for Ecological Analysis and Synthesis (NCEAS)*

The following are some highlights from this project:

  - Historic data compilation and documentation of 27% of 419 historical data sets from past EVOSTC projects
  - Development and deployment of a DataONE Gulf of Alaska Member node (https://goa.nceas.ucsb.edu)
  - Replication of historical data from the GoA Member node to 2 geographically dispersed replica member nodes throughout the US
  - Development of multiple releases of the Metacat data management system to support the GoA member node, along with new user interface customizations for that site
  - Development and maintenance of multiple Morpho metadata editor releases, and training of GulfWatch personnel on Morpho usage
  - Development of ability for GoA users to publish data using a DOI identifier to make the data set citable in primary literature. For example:
    - Brenda Norcross, Gary Borstad, Evelyn Brown, and Stephanie Moreland. Estimating forage fish distribution and abundance using aerial surveys in Prince William Sound, Alaska: 1995 - 1999. doi:10.5063/F15H7D6G Published 2013.
  - Data integration and synthesis of multiple large scale data sets in preparation for broader synthesis activities, including ADCP, Sea bird data, and other spatially extensive data sets. Derived data are integrated into the GoA data portal.
  - Development of a prototype system for creating and archiving derived data sets from primary data with full traceability. The system archives derived data, visualization outputs, analytical scripts, and a full provenance trace linking these systems. The new user interface for this system will be deployed in the production GoA member node in year 4.
  - Issued Call for Proposals, conducted rigorous peer review process, and selected 2 synthesis working groups to begin activities in Fall 2014. These working groups are:
    - Kristin Marshall, Anne Beaudreau, Richard Brenner, Mary Hunsicker, Eric Ward, and A. Ole Shelton. Applying portfolio effects to the Gulf of Alaska ecosystem: did multi-scale diversity buffer against the Exxon Valdez oil spill?
    - Thomas Okey, Terrie Klinger, and James J. Ruzicka. Understanding changes in the Coastal Gulf of Alaska Ecosystem: Analysis of Past Dynamics to Improve Prediction of Future Response to Natural and Anthropogenic Change.

- *Science coordination and synthesis – Kris Holderied and Tammy Neher, NOAA Kasitsna Bay Laboratory (KBL)*

  This year, we held a successful annual meeting and time series workshop as well as the in-person meeting at the Alaska Marine Science Symposium and two quarterly teleconferences with participants from each project. The science coordinator worked with Axiom and AOOS to develop metadata criteria and completed website and data portal updates. We also have developed small working groups, held working group teleconferences, and completed and released the draft full outline and introduction to science synthesis report for joint workshop. The science coordinator worked with NOAA NCCOS to develop a program intranet site to track deliverables and to provide updates and news to the program principal investigators.

- *Conceptual ecological modeling– Tuula Hollmen, Alaska Sea Life Center (ASLC)*
  During this past year, we have developed a conceptual modeling framework for organizing collaborative efforts and communicating research or management progress to stakeholders or funders. We have also developed methods to analyze conceptual model input to incorporate quantitative expert ratings about properties of system components, including assessment of the state of knowledge, the strength of ecological impact, and the state of management or research attention devoted to a given component (code implemented in the R statistical programming environment). We also have developed a general ecosystem model for the Gulf Watch Alaska program synthesizing PI input into a simplified visual diagram to be used with program outreach materials and team meetings and discussions. Finally, we have authored a manuscript on conceptual ecological modeling methods (*Conceptual models are flexible tools for research planning, prioritization, and communication*) to be published this coming year.

Environmental drivers monitoring component

- *Gulf of Alaska mooring (GAK1) monitoring – Tom Weingartner, University of Alaska Fairbanks (UAF)*
  This program continues a 44-year time series of temperature and salinity measurements at hydrographic station GAK 1. The data set, which began in 1970 as a research cruise, now consists of quasi-monthly CTDs and a year-round mooring with 6 temperature/conductivity recorders throughout the water column. We are currently working to add all 2013 data sets to the GAK 1 website (http://www.ims.uaf.edu/gak1/) and the GWA data portal.

  During this past sampling season, we found that the recent winter coolings of 2007 and 2008 were associated with an approximate doubling in the abundance of pandalid shrimp caught in pots in Prince William Sound and that the abundance of shrimp >32 mm was also highest in these years (shrimp data provided by Dan Bosch, Alaska Dept. of Fish and Game, Division of Sport Fisheries). It is too soon to say if there is a relationship between these cold winters and the shrimp catch, but we note that the cold period prior to the mid-1970s regime shift was also related to greater shrimp abundance throughout the Gulf of Alaska.

  We also have found that sea-level variations at Seward (and presumably most other northern Gulf of Alaska sites) are primarily related to along-shore winds in the 2 - 40 day period range. However, the annual cycle in Seward sea level is primarily associated with the annual cycle of salinity at hydrographic station GAK 1.

- *Seward line monitoring – Russ Hopcroft, UAF*
  We are currently processing and loading the data for publication from 2013; 2014 is the 17th year of consecutive observations for this project. We are finding that temperature, as well as salinity, continue to be major drivers of observed differences in planktonic communities within and between years. Additionally, large-scale atmospheric indices appear to be poor correlates of plankton community structure leading us to look at other characteristics and confounding factors.

- *Oceanographic conditions in Prince William Sound – Rob Campbell, PWSSC*
  The results of this project have been incorporated into a 30-year time series of hydrographic observations in the PWS region. Preliminary results show a cooling and freshening trend in the

surface waters of some of the Sound (presumably due to the recent loss of glacial ice mass in the region) and a warming trend at depth.

- *Oceanographic monitoring in Cook Inlet – Angie Doroff and Kris Holderied, Alaska Department of Fish and Game (ADFG) / Kachemak Bay Research Reserve (KBRR)/ KBL*
  - The Kachemak Bay Research Reserve and NOAA Kasitsna Bay Laboratory are using oceanographic data from this Gulf Watch Alaska project to help validate a Cook Inlet ocean circulation model developed by NOAA's National Ocean Service, which has been used for a tidal energy assessment of the Inlet and will be part of a NOAA operational Cook Inlet marine forecast system. KBRR and the University of Alaska Fairbanks (UAF) are using time series of oceanographic data (temperature and salinity) from long-term monitoring studies (inclusive of but not limited to this project) and drifter buoy data in an external model validation effort. KBL is providing CTD data to the model developer (NOS Coast Survey Development Laboratory) for development and validation efforts.
  - This Gulf Watch Alaska study improved the time series and geographic scope of ongoing monitoring of phytoplankton for harmful algal species conducted by the NOAA Kasitsna Bay Laboratory and Kachemak Bay Research Reserve. The phytoplankton species that causes paralytic shellfish poisoning, *Alexandrium fundyense,* were found at all Kachemak Bay sampling locations throughout the summer, although at relatively low concentrations. *A. fundyense* concentrations were found to be significantly correlated with both water temperature and salinity conditions. Phytoplankton sampling throughout the year allowed us to quickly identify and disseminate information on two water discoloration events that occurred in Kachemak Bay during 2013: a red water event caused by the ciliate *Mesodinium rubrum* that occurred in June and a brown water event caused by the dinoflagellate *Karenia mikimotoi* that occurred in September, the first described bloom of *K. mikimotoi* in Alaskan waters.
  - The project leveraged partnerships with the Alaska Ocean Observing System and University of Alaska Fairbanks to collect water samples to quantify variability in water chemistry associated with ocean acidification.
  - Through a partnership with the U.S. Fish and Wildlife Service, we are enhancing the Gulf Watch Alaska program to provide marine bird and mammal surveys that will improve understanding of relationships between marine conditions, primary productivity, and seabirds and marine mammals.

- *Continuous plankton recorder –Sonia Batten, Sir Alister Hardy Foundation for Ocean Science (SAHFOS)*

  The CPR has so far been deployed in late March, April, May and June 2014 (though June samples have not yet been processed). Temperature sensors on the CPR returned data for April and May (March failed) and it is clear that surface waters are warmer than previous recent years, particularly in May.

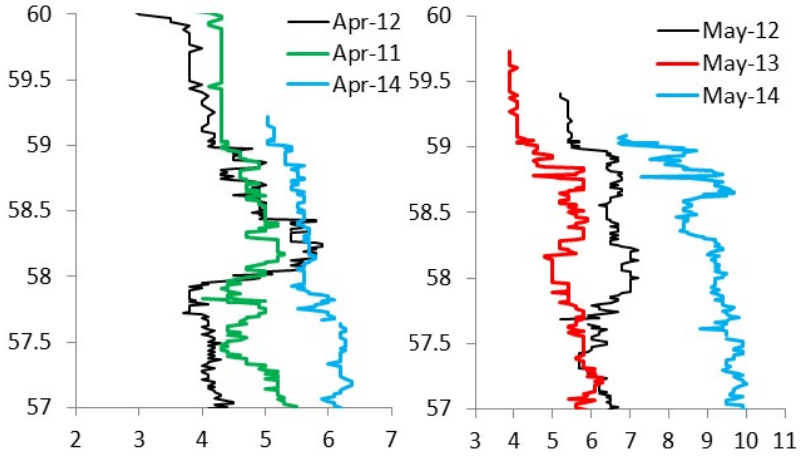

Figure 1. Temperature against latitude for transects in April and May, 2011 to 2014.

We have currently processed 25% of the shelf samples, so numbers will change once all samples have been processed, however, at this time estimated mesozooplankton biomass is quite high for spring, about as high as previously recorded in May. While counting we noticed that it was not because large copepods that we typically see in spring were especially numerous, instead small copepods (such as *Pseudocalanus, Acartia*) were particularly abundant.

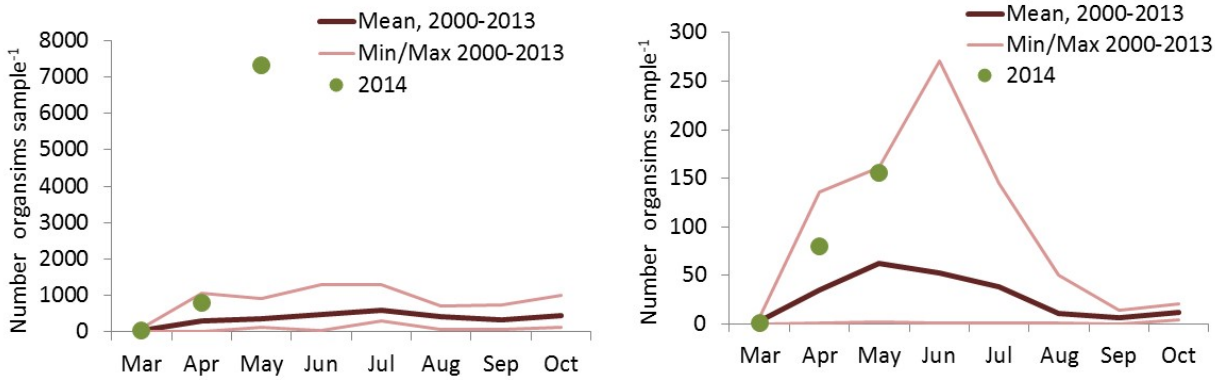

Figure 2. Monthly mean (and min/max) sample abundances for small copepods (left) and large copepods (right). Provisional 2014 spring data are overlaid.

The right hand panel of figure 2 shows that large copepods were quite abundant, but within the range seen before. Small copepods were however *much* more abundant than seen before – about 10x as many. Normally their peak is in summer, typically July, though numbers do start to increase in spring. It is possible that the warm water has encouraged them to increase early, but will this be a sustained increase through the summer? Phytoplankton indices from the CPR were not unusually high or low in these transects, though the diatom peak appears to have been in April rather than May. Phytoplankton could have increased earlier than normal, or been more heavily grazed by the extra copepods.

Pelagic monitoring component

- *Ability to detect trends in nearshore marine birds – Heather Coletti, USNPS Southwest Alaska inventory and monitoring Network (SWAN)*

Survey data continues to be collected in Kenai Fjords NP and Katmai NPP through the Nearshore Benthic component of GWA. A new data collection platform (iPad) with a customized iPad survey application was tested in Katmai. Recommendations have been made to improve the application for field data collection.

- *Long-term killer whale monitoring – Craig Matkin, North Gulf Oceanic Society (NGOS)*
  To date, we have completed photo-identification for eight of the major resident pods, all but three AT1 transient individuals have been accounted for, and 23 Gulf of Alaska transients have been documented during 42 days of fieldwork during May and June. This was our most comprehensive spring field season in several years. In addition, we deployed the first time/depth tag on a Gulf of Alaska transient whale and collected over a dozen scale samples from sites of fish kills made by resident killer whales in Hinchinbrook entrance in June. There is little previous data for this location and time of year and so this new information will help us decipher diet and habitat use patterns. Finally, we consistently update our Facebook page associated with fieldwork, which has generated up to 12,000 readers for some entries.

- *Humpback whale predation on herring – John Moran and Jan Straley, NOAA National Marine Fisheries Service (NMFS) Auke Bay Laboratory and University of Alaska Southeast (UAS)*
  October 2013 Survey: As in past years during the early fall surveys, whales were initially most numerous in southern Montague Strait feeding on herring but were moving into the sound as evidenced by finding the same whales on subsequent days in other locations along our route. Whales along Knight Island Passage and the mouth of Bainbridge Passage were feeding on krill, although small herring were caught while at anchor at Shelter Cove, Evans Island. Spawning sand lance were collected from Hogan Bay.
  December 2013 Survey: Humpback whale distribution differed from previous surveys during December, probably the result of shifts in the prey field. Only seven whales were present in Port Gravina, bird numbers were also low. Whales were spread out in the tanker anchorage area south of Knowles Head, an area more typically occupied during Sept/Oct.

  April 2014 Survey: We observed higher whale numbers than were seen during previous spring surveys. Although krill were present, whales focused primarily on herring as prey. Both whales and herring schools were highly mobile, moving daily between Port Fidalgo and Port Gravina. The prolonged staging period by herring may have led to increased predation rates.

  July 2014 Survey: Overall whale numbers were lower in July than our fall and winter PWS surveys, with only10 unique whales identified. Three days of forage fish aerial surveys during our trip confirmed low whale numbers, with only one humpback seen near Smith Island.

  We identified, age 0 to 2+ herring as being prey for humpback whales in the Green Island area. Several humpback were specifically targeting schools of age 0 herring (confirmed with scales), associated with feeding flocks of gulls and murrelets Three to four fin whales and one Minke whale were seen feeding in Montague Strait. This is the first time either species has been seen on our surveys.

  We joined with Mayumi Arimitsu and the USGS team on the evenings of 16 and 17 July and spent the day on the 17th working together to assess target prey of humpback whales in PWS. A strong krill layer was seen, age 0 pollock seemed to be unusually abundant.

- *Forage fish distribution and abundance –Mayumi Arimitsu and John Piatt, U. S. Geological Survey (USGS) Alaska Science Center*
  In 2014 we took a two-pronged, collaborative approach to increase our encounter rate with patchy forage schools: we used a spotter plane to find near-surface schooling fish, and whales to find deep-water forage aggregations. We designed and successfully completed a Sound-wide aerial-acoustic survey for forage fish. We also teamed up with the humpback whale crew to quantify krill, capelin and schools of age-0 herring near Montague Island with hydroacoustics and trawls. We validated aerial observations of Pacific sand lance in shallow sandy habitat along Middle Ground Shoal and in Cabin Bay.

- *Prince William Sound marine bird surveys – Kathy Kuletz, David Irons, and Robert Kaler, U.S. Fish and Wildlife Service (USFWS*)
  Using data collected during small boat surveys (1989-2012), Cushing (2014) used taxon- and community-centric approaches to examine patterns of marine bird distribution and abundance in Prince William Sound and found marine bird communities as a whole to be spatially structured along a primary onshore-offshore environmental gradient, and secondarily structured along an estuarine-marine environmental gradient.

  Cushing (2014) also investigated spatial habitat associations and temporal change of *Brachyramphus* murrelets and found that abundance estimates for both marbled murrelets (*Brachyramphus marmoratus*) and (*B. brevirostris*) decreased by more than two-thirds over the study period. There was no evidence that rates of change differed along environmental or geographic gradients and no evidence that changes in seasonal patterns of abundance occurred.

  Literature cited:
  Cushing, D. 2014. Patterns of Distribution, Abundance, and Change over Time in the Marine Bird Community of Prince William Sound, Alaska, 1989-2012. Master of Science Thesis, Oregon State University, pp128.

- *Winter habitat use and distribution of sea birds in Prince William Sound, Mary Anne Bishop (PWSSC)*

We have completed surveys through this spring and are working to check data and publish to the Ocean Research Workspace. Currently, two manuscripts are in review from this project and we are working on providing summaries for the 2014 GWA science synthesis report to the EVOSTC.
Some of the highlights of our findings to date include:

- Longitude was the most frequently significant predictor of bird presence in occupancy models. For murres and cormorants, there was a positive association with sea surface temperature, while for loons we found an inverse relationship.
- Common Murres concentrate primarily in the northeast PWS, consistent with previous surveys (e.g. Year 1); temporal patterns were less evident than in previous years.
- Murrelets migrated into the Sound between the October and November surveys and decreased by March; we observed relatively high numbers of murrelets in the Southwest Passages during our February 2014 cruise.
- Black-legged Kittiwakes were nearly absent during the December and February cruises.

Benthic monitoring component

- *Nearshore benthic systems in the Gulf of Alaska – USGS Alaska Science Center/ USNPS SWAN, Coastal Resources Associates*

  Sea star monitoring: In late May 2014, Melissa Miner, a marine biologist with the MARINe nearshore monitoring program at the University of California, Santa Cruz, and expert on the sea star wasting syndrome, joined the GWS field sampling trip in Eastern PWS, Alaska. Sea star wasting disease is causing massive die-offs of multiple sea star species along the North American Pacific coast, and was reported this spring in southeast Alaska. The cause of sea star wasting syndrome is not known, and there is concern about the number of stars dying and the potential geographical extent over which the disease may spread. Ms. Miner worked with the Gulf Watch scientists on identification of diseased sea stars, so that over the course of the 2014 field season, sea stars across the GOA were monitored for signs of the disease. Stars were examined in 5 areas (Eastern and Western PWS, Kenai Fjords and Katmai National Parks, and Kachemak Bay) and no evidence of disease was found. (For more information on the sea star wasting disease, see http://www.eeb.ucsc.edu/pacificrockyintertidal/data-products/sea-star-wasting/index.html)

  Mussels across the GOA showing similar trends: There is evidence of broad synchrony across the Gulf of Alaska in densities of mussels and size of mussel beds, despite site-scale variation. Further, in 2014 recruitment of mussels was observed to be at a high level at study areas across the GOA, suggesting the influence of large-scale patterns in environmental drivers on recruitment processes.

  Sea otters in western PWS, including at the heavily oiled area of northern Knight Island, have returned to pre-spill abundance, and sea otter mortality patterns, based on ages-at-death, have returned to normal (based on pre-spill data) in WPWS by 2011. These observations are consistent with recovery of the western PWS sea otter population from the 1989 EVOS, based on criteria defined by the EVOSTC. (For more information, see USGS OFR report: http://pubs.usgs.gov/of/2014/1030/pdf/ofr2014-1030.pdf).

REFERENCE

Dean, T.A., J.L. Bodkin and H.A. Coletti. 2014. Protocol Narrative for Nearshore Marine Ecosystem Monitoring in the Gulf of Alaska, Version 1.1. Natural Resource Technical Report NPS/SWAN/NRTR—2014/756. National Park Service, Fort Collins, Colorado.

Table 1. Components of the proposed nearshore benthic monitoring plan and schedule for 2015 and 2016. (*Note*: 5 sites are sampled within each area).

COMPONENT	**2015**	**2016**
Western PWS, intertidal invertebrates and algae	**x**	**x**
Western PWS, kelps and sea grass	**x**	**x**
Western PWS, black oystercatchers	**x**	**x**
Western PWS, sea otter carcass recovery	**x**	**x**
Western PWS, sea otter foraging observations	**x**	**x**
Eastern PWS, intertidal invertebrates and algae		**x**
Eastern PWS, kelps and sea grass		**x**
Northern PWS, intertidal invertebrates and algae	**x**	
Northern PWS, kelps and sea grass	**x**	
Katmai NP, intertidal invertebrates and algae	**x**	**x**
Katmai NP, kelps and sea grass	**x**	**x**
Katmai NP, black oystercatchers	**x**	**x**
Katmai NP, sea otter carcass recovery	**x**	**x**
Katmai NP, sea otter foraging observations	**x**	**x**
Kenai Fjords NP, intertidal invertebrates and algae	**x**	**x**
Kenai Fjords NP, kelps and sea grass	**x**	**x**
Kenai Fjords NP, black oystercatchers	**x**	**x**
Kenai Fjords NP, sea otter carcass recovery	**x**	**x**
Kenai Fjords NP, sea otter foraging observations	**x**	**x**
Western PWS, sea otter aerial survey		
Kenai NP, sea otter aerial survey		**x**
Katmai NP, sea otter aerial survey	**x**	
PWS, nearshore summer marine bird survey (under Pelagic component)		**x**
Katmai NP, nearshore marine bird survey	**x**	**x**
Kenai NP, nearshore marine bird survey	**x**	**x**
Stable isotope analysis of selected nearshore species (4 areas/year)	**x**	**x**

- *Ecological Communities in Kachemak Bay – Katrin Iken and Brenda Konar, UAF*

We completed sampling for 2014 during the month of June. Some interesting findings from our work to date include:

  - There is high spatial variability of intertidal community structure within Kachemak Bay.
  - Pulsed localized recruitment events, for example by mussels, may contribute to this spatial heterogeneity.
  - Sea otter populations have increased in density between 2002 and 2012, reaching an estimated 6000 individuals in 2012.
  - Sea otter diet in Kachemak Bay consists on average of more than 80% mussels, clams and crabs.

Lingering oil component

- *EVOS oil exposure of harlequin ducks and sea otters – Dan Esler and Brenda Ballachey, USGS Alaska Science Center*

This project was completed this past year and full details were provided in the program annual report for FY2013. This study was implemented to evaluate recovery status of harlequin ducks and sea otters in PWS using biomarker assays to assess continuing exposure to lingering oil, and potential health consequences of contemporary or previous exposure. Sea otters were captured and sampled in western PWS in summer 2012, and blood samples from those otters were analyzed for biomarker and health assays using gene transcription analyses. A final report on the gene transcription results recently was completed, and is provided as an attachment to this report; highlights of associated sea otter studies through 2013 are included in the Nearshore Benthic Annual Report (Project component 12120114-R). Harlequin ducks were captured in PWS in March 2013 and liver biopsies collected for assays of cytochrome P4501A (CYP1A), a biomarker of exposure to oil; a summary of the findings from harlequin ducks over more than a decade of sampling in western PWS is provided below and in a final report to the EVOSTC.

- Oil level and weathering tracking – NOAA/NMFS Auke Bay Laboratory
  - An expanded, revised hydrocarbon database was released to the Trustees.
  - A retrospective analysis of geochemical biomarkers in PWS sediment is underway; this effort has been delayed by litigation-driven demands involving another major PWS study (bioremediation).
  - New analytical tools developed for other ongoing projects are in place and will aid interpretation of the historical biomarker analyses.

II. Coordination and Collaboration

A. Within the Program

A primary objective of the integrated Gulf Watch Alaska program is to coordinate cross-program monitoring, data management, outreach and administration. Below is a summary of current and proposed collaboration efforts within the Gulf Watch Alaska program, within each of the program components. Additional details can be found in the individual project reports in Appendix 1.

<u>Gulf Watch Alaska Program Management, Outreach, and Administration Activities</u>

- *Program coordination and logistics – Prince William Sound Science Center (PWSSC), Alaska Ocean Observing System (AOOS), and NOAA Kasitsna Bay Laboratory (KBL):* The Program Management Team (PMT consisting of Molly McCammon, Katrina Hoffman, Kris Holderied, and Tammy Neher)

provides overall program coordination, with assistance from the Science Coordinating Committee (SCC) consisting of principal investigators from each of the four program monitoring components (Brenda Ballachey, Mandy Lindeberg, Russ Hopcroft, and Tom Weingartner). The science coordinator (Neher) will continue to work closely with PWSSC staff, the PMT and SCC to assist with overall administrative activities of the program, including developing reports and planning meetings and events. The PMT works closely with the SCC to ensure that all of the program reporting needs are met, that there is consistency in how the data are collected, reviewed, and published, and that all members of the team are aware of the program administrative requirements. Finally, the PMT and SCC elected the program Science Review Panel in January, 2014 (Drs. Leslie Holland-Bartells, Hal Batchelder, Terrie Klinger, Stanley Rice and Mr. Eric Volk) to assist with scientific review of program documents such as sampling protocols and reports.

- *Data management –AOOS/Axiom Consulting:* The PMT and SCC work with Axiom staff to develop new data management and data access tools, including coordination of principal investigator (PI) data services requirements, participating in AOOS data access and visualization tool rating webinars and teleconferences, providing data and feedback for new access tools in the data portal, and providing feedback to improve metadata generation tools. The science coordinator works with all project principal investigators within the program to ensure new data is loaded to the data portal, has undergone quality assurance (QA)/quality control (QC) measures, and has appropriate metadata available for public access.
- *Historical data management and synthesis – National Center for Ecological Analysis and Synthesis (NCEAS):* The PMT and SCC facilitate communication between project principal investigators and NCEAS staff for historical data collection and synthesis and provide feedback for new data management tools and data publication.
- *Conceptual ecological modeling– Alaska Sea Life Center (ASLC):* The PMT and SCC work with ASLC staff to develop initial Gulf of Alaska ecological model and sub-model descriptions, coordinate model development and updates during program meetings and workshops, and incorporate information into.

<u>Gulf Watch Alaska Long Term Monitoring Projects</u>

Gulf Watch Alaska scientists formed several small working groups this past year with the purpose of coordinating data collection methods within the program, developing synthesis materials, identifying additional data outside the program that may help answer large scale ecosystem questions, and identifying future needs. Preliminary working group collaborations include the following:

- *Marine birds projects-Historical data management and synthesis*: The marine birds working group compiled lists of productivity and abundance data sets and these are being collected and published by NCEAS staff to the program data portal. These data sets are proposed to be used in broad-scale analyses with other ecological factors to determine conditions that may be limiting recovery or driving population and productivity trends.
- *Environmental drivers component-Nearshore benthic component:* The environmental drivers group is working with the nearshore benthic group to provide environmental and plankton data

for use in correlating with temporal patterns in mussel beds and intertidal communities. These types of cross-program collaborations are expected to increase in years 4 and 5 of the program.

- *Cross-program field sampling coordination*: Many of the program scientists coordinate to share vessel time and survey efforts. In PWS there are collaborations between the humpback whale and winter seabird projects, herring and forage fish projects, and humpback whale and GOA nearshore benthic projects. The lower Cook Inlet oceanography project provides shipboard space for seabird/marine mammal observers in the pelagic component. These collaborations are proposed to continue through the duration of the program.
- *Environmental Drivers component*: The environmental drivers component scientists held meetings to coordinate cross-program zooplankton sampling methods.

Herring Research and Monitoring Program and Gulf Watch Alaska

The Gulf Watch Alaska PMT works closes with the Herring Research and Monitoring PIs to coordinate research activities, information, and reporting. This work is proposed to continue through the duration of the program and includes efforts such as:

- Sharing of vessel time and staff between HRM projects and GWA projects
- Attendance at meetings by staff from both the LTM and HRM programs
- Coordination of reporting documents and work plan development
- Sharing of expertise and analytical ideas between PIs in both programs
- Coordination of outreach tools and data sharing tools, such as the AOOS data portal, other outreach activities and metadata development tools.
- The aerial survey project is closely coordinated between the HRM program and forage fish project. Protocols, equipment, and expertise are shared between the two efforts. The aerial surveys also provided observations for the humpback whale project.
- The herring energetics and growth studies are working with the environmental drivers projects to determine if relationships between environmental conditions and herring growth can be detected.

B. With Other Council-funded Projects

Dr. David Irons is one of the principal investigators of the PWS seabird monitoring project. Dr. Irons also coordinates his findings with the Pigeon Guillemot restoration research project in PWS (11100853-Am.8.29.13).

C. With Trustee or Management Agencies

With over $8 million dollars proposed in cost-share, in-kind, and direct funds, the Gulf Watch Alaska program could not be possible without extensive leveraging of resources by the trustee and management agencies that is proposed to continue through the duration of the program (see Appendix 1 for details and cost-share section of individual project budgets). Some examples include direct fund support for the Cook Inlet oceanography, killer whale, CPR, and data management projects from AOOS, Sir Alister Hardy Foundation for Ocean Sciences, North Pacific Research Board, Norcross Wildlife Foundation, and Canadian Department of Fisheries and Oceans. Equipment, vessel time, and personnel support is provided to the humpback whale, forage fish, nearshore ecology in the Gulf of Alaska, and winter seabirds projects from NOAA Auke Bay Laboratory, USGS, USFWS, Alaska Department of Fish and Game, and the Ocean Tracking Network.

- *Outreach – AOOS:* The program's Outreach Planning Committee (consisting of team members from Alaska Sea Life Center, Kachemak Bay Research Reserve, Prince William Sound Science Center, Prince William Sound Regional Citizens Advisory Council, Alaska Sea Grant, Center for Ocean Science Education Excellence (COSEE) Alaska, North Pacific Research Board, U.S. Geological Survey (USGS), and NOAA National Marine Fisheries Service (NMFS)) works with the PMT to develop materials and reports, and plan local events. The Outreach Team also assists with annual updates to website pages and development of tools and review for publically accessible information working in close collaboration with Axiom Consulting and TerraGraphica.
- *Marine birds projects-U.S.Fish and Wildlife Service (USFWS), National Park Service (NPS), U.S. Geological Survey (USGS)*: Scientists within the marine birds working group have solicited data sets from USGS, USFWS, and NPS staff for inclusion and publication in the historic data series compiled by NCEAS.
- *Cook Inlet collaborations (NOAA Kasitsna Bay Laboratory, NPS, USFWS)*- Scientists in the Cook Inlet oceanography and nearshore benthic projects have initiated a collaboration with the *Bureau of Ocean Energy Management (BOEM)* to obtain additional funding to maintain quarterly oceanography surveys, provide seabird and marine mammals observers on the Cook Inlet surveys, and validate the NOAA/National Ocean Service (NOS) Cook Inlet ocean current circulation model. Scientists from NOAA Kasitsna Bay Laboratory, KBRR are also working with Axiom staff to use GWA monitoring data for a Harmful Algal Bloom (HAB) public website and advisory page.

III. PROGRAM DESIGN – Plan for FY15

A. Objectives for FY15

The objectives of the Gulf Watch Alaska program as proposed are:

1. Sustain and build upon existing time series in the EVOS-affected regions of the Gulf of Alaska.
2. Provide scientific data, data products and outreach to management agencies and a wide variety of users.
3. Develop improved monitoring for certain species and ecosystems.
4. Develop science synthesis products to assist management actions, inform the public and guide monitoring priorities for the next 20 years.
5. Enhance connections between the Gulf Watch Alaska and Herring Research and Monitoring (HRM) programs.
6. Leverage partnerships with outside agencies and groups to integrate data from broader efforts.

Please see Appendix 1 for detailed objectives for individual projects within the Gulf Watch Alaska program.

B. Changes to Project Design

No changes are anticipated to the program.

IV. SCHEDULE

A. Program Milestones for FY15

Many of the program milestones are ongoing throughout the full intended duration of the program with various dates of completion for project specific tasks for each year outlined in each individual project proposal. For consistency between all the projects, the program completion date for each year's monitoring work, publication of the previous year's work, and associated reporting activities for the program is proposed to be the end of the project fiscal year, *January 31, 2016* unless otherwise noted.

Objective 1. Sustain and build upon existing time series in the EVOS-affected regions of the Gulf of Alaska.

Milestones:

- *Facilitate completion of data collection for year 4*
- *Ensure year 3 data is loaded and published from Ocean Workspace*
- *Continue to explore new partnerships and build upon developing collaborations (ongoing)*

Objective 2. Provide scientific data, data products and outreach to management agencies and a wide variety of users.

Milestones:

- *Publish all year 3 data to data portal*
- *Continue improvements to data portal including addition of data visualization tools (ongoing)*
- *Update website for all projects and new resources (April 31, 2015)*
- *Plan and support various outreach events as described in Appendix 1, Outreach– Molly McCammon (AOOS, 12120114-B)*

Objective 3. Develop improved monitoring for certain species and ecosystems.

Milestones:

- *Continue to develop improved monitoring plans for Forage Fish (Appendix 1, 12120114-O)*
- *Develop recommendations to improve monitoring programs to reflect findings of marine birds trends analyses project (Ability to detect trends in nearshore marine birds – Coletti, NPS South West Alaska Network [SWAN], 12120114-F)*

Objective 4. Develop science synthesis products to assist management actions, inform the public and guide monitoring priorities for the next 20 years.

Milestones:

- *Solicit stakeholder input to develop improved data visualization and decision support*
- *Continue to improve and build upon public website and data portal*

Objective 5. Enhance connections between the Gulf Watch Alaska and Herring Research and Monitoring (HRM) programs.

Milestones:

- *Continue working collaboratively with HRM group, including participating in team meetings and work groups*
- *Continue cross-program collaborations for sampling, shared vessel time, and information, such as occurs with the forage fish, humpback whale, and winter seabird projects*
- *Participate in EVOSTC joint science workshop and provided information from program synthesis report.*

Objective 6. Leverage partnerships with outside agencies and groups to integrate data from broader efforts.

Milestones:

- *Continue to build collaborations with outside entities such as NPRB, BOEM, Shorezone, and University of Washington and new partners within AOOS, UAF, NOAA National Center for Coastal Ocean Services (NCCOS)*
- *Continue efforts within small working groups to incorporate data sets from within and outside the GWA program into the historical data compiled and published by NCEAS*

B. Measurable Tasks for FY15

FY 15, 1st quarter (February 1, 2015 - April 31, 2015)

Through quarter:	*Winter Seabirds, Humpback Whale, Killer Whale, Lower Cook Inlet Oceanography, PWS Oceanography, CPR, Seward Line and GAK1 sampling completed (see Appendix 1 for details)*
February 4-6:	*Participate in the joint EVOSTC science synthesis conference*
Mar. 1:	*Annual project and program summary reports submitted*
Mar 1:	*Year 3 project data loaded and published on public data portal*
Feb-Mar:	*Participate in HRM annual PI meeting*
Mid-April:	*Hold quarterly program PI teleconference*
April 31:	*Updates to program website for year 3 completed*

FY 15, 2nd quarter (May 1, 2015-July 30, 2015)

Through quarter:	*Killer Whale, Lower Cook Inlet Oceanography, PWS Oceanography, CPR, Seward Line, Nearshore Ecology in GOA, Kachemak Bay Benthic, Forage Fish, and GAK1 sampling completed.*
Dates TBD:	*Hold summer outreach events (ASLC, KBRR, PWSSC)*
Mid-July:	*Hold quarterly program PI teleconference*

FY 15, 3rd quarter (August 1, 2015 – October 31, 2015)

Through quarter:	*Killer Whale, Lower Cook Inlet Oceanography, PWS Oceanography, CPR, Seward Line, GOA Seabirds, and GAK1 sampling completed (see Appendix 1 for details)*
August:	*Year 5 work plans and NOAA semi-annual reports submitted*
September:	*Hold stakeholder work group meeting*
September:	*Participate in EVOSTC science panel and public advisory committee meetings*

FY 15, 4th quarter (November 1, 2015- January 31, 2016)

Through quarter:	*Winter Seabirds, Humpback Whale, Killer Whale, lower Cook Inlet Oceanography, PWS Oceanography, CPR, Seward Line and GAK1 sampling completed (see Appendix 1 for details)*
November:	*Hold annual GWA PI meeting, Anchorage*
January:	*Participate in Alaska Marine Science Symposium*
January:	*Hold PI meeting at AMSS*

V. PROJECT PERSONNEL – Changes and Updates

No new personnel are anticipated for FY 2015.

VI. BUDGET

A. Budget Forms

Please see attached workbook.

B. Changes from Original Proposal

No changes are anticipated.

C. Sources of Additional Funding

This program is highly leveraged and subsidized from a wide range of sources. Approximately $1.4 million dollars will be provided as equipment/vessel sharing, personnel, and grants to the Gulf Watch Alaska projects in FY2015. In-kind and funding sources come from various entities, including Prince William Sound Science Center, AOOS, NOAA/NOS Kasitsna Bay Laboratory, NOAA/NMFS Alaska Fisheries Science Center and Northwest Fisheries Science Center, Alaska Sea Grant, BOEM, NOAA National Estuarine Research Reserve System (NERRS), USGS, USFWS, NPS, CIRCAC, ADF&G, Ocean Tracking Network, Canadian Department of Fisheries and Oceans, Sir Alister Hardy Foundation for Ocean Science, North Gulf Oceanic Society, Norcross Wildlife Foundation, and North Pacific Research Board.

APPENDIX 1. Individual Project Proposals

Administration– Hoffman (PWSSC, 15120114-B)

FY15 PROJECT PROPOSAL SUMMARY PAGE
Continuing, Multi-Year Projects

Project Title: Long term monitoring: Program management component – Administration, Science Review Panel and PI Meeting Logistics, and Outreach and Community Involvement

Project Period: February 1, 2015 – January 31, 2016

Primary Investigator(s): Katrina Hoffman, Prince William Sound Science Center (PWSSC) and Molly McCammon, Alaska Ocean Observing System (AOOS)

Study Location: Prince William Sound, Lower Cook Inlet, Resurrection Bay and Gulf of Alaska. Administrative services are conducted at the PWSSC office in Cordova. Science review and PI meetings are held in Anchorage or elsewhere in the EVOS region. Outreach and community involvement activities may be conducted throughout the EVOS region.

Project Website (if applicable): www.gulfwatchalaska.org

Abstract*: This project is a component of the integrated Long-term Monitoring of Marine Conditions and Injured Resources and Services submitted by McCammon et al. To achieve fiscal efficiency, the Prince William Sound Science Center (PWSSC) serves as the administrative lead and fiscal agent for the consortium implementing this program known as Gulf Watch Alaska (GWA). As fiscal agent and administrative lead, PWSSC is responsible for: managing award contracts for all non-Trustee Agency projects within the program; ensuring the program and projects adhere to all reporting policies, practices and timelines as required by the EVOSTC and NOAA; serving as a liaison between the program and EVOSTC staff; coordinating travel and logistics for principal investigator annual meetings; coordinating travel and logistics for outreach efforts; participating in an annual audit; and providing administrative support to the outreach and community involvement component of the GWA program. The Outreach and Community Involvement component is coordinated by the Alaska Ocean Observing System. We also coordinate with the Herring Research and Monitoring Program on data sharing, administration and outreach.

Estimated Budget: $1,301.0k Total without the 9%GA - $1,418.2K including 9%GA

EVOSTC Funding Requested* (*must include 9% GA)*:

FY12	FY13	FY14	FY15	FY16	TOTAL
$263.3	$274.7	$298.6	$293.4	$288.1	$1418.2

Non-EVOSTC Funds to be used:

FY12	FY13	FY14	FY15	FY16	TOTAL

**If the amount requested here does not match the amount on the budget form, the request on the budget form will considered to be correct.*

Date: September 2, 2014

I. EXECUTIVE SUMMARY

Please provide a summary of the project including key hypotheses and overall goals, as submitted in your original proposal. If there are additional highlights that you would like to include since you submitted your annual report, please include them here. Also, please list any publications that have been submitted and/or accepted since you submitted your annual report.

The EVOS Trustee Council requested that a consortium submit one proposal for the GWA program. Three organizations in the consortium comprise the Program Management Team (PMT): PWSSC is the administrative lead and fiscal agent; NOAA's Kasitsna Bay Laboratory (KBL) is the science program lead, and the Alaska Ocean Observing System (AOOS) provides data management and outreach and community involvement services. AOOS also serves as the Team Lead and primary point of contact for the overall program. Collectively, this consortium brings a wealth of knowledge about the spill-affected region, has extensive experience with managing multi-million dollar science programs with multiple partners, and has the capacity to leverage significant additional dollars.

This administrative project completes annual audits; establishes and manages contracts to all non-Trustee agency organizations funded through this program; completes fiscal reporting; supports activities of the Scientific Review panel; sets up logistics for and supports annual PI meetings; provides travel and logistics support to the Outreach Steering Committee; and tracks Outreach and Community Involvement activities coordinated by PI McCammon. For details about Outreach and Community Involvement, please see McCammon's project proposal form.

II. COORDINATION AND COLLABORATION

A. Within a EVOSTC-Funded Program

PWSSC submits progress reports to NOAA for all projects funded through this program. We submit fiscal reports to NOAA for all non-Trustee agency projects funded through this program. We coordinate the annual meeting for all Trustee and non-Trustee agency projects funded through this program. We issue sub-award contracts to all non-Trustee agency projects funded through this program. We regularly engage with Scott Pegau, Coordination and Logistics principal investigator of the EVOSTC-funded Herring Research and Monitoring (HRM) program to ensure that both programs are sharing information about data, projects, and administrative requirements. Members of the GWA Program Management Team attend HRM PI meetings. Aerial surveys are coordinated between the two programs to maximize benefits to multiple projects. GWA provides data on environmental conditions and other factors relevant to HRM projects and synthesis work.

B. With Other EVOSTC-funded Projects

C. With Trustee or Management Agencies

Not applicable.

III. PROJECT DESIGN – PLAN FOR FY15

A. Objectives for FY15

Identify the primary objectives for your project for FY15 as submitted in your original proposal.

This project has the following objectives:

Objective 1 **Fiscal management tasks**

a. Award and management of all contracts and sub awards for non-Trustee organizations involved in this program (this totals 9 investigators among 6 contracts[1] in addition to 2 PWSSC projects)—this is ongoing
b. Timely submission of financial reports—this is ongoing
c. Completion of annual audits—this is scheduled for November 2015
d. Monitoring of project spending—this is ongoing

The budget assumes that funding to Trustee Agencies is provided directly to that agency and not through PWSSC. The PWSSC awards contracts to all non-Trustee organizations involved in this proposal, with two exceptions for two co-PIs who are working with Trustee agency projects (Straley from University of Alaska Southeast and Dean from Coastal Resources Associates). Straley and Dean's participation are included as contracts within, respectively, the Moran (NOAA) and Ballachey (USGS) Trustee agency project DPDs and budgets.

Objective 2 **Formation and operation of a scientific review panel**

Costs associated with the formation and operation of a scientific review panel for the LTM program is included in the administrative fee. These costs include administrative assistance and travel arrangements and expenses. The scientific review panel has commenced their activities and PWSSC will support their travel to meetings, meetings, and teleconferences as needed.

Objective 3 **Travel expenses for the Annual Meeting of GWA PIs**

This includes coordination of all logistics in support of annual PI meetings as well as the provision of a teleconference line for all teleconferences. Annual meetings are typically in November.

Objective 4 **Travel expenses for Outreach Team***

Administrative assistance and travel arrangements and expenses for activities directed by the Outreach and Community Involvement Team, led by McCammon, are included in this project.

Objective 5 **GWA Project Outreach and Community Involvement***

This includes McCammon coordination of the steering committee; PWSSC logistics support for meetings; and management of any contracts through which outreach activities are funded.

**For more details about Outreach and Community Involvement, please see McCammon's project proposal form.*

B. Changes to Project Design

If the project design has changed from your original proposal, please identify any substantive changes and the reason for the changes. Include any information on problems encountered with the research or methods, if any. This may include logistic or weather challenges, budget problems, personnel issues, etc. Please also include information as to how any problem has been or will be resolved. This may also include new insights or hypotheses that develop and prompt adjustment to the project.

There are no major changes to the administration of the Gulf Watch Alaska program. The joint science meeting with GWA, HRM and the EVOSTC Science Panel is now scheduled for February 2015 as opposed to the originally anticipated date in 2014.

IV. SCHEDULE

A. Project Milestones for FY15

[1] Six contracts will be awarded to the Univ. of Alaska Fairbanks (Hopcroft, Weingartner, Konar, Iken), SAHFOS (Batten), North Gulf Oceanic Society (Matkin), Alaska SeaLife Center (Hollmen), Alaska Ocean Observing System through Axiom Consulting (McCammon/Bochenek), and Alaska Ocean Observing System (McCammon).

For each project objective listed (III.A), specify when critical project tasks will be completed, as submitted in your original proposal. Please identify any substantive changes and the reason for the changes. Please format your information as in the following example:

Objective 1. Develop sediment-core chronologies in lake-productivity indicators.
To be met by September 2015

Objective 1. Fiscal management tasks

a. Award and management of all contracts and sub awards for non-Trustee organizations involved in this program
Updated contracts are issued at the beginning of each project year—to be met in February 2015. Contract management is ongoing throughout the award year.
b. Timely submission of financial reports
Submitted to NOAA by 4/30/15 and 10/30/15; budget reports are submitted to EVOSTC with annual report package by 3/1/15 and with work plan proposals by 9/1/15.
c. Completion of annual audits
To be conducted in November 2015 with analysis completed by February 2016.
d. Monitoring of project spending
This is continuous throughout the duration of the project.

Objective 2 **Formation and operation of a scientific review panel**
Scientific review panel activities are ongoing throughout the remainder of the project. Review Panel members will participate in the joint science workshop in February 2015.

Objective 3 **Travel expenses for the Annual Meeting of GWA PIs**
This will be done as needed for the annual PI meeting, which should be in November 2015, as well as a gathering at the January 2016 Alaska Marine Science Symposium. Funds will also support select PI travel to the February 2015 joint science workshop with EVOSTC staff and HRM investigators.

Objective 4 **Travel expenses for Outreach Team***
Completion of this objective is ongoing; expenses are covered as accrued during the project year.

Objective 5 **GWA Project Outreach and Community Involvement***
Completion of this objective is ongoing; expenses are covered as accrued during the project year.

B. Measurable Project Tasks for FY 15

Specify, by each quarter of each fiscal year, when critical project tasks (for example, sample collection, data analysis, manuscript submittal, etc.) will be completed, as submitted in your original proposal. Please identify any substantive changes and the reason for the changes. Please format your schedule as in the following example:

FY 15, 1st quarter (February 1, 2015 - April 31, 2015)
February: Support attendance at EVOSTC joint science workshop
March 1: *Submit Year 3 annual reports*
April: *Fiscal report submitted to NOAA*
FY 15, 2nd quarter (May 1, 2015-July 30, 2015)
May: Attend HRM PI meeting if scheduled.
June/July: Prepare/submit proposal for next 5-year program if RFP issued
FY 15, 3rd quarter (August 1, 2015 – October 31, 2015)
August: Submit proposed work plans for FY16.
October: Fiscal report submitted to NOAA.
November: Travel and logistics for annual PI meeting.
FY 15, 4th quarter (November 1, 2015- January 31, 2016)
November: Annual PI meeting. Conduct annual audit.
January: Host meeting at Alaska Marine Science Symposium

V. PROJECT PERSONNEL – CHANGES AND UPDATES

See McCammon note in outreach project report regarding inclusion of Sigman in outreach coordination activities.

VI. BUDGET

A. Budget Forms (Attached)

Please see attached program budget workbook.

B. Changes from Original Proposal

We do not request any funding changes from the original proposal.

C. Sources of Additional Funding

Identify non-EVOSTC funds or in-kind contributions used as cost-share for the work in this proposal. List the amount of funds, the source of funds, and the purpose for which the funds will be used. Do not include funds that are not directly and specifically related to the work being proposed in this proposal. Not applicable for administrative aspects of the program.

Outreach– Molly McCammon (AOOS, 15120114-B)

FY15 PROJECT PROPOSAL SUMMARY PAGE
Continuing, Multi-Year Projects

Project Title: (Please be sure to use the same title throughout the document)

Project Period: February 1, 2015 – January 31, 2016

Primary Investigator(s): (List each investigator and their affiliation) Molly McCammon, AOOS

Study Location: (Be as specific as possible)

Project Website (if applicable): www.aoos.org

Abstract*:
The overall goal of the Outreach and Community Involvement component is to provide education and outreach materials to communities in Prince William Sound and lower Cook Inlet and other stakeholders and resource managers highlighting the scientific information and knowledge gained through the Gulf Watch Alaska program. The component is led by Molly McCammon, Executive Director of the Alaska Ocean Observing System, and guided by a Steering Committee that includes key outreach staff from AOOS, the PWS Science Center (PWSSC), Prince William Sound Regional Citizens Advisory Council (PWSRCAC), Kachemak Bay Research Reserve (KBRR), Alaska SeaLife Center (ASLC), North Pacific Research Board (NPRB), COSEE Alaska (COSEE), NOAA and USGS. Marilyn Sigman, a marine educator with the COSEE Program is now providing some additional staff support to our outreach efforts. The Steering Committee meets regularly throughout the year. Activities include development of basic communication and branding materials, a programmatic website and data portal, community lectures in Cordova and Homer, and public Discovery Labs in Homer.

Estimated Budget: This project is funded as a component of Hoffman administrative budget

Date: September 2, 2014

I. EXECUTIVE SUMMARY

The overall goal of the Outreach and Community Involvement component is to provide education and outreach materials to communities in Prince William Sound and lower Cook Inlet and other stakeholders and resource managers highlighting the scientific information and knowledge gained through the Gulf Watch Alaska program. Since the March 1 annual report, we followed up the AOOS and Alaska Sea Grant-sponsored Community Based Monitoring Workshop with a half-day session exploring potential CBM-type activities in the GWA geographic region. The summer issue 2014 *Delta Sound Connections* newspaper included a 2-page section highlighting the GWA Program and circulated throughout the Sound.

II. COORDINATION AND COLLABORATION

A. Within a EVOSTC-Funded Program

The GWA Program Management Team actively participates in the Outreach and Community Involvement Steering Committee to ensure all activities are coordinated and integrated within the entire GWA Program. Outreach activities are regularly reported on during all PI and Science Coordinating Committee meetings.

B. With Other EVOSTC-funded Projects

Not currently applicable, but we plan to explore future collaborations with the marine debris project.

C. With Trustee or Management Agencies

The Outreach component works closely with Department of Interior and NOAA outreach/communication specialists (two staff members serve on the Steering Committee) in order to leverage existing agency outreach activities.

III. PROJECT DESIGN – PLAN FOR FY15

A. Objectives for FY15

- Continue outreach and information dissemination efforts at community level events, workshops, and scientific meetings.
- Develop new projects including scientific mini-symposia and film festivals, virtual field trip and curriculum, and exhibit.
- Follow-up on initial actions to inform agency managers and to explore opportunities for Community Based Monitoring.

B. Changes to Project Design

Now that the website and basic communication materials are essentially completed and community lectures and education projects in Cordova and Homer launched, we are focusing our efforts this year on developing scientific mini-symposia and film festivals for smaller communities and their schools; a virtual field trip and curriculum to be developed by the Alaska SeaLife Center; and a GWA exhibit for the AK SeaLife Center that could be shared with museums in Valdez, Homer and Cordova.

We will also follow up on a webinar that will be held in September 2014 to educate federal and state agency resource managers about the GWA program, which will begin the dialogue on how best to organize scientific data and information to meet management needs, as well as continue the dialogue on opportunities for Community Based Monitoring.

IV. SCHEDULE

A. Project Milestones for FY 15

Objective 1. Continue outreach and information dissemination efforts at community level events, workshops, and scientific meetings.

Ongoing. To be met by January 2016

Objective 2. Develop new projects including scientific mini-symposia and film festivals, virtual field trip and curriculum, and exhibit.

To be met by January 2016

Objective 3. Follow-up on initial actions to inform agency managers and to explore opportunities for Community Based Monitoring.

To be met by January 2016

B. Measurable Project Tasks for FY 15

FY 15, 1st quarter (February 1, 2015 - April 31, 2015)

February: *First Virtual Field Trip completed*

March: *Participate in Kachemak Bay Science Conference; provide travel for lower Cook Inlet communities to participate*

FY 15, 2nd quarter (May 1, 2015-July 30, 2015)

April 30: *Delta Sound Connections newspaper*

May 30: *AK SeaLife Center exhibit completed*

FY 15, 3rd quarter (August 1, 2015 – October 31, 2015)

August: *Discovery Labs, Homer*

FY 15, 4th quarter (November 1, 2015- January 31, 2016)

January: *Sponsor speakers at AK Marine Science Symposium*

V. PROJECT PERSONNEL – CHANGES AND UPDATES

Marilyn Sigman, a marine educator with the COSEE Program is now providing some additional staff support to our outreach efforts.

VI. BUDGET

A. Budget Forms

Please see included program workbook for budget forms.

B. Changes from Original Proposal

NA

C. Sources of Additional Funding

Data Management– McCammon/Bochenek (AOOS/Axiom, 15120114-D)

FY15 PROJECT PROPOSAL SUMMARY PAGE
Continuing, Multi-Year Projects

Project Title: Data Management Support for the EVOSTC Long Term Monitoring Program

Project Period: February 1, 2015 – January 31, 2016

Primary Investigator(s): Rob Bochenek, Axiom Consulting & Design

Study Location: EVOS Spill Affected Area

Project Website (if applicable): http://www.gulfwatchalaska.org/

Abstract*: This project supplies the EVOS Long Term Monitoring (LTM) effort with critical data management support to assist study teams in efficiently meeting their objectives and ensuring data produced or consolidated through the effort is organized, documented and available to be used by a wide array of technical and non-technical users. This effort leverages, coordinates and cost shares with several existing data management projects managed by the Alaska Ocean Observing System (AOOS) that are parallel in scope to the data management needs of the long term monitoring program. In the first two years, this project will focus on providing informatics support to streamline the transfer of information between various study teams and isolate and standardize historic data sets in the general spill affected area for use in retrospective analysis, synthesis and model development. These efforts continue into year three through five, but efforts will also begin to focus on developing management and outreach applications for the data and data products produced from the LTM program.

Estimated Budget:

EVOSTC Funding Requested* (*must include 9% GA)*:

FY12	FY13	FY14	FY15	FY16	TOTAL
$190.8	$163.4	$164.0	$164.0	$162.6	$844.7

Non-EVOSTC Funds to be used:

FY12	FY13	FY14	FY15	FY16	TOTAL
$683.0	$640.0	$620.0	$500.0	$500.0	$2,943.0

Date: September 2, 2014

I. EXECUTIVE SUMMARY

As originally proposed, the objectives of this project are to 1) provide data management oversight and services for EVOS LTM project team data centric activities which include data structure optimization, metadata generation, and transfer of data between project teams; 2) consolidate, standardize and provide access to study area data sets that are critical for retrospective analysis, synthesis and model development; 3) develop tools for user groups to access, analyze and visualize information produced or processed by the LTM effort; and 4) integrate all data, metadata and information products produced from this effort into the AOOS data management system for long term storage and public use.
Project investigators continue to provide core data management oversight and services for the Long-term Monitoring Program known as Gulf Watch Alaska. The focus continues to be on establishing – and implementing - protocols for data transfer, metadata requirements and salvage of historic data, both those data funded by the *Exxon Valdez* Oil Spill Trustee Council and ancillary historic data from other projects. Investigators meet with National Center for Ecological Analysis and Synthesis investigator Matt Jones to coordinate future activities. PIs have participated in regular PI meetings, including the in-person meeting in November 2013 and the January 2014 data meeting and are coordinating activities between the Herring and LTM programs. In addition, the AOOS Ocean Research Workspace, rolled out to PIs in Year 1, continues to be used as the internal staging area for PI data and work products, with individual PI user and group profiles created. Several training seminars have been held via webinars, and PIs are now using the system to organize and consolidate their project level data. Software engineers at Axiom are providing support for the Workspace, resolving bugs and implementing new functionality in response to user feedback. All 2012 data are now posted on the Workspace, per the Program Management data sharing protocols, with 2013 data now being posted. The Gulf Watch Alaska Data Portal was released in September 2013 as a key component of the Alaska Ocean Observing System's Gulf of Alaska Ocean Data Explorer. The portal showcases Gulf Watch Alaska project data once it becomes public, alongside environmental data sets ingested by the project team.

Investigators have been involved in several exercises and meetings to optimize approaches to managing Gulf Watch data in more effective ways. Most notable of these activities occurred in January of 2014 during an EVOSTC sponsored Data Management Meeting. During that meeting, several recommendations were made which have spurred investigators to adapt their data management approach in support of the entire Gulf Watch program. Investigators have been modifying protocols defined in the Gulf Watch data management plan to address these issues.

II. COORDINATION AND COLLABORATION

A. Within a EVOTC-Funded Program

The Research Workspace technology being used for data management of the Gulf Watch Alaska program is designed to help facilitate the integration of datasets across disciplines and researchers within the Gulf Watch program. This technology is also being used by the EVOSTC-sponsored herring program. Teams and investigators are able to access each other's datasets in a seamless fashion.

B. With Other EVOSTC-funded Projects

The Research Workspace is also being used to organize and centralize data and electronic resources for historic EVOS funded projects. NCEAS and AOOS data management teams have been working together over the span of the project to salvage and document as much information as possible for historic EVOS data that is in jeopardy of being lost to time.

C. With Trustee or Management Agencies

In September 2013 the data management team released the Alaska Ocean Observing System's Gulf of Alaska (GOA) Data Portal, which integrates data and project information produced by Gulf Watch Alaska researchers with a large number of additional GIS, numerical modeling and remote sensing data resources. The team was able to leverage the AOOS Ocean Data Explorer portal which has been developed using other funding (primarily NOAA) and has these additional features: an integrated search catalog which allows users to search by category or key word, ability to preview data before downloading files, and advanced visualization tools. The platform provides open access to a large array of valuable scientific information that can be accessed and used by mangers and scientists with Trustee Council agencies. AOOS data management has worked with several data consumers within USGS, NPS, BOEM and NOAA in accessing and using data contained within this data portal. The Research Workspace is also being used by the North Pacific Research Board's Gulf of Alaska Integrated Ecosystem Research Program. Historic data acquired through that program is also being provided to Gulf Watch Alaska PIs.

III. PROJECT DESIGN – PLAN FOR FY15

A. Objectives for FY15

1) Provide data management oversight and services for EVOS LTM project team data centric activities, which include data structure optimization, metadata generation, and transfer of data between project teams.

2) Consolidate, standardize and provide access to study area data sets that are critical for retrospective analysis, synthesis and model development.

3) Develop tools for user groups to access, analyze and visualize information produced or processed by the LTM effort.

4) Integrate all data, metadata and information products produced from this effort into the AOOS data management system for long-term storage and public use.

B. Changes to Project Design

Small changes have been made to protocols within the Gulf Watch Alaska Data Management Plan to address concerns of the EVOSTC Science Panel and include clarification of QA/QC procedures and review of Standard Operating Procedures (SOPs) by the program's internal science advisory team.

IV. SCHEDULE

A. Project Milestones for FY 15

Objective 1. Provide data management oversight and services for EVOS LTM project team data centric activities, which include data structure optimization, metadata generation, and transfer of data between project teams.
Assess and review year 4 data sets – To be met by September 2015

Objective 2. Consolidate, standardize and provide access to study area data sets that are critical for retrospective analysis, synthesis and model development.
Data ingested in year 3 will be available via data access tools – To be met by June 2015
Any additional historical data will be made available through the AOOS Gulf of Alaska portal - Ongoing

Objective 3. Develop tools for user groups to access, analyze and visualize information produced or processed by the LTM effort
New user tool platform (developed at 2014 PI meeting) released –

To be met by June 2015

Objective 4. Integrate all data, metadata and information products produced from this effort into the AOOS data management system for long-term storage and public use.
This task is ongoing.

B. Measurable Project Tasks for FY 15

FY 15, 1st quarter (February 1, 2015 - April 31, 2015)

February *EVOS synthesis workshop with Herring and Long-term monitoring programs*
March *Submit annual report*
March *Submit annual financial report*

FY 15, 2nd quarter (May 1, 2015-July 30, 2015)

May *Participate in Herring Program annual PI meeting*
July *Submit Y5 work plan for review*
June *Release version 2 of user tool platform*

FY 15, 3rd quarter (August 1, 2015 – October 31, 2015)

September *Oversee transfer of field year 4 data*
October *Assess year 4 datasets and metadata submitted through Ocean Workspace*

FY 15, 4th quarter (November 1, 2015- January 31, 2016)

January *Annual Marine Science Symposium*

V. PROJECT PERSONNEL – CHANGES AND UPDATES

None

VI. BUDGET

A. Budget Forms (Attached)

Please see included program workbook for budget forms.

B. Changes from Original Proposal

No Change

C. Sources of Additional Funding

AOOS brings a significant level of leveraged resources, infrastructure, regional data management projects and partnerships to this proposed effort. The data management effort for the LTM and herring projects could not be accomplished for the budgeted amount by a team without these leveraged resources.

1. AOOS – (540k to AOOS DM) Alaska oceanographic data management effort. Supports open source, standards based data system that serves up and archives real-time sensor feeds, models & remote sensing data, GIS data layers, and historical datasets. Data system developed on interoperability concepts and meets NOAA Integrated Ocean Observing System standards and protocols for streaming data feeds to national data assimilation centers. Data Management Committee chaired by Dr. Phil Mundy provides ongoing advice, prioritization and direction to the team at Axiom Consulting & Design. AOOS board is made up of federal and state agencies, and major marine research institutions in the state that have committed to data sharing. The AOOS board has committed to supporting a statewide data system for as long as AOOS exists. Federal funding is stable, although we would like to see it increase. In the event AOOS was to end, all data and data products would be transferred to the University of Alaska.
2. NPRB GOAIERP – (80K) During this project year, NPRB will be providing funding to the AOOS data management team to support the Gulf of Alaska Integrated Ecosystem Research Program, which is performing research in the same area as Gulf Watch.

3. USFWS Seabird Data System – ($50K) Project involves the creation and population of a series of new seabird metric databases (diet and productivity) and integrating these new databases with legacy seabird databases (species distribution and abundance at seabird colonies, pelagic species distribution and abundance, USGS seabird monitoring databases and NPRB's North Pacific Seabird Diet Database). Modern spatially explicit, web based data entry interfaces have and continue to be developed to assist researchers existing in distributed agencies to contribute their historic and current seabird metric data into standard data structures. Project will result in vastly increasing the amount and quality of seabird species distribution, diet and other seabird data available for use in retrospective analysis and management. Though data includes areas around all of Alaska, most available data is located in GOA and PWS.
4. AOOS – collaborator with Alaska Data Integration Working Group – an initiative with the Alaska Climate Change Executive Roundtable – to develop protocols for serving up project data to increase data sharing among federal and state agencies.
5. AOOS and NOAA – initiatives to develop data sharing agreements with private sector, including oil & gas companies.
6. Kenai Fish Habitat Partnership/Cook Inlet Regional Citizens Advisory Council (28K) – contract with Axiom to develop a data management system for their oceanographic and contaminants data in Cook Inlet.
7. NOAA – Project to Axiom to develop a Cook Inlet beluga sightings database.

Historical data management and synthesis – Jones (NCEAS, 15120120)

FY15 PROJECT PROPOSAL SUMMARY PAGE

Continuing, Multi-Year Projects

Project Title: Collaborative Data Management and Holistic Synthesis of Impacts and Recovery Status Associated with the Exxon Valdez Oil Spill

Project Period: February 1, 2015 – January 31, 2016

Primary Investigator(s): Matthew B. Jones, National Center for Ecological Analysis and Synthesis (NCEAS)

Study Location: Entire Exxon Valdez oil spill affected area

Project Website (if applicable): www.gulfwatchalaska.org, https://goa.nceas.ucsb.edu/

Abstract*: The AOOS-led Long-Term Monitoring (LTM) and the PWSSC-led Herring Research and Monitoring (HRM) programs propose an ambitious monitoring and research agenda over the next five years. These efforts could facilitate a more thorough understanding of the effects of the oil spill if the new data and information on the spill-affected ecosystems are effectively managed and collated along with historical data on these systems, and then used in a comprehensive synthesis effort. We propose a collaboration among NCEAS and the AOOS LTM and HRM teams to help build an effective data management cyberinfrastructure for proposed monitoring efforts and organize these data with historical data, including previous EVOSTC-funded efforts, to prepare for synthesis and ensure all data are organized, documented and available to be used by a wide array of technical and non-technical users. Building on the LTM and HRM syntheses and modeling efforts and the 20-year historical data from EVOSTC projects and any available current data, NCEAS would convene two cross-cutting synthesis working groups to do a full-systems analysis of the effects of the 1989 oil spill on Prince William Sound and the state of recovery of the affected ecosystems.

Estimated Budget:

EVOSTC Funding Requested* (*must include 9% GA)*:

FY12	FY13	FY14	FY15	FY16	TOTAL
$416.8	$464.7	$372.1	$379.2	$73.9	$1,706.7

Non-EVOSTC Funds to be used:

FY12	FY13	FY14	FY15	FY16	TOTAL
$0.0	$0.0	$0.0	$0.0	$0.0	$0.0

Date: 2 September 2014

I. EXECUTIVE SUMMARY

In the two decades following the *Exxon Valdez* oil spill (EVOS), and after extensive restoration, research, and monitoring efforts, it has been recognized that full recovery from the spill will take decades and requires long-term monitoring of both the injured resources and factors other than residual oil that may continue to inhibit recovery or adversely impact resources that have recovered. Monitoring information is valuable for assessing recovery of injured species, managing those resources and the services they provide, and informing the communities who depend on the resources. In addition, long-term, consistent, scientific data is critical to allow us to detect and understand ecosystem changes and shifts that directly or indirectly (e.g. through food web relationships) influence the species and services injured by the spill.

An integrated monitoring program requires information on environmental drivers and pelagic and benthic components of the marine ecosystem. Additionally, while extensive monitoring data has been collected thus far through EVOS Trustee Council-funded projects as well as from other sources and made publicly available, much of that information needs to be collated and assessed holistically to understand factors affecting individual species and the ecosystem as a whole. Interdisciplinary syntheses of historical and ongoing monitoring data are needed to answer remaining questions about the recovery of injured resources and impacts of ecosystem change.

Data collected prior to and in response to the Exxon Valdez oil spill are profoundly heterogeneous. They range from long-term, automated sensing of oceanographic and atmospheric conditions, to short-term, experimental, monitoring, and behavioral studies of biological components of the system. The scientific data to be collected in these studies includes data on population trends, behavior, physiology, disease, and genetics of many species, as well as oceanographic and meteorological data at both regional and local scales. This diversity of data and data collection protocols substantially complicates data management by EVOSTC long-term monitoring projects. In addition, investigators on both the long-term monitoring and herring population studies are affiliated with many different institutions and agencies, each currently collecting data from many sites within the spill region and managing it within the frameworks dispersed among these agencies. Any data management system will necessarily need to accommodate this heterogeneity and dispersion by preserving the original data and providing mechanisms to access, integrate, and analyze the data for crosscutting synthesis. Data management activities for oceanographic information occur in isolated, physically distributed agencies, leading to low cross-agency utilization of data. Technical barriers, complex data formats, a lack of standardization and missing metadata have limited access to data and made the utilization of available scientific information cumbersome and daunting. As a consequence, existing data is underutilized and often has not undergone quality assurance.

In this proposal, we outline the collaboration between the National Center for Ecological Analysis and Synthesis (NCEAS), the Alaska Ocean Observing System (AOOS) and their partner Axiom Consulting, and the investigators of the pending Long Term Monitoring (LTM - proposal submitted by McCammon et al.) and Herring Research and Monitoring (HRM – proposal submitted by Pegau et al.) programs (see Figure below). This project will augment the expertise in data management and synthesis of these groups to maximize the efficiency of data collection and management for the LTM and HRM programs and expand access to these data, collate additional historical data that are useful for synthesis from the EVOS affected area, and conduct a broad-ranging synthesis of twenty years of EVOSTC funded research data to generate a comprehensive assessment of ecosystem impacts and recovery status for the spill affected area.

This collaboration document augments the data management, infrastructure development, and synthesis activities previously proposed by the AOOS partners with additional objectives that introduce new technologies from NCEAS to jointly improve the data management infrastructure available to researchers, broaden the scope of data collation and integration, and embark on an ambitious synthesis plan (Figure 1). During the first three years, NCEAS has focused on mining historical data and contributing to development of both the AOOS cyberinfrastructure and the DataONE Federation infrastructure in order to create the necessary data resources for synthesis; during years 3-5, NCEAS has been conducting a multi-year working group effort to synthesize what is known about spill effects and recovery of ecosystems. These activities will be interwoven with the complementary but distinct data management, technology development, and analysis activities previously proposed by Axiom and AOOS and which are referenced in the objectives below.

II. COORDINATION AND COLLABORATION

D. Within a EVOTC-Funded Program

- Alaska Ocean Observing System (AOOS)
- Axiom Consulting
- Long Term Monitoring (LTM)
- Herring Research and Monitoring (HTM)

E. With Other EVOSTC-funded Projects

While the project is mostly independent of other Trustees programs, we have collaborated with hundreds of Trustee-funded investigators to collate historical data collected by the various funded projects. This collaboration has allowed us to collate a rich set of data arising from past Trustee project funding.

F. With Trustee or Management Agencies

This proposal was originally in response to a request for involvement in data management activities from Elise Hsieh, with the stated goal to connect the data management activities of the project to other activities in which we are involved, including DataONE and related efforts.

Conduct of the synthesis working groups described below is done in collaboration with the National Center for Ecological Analysis and Synthesis, as well as many participating scientists that volunteer their time to work on integrative synthesis. These collaborations are highly productive because of the diversity and intensity of the participating scientists

III. PROJECT DESIGN – PLAN FOR FY15

A. Objectives for FY15

5) Provide data management oversight and services for project team data centric activities that include data structure optimization, metadata generation, and transfer of data between project teams (AOOS lead, with contributions from NCEAS).

6) Consolidate, standardize and provide access to related and historic data sets that are critical for retrospective analysis, synthesis and model development within the LTM and HRM programs. (AOOS and NCEAS).

7) Develop tools for user groups to access, analyze and visualize information produced or processed by the LTM and Herring Research efforts (AOOS lead, with contributions from NCEAS).

8) Organize, integrate, analyze, and model the 20-year historical data from EVOSTC-funded projects and other monitoring in the spill area in preparation for synthesis (under LTM and HRM programs and in NCEAS working groups) (NCEAS lead with AOOS contributions).

9) Integrate all data, metadata and information products produced from this effort into the AOOS data management system for long-term storage and public use (AOOS lead).

10) Augment AOOS/IOOS preservation and interoperability system with other data systems through integration of DataONE services (NCEAS lead).

11) Conduct additional broad synthesis activities on spill impacts and recovery as part of whole-ecosystem analysis through NCEAS working groups (NCEAS lead with AOOS and PWSSC contributions).

B. Changes to Project Design

The project design has not changed, but has been delayed by a longer process for selecting synthesis working groups. While we originally planned to begin working group meetings during FY14, groups were selected and announced during July 2014. Due to scheduling constraints by the working group participants, it appears the first working group meetings will be held during early 2015. Thus we plan to simply rollover the the budget expenditures from FY14 to FY15 and FY16.

IV. SCHEDULE

A. Project Milestones for FY 15

For each project objective listed (III.A), specify when critical project tasks will be completed, as submitted in your original proposal. Please identify any substantive changes and the reason for the changes. Please format your information as in the following example:

Objective 1. Develop sediment-core chronologies in lake-productivity indicators.
To be met by September 2015

Objective 2. Compare sediment data corresponding to the past few decades to salmon population statistics.
To be met by December 2015

Objective 3. Reconstruct time-series of lake productivity, input of marine-derived nutrients, and salmon escapement.
To be met by January 2016

Objective 1. Provide data management oversight and services for EVOS LTM project team data centric activities that include data structure optimization, metadata generation, and transfer of data between project teams.

This objective will be addressed by AOOS and NCEAS throughout the entire span of the project and will follow the annual cycle of field data collection and analysis by principal investigators. NCEAS milestones will include incorporation of project-

specific data management tools into the Ocean Workspace and development of Smart Semantic Search Services for data discovery.

Status: Mostly complete but ongoing consultation, but with minimal emphasis during years 4-5. Dependent upon continued collaboration by other project participants.

Objective 2. Consolidate, standardize and provide access to related and historic data sets that are critical for retrospective analysis, synthesis and model development within the LTM and HRM programs.

This objective will be primarily met by AOOS and NCEAS by the fourth quarter of year two of the effort (September 2013). However, AOOS will continue to add data to the system throughout the entire life of the project, and NCEAS will continue to add data as needed by synthesis efforts through year 4.

Status: This activity is complete from years 1-3 (recoverable data sets have been collated, but many remain that are non-recoverable), but will continue to gather specific data sets that target specific data needs for synthesis working group activities in years 4-5.

Objective 3. Develop tools for user groups to access, analyze and visualize information produced or processed by the LTM and HRM efforts.

For AOOS, see milestones in LTM and HRM detailed project descriptions. For NCEAS, analysis and visualization tools that are incorporated into the system will be available at the end of year 2 when other software deliverables are produced.

Status: We continue to develop data discovery and presentation tools to show how data are used in analysis during the synthesis process.

Objective 4. Organize, integrate, analyze, and model the 20-year historical data from EVOSTC-funded projects and other monitoring in the spill area in preparation for LTM and HRM program and NCEAS working group synthesis efforts

Historical and newly generated data will be collated throughout years 1 and 2, with integration and modeling of these occurring as they are collated. Data and modeling summaries will be posted in Quarter 4 of year 1, and the complete historical data set will be available in Quarter 4 of year 2. NCEAS working groups will continue to integrate the data used in their synthesis activities with new data from LTM and HRM projects as it becomes available during years 3 and 4.

Status: Historical data are now documented and organized through the single GoA Data Portal, and are accessible via analytical scripting systems such as R. The Projects Data Coordinator has worked on integration of key data sets, including ADCP data across the study area, seabird data, and others. Results of these integrations are also being pushed

to the GoA member node as derived data products that can be reused in synthesis efforts.

Objective 5. Integrate all data, metadata and information products produced from this effort into the AOOS data management system for long-term storage and public use.

This objective will be addressed throughout the entire span of the project. The AOOS data system is to serve as the vessel to capture all project level data produced through this effort in addition to those datasets salvaged to inform the historic synthesis effort. This task will be ongoing as long as the program is producing or acquiring additional data.

Status: The NCEAS Data Coordinator (Couture) continues to work with groups to produce syntheses of the various historical and contemporary data sets. Emphasis will shift in year 4 and 5 to focus on data integration needed for the two NCEAS synthesis working groups. All historical that have been collated to date have been archived in the AOOS data systems, and additional data are added as they are identified, collated, and documented.

Objective 6. Augment AOOS/IOOS preservation and interoperability system with other data systems through integration of DataONE services.

Initial integration with DataONE will occur in year 1 with a prototype release in Quarter 4, and a final release of DataONE services in year 2 Quarter 4. Once operational, data will continue to be replicated to DataONE as they are produced throughout the span of the project.

Status: The Gulf of Alaska Member node has been developed, tested, and deployed (https://goa.nceas.ucsb.edu). All historical that have been collated to date have been archived in DataONE and replicated across multiple nodes, and additional data are added as they are identified, collated, and documented. Historical data can be accessed at https://goa.nceas.ucsb.edu in addition to the AOOS site and the DataONE data portal (https://cn.dataone.org). The Gulf of Alaska Member Node was established and deployed in year 3, but we continue to offer to assist Axiom on better coupling between the AOOS data systems and DataONE. We understand a new initiative in this light is being developed at Axiom.

Objective 7. Conduct broad synthesis activities on spill impacts and recovery as part of whole-ecosystem analysis through NCEAS working groups.

Status: Two working groups have been selected and developed in year 3, and are conducting synthesis activities in years 3-5. One postdoc is under recruitment to work with these working groups and is expected to start in January 2014, and the other is being re-advertised after the main candidate declined our offer in August 2014.

B. Measurable Project Tasks for FY 15

Specify, by each quarter of each fiscal year, when critical project tasks (for example, sample collection, data analysis, manuscript submittal, etc.) will be completed, as submitted in your original proposal.

Please identify any substantive changes and the reason for the changes. Please format your schedule as in the following example:

FY15 1st Quarter (February 1, 15 to January 31, 16)

February Assess year 3 datasets and metadata submitted through AOOS
Conduct Working Group meetings throughout year as researcher schedules allow

FY15 2rd Quarter

May Participate in annual HRM program PI meeting

FY15 3rd Quarter

August Submit input for five-year plan for FY17-22

FY15 4th Quarter

November Participate in LTM program PI meeting
December Create synopsis of FY15 synthesis WG meetings, draft and submit publications
January Report on completion of 4 synthesis working groups meetings in 4th year

V. PROJECT PERSONNEL – CHANGES AND UPDATES

No changes to senior personnel.

VI. BUDGET

D. Budget Forms (Attached)

Provide completed budget forms.

E. Changes from Original Proposal

No changes from original request, but we do request that FY14 and prior funds be rolled forward to support the working groups, postdocs, and engineers that have not yet worked on the project.

F. Sources of Additional Funding

No non-EVOSTC funds or in-kind contributions used.

Science Coordination and Synthesis – Holderied (NOAA KBL, 15120114-H)

FY15 PROJECT PROPOSAL SUMMARY PAGE
Continuing, Multi-Year Projects

Project Title: Science Coordination and Synthesis for the Long Term Monitoring Program

Project Period: February 1, 2015 – January 31, 2016

Primary Investigator(s): Kris Holderied, NOAA Kasitsna Bay Laboratory,Kris.Holderied@noaa.gov, 907-235-4004, 2181 Kachemak Drive, Homer, AK 99603

Study Location: North-central Gulf of Alaska region from Katmai National Park to Prince William Sound

Project Website (if applicable): www.gulfwatchalaska.org

Abstract*: This project is a component of the integrated Long-term Monitoring of Marine Conditions and Injured Resources and Services submitted by McCammon et al (2011). This project explicitly provides for science coordination and syntheses of data from our long-term monitoring program, as well as incorporating an interdisciplinary framework into program development and implementation. The science coordination and synthesis component of our integrated program improves linkages between monitoring in different regions (Prince William Sound, Gulf of Alaska shelf, lower Cook Inlet) as well as between disciplines in a given region, as a way to better discern the impacts of environmental change on restoration and continued recovery of injured resources. Science coordination includes facilitating program planning and sharing of information between principal investigators, developing annual reports on the science program, and coordinating ongoing evaluation of the overall program. Science synthesis efforts help integrate information across the entire program and are closely coordinated with the conceptual ecological modeling and data management teams in our integrated program.

Estimated Budget:

EVOSTC Funding Requested* (*must include 9% GA)*:

FY12	FY13	FY14	FY15	FY16	TOTAL
$221.6	$139.0	$148.3	$146.1	$164.6	$819.6

Non-EVOSTC Funds to be used:

FY12	FY13	FY14	FY15	FY16	TOTAL
	$13.0	$13.0	$13.0	$13.0	$52.0

Date: September 2, 2014

I. EXECUTIVE SUMMARY

The overarching goal of the long-term monitoring program is to provide sound scientific data and products to inform management agencies and the public of changes in the environment and the impacts of these changes on injured resources and services. The science coordination and synthesis efforts support this goal by documenting the overall science monitoring program, improving information sharing between Principal Investigators (PIs) and with the herring program, assisting in development of multi-disciplinary datasets and tools, and informing an ongoing evaluation of the long term monitoring program's effectiveness and priorities in meeting EVOSTC goals. This continuing project addresses three primary objectives: 1) improve communication and data sharing; 2) improve and document integration of monitoring results; and 3) improve communication of monitoring information to resource managers and the general public.

II. COORDINATION AND COLLABORATION

A. Within a EVOSTC-Funded Program

The first primary objective of the science synthesis project is to improve communication and data sharing between the various projects within the program. Below is a list of the projects and coordination activities that will occur in year 4 of the program:

Gulf Watch Alaska Program Management, Outreach, and Administration Activities

- *Program coordination and logistics – Prince William Sound Science Center (PWSSC) and Alaska Ocean Observing System (AOOS):* The science coordinator will continue to work closely with PWSSC staff to assist with overall administrative activities of the program, including developing reports, and planning meetings and events.
- *Outreach – AOOS:* The science coordinator will continue to participate in the Outreach Planning Committee and work to report and plan local events as well as assists with updates to website pages and publically accessible information.
- *Data management –AOOS/Axiom Consulting:* The science coordinator will continue to work with Axiom staff to develop new data management and data access tools, including participating in AOOS tool rating webinars and teleconferences, providing data and feedback for new access tools in the data portal, and providing feedback to improve metadata generation tools. The science coordinator also will continue to work with all project Principal Investigators within the program to ensure new data is loaded to the portal, has undergone QA/QC measures, and also has appropriate metadata available for public access.
- *Historical data management and synthesis – National Center for Ecological Assessment and Synthesis (NCEAS):* The science coordinator will continue to facilitate communication between project principal investigators and NCEAS staff for data collection and synthesis and work to provide feedback for new data management tools and data publication.
- *Conceptual ecological modeling– Alaska Sea Life Center (ASLC):* The science coordinator will continue to work with ASLC staff to develop sub-model descriptions and updates and incorporate information into reports as well as plan and coordinate model development during meetings and workshops for the program.

Gulf Watch Alaska Field Monitoring project Coordination Activities

The science synthesis and coordination project science coordinator will continue to conduct a variety of activities to facilitate reporting, outreach, sharing, and publication of the information from the various monitoring projects. These activities will include:

1. Tracking and assisting with data and metadata publication in the program data portal.
2. Editorial review, collation, and writing the program synthesis pieces of reports and work plans.
3. Editorial review, website development and updates, and assistance with coordination of outreach events for each project.
4. Planning and documenting all quarterly teleconferences and meetings, providing notes and information to the group.
5. Attendance to a variety of scientific workshops to facilitate coordination of ideas and information from outside of the program.
6. Maintenance of program intranet site for purposes of conveying important dates and program information.

These activities will continue to be conducted as a coordinated effort for all of the monitoring projects within the program:

- *Gulf of Alaska mooring (GAK1) monitoring – University of Alaska Fairbanks (UAF)*
- *Seward line monitoring – UAF*
- *Oceanographic conditions in Prince William Sound – PWSSC*
- *Oceanographic monitoring in Cook Inlet – Alaska Department of Fish and Game (ADFG) / Kachemak Bay Research Reserve (KBRR)/ KBL*
- *Continuous plankton recorder –Sir Alister Hardy Foundation for Ocean Science (SAHFOS)*
- *Ability to detect trends in nearshore marine birds – USNPS Southwest Alaska inventory and monitoring Network (SWAN)*
- *Long-term killer whale monitoring – North Gulf Oceanic Society (NGOS)*
- *Humpback whale predation on herring – NOAA National Marine Fisheries Service (NMFS) Auke Bay Laboratory*
- *Forage fish distribution and abundance – U. S. Geological Survey (USGS) Alaska Science Center*
- *Prince William Sound marine bird surveys – U.S. Fish and Wildlife Service (USFWS)*
- *Nearshore benthic systems in the Gulf of Alaska – USGS Alaska Science Center/ USNPS SWAN, Coastal Resources Associates*
- *Ecological Communities in Kachemak Bay – UAF*
- *EVOS oil exposure of harlequin ducks and sea otters – USGS Alaska Science Center*
- *Oil level and weathering tracking – NOAA/NMFS Auke Bay Laboratory*

B. With Other EVOSTC-funded Projects

The Science Coordination and Synthesis project science coordinator will continue to work closely with the Herring Research and Monitoring program PIs to maintain reporting consistencies and share information. The science coordinator and HRM program coordinator continue to participate in annual meetings, teleconferences and work closely to encourage information sharing and address shared questions between the programs.

C. With Trustee or Management Agencies

The Science Coordination and Synthesis project science coordinator is working with the outreach team to develop a stakeholder outreach group with the purpose of informing managers and seeking input for desirable data access and viewing tools. Webinars and conference calls are planned through 2014 and 2015 to build this group.

III. PROJECT DESIGN – PLAN FOR FY15

A. Objectives for FY15

This project addresses three primary objectives that are ongoing: 1) improve communication and data sharing; 2) improve and document integration of monitoring results; and 3) improve communication of monitoring information to resource managers and the general public.

B. Changes to Project Design

No changes are planned.

IV. SCHEDULE

A. Project Milestones for FY 15

Objective 1. Improve communication, data sharing and coordinated field work planning between principal investigators of the individual monitoring projects, as well as with other agencies and research organizations.

Ongoing throughout project.

Objective 2. Improve and document integration of science monitoring results across the LTM program - working with the PIs, data management and modeling teams as well as other agencies and research organizations.

Ongoing throughout project.

Objective 3. Improve communication of monitoring information to resource managers and the public through data synthesis and visualization products and tools – working with the data management, conceptual ecological modeling and outreach teams, as well as other agencies and research organizations

Ongoing throughout project.

B. Measurable Project Tasks for FY 15

Many of the Science Coordination and Synthesis tasks and activities are ongoing throughout the year and will continue as proposed. These include:

1. Coordinate with Team Lead, PIs, administrative team and EVOSTC staff on overall LTM program planning, reporting and evaluation.

2. Plan agendas and facilitate program and small working group meetings and teleconferences.

3. Maintain program field work schedule and tracking of outreach and research activities.

4. Coordinate with the herring program lead on program implementation and joint information needs.

5. Coordinate with groups outside the LTM program (NPRB GOAIERP, NPS, GINA, LCCs etc.) on joint synthesis of information.

6. Coordinate with PIs to improve integration of multi-disciplinary monitoring activities within geographic regions (PWS, outer Kenai Peninsula coast, lower Cook Inlet) and of monitoring within single disciplines between different regions.

7. Assist in development and refinement of conceptual ecological models with the modeling team, herring program lead, and outside groups.

8. Work with data management team, modeling PI, and outreach team to develop data exploration and visualization tools.

9. Assist with internal "beta" testing of initial data visualizations and tools developed by the data management team.

10. Network with other monitoring programs and regional stakeholders to identify information needs that may be met by improved data visualization tools for the LTM program data.

FY 15, 1st quarter (February 1, 2015 - April 31, 2015)

February: *Participate in Joint Science Workshop with Herring Program.*
Compile, edit, annual reports for Year 3 EVOSTC and annual NOAA report.
March: *Submit annual reports for EVOSTC Year 3 and annual NOAA report.*
April: *Plan and coordinate quarterly program teleconference*

FY 15, 2nd quarter (May 1, 2015-July 30, 2015)

May: *Prepare and disseminate work plan templates to group*
June-July: *Plan and facilitate quarterly program teleconference*
Prepare Year 5 work plan for Science Synthesis and for Program

FY 15, 3rd quarter (August 1, 2015 – October 31, 2015)

August: *Compile and edit program work plans for Year 5 and mid-year reports for NOAA*
September 1: *Year 5 work plans submitted to EVOSTC and mid-year report to NOAA*
October: *Plan annual PI meeting and workshops*

FY 15, 4th quarter (November 1, 2015- January 31, 2016)

November: *Annual PI meeting and workshops*
December-January: *Preparation for and attendance to AMSS*
Plan and facilitate quarterly program teleconference
Begin compilation of Year 4 annual report.

V. PROJECT PERSONNEL – CHANGES AND UPDATES

No changes are proposed.

VI. BUDGET

A. Budget Forms (Attached)

Please see included program workbook for budget forms.

B. Changes from Original Proposal

No changes proposed.

C. Sources of Additional Funding

Identify non-EVOSTC funds or in-kind contributions used as cost-share for the work in this proposal. List the amount of funds, the source of funds, and the purpose for which the funds will be used. Do not include funds that are not directly and specifically related to the work being proposed in this proposal.

Conceptual Ecological Modeling – Hollmen (ASLC, 15120114-I)

FY15 PROJECT PROPOSAL SUMMARY PAGE
Continuing, Multi-Year Projects

Project Title: Long-term Monitoring: Synthesis and Conceptual Modeling - Conceptual Ecological Modeling

Project Period: February 1, 2015 – January 31, 2016

Primary Investigator(s):
Tuula Hollmen (Principal Investigator), Alaska SeaLife Center and University of Alaska Fairbanks, PO Box 1329, Seward, AK 99664; Phone: 907-224-6323; Fax 907-224-6320; Email: tuulah@alaskasealife.org
Suresh Sethi (Collaborator), Alaska Pacific University, 4101 University Drive, Anchorage, AK 99508; Email: sasethi@gmail.com

Study Location: N/A

Project Website: www.gulfwatchalaska.org

Abstract*: This project is a component of the integrated Gulf Watch Alaska Long-term Monitoring of Marine Conditions and Injured Resources and Services program. Under this research project, we will develop conceptual ecological models to support the synthesis and planning relating to the long term monitoring program in Prince William Sound, outer Kenai coast, and lower Cook Inlet/Kachemak Bay. To develop these models, we will summarize system components, processes, and influences into a synthetic framework. The conceptual models will assist in identification of data needs and development of long term monitoring priorities and, by iterative revision and refinement of models, demonstrate progress in understanding of ecosystem structure and function through the Gulf Watch Alaska program. The conceptual models will also provide guidance for development of numerical and quantitative models of system function and responses to external influences. Finally, the conceptual models will provide a communication tool among scientists, resource managers, policy-makers, and the general public, and will provide visualization and interactive tools to support outreach efforts of the Gulf Watch Alaska program.

We have developed a general conceptual ecosystem model based on input from principal investigators of the Gulf Watch Alaska program, representing current understanding of system structure and function by the program PIs. We have developed a semi quantitative linkage rating tool to characterize desired properties of interactions and relationships among system components. The rating tool has been applied to an example sub model, and will be used in explore and rank properties of a suite of musicale and management oriented sub models currently in development. Additionally, our team is developing decision support tools to assist the program with prioritization of monitoring variables and linkages to key management objectives.

Estimated Budget:

EVOSTC Funding Requested* (*must include 9% GA)*:

FY12	FY13	FY14	FY15	FY16	TOTAL
$83.1	$91.9	$95.6	$78.6	$81.9	$431.0

Non-EVOSTC Funds to be used:

FY12	FY13	FY14	FY15	FY16	TOTAL

**If the amount requested here does not match the amount on the budget form, the request on the budget form will considered to be correct.*

Date: September 2, 2014

I. EXECUTIVE SUMMARY

Conceptual ecological models are considered a key element of environmental and biological monitoring programs. Models provide a schematic framework to organize and illustrate complex system structure, thus serving as a tool to facilitate understanding and communication among scientists, managers, and the public. Gulf Watch Alaska is a long term, integrated monitoring program focused on environmental drivers and pelagic and benthic components of the Gulf of Alaska marine ecosystem. While extensive long term monitoring data from different components of the system exists, much of that information needs to be synthesized and assessed to understand the range of factors affecting individual species and the ecosystem as a whole. Interdisciplinary syntheses of historical and ongoing monitoring data are needed to answer remaining questions about the recovery of injured resources, and plan priorities for continued monitoring of status and dynamics of the Gulf ecosystem.

The conceptual ecological modeling project will provide a framework for 1. exploration, understanding, and synthesis of key components and processes of our study system, 2. refinement and development of further monitoring strategies, and 3. development of outreach and communication tools among scientists, managers, general public, and other interested parties. The conceptual models are developed to support the synthesis of data and to serve as a framework and guide for development of monitoring priorities, to meet the overall goals of the long term monitoring program.

The objectives of the conceptual modeling project are:

1. *Develop conceptual ecological models, summarizing key components, processes, and functions of the study system*
2. *Develop computer applications and web-based interfaces for interactive data exploration and visualization*

We have developed a general conceptual ecosystem model based on input from principal investigators of the Gulf Watch Alaska program, representing current understanding of system structure and function by the program PIs. We also have developed a rating system to elicit from experts and include quantitative information on properties of system linkages into conceptual ecological models. We plan to iteratively update the general model to demonstrate progress of research and learning about the structure and function of the Gulf of Alaska ecosystem by the Gulf Watch monitoring program. We also plan to apply the linkage rating methods to develop a suite of sub models to explore ecosystem components and control mechanisms in the Gulf in greater detail. Finally, we plan to elicit and link management objectives to our monitoring objectives by using a combination of modeling and decision support tools. The process will support the identification and ranking of priority long term monitoring variables for the program.

Publication update:

Manuscript: *Conceptual models are flexible tools for research planning, prioritization, and communication* submitted in August 2014.

II. COORDINATION AND COLLABORATION

A. Within a EVOTC-Funded Program

The components and projects funded under the Gulf Watch program are closely linked to the conceptual modeling project. The conceptual modeling is driven by expert input from program PIs. The input is gathered in modeling workshops, working group meetings, conference calls, and by email surveys.

B. With Other EVOSTC-funded Projects

The modeling efforts will be coordinated with the EVOS TC funded herring research program.

C. With Trustee or Management Agencies

Input on objectives from management agencies will be incorporated into modeling efforts. The input will be gathered through stakeholder webinars and meetings.

III. PROJECT DESIGN – PLAN FOR FY15

A. Objectives for FY15

Continue development of conceptual models
Continue development of interactive/data visualization tools
Attend annual PI meetings and Alaska Marine Science Symposium
Prepare modeling progress update for annual report

B. Changes to Project Design

No changes occurred.

IV. SCHEDULE

A. Project Milestones for FY 15

No substantive changes are proposed.

Objective 1. Continue development of conceptual models
To be met by January 2016
Task 1: *Draft first set of component sub models – to be met February 2015*
Task 2: *Elicit stakeholder input on management objectives – to be met May 2015*
Task 3: *Design conceptual models focusing on management applications and addressing management problems identified by stakeholders – to be met October 2015*
Task 4: *Annual review and update of general, dynamic conceptual ecosystem models – to be met November 2015*

Objective 2. Continue development of interactive/data visualization tools
To be met by January 2016
Task 1: *Data visualization tools based on \sub models – to be completed July 2015*

Objectives 3. Attend annual PI meetings and Alaska Marine Science Symposium
To be met by November 2015 and January 2016

Objective 4: Prepare modeling progress update for annual report
To be met by February 2016

B. Measurable Project Tasks for FY 15

No substantive changes are proposed.

FY 15, 1st quarter (February 1, 2015 - April 31, 2015)
February: *Complete first set of draft sub models*
May: *Elicit stakeholder input on management objectives*
FY 15, 2nd quarter (May 1, 2015-July 30, 2015)
July: *Complete data visualization tools for sub models*
FY 15, 3rd quarter (August 1, 2015 – October 31, 2015)
October: *Design draft sub models focusing on selected management applications*
FY 15, 4th quarter (November 1, 2015- January 31, 2016)

November:	*Elicit input at the annual PI meeting for iterative updating of conceptual ecosystem models.*
November:	*Continue elicitation of input from PIs on priorities for monitoring using structured decision support tools.*
January:	*Draft manuscript describing hierarchical development of conceptual models: general ecosystem model, meso-scale sub models, focused management objectives model*

V. PROJECT PERSONNEL – CHANGES AND UPDATES

No changes have been made.

VI. BUDGET

A. Budget Forms (Attached)

Please see included program workbook for budget forms.

B. Changes from Original Proposal

None Proposed

C. Sources of Additional Funding

N/A

Gulf of Alaska mooring (GAK1) monitoring – Weingartner (UAF, 15120114-P)

FY15 PROJECT PROPOSAL SUMMARY PAGE
Continuing, Multi-Year Projects

Project Title: Long-term monitoring: Environmental Drivers component - Long-term Monitoring of Oceanographic Conditions in the Alaska Coastal Current from Hydrographic Station GAK

Project Period: February 1, 2015 – January 31, 2016

Primary Investigator(s): Thomas Weingartner, Principal Investigator, School of Fisheries and Ocean Science, University of Alaska, Fairbanks, AK 99775 (907-474-7993; tjweingartner@alaska.edu)

Study Location: Mouth of Resurrection Bay, 59° 51'N, 149° 28'W

Project Website http://www.ims.uaf.edu/gak1/

Abstract*: This project is a component of the integrated Long-term Monitoring of Marine Conditions and Injured Resources and Services submitted by McCammon et. al.

This program continues a 44-year time series of temperature and salinity measurements at hydrographic station GAK 1. The data set, which began in 1970, now consists of quasi-monthly CTDs and a mooring with 6 temperature/conductivity recorders throughout the water column. The project monitors four important Alaska Coastal Current ecosystem parameters that will quantify and help understand interannual and longer period variability in:

1. Temperature and salinity throughout the 250 m deep water column,
2. Near surface stratification,
3. Baroclinic transport in the Alaska Coastal Current

In aggregate these variables are basic descriptors of the Alaska Coastal Current, an important habitat and migratory corridor for organisms inhabiting the northern Gulf of Alaska, including Prince William Sound.

Estimated Budget:

EVOSTC Funding Requested* (*must include 9% GA)*:

FY12	FY13	FY14	FY15	FY16	TOTAL
$109.5	$112.5	$115.7	$119.1	$122.5	$497.8

Non-EVOSTC Funds to be used:

FY12	FY13	FY14	FY15	FY16	TOTAL

Date: September 2, 2014

I. EXECUTIVE SUMMARY

The purpose of this project is to provide long-term monitoring data on the physical oceanography of the Alaska Coastal Current and the northern GoA shelf. The Alaska Coastal Current (ACC) is the most prominent feature of the Gulf of Alaska's shelf circulation. It is a narrow (~40 km), swift, year-round flow maintained by the integrated forcing of winds and coastal freshwater discharge. That forcing is variable and reflected in ACC properties. The current originates on the British Columbian shelf and exits the Gulf into the Bering Sea through Unimak and Amukta passes. Substantial portions of the ACC circulate through Prince William Sound and feed lower Cook Inlet and Kachemak Bay before flowing southwestward through Shelikof Strait. The current controls water exchanges, and transmits its properties into the fjords and bays between Prince William Sound and the Alaskan Peninsula. The monitoring proposed herein quantifies variability of the Gulf's inner shelf environment. ACC monitoring provides the broader-scale context for understanding variability in adjacent marine ecosystems and its effect on particular species (e.g., herring, salmon, and forage fish). The ACC's variability is transmitted to nearshore habitats around the gulf.

Measurements at GAK 1 at the mouth of Resurrection Bay, began in 1970. Initially the sampling was opportunistic, became more regular in the 1980s and 1990s, and systematic beginning in 1997 with EVOSTC support. Since then it has included quasi-monthly conductivity-temperature versus depth (CTD) casts and hourly temperature and salinity measurements at 6 depths distributed over the water column. GAK 1 is *the only station* in the GoA that measures both salinity and temperature over the 250 m deep water column.

The 44-year GAK 1 time series has documented:

1. The large interannual differences associated with El Nino and La Nina events, including substantial differences in the spring bloom between these phenomena (Weingartner et al., 2003, Childers et al., 2005).
2. The intimate connection between coastal freshwater discharge and the depth-varying evolution of winter and spring temperatures over the shelf (Janout et al., 2010; Janout 2009).
3. That GAK 1 is a reliable index of ACC transports of mass, heat, and freshwater (Weingartner et al., 2005).
4. That GAK 1 near-surface salinities are correlated with coastal freshwater discharge from around the Gulf (Weingartner et al., 2005).
5. Variations in mixed-layer depth in the northern Gulf, which affects primary production (Sakar et al., 2006; Henson, 2007)
6. Decadal scale trends in salinity and temperature, (Royer, 2005; Royer and Grosch, 2006; Weingartner et al., 2005, and Janout et al., 2010).
7. The relationships between temperature and salinity variations and the Pacific Decadal Oscillation and the strength and position of the Aleutian Low (Royer, 2005; Weingartner et al., 2005, and Janout et al., 2010)
8. That the record can guide understanding the variability in iron concentrations, a potentially limiting micro-nutrient required by many phytoplankton. Preliminary efforts indicate that iron and surface salinity are correlated at least in certain seasons (Wu, et al., 2008).
9. The evolution of the anomalously cold winter of 2007-08, which showed how winter runoff may affect the vertical distribution of temperature in the spring (Janout et al., 2010; Janout et al., 2012).
10. That the vertically-integrated density at station GAK 1 is in-phase with and largely responsible for the annual cycle of sea-level at Seward (Kelly, in prep.)

As shown by Meuter et al., (1994), Meuter (2004), and Spies (2009), these issues affect ecosystem processes on both the shelf and within Prince William Sound and Lower Cook Inlet/Kachemak Bay.

II. COORDINATION AND COLLABORATION

A. Within a EVOTC-Funded Program

All data sets will be available on the GAK 1 website (http://www.ims.uaf.edu/gak1/). The GAK 1 data are being integrated with other scientists in Gulf Watch Alaska as well as with other interested scientists not involved in the program. For example, we have assisted the National Park Service in establishing a similar monthly sampling and data processing protocol in Glacier Bay National Park. That NPS data is being blended with the GAK 1 to examine shelf-wide differences in temperature and salinity properties. Essentially the Glacier Bay data set complements GAK 1 since the Glacier Bay data is collected upstream (in terms of the general circulation characteristics of the GOA shelf. Collectively, the Glacier Bay and GAK1 data sets provide a broad-scale perspective of the GOA shelf environment. The GAK 1 data are an essential complement to the EVOSTC-supported efforts along the Seward Line, and with the EVOS-TC supported physical oceanographic sampling conducted in Prince William Sound and in Lower Cook Inlet. We can thus quantify both temporal and regional spatial variability in physical properties of the waters of this ecosystem.

B. With Other EVOSTC-funded Projects

The GAK 1 data set provides the only long-term historical data set on temperature and salinity trends in the northern Gulf of Alaska. Its primary value with respect to all EVOS-TC funded projects is to allow a retrospective assessment of oceanic anomalies on the inner shelf waters of the Gulf of Alaska. It provides a basis for researchers in the nearshore and herring projects to examine their results in the light of known historical variability in the physical aspects of the marine environment. It also allows the other programs to place their measurements of physical properties into an historical context.

C. With Trustee or Management Agencies

Our collaboration with other agencies (ADFG, USFWS, NPS, USGS, NOAA) is mainly conducted informally. However, we have specifically contributed to the design and data analyses of the Glacier Bay National Park Service in establishing a similar sampling program within Glacier Bay (although that program does not as yet include a mooring) and they have welcomed our use of their data sets. Most other collaborations with such agencies (excluding PIs involved in the Gulfwatch program from these agencies) is very informal and may not be known to us. This situation arises because we provide our data via our website and potential users are free to access it directly from the website. (While we ask that they inform us of their use of the data, this is not a condition of its use. It is our opinion and experience that requiring a user to register to access the data can dissuade a potential user. For example, we know that commercial and charter fishers have used these data, but that they would not do so if asked to register. Similarly, we know other scientists who have conducted exploratory research with these data but may not publish the results. We do ask that researchers inform us of any publications that derive from the work and acknowledge appropriately the data set and its funding source. Many researchers alert us to the use of these data when they have produced a peer-reviewed paper and these papers are listed on our website.) In prior years, we know that ADF&G have used the data to explore salmon abundance and NOAA-PMEL has used it in their research on the Gulf of Alaska shelf.

III. PROJECT DESIGN – PLAN FOR FY15

A. Objectives for FY15

The fundamental goal of this program is to provide a high quality, long-term data to quantify and understand monthly, seasonal, interannual and longer period variability of the GoA shelf. This measurement provides the broader scale spatial perspective discussed on pages 1 -5. Specifically we will measure:

1. Temperature and salinity throughout the water column,

2. Near surface stratification since this affects phytoplankton bloom dynamics,
3. Baroclinic transport in the Alaska Coastal Current

These objectives are to be accomplished through a combination of quasi-monthly shipboard sampling at GAK 1 and with an oceanographic mooring deployed at that location.

B. Changes to Project Design
Not applicable

IV. SCHEDULE
A. Project Milestones for FY 15
1. Temperature and salinity throughout the water column,
2. Near surface stratification since this affects phytoplankton bloom dynamics,
3. Baroclinic transport in the Alaska Coastal Current.

B. Measurable Project Tasks
FY 14, 1st quarter (February 1 – May 31, 2015)
February 2014 Project funding available
Begin quasi-monthly CTD sampling at GAK1; recover and re-deploy the GAK 1 mooring in March
FY 14, 2nd quarter (June 1, 2015-August 30, 2015)
Continue quasi-monthly CTD sampling at GAK1
FY 14, 3rd quarter (September 1, 2015-November 30, 2015)
Continue quasi-monthly CTD sampling at GAK1
FY 14, 4th quarter (December 1, 2015 – January 31, 2016)
Continue quasi-monthly CTD sampling at GAK1. Post data on website

V. PROJECT PERSONNEL – CHANGES AND UPDATES
Not applicable.

VI. BUDGET
A. Budget Forms (Attached)
Please see included program workbook for budget forms.
B. Changes from Original Proposal
Not applicable
C. Sources of Additional Funding
Not applicable

Seward line monitoring – Hopcroft (UAF, 15120114-J)

FY15 PROGRAM PROJECT
PROPOSAL FORM

Project Title: Long term monitoring: Environmental drivers component - The Seward Line: Marine Ecosystem monitoring in the Northern Gulf of Alaska

Project Period: February 1, 2015 – January 31, 2016

Primary Investigator(s): Russell R Hopcroft (rrhopcroft@alaska.edu), Tom Weingartner & Ken Coyle (UAF), Jeremy Mathis (UAF/NOAA).

Study Location: Mouth of Resurrection Bay, 59° 51'N, 149° 28'W south to offshelf station, , 58° 5.9'N, 147° 47.6'W

Project Website https://www.sfos.uaf.edu/sewardline/

Abstract: The ocean undergoes year-to-year variability in the physical environment, superimposed on longer-term cycles, and potential long-term trends. These variations influence ocean chemistry, and propagate through the lower trophic levels, ultimately influencing fish, seabirds and marine mammals. Over the past 50 years the Northern Pacific appears to have undergone at least one clear "regime shift", while the last 12 years have seen multi-years shifts of major atmospheric indices, leaving uncertainty about what regime the coastal Gulf of Alaska is currently in. Regime shifts are often expressed as fundamental shifts in ecosystem structure and function, such as the 1976 regime shift that resulted in a change from a shrimp dominated fisheries to one dominated by pollock, salmon and halibut. Long-term observations are also critical to describe the current state, and natural variability inherent in an ecosystem at risk of significant anthropogenic impact. Given the potential for such profound impacts, this proposal seeks to continue multidisciplinary observations which began in 1997 along the Seward Line and in PWS that assess the current state of the Northern Gulf of Alaska, during 2012-2017. Such observations form critical indices of ecosystems status that help us understand some key aspects of the stability or change in upper ecosystems components for both the short and longer-term. By analogy, the weather has been for more than a hundred years, yet regular observations are still needed to know what is happening and what can be expected in the near future.

Estimated Budget:
EVOSTC Funding Requested:

FY12	FY13	FY14	FY15	FY16	TOTAL
$98.1	$59.9	$100.5	$104.0	$113.7	$476.2

(Funding requested must include 9% GA)

Non-EVOSTC Funds to be used:

FY12	FY13	FY14	FY15	FY16	TOTAL
$0	$0	$0	$0	$0	$0

Date: September 2, 2014

I. EXECUTIVE SUMMARY

A. Statement of Problem

Long times-series are required for scientists to tease out pattern (and cause) from simple year-to-year variability. Like other regions, the Northern Pacific undergoes significant inter-annual variability, driven partially by variations in major climatic indices (e.g. El Niño, the Pacific Decadal Oscillation). Larger longer-term variations referred to as "regime shifts" have occurred in the past, and will likely occur again. Regime shifts are expressed as fundamental shifts in ecosystem structure and function, such as the 1976 regime shift that resulted in a switch within the Gulf of Alaska from a shrimp-dominated fishery to one dominated by pollock, salmon and halibut. Long-term observations are also critical to describe the current state, and natural variability inherent in an ecosystem at risk of significant anthropogenic impact. Given the potential for such profound impacts, the Seward Line Long-term Observation Program (http://www.sfos.uaf.edu/sewardline/) provides these critical observations on the current state of the Northern Gulf of Alaska ecosystem. Seward Line observations over the past 16 years have fundamentally revised our understanding of the coastal Gulf of Alaska ecosystem and allow us an appreciation of not only its major properties, but also their inter-annual variability. To date, we have observed both unusually warm and cold years, which influence the timing of the planktonic communities, but not necessarily their ultimate abundance and biomass.

In the past 12 months, an additional 5 years of funding have been secured from an established consortium partner, new instrumentation has been funded, and 2 papers have been submitted (one accepted, one in review) based on Seward Line observations.

II. COORDINATION AND COLLABORATION

A. Within a EVOTC-Funded Program

Within Gulf Watch, this project links tightly with the GAK1 mooring, providing a cross shelf context for its observations. It complements the CPR, PWS, and Lower Cook Inlet/Kachemak Bay long-term monitoring efforts by providing more detailed oceanographic evaluation of the GOA shelf and the major passages in PWS than provided by the other programs. All of these components overlap in their sampling locations relatively little, enough to ensure comparability between datasets, but not enough to be duplicative. Hopcroft serves on the Science Coordinating Committee, and participates regularly in associated functions to this end.

B. With Other EVOSTC-funded Projects

This project provides environmental context and indices to Prince William Sound Herring Program.

C. With Trustee or Management Agencies

This project places EVOS within a consortium of NPRB, AOOS and NOAA currently funding the line. Full annual costs of the program are $400-500K including ship time. ADF&G considers Seward Line data while generating Pink Salmon return forecasts for PWS.

III. PROJECT DESIGN

A. Objectives for FY15

The scientific purpose of this project is to develop an understanding of the response of this marine ecosystem to climate variability, and provide baselines against which to access any other anthropogenic influences on the GOA ecosystem. Toward this end, the Seward Line cruises on the Gulf of Alaska shelf determine the physical-chemical structure, primary production and the distribution and abundance of zooplankton, along with their seasonal and inter-annual variations. Some of the data is compared with

historical data sets whereas other data sets are a product of this continuing systematic sampling effort on this shelf.

Specifically, cruises:

1. Determine thermohaline, velocity, and macronutrient structure of the Gulf of Alaska shelf, emphasizing the Seward Line, and Prince William Sound stations (Fig 1).
2. Determine the state of carbonate chemistry (i.e. Ocean acidification)
3. Determine primary production and phytoplankton biomass distribution.
4. Determine the distribution and abundance of zooplankton.
5. Determine rates of growth and egg production of selected key zooplankton species.

B. Changes to Project Design

Most aspects of project remain the same as in the original proposal. Instrumentation on the CTD system has been improved, and additional bottles will be available for water chemistry. Methodological improvements in the quality of macronutrient chemistry require more field preparation and have necessitated dropping these measurements from the minor ("i") stations along the Seward Line. Chlorophyll measurements have shifted to direct extraction and measurement at sea to alleviate emerging concerns about degradation of pigments associated with freezing. Microzooplankton sampling is being added to the core program. A combination of poor weather and increased complexity of cruises has lowered the priority of measuring zooplankton rates (i.e. growth and egg production).

IV. SCHEDULE

A. Project Milestones for FY15

As with most long-term observation programs, the Seward Line has the same Milestones annually.

Objectives 1-5. Cruises are executed early each May and in mid-September collecting data or samples to address all objectives each cruise. Final datasets are released annually.

Typically:

- Physical oceanography and chlorophyll are available 60 days after a cruise.
- DIC and TA are available 90 days after a cruise.
- Macronutrients and zooplankton are available 6 months after a cruise.
- Results are presented annually at the Alaska Marine Science Symposium

B. Measurable Project Tasks for FY15

May 2015 – Spring cruise executed
September 2015 – Late Summer cruise executed
January 2016 – Results presented at AMSS

Cruises are executed early each May and in mid-September collecting data or samples to address all planned objectives each cruise. Products associated with each objective are subsequently posted graphically to the project's website at various intervals reflecting the degree or post-processing required.

V. PROJECT PERSONNEL – CHANGES AND UPDATES

NPRB's recent LTM funding brings 3 additional PIs to the Seward Line project: Seth Danielson (UAF – physical oceanography), Suzanne Strom (phyto/micro-zooplankton – WWU) and Kathy Kuletz (seabirds – USFWS). None of these PIs will have direct access to EVOS funding.

VI. BUDGET

A. Budget Form

Please see included program workbook for budget forms.

B. Changes from Original Proposal

The overall EVOS funding request remains the same as in the original proposal.

C. Sources of Additional Funding

The Seward Line was selected for 5 years of collaborative funding through NPRB's Long-term Monitoring program ($1M). In addition to supporting core activities, this funding will 1) add more detailed phyto/microzooplankton research and 2) formalize funding for observations of seabirds and marine mammals that have been supplied by USFWS at no cost to the project for the past 10 years.

A proposal to the Murdock Foundation to add high-resolution optical detection of biological and non-biological particles during CTD casts was funded ($300K) and should be operation by next cruise. The new CTD frame ($30K) required to accommodate this equipment was supported by a combination of AOOS, NOAA and UAF funds.

Oceanographic conditions in Prince William Sound – Campbell (PWSSC, 15120114-E)

FY15 PROPOSAL SUMMARY PAGE
Continuing, Multi-Year Projects

Project Title: Long term monitoring of oceanographic conditions in Prince William Sound

Project Period: February 1, 2015 – January 31, 2016

Primary Investigator(s): Campbell, Robert W., PWS Science Center, 300 Breakwater Ave., Box 705, Cordova, AK, 99574; rcampbell@pwssc.org

Study Location: Prince William Sound, Hinchinbrook Entrance, Montague Strait, Simpson Bay, Whale Bay, Eaglek Bay, Zaikof Bay

Project Website: www.gulfwatchalaska.org

Abstract*: This project is a component of the integrated Long-term Monitoring of Marine Conditions and Injured Resources and Services submitted by McCammon *et. al*. This project is intended to provide physical and biological measurements that may be used to assess bottom-up impacts on the marine ecosystems of Prince William Sound. Specifically, it is proposed to deploy an autonomous profiling mooring in central Prince William Sound that will provide high frequency (~daily) depth-specific measurements of physical (temperature, salinity, turbidity), biogeochemical (nitrate, phosphate and silicate) and biological (Chlorophyll-a concentration) parameters, over the course of the growing season (focused on the vernal and autumn blooms). Several regular vessel surveys are also proposed to provide ground-truth data for the mooring, and to attempt to capture some of the spatial variability in PWS. As well as the mooring site, the surveys will visit all four of the SEA bays to maintain ongoing EVOSTC funded time series measurements at those sites and to support proposed herring research (Pegau et. al). The major entrances (Hinchinbrook Entrance and Montague Strait) will also be visited. The surveys will make the same suite of measurements as the mooring, and will also collect water and plankton samples. This project will also link significantly with the herring research efforts proposed by Pegau et al.

Estimated Budget:

EVOSTC Funding Requested* (*must include 9% GA)*:

FY12	FY13	FY14	FY15	FY16	TOTAL
$238.1	$193.2	$197.3	$203.7	$211.9	$1,044.2

Non-EVOSTC Funds to be used:

FY12	FY13	FY14	FY15	FY16	TOTAL
			$145	$135	

Date: September 2, 2014

I. EXECUTIVE SUMMARY

The goal of this program is to deliver a monitoring program that will return useful information on temporal and spatial changes in the marine environment, at a reasonable cost, and with a reasonable amount of effort. The data should be depth-specific (because water column stability is important to ecosystem productivity), of high enough frequency to capture timing changes (changes that occur on order of weeks), and give an idea of spatial variability in the region. As well, given that PWS herring will remain a funding priority of the EVOSTC in the next 20 years, any long term monitoring efforts should be integrated with future herring studies as well as building upon ongoing work funded by the trustee council. Specific objectives include:

1. Install and maintain an autonomous profiling mooring in PWS that will measure daily profiles of temperature, salinity, oxygen, chlorophyll-a (as a proxy for phytoplankton biomass), turbidity and nitrate concentration in the surface layer (0-100 m).
2. Conduct regular surveys in PWS to tie in spatial variability to the high frequency time series provided by the mooring.
3. Support continued herring research by maintaining the existing time series (hydrography, plankton and nutrients) at the four SEA bays.

II. COORDINATION AND COLLABORATION

A. Within the Program

Provide a list and clearly describe the present functional and operational relationships with other program projects. This includes any coordination that has taken or will take place and what form the coordination will take (shared field sites or researchers, research platforms, sample collection, data management, equipment purchases, etc.).

1. All plankton samples collected by the lower Cook Inlet group (Angela Doroff) are analyzed as part of this project.
2. Following extended discussions as to sampling protocols for zooplankton among the different projects (PIs Batten, Doroff and Hopcroft), we have begun a simple comparison study to examine how the different gears used are sampling and how they might be compared.
3. Working specifically with Sonia Batten, plankton categories have been defined so that the more detailed taxonomic categories determined as part of this project may be “downscaled” so to be comparable with the Continuous Plankton Recorder surveys conducted by Batten.
4. A dialog has begun among all of the PIs of the “Environmental Drivers” section on data availability to better understand variability in the spring bloom throughout the northern Gulf of Alaska.

B. With Other Council-funded Projects

Indicate how your proposed project relates to, complements or includes collaborative efforts with other proposed or existing projects funded by the Council that are not part of your program.

This project has provided plankton data to researchers within the PWS Herring Survey (PI Ron Heintz), and regularly sends live and preserved plankton to the Hershberger group at Marrowstone Research Station for genetic and histological work looking for vectors of fish pathogens.

C. With Trustee or Management Agencies

1. A researcher from NOAA (Johanna Vollenweider) working on a project independent of the council-funded effort has attended a cruise, to collect herring scales and tissue samples for development of better age determination methods.
2. Seawater samples have been collected for the Ocean Acidification research group at NOAA AFSC/UAF Ocean Acidification Research Center (contact: Natalie Monacci).

3. ADF&G was assisted with a check on reported herring spawn in Port Eccles (contact: Steve Moffitt).
4. Seawater samples are being taken during all cruises in 2014 to send to the WHOI radioisotope group, which will be tested for the presence of isotopes characteristic of the 2011 Fukushima Daiichi nuclear disaster (contact: Ken Buesseler).
5. Project staff are an on-call response vessel for emergency retrieval of a number of gliders (surface and subsurface) deployed in PWS by NOAA AFSC staff in 2014 (contact: Wiley Evans).

III. PROJECT DESIGN – PLAN FOR FY15

A. Objectives for FY15

Objective 1. Install and maintain an autonomous profiling mooring in PWS.

Objective 2. Conduct regular surveys in PWS.

Objective 3. Support continued herring research by maintaining the existing time series (hydrography, plankton and nutrients) at the four SEA bays.

B. Changes to Project Design

The original intention of this project was to leave the profiling mooring in place operationally for most of the year. After 1.5 years of operation, we have learned that significant maintenance and calibration work is required, and that winter conditions are energetic enough that it is unwise to leave such an expensive piece of equipment in place all winter long. Given that much of the profiler's instrumentation is biophysical, we have focused on the productivity season in PWS, deploying the profiler in late winter (prior to the spring bloom), and retrieving it in late autumn (following the autumn bloom period). The profiler is bleeding-edge technology, and this project is by far the most northerly and deepest deployment of the system to date, and it has suffered a number of malfunctions, necessitating unplanned (and unbudgeted) trips to retrieve/redeploy the mooring. Communications have also been something of an issue (the local cellular provider's data service could charitably be referred to as "flakey"), but all data is logged internally and analyzed post-hoc.

It was originally planned to measure macronutrients (nitrate, phosphate, silicic acid) via Capillary Electrophoresis (CE), and considerable time and effort (under this project, and other non-TC projects) has been expended working up various methods, with limited success: CE is a separation technique (similar to HPLC, but using electric current instead of pressure), and the non-nutrient cations present in seawater interfere considerably with the analysis. We have been working with a CE chemist in the Czech Republic who has worked with saline samples, and in the meantime have gone back to the standard wet-chemical methods for the analysis of nutrients and are working on the backlog that has accumulated.

IV. SCHEDULE

A. Project Milestones for FY 15

Objective 1. Install and maintain an autonomous profiling mooring in PWS.
To continue into autumn 2014 (~early November) and resume in March 2015

Objective 2. Conduct regular surveys in PWS.
Surveys will be conducted in August, October and November 2014, and six cruises will be conducted in 2015.

Objective 3. Support continued herring research by maintaining the existing time series (hydrography, plankton and nutrients) at the four SEA bays

Surveys in the bays will be conducted in August, October and November 2014, and six cruises will be conducted in 2015.

B. Measurable Project Tasks for FY 15

Specify, by each quarter of each fiscal year, when critical project tasks (for example, sample collection, data analysis, manuscript submittal, etc.) will be completed, as submitted in your original proposal. Please identify any substantive changes and the reason for the changes. Please format your schedule as in the following example:

FY 15, 1st quarter (February 1, 2015 - April 31, 2015)

March: *PWS Survey, Mooring deployed*

FY 15, 2nd quarter (May 1, 2015-July 30, 2015)

May: *PWS Survey, Mooring maintenance*

June: *PWS Survey, Mooring maintenance*

FY 15, 3rd quarter (August 1, 2015 – October 31, 2015)

August: *PWS Survey, Mooring maintenance*

October: *PWS Survey, Mooring maintenance*

November: *PWS Survey, Mooring maintenance*

FY 15, 4th quarter (November 1, 2015- January 31, 2016)

November: *Begin analysis and report writing*

V. PROJECT PERSONNEL – CHANGES AND UPDATES

No personnel have been added or removed from the project.

VI. BUDGET

A. Budget Forms

Please see included program workbook for budget forms.

B. Changes from Original Proposal

No changes requested.

C. Sources of Additional Funding

PWSSC provides a CTD profiler (SBE model 25plus) with several auxiliary sensors (chlorophyll fluorometer, backscatter turbidometer, oxygen sensor, solid state active fluorometer and nitrate analyzer), which is used for all field surveys, and to cross-calibrate with the profiler (value ~$75K). Extracted chlorophyll-*a* is read on a Turner Designs TD-700 fluorometer (replacement cost ~$10K). As well as the moored profiler, PWSSC provides a pair of acoustic releases, and a 1-m diameter syntactic foam float with upward and downward looking RDI ADCP current profilers (value ~$50K). The Alaska Ocean Observing System has also contributed $10K in FY14 for surveys in PWS.

Oceanographic monitoring in Cook Inlet – Doroff (ADFG KBRR) and Holderied (NOAA KBL, 15120114-G)

FY15 PROJECT PROPOSAL SUMMARY PAGE
Continuing, Multi-Year Projects

Project Title: Long-term monitoring of oceanographic conditions in Cook Inlet/Kachemak Bay to understand recovery and restoration of injured near-shore species

Project Period: February 1, 2015 – January 31, 2016

Primary Investigator(s): Angela Doroff (Research Coordinator, Kachemak Bay National Estuarine Research Reserve), Kris Holderied (Director, NOAA Kasitsna Bay Laboratory)

Study Location: Kachemak Bay and Lower Cook Inlet, Alaska

Project Website: See project information on www.gulfwatchalaska.org

Abstract: This project is designed to assist in the evaluation of recovery and restoration of injured resources in the foot print of the *Exxon Valdez* oil spill (EVOS), by characterizing oceanic conditions in Cook Inlet and determining, in coordination with oceanographic monitoring at other sites under the Gulf Watch Alaska program, connections between marine conditions and plankton communities in near-shore and Gulf of Alaska waters. Mapping currents and water mass movements contributes to our understanding of patterns in the abundance and diversity of marine plankton, invertebrates, fish, birds, and mammals in coastal south-central Alaska. In this study, we are mapping the waters in lower Cook Inlet and Kachemak Bay to understand seasonal patterns, effects of freshwater runoff, intrusions of the Alaska Coastal Current, and complex frontal structures, and then relate these observations to distributions of injured resources. Characterizing seasonal patterns in physical oceanography will also help us understand the connectivity of water movement and potential plankton transport pathways between Kachemak Bay, lower Cook Inlet and the adjacent Gulf of Alaska shelf. By determining the local species of phytoplankton and zooplankton and understanding their seasonal distribution we will begin to understand lower trophic patterns that support upper trophic level marine species. This continuing project proposal does not change significantly from our original proposal for year 4. Information from this project is also being used to inform local mariculture operations, understand depletions of hard shell clams and other invertebrate species, develop NOAA Cook Inlet ocean circulation model applications, and support monitoring and research programs for harmful algal blooms and ocean acidification.

Estimated Budget:

EVOSTC Funding Requested* (*must include 9% GA)*:

FY12	FY13	FY14	FY15	FY16	TOTAL
$191.9	$177.4	$166.5	$133.7	$108.8	$778.2

Non-EVOSTC Funds to be used:

FY12	FY13	FY14	FY15	FY16	TOTAL
$180.0	$180.0	$180.0	$155.0	$155.0	$850.0

**this reflects the combined budget summaries for the Kachemak Bay Research Reserve and NOAA Kasitsna Bay Laboratory which are trustee agencies. See individual budgets submitted separately for this project.*

Date: September 2, 2014

I. EXECUTIVE SUMMARY

This project is designed to assist in the evaluation of recovery and restoration of injured resources in the foot print of the *Exxon Valdez* oil spill (EVOS), by characterizing oceanic conditions in Cook Inlet and determining, in coordination with oceanographic monitoring at other sites under the Gulf Watch Alaska program, connections between marine conditions and plankton communities in near-shore and Gulf of Alaska waters. It is important to know if oceanic conditions and changes in the Gulf of Alaska are synchronous with near-shore trends, and monitoring at multiple sites (in coordination with other Gulf Watch Alaska monitoring projects) will help discern such relationships. We are particularly interested in how near-shore conditions reflect the significant inter-annual variability in the North Pacific Ocean which is driven partially by variations in major climate patterns such as ENSO and the Pacific Decadal Oscillation. In addition we are investigating linkages between marine conditions in Cook Inlet/Kachemak Bay and Prince William Sound. Both are large estuaries that are connected by the Alaska Coastal Current, influenced by freshwater input (precipitation and snowpack and glacier melt), and experience upwelling of waters from the adjacent shelf. Cook Inlet has stronger tidal currents and associated complex oceanographic fronts that are linked to bathymetry and freshwater runoff. In this study, we also leverage use of data from past oceanographic monitoring in Cook Inlet (Okkenon et al. 2009) and Kachemak Bay (Murphy and Iken 2013) to extend the time series used for analysis. Mapping currents and water mass movements of a region is essential for understanding patterns in the abundance and diversity of marine plankton, invertebrates, fish, birds, and mammals in coastal Alaska. By characterizing phytoplankton and zooplankton communities and understanding their seasonal distribution, we will quantify seasonal patterns lower trophic species that support upper trophic level marine organisms. In coordination with the Seward Line (PI: Hopcroft) and Continuous Plankton Recorder (PI: Batten) projects we will assess estuary-shelf linkages and potential plankton transport pathways between Kachemak Bay, lower Cook Inlet and the adjacent Gulf of Alaska shelf. The project combines intensive oceanographic monitoring in Kachemak Bay, with seasonal, quarterly monitoring in lower Cook Inlet. Kachemak Bay monitoring includes: 1) continuous data from existing Kachemak Bay Research Reserve (KBRR) water quality monitoring stations (YSI sondes measuring temperature, salinity, dissolved oxygen, turbidity, pH) at the Homer and Seldovia harbors; 2) an additional shoreline water quality station to be deployed and maintained during ice-free months in Bear

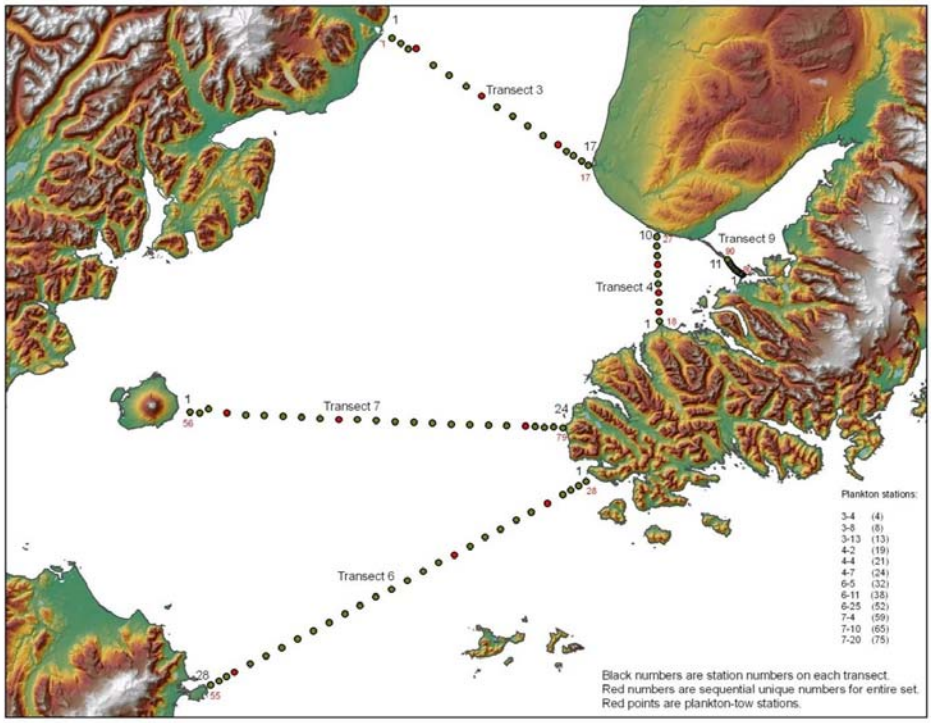

Figure 1. Cook Inlet sampling Transects

Cove (near head of Kachemak Bay); and 3) monthly small-boat conductivity-temperature-depth (CTD) profiler and plankton sampling conducted on a mid-bay transect (at Homer Spit). The seasonal surveys include CTD and plankton sampling along the five transects shown in Figure 1. Note that the Continuous Plankton Recorder (PI: Batten) vessel track intersects three of our Cook Inlet transects.
Highlights from field work to date include the quantification of rapid changes in oceanographic conditions and plankton across persistent, tidal current and bathymetry-linked fronts and convergence zones in lower Cook Inlet, with implications for the development of biological hotspots.

We have also identified consistently strong stratification for more of the year than originally anticipated, except in tidal rip areas, which indicates the importance of buoyancy flux in this region. Information from this project is also being used to inform local mariculture operations, understand local depletions of hard shell clam and other invertebrate species, develop NOAA Cook Inlet ocean circulation model applications, and support monitoring and research programs for harmful algal blooms and ocean acidification.

II. COORDINATION AND COLLABORATION

A. Within a EVOTC-Funded Program

The lower Cook Inlet oceanographic and plankton monitoring project was designed to complement concurrent monitoring conducted in other projects of the Environmental Drivers component of the EVOSTC-funded Gulf Watch Alaska program. These projects include "The Seward Line: marine ecosystem monitoring in the northern Gulf of Alaska" (PI: Hopcroft), "Long-term Monitoring of Oceanographic Conditions in the Alaska Coastal Current from Hydrographic Station GAK 1" (PI: Weingartner), "Long-term monitoring of oceanographic conditions in Prince William Sound" (PI: Campbell), and "Long-term Monitoring of zooplankton populations on the Alaskan Shelf and Gulf of Alaska using Continuous Plankton Recorders" (PI: Batten). Collectively, the Gulf Watch Alaska oceanographic sampling provides comparisons between conditions within two large estuaries, Cook Inlet (PIs: Doroff and Holderied) and Prince William Sound (PI: Campbell) and between the estuaries and the adjacent shelf (PIs: Weingartner, Hopcroft and Batten). Campbell is also providing identification for the Cook Inlet zooplankton samples, which enhances data consistency across the integrated program. The Environmental Drivers component group has also met in person and by phone to improve coordination of zooplankton sampling methods, to enhance cross-program data analysis and assess the need for future modifications in sampling design.
To support other Gulf Watch Alaska biological monitoring efforts, this project is providing oceanographic time series for the Kachemak Bay benthic component project "Long-term monitoring of Ecological Communities in Kachemak Bay: a comparison and control for Prince William Sound" (PIs: Konar and Iken) and berths on our lower Cook Inlet cruises for U.S. Fish and Wildlife Service seabird and marine mammal observers who are part of the pelagic monitoring component (PI: Kuletz).

B. With Other EVOSTC-funded Projects

This study does not leverage other EVOSTC funded projects outside of Gulf Watch Alaska, although oceanographic data sampling and analysis is being coordinated with the EVOSTC-funded Herring Research and Monitoring Program (PI: Pegau).

C. With Trustee or Management Agencies

The Kachemak Bay Research Reserve (KBRR) provides resources for continuous monitoring of water quality and meteorological data and this proposed project leverages and supplements the System-wide Monitoring Program (SWMP) of NOAA's National Estuarine Research Reserve system at KBRR and use of a CTD and plankton nets. NOAA Kasitsna Bay Laboratory (KBL) is providing in-kind contributions of staff time and use of a CTD. The combined in-kind contributions from KBRR and KBL are $155K/year. Thus

far, this research and monitoring program have provided the following linkages to related projects in the study area:

a. KBRR and KBL are using oceanographic data from this project to help validate a Cook Inlet ocean circulation model developed by NOAA's National Ocean Service, which has been used for a tidal energy assessment of the Inlet and will be part of a NOAA operational Cook Inlet marine forecast system. KBRR and the University of Alaska Fairbanks (UAF) are using time series of oceanographic data (temperature and salinity) from long-term monitoring studies (inclusive of but not limited to this project) and drifter buoy data in an external model validation effort. KBL is providing CTD data to the model developer (NOS Coast Survey Development Laboratory) for development and validation efforts.
b. This study improved the time series and geographic scope of ongoing phytoplankton monitoring for harmful algal species conducted by KBRR and KBL. The phytoplankton species that causes paralytic shellfish poisoning, *Alexandrium fundyense,* were found at all Kachemak Bay sampling locations throughout the summer, although at relatively low concentrations. *A. fundyense* concentrations were found to be significantly correlated with both water temperature and salinity conditions.
c. The NOAA KBL has a joint project with the Alaska Ocean Observing System (AOOS) and UAF to quantify variability in water chemistry associated with ocean acidification in Kachemak Bay and lower Cook Inlet. The project leverages ship time from this project to periodically collect water samples at CTD stations for carbonate chemistry analysis. Coastal water chemistry changes with freshwater input from glacial watersheds and snowmelt, upwelling of ocean waters and phytoplankton blooms and understanding this variability is needed to assess how much ocean acidification may threaten nearshore species and habitats. FY14 funding ($25K) was provided to KBL by NOAA's Integrated Ocean Observing System (IOOS).
d. Through a partnership with the U.S. Fish and Wildlife Service, we are enhancing the Gulf Watch Alaska program to provide a platform for marine bird and mammal surveys that will improve understanding of relationships between marine conditions, primary productivity, and seabirds and marine mammals. We will continue to provide ship berths to USFWS observers and in year 4 USFWS will also be able to leverage funding from a separate Cook Inlet project with the Bureau of Ocean Energy Management (BOEM) to support the seabird and marine mammal observing effort.
e. NOAA KBL and BOEM have also initiated a collaboration to update information on marine conditions and ecological linkages in Cook Inlet, to support BOEM's environmental analysis for potential oil and gas lease sales in the region. BOEM is providing an initial $75K to conduct seasonal Cook Inlet surveys and oceanographic data analysis to support their environmental analysis needs for potential oil and gas lease sales in the region. The BOEM funding will allow us to maintain quarterly Cook Inlet cruises, for which there was not sufficient funding available under our original EVOSTC proposal.

III. PROJECT DESIGN – PLAN FOR FY15

A. Objectives for FY15 (year 4)

There are no significant changes from the original proposal to this project. Due to cost savings by KBRR we are able to obtain charter vessel support for three seasonal Cook Inlet surveys, rather than the two in our original proposal. As mentioned in Section II, we also plan to collaborate with BOEM to conduct a fourth survey during year 4 and maintain the quarterly frequency for the seasonal surveys without additional EVOSTC funds. Also, based on results of phytoplankton sampling from this project to date, we propose to conduct a limited amount of additional nutrient sampling, at no additional cost, to evaluate the benefits of additional nutrient information (objective 4b).

The objectives for year 4 include:

1. Improve understanding of marine conditions and water mass movement in Kachemak Bay
    a. Conduct monthly CTD sampling surveys along a mid-Kachemak bay transect and continuous sampling at KBRR water quality stations.
    b. Install a seasonal YSI data sonde in Bear Cove during the ice-free period to monitor trends in salinity, temperature, and nutrients at the head of the Bay in proximity to oyster farms and native clam beds.
    c. Analyze water mass characteristics, spatial, seasonal and annual changes in the depth and persistence of freshwater lens and stratification in Kachemak Bay.
2. Determine linkages, and temporal variability in those links, between Kachemak Bay/lower Cook Inlet and the adjacent Gulf of Alaska shelf.
    a. Conduct three oceanographic surveys in lower Cook Inlet and coordinate with BOEM for support of additional fourth survey.
    b. Analyze CTD data for spatial, seasonal and annual variability and trends, as well as linkages to oceanographic data from the GAK1 mooring and Seward line.
3. Examine the short-term variability and track long-term trends in oceanographic and water quality parameters
4. Improve understanding of temporal and spatial variability in plankton communities and linkages to marine conditions.
    a. Sample at a subset of stations along each CTD transect for marine plankton. Zooplankton samples will continue to be analyzed by PI Campbell as part of the PWS oceanographic monitoring project. Phytoplankton will continue to be analyzed by KBL staff.
    b. Compare zooplankton between Kachemak Bay and lower Cook Inlet and with CPR sampling results for temporal patterns in species composition.
    c. Evaluate the feasibility on collecting nutrient data on a subset of plankton monitoring stations at depth and surface waters in lower Cook Inlet and outer Kachemak Bay.

B. Changes to Project Design

No changes to project personnel or overall project cost from our original proposal. As described in Section II, we are leveraging cost savings and collaboration with BOEM to maintain a quarterly frequency of Cook Inlet sampling without additional EVOSTC funding. Within the proposed project budget, we will collect a limited number of additional water samples at selected CTD stations for nutrient analyses, to evaluate the benefit of obtaining nutrient data at higher temporal and spatial resolution for understanding seasonal variability in plankton abundance and community composition.

IV. SCHEDULE

A. Project Milestones for FY 15

1. Objective 1-3.

a. Quarterly CTD/marine plankton surveys will be conducted in Cook Inlet (Figure 1. One survey will be conducted with BOEM support.

b. Monthly CTD/marine plankton surveys will be conducted in Kachemak Bay.

c. Continuous water quality station monitoring data will be collected at 5 stations during ice-free months and 3 stations during winter months. Kachemak Bay sub-bay temperatures will be monitored year-round with Hobo tidbit sensors deployed by KBRR.

d. Quality-controlled and processed CTD data will provided to the Gulf Watch Alaska Ocean Workspace no later than one year after data collection. Water quality station

monitoring data is available through the NERR Centralized Data Management Office (http://cdmo.baruch.sc.edu/)

2. Objective 3.

a. Using data collected in Objective 1, we will calculate temperature and salinity patterns and anomalies (for continuous data) in lower Cook Inlet and Kachemak Bay.

3. Objective 4. For samples collected during our field cruises, phytoplankton samples will be analyzed within three months by KBL and zooplankton samples preserved and shipped quarterly to the Prince William Sound Science Center for analysis. The species composition, timing, and where applicable, relative abundance of marine plankton will be determined for the study area. When complete, these trends will be related to other Gulf Watch Alaska studies.

B. Measurable Project Tasks for FY 15

All year:	*Monthly CTD/plankton survey in Kachemak Bay*
	Continuous water temperature monitoring in Kachemak Bay sub-bays
FY 15, 1st quarter (February 1, 2015 - April 31, 2015)	
February:	*Project funding available*
	1st Quarterly CTD/plankton survey in lower Cook Inlet
	Continuous water quality monitoring at 3 stations
March:	*Continuous water quality monitoring at 3 stations*
April:	*2nd Quarterly CTD/plankton survey in Cook Inlet*
	Continuous water quality monitoring at 5 stations
FY 15, 2nd quarter (May 1, 2015-July 30, 2015)	
May :	*Continuous water quality monitoring at 5 stations*
June :	*Continuous water quality monitoring at 5 stations*
July:	*3rd Quarterly CTD/plankton survey in lower Cook Inlet*
	Continuous water quality monitoring at 5 stations
FY 15, 3rd quarter (August 1, 2015 – October 31, 2015)	
August:	*Continuous water quality monitoring at 5 stations*
	Work plan input to science coordinator
September:	*Continuous water quality monitoring at 5 stations*
October:	*4rd Quarterly CTD/plankton survey in lower Cook Inlet*
	Continuous water quality monitoring 5 stations
FY 15, 4th quarter (November 1, 2015- January 31, 2016)	
November:	*Continuous water quality monitoring 3 stations*
	Attend annual PI meeting
December:	*Continuous water quality monitoring 3 stations*
January:	*Annual report input to science coordinator*
	Present at Alaska Marine Science Symposium
	Continuous water quality monitoring 3 stations

V. PROJECT PERSONNEL – CHANGES AND UPDATES

No changes to original personnel.

VI. BUDGET

A. Budget Forms (Attached)

There are no proposed changes from the original proposal (please see attached budget sheets for the Kachemak Bay Research Reserve and the NOAA Kasitsna Bay Laboratory).

B. Changes from Original Proposal

No changes from the original proposal other than we are leveraging cost savings and collaboration with BOEM to maintain a quarterly frequency of Cook Inlet sampling without additional EVOSTC funding and we will conduct a pilot expansion of nutrient sampling at no additional cost.

C. Sources of Additional Funding

During year one of this study, we supported work being conducted for this EVOSTC project with an additional $102K of funding for new water quality monitoring equipment which enabled the purchase of equipment for continuous monitoring of Chlorophyll a at each of the water quality monitoring sites in Kachemak Bay. The chlorophyll data will be available to this project through year five. Annual in-kind contributions to this project total $155K from the following sources: $120K Kachemak Bay Research Reserve's System-wide Monitoring Program for water quality and weather; $10K CTD (2 CTDs are utilized on the project (one each from KBRR and the NOAA KBL); $25K in in-kind salary for KBL staff. To date, the combined in kind contributions from KBRR and KBL to date for this project have been $567K. In year 4 KBL plans to leverage a portion of $75K from BOEM funding for another Cook Inlet collaboration project to maintain quarterly Cook Inlet sampling (see descriptions in Section II.C above).

Continuous plankton recorder – Batten (SAHFOS, 15120114-A)

FY15 PROPOSAL SUMMARY PAGE
Continuing, Multi-Year Projects

Project Title: Long-term Monitoring of zooplankton populations on the Alaskan Shelf and Gulf of Alaska using Continuous Plankton Recorders.

Project Period: February 1, 2015 – January 31, 2016

Primary Investigator(s): Sonia Batten, SAHFOS soba@sahfos.ac.uk and Alex Bochco, PICES (bychkov@pices.int)

Study Location: Lower Cook Inlet, Gulf of Alaska shelf and adjacent open ocean.

Project Website (if applicable): http://www.gulfwatchalaska.org/

Abstract*: Many important species forage outside of Prince William Sound for at least some of their life history (herring, salmon, birds and marine mammals for example) so an understanding of the productivity of these shelf and offshore areas is important to understanding and predicting fluctuations in resource abundance. The Continuous Plankton Recorder (CPR) has sampled a continuous transect extending from the inner part of Cook Inlet, onto the open continental shelf and across the shelf break into the open Gulf of Alaska monthly through spring and summer since 2004. There are also data from 2000-2003 from a previous transect. The current transect intersects with the outer part of the Seward Line and provides complementary large scale data to compare with the more local, finer scale plankton sampling on the shelf and in PWS. We are continuing to sampling this transect spring through fall each year with monthly resolution. Resulting data will enable us to identify where the incidences of high or low plankton are, which components of the community are influenced, and whether the whole region is responding in a similar way to meteorological variability. Evidence from CPR sampling over the past decade suggests that the regions are not synchronous in their response to ocean climate forcing. The data can also be used to try to explain how the interannual variation in ocean food sources creates interannual variability in PWS zooplankton, and when changes in ocean zooplankton are to be seen inside PWS. The CPR survey is a cost-effective, ship-of-opportunity based sampling program supported in the past by the EVOS TC that includes local involvement and has a proven track record.

Estimated Budget:

EVOSTC Funding Requested* (*must include 9% GA)*:

FY12	FY13	FY14	FY15	FY16	TOTAL
$0.0	$66.8	$68.8	$70.7	$73.1	$279.5

Non-EVOSTC Funds to be used:

FY12	FY13	FY14	FY15	FY16	TOTAL
	$94.7	$148.0	$180.8	$169.0	$592.5

Date: September 2, 2014.

I. EXECUTIVE SUMMARY

The Continuous Plankton Recorder (CPR) transect samples the Alaskan shelf and crosses the slope into the open Gulf of Alaska, providing a record of taxonomically resolved near-surface zooplankton and large phytoplankton abundance over wide spatial scales. Many important species forage outside of Prince William Sound for at least some of their life history (herring, salmon, birds and marine mammals for example) so an understanding of the productivity of these shelf and offshore areas is important to understanding and predicting fluctuations in resource abundance. Our sampling transect extends from the inner part of Cook Inlet to the open continental shelf, across the shelf break and into the open Gulf of Alaska in a continuous fashion (Figure 1), enabling us to identify where the incidences of high or low plankton are and whether the whole region is responding in a similar way to meteorological variability. Plankton are identified and counted so that community composition changes can be determined. Sampling is carried out monthly, spring through fall, so that changes in seasonal timing between years can also be detected. Results to date demonstrate a high degree of inter-annual variability, with sequential years often being substantially different; both phytoplankton and zooplankton indices of abundance were very low in 2011 but reversed to relatively positive in 2012. Timing of seasonal peaks, community composition and abundance of many groups of plankton each also often appear to be tied to physical forcing, suggesting that the productivity of the shelf region is likely controlled by bottom-up forcing (Batten et al., in prep.).

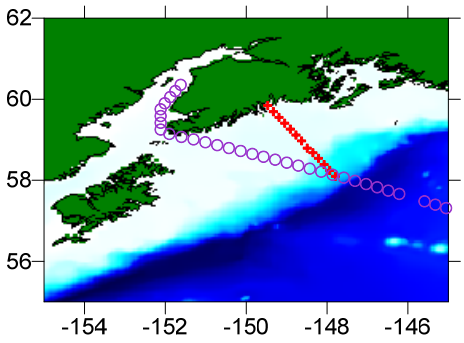

Figure 1 Location of samples on a typical CPR transect (○) together with the Seward Line (+)

II. COORDINATION AND COLLABORATION

A. Within the Program

The CPR survey is complimentary to the net sampling and oceanographic data collected elsewhere in the program by Hopcroft, Campbell, Holderied and Doroff. Each of these PIs focusses on a localized region, sampling the water column there (the Seward line, PWS and lower Cook Inlet, respectively) while the horizontally-sampling CPR links these regions and provides a larger-scale, synoptic view of lower trophic level variability. Monthly sampling by the CPR also provides the within-year timing context for the less frequent Seward Line sampling, for example. The unique nature of CPR sampling, and the fact that a commercial vessel is the research platform means that it is not possible to share equipment or sampling with the other lower trophic level group members. The group however, has already produced a document outlining the different zooplankton sampling strategies and ways to conduct comparisons (appended to the annual report submitted earlier in 2014) and there is regular communication within the group regarding sampling issues and results.

B. With Other Council-funded Projects

Prior to its inclusion in the EVOSTC Long term Monitoring Program, the CPR was a part of the previous Herring Restoration Program. As such, Dr. Batten maintains contact with the current Herring Program PI, Dr. Pegau, and attends their project meetings at the Alaska Marine Science Symposium. Earlier this year intriguing correlations between CPR plankton indices and herring scale measurements of growth were found during our discussions. We plan to explore this more thoroughly and produce a manuscript once the scale measurements are complete.

C. With Trustee or Management Agencies

The North Pacific CPR Survey also receives support from the North Pacific Research Board, most recently as part of its new Long Term Monitoring Program beginning July 2014. The Canadian Department of Fisheries and Ocean also supports the southeast sample collection and results are fed into annual DFO "State of the Ocean" reports. CPR data are also annually included in the NOAA Ecosystems Considerations report.

III. PROJECT DESIGN – PLAN FOR FY15

A. Objectives for FY15

The fundamental goal of this program is to provide continued large spatial scale data on plankton populations to extend the existing time series and integrate the data with more regional, locally more intensive, sampling programs. More specifically, we will provide monthly (spring to fall – typically April to September) sampling in 2015 of zooplankton and large phytoplankton along the transect from the oceanic Gulf of Alaska to Cook Inlet, analyzing every 4th oceanic and every shelf sample to provide taxonomically resolved abundances. Temperature loggers have been fitted to CPRs since 2011 and we will maintain in situ temperature data collection on this transect in 2015.

B. Changes to Project Design

No Changes

IV. SCHEDULE

A. Project Milestones for FY 15

Objective 1. Sample collection on the transect from Cook Inlet to Puget Sound will begin in spring 2015 (likely April) and continue approximately monthly through to August/September 2015 (6 transects will be sampled). All shelf samples will be processed and every 4th oceanic sample. Along transect temperature data will be collected.
To be met by October 2015.

Objective 2. A subset of samples (25%) will be processed within 3 months of collection at the Institute of Ocean Sciences (DFO, Canada) and results from this processing (e.g. estimated mesozooplankton biomass and comparisons with data from previous years) will be available in progress reports and from the PI as soon as practicable. Full, quality controlled data from 2015 will be available by June 2016.
To be met within 3 months of sampling for subset data with full data available by June 2016.
Note that availability of full QC data is earlier than originally proposed, owing to more efficient protocols implemented at SAHFOS.

B. Measurable Project Tasks for FY 15

FY 15, 1st quarter (February 1, 2015 - April 31, 201)

February:	Shipping of serviced CPR from UK to Horizon Kodiak
March/April:	First transect sampled
	Annual progress report for FY 14 submitted.
April:	Begin 2015 sample processing (ongoing hereafter)

FY 15, 2nd quarter (May 1, 2015-July 30, 2015)

May-July:	3 transects sampled
June:	Final QC data from 2014 available
	First results from 2015 sampling available (ongoing hereafter)

FY 15, 3rd quarter (August 1, 2015 – October 31, 2015)

August-September: 2 transects sampled
October: CPR shipped back to UK for overhaul/repair.

FY 15, 4th quarter (November 1, 2015- January 31, 2016)

November: Attend annual PI meeting.
January Attend Annual Science Symposium

V. PROJECT PERSONNEL – CHANGES AND UPDATES

No Changes

VI. BUDGET

A. Budget Forms

Please see included program workbook for budget forms.

B. Changes from Original Proposal

No Changes

C. Sources of Additional Funding

The North Pacific CPR Survey is funded by a consortium managed by the North Pacific Marine Science Organization (PICES). Members of the consortium comprise the EVOSTC, North Pacific Research Board (NPRB), Canadian Department of Fisheries and Oceans (DFO), Sir Alister Hardy Foundation for Ocean Science (SAHFOS) and Dr. Sanae Chiba (JAMSTEC, Japan). Committed funding for the duration of this contract is given in the table below. Note that in addition to money DFO also provides laboratory and other facilities as in-kind support. Direct funds from DFO, NPRB and SAHFOS are used to fund sample collection and analysis, data analysis, travel, and report/manuscript writing. In-kind support by Dr. Chiba covers analysis of western Pacific samples, freeing up the other funding for eastern Pacific sample analysis. SAHFOS in-kind support includes equipment, archiving and miscellaneous costs that ensure the sampling intensity is maintained.

Source	**FY**	**2015**	**2016**	***Notes***
DFO	Apr 1st to Mar 31st	$12,500		*Canadian $*
DFO	Apr 1st to Mar 31st	$10,000	$10,000	*In-kind support, Canadian $*
NPRB	July 1st to June 30th	$60,777	$61,469	*US$*
SAHFOS		$60,000	$60,000	*Estimated, includes salary support for S. Batten and in-kind support*
Dr Chiba		$37,500	$37,500	*Estimated in-kind support*

Note the differing FY cycles of the different organizations which means the breakdown of funds between 2014, 15 and 16 has been estimated.

Ability to detect trends in nearshore marine birds – Coletti (USNPS SWAN, 15120114-F)

FY15 PROJECT PROPOSAL SUMMARY PAGE
Continuing, Multi-Year Projects

Project Title: Data synthesis, analysis and recommendations for sampling frequency and intensity of nearshore marine bird surveys to detect trends utilizing existing data from the Prince William Sound, Katmai and Kenai Fjords coastlines.

Project Period: February 1, 2015 – January 31, 2016

Primary Investigator(s): Heather Coletti, Marine Ecologist, Southwest Alaska Network Inventory and Monitoring Program, National Park Service, Heather_Coletti@nps.gov, 907-644-3687
Collaborators: David Irons, James Bodkin, Brenda Ballachey, Tom Dean

Study Location: Gulf of Alaska: Prince William Sound, Kenai Fjords National Park, Katmai National Park and Preserve

Project Website: http://www.gulfwatchalaska.org;
http://science.nature.nps.gov/im/units/swan/monitor/nearshore.cfm;
http://alaska.usgs.gov/science/biology/nearshore_marine/lt_monitoring.php

Abstract*: This project is a component of the integrated Long-term Monitoring of Marine Conditions and Injured Resources and Services submitted by McCammon et al. Skiff based surveys for marine birds along the Prince William Sound, Katmai and Kenai Fjords coastlines have been conducted for over 20 and 8 years, respectively. The results of these surveys provide estimates of species composition, relative abundance, and distribution of all marine birds and mammals within this nearshore zone. The focus of these surveys is on marine birds that are trophically linked to the nearshore food web, and include species of sea ducks (harlequin ducks, Barrow's and common goldeneye, and scoters), mergansers (common and red-breasted), and shorebirds, specifically the black oystercatcher, cormorants, glaucous-winged gulls and pigeon guillemots. Sustainability of long-term monitoring programs requires the optimization of sampling intensity and efforts to minimize costs while concurrently having sufficient power to detect a trend. While there has been critical thought in the past regarding these questions, current available analytical methods now allow for the use of existing data in simulations, to estimate number of samples and sample frequency required to detect a specified trend as well as examine effects contributing to variation, such as imperfect detection.

Estimated Budget:

EVOSTC Funding Requested* (*must include 9% GA)*:

FY12	FY13	FY14	FY15	FY16	TOTAL
$32.7	0.00	0.00	0.00	0.00	$32.7

Non-EVOSTC Funds to be used: **

FY12	FY13	FY14	FY15	FY16	TOTAL
$10.0	$20.0	$10.0	$10.0	0.00	$30.0

***In-kind salary support from NPS – has changed because of shifts in timeline and approach to meeting objectives – see project milestones & objectives.*

Date: September 2, 2014

I. EXECUTIVE SUMMARY

The original approach to this proposal was to obtain a contract for analysis of marine bird survey data collected as part of the Gulf Watch Alaska (GWA) project. Since 2012, several factors have precluded a contract from being awarded. These include unforeseen delays by administrative offices, the federal government shutdown, and a lack of interested bidders. Most recently, a contract statement of work was finalized during June of 2013. The species chosen to focus the analyses on were harlequin duck, black oystercatcher and pigeon guillemot. These species represent various foraging guilds, are all nearshore reliant and occur in varying densities across habitats. The resulting statement of work is summarized below. The objectives of the original GWA proposal were to make recommendations as to the sampling frequency and intensity of nearshore marine bird surveys to detect trends in proportion of sites occupied (occupancy as an alternative metric to abundance) for harlequin ducks, pigeon guillemots and black oystercatchers in Katmai, Kenai Fjords and Prince William Sound.

The contract was submitted to the NPS contracting officials during July of 2013 and was put out to bid in early August of 2013. No bids were submitted. At this point, no funds have been committed and there has been further discussion on how to proceed. Re-advertisement of the bid was discussed as a possibility. However, we decided in the spring of 2014 to complete the work within NPS, using a NPS SWAN (Southwest Alaska Network) quantitative ecologist to complete the analysis.

At this point, we have committed to a preliminary analysis, with results to be reported in the 2014 GWA Synthesis Report. Preliminary analysis will include:

1. Use of a subset of available data to conduct a preliminary single-season analysis of proportion of sites occupied.
2. Summary of analysis that has been completed to date including exploratory analysis using subpopulation (domain) analysis and examining variation.

Original Summarized Proposal:

Initial analyses for NPS data (KATM and KEFJ) have shown high variability, making trend detection somewhat difficult. We recognize that variability is influenced by several factors including, but not limited to:

1. Individuals in groups are not independent

2. Imperfect detection

3. Habitat preferences by species. Habitat is treated as homogeneous across transects

4. Annual variation in distribution (i.e., availability) relative to our sampling area – By availability we mean birds present and subject to counts.

5. Within-season variation in distribution – birds may utilize home ranges that are larger than individual transects, and any individual that utilizes a given transect during the season may or may not be present and subject to being detected and counted at any given sampling occasion. Birds may also utilize home ranges that overlap multiple transects.

We anticipate that we will be able to detect large (>50%) changes in abundance for relatively common species, but have recently considered other questions of interest. We propose utilizing this data in an occupancy framework. Occupancy, defined here as the proportion of area occupied, may provide useful information regarding species distribution, habitat preferences by species, and rates of extinction and colonization (species richness) by area (MacKenzie et al. 2006). As potential stressors to a system such as

climate change, invasive species and other anthropogenic factors increase, understanding how a species or community is responding to those changes through changes in distribution may be informative for resource managers trying to assess park or regional resources and appropriate management actions.

While all species are identified and enumerated during the surveys, this current analysis will be done for three species, specifically harlequin duck, black oystercatcher and pigeon guillemot, that represent a range of abundances and distribution. We don't collect ancillary data that would allow us to account for imperfect detection in our survey methods. Occupancy modeling was developed to permit inference in the face of imperfect detection, so we propose an approach used by Hines et al. (2010) allowing the use of spatial replicates for occupancy modeling.

Hines, J. E., J. D. Nichols, J. A. Royle, D. I. MacKenzie, A. M. Gopalaswamy, N. Samba Kumar, and K. U. Karanth. 2010. Tigers on trails: occupancy modeling for cluster sampling. Ecological Applications 20(5) 1456-1466.

MacKenzie, D. I., J. D. Nichols, J. A. Royle, K. H. Pollock, L. A. Bailey, and J. E. Hines. 2006. Occupancy modeling and estimation. Academic Press, San Diego, California, USA.

In relation to this work, a marine bird subgroup was created during the November 2013 GWA PI meeting, including both nearshore and pelagic representatives. The group is co-chaired by Dan Esler and Kathy Kuletz. Activities included a first conference call in December to lay out the goals of the group, review ongoing activities within GWA, identify complementary work outside of GWA, discuss significant issues, and generate action items to address. Specifically related to this analysis, there was broad recognition that approaches to quantification of these attributes are very different for nearshore versus pelagic species (e.g., nearshore benthivores occur in our study areas largely during winter and are concentrated in intertidal and shallow subtidal habitats, whereas pelagic bird abundance peaks during the breeding season and occur across a range of nearshore to offshore habitats). It was also recognized that power analyses would help direct marine bird efforts across these programs. Our overall goal of the marine bird working group is to evaluate current activities and consider whether there are more effective or efficient approaches to achieving desired outcomes, which are (1) quantifying marine bird numerical trends, distribution, and productivity, and (2) subsequently linking those with spatial variation in habitat and temporal variation in ocean conditions, including prey. The project described here could be quite beneficial as a methods approach to a variety of programs within GWA.
In the next year, we will continue to pursue avenues of analysis as described above and focus our efforts on three (3) nearshore species.

II. COORDINATION AND COLLABORATION

A. Within a EVOTC-Funded Program

Provide a list and clearly describe the functional and operational relationships with other EVOSTC-funded program projects. This includes any coordination that has taken or will take place and what form the coordination will take (shared field sites or researchers, research platforms, sample collection, data management, equipment purchases, etc.).
This project works closely with the Nearshore Benthic component of GWA, as on-going marine bird and mammal surveys are conducted annually within the benthic component. This project also works closely with the GWA Pelagic component, and the bird subgroup is composed of GWA PIs across components. Results from this analysis will provide recommendations to all interested parties within GWA.

B. With Other EVOSTC-funded Projects

Indicate how your proposed project relates to, complements or includes collaborative efforts with other proposed or existing projects funded by the EVOSTC that are not part of a EVOSTC-funded program.

C. With Trustee or Management Agencies

Please discuss if there are any areas which may support EVOSTC trust or other agency work or which have received EVOSTC trust or other agency feedback or direction, including the contact name of the agency staff. Please include specific information as to how the subject area may assist EVOSTC trust or other agency work.

If the proposed project requires or includes collaboration with other agencies, organizations or scientists to accomplish the work, such arrangements should be fully explained and the names of agency or organization representatives involved in the project should be provided. If your proposal is in conflict with another project, note this and explain why.

III. PROJECT DESIGN – PLAN FOR FY15

A. Objectives for FY15

Identify the primary objectives for your project for FY15 as submitted in your original proposal.

We plan to continue analysis into FY15 and to complete a final report at the end of FY15 that includes recommendations for survey modifications.

B. Changes to Project Design

If the project design has changed from your original proposal, please identify any substantive changes and the reason for the changes. Include any information on problems encountered with the research or methods, if any. This may include logistic or weather challenges, budget problems, personnel issues, etc. Please also include information as to how any problem has been or will be resolved. This may also include new insights or hypotheses that develop and prompt adjustment to the project.

The only change to note is that we have decided to complete the analysis within NPS (staff biometrician) as opposed to through an external contract. See Executive Summary.

IV. SCHEDULE

A. Project Milestones for FY15

For each project objective listed (III.A), specify when critical project tasks will be completed, as submitted in your original proposal. Please identify any substantive changes and the reason for the changes. Please format your information as in the following example:

Objective 1. Complete analysis
3rd quarter October 2015

Objective 2. Complete final report to EVOS TC
4th quarter January 2016

B. Measurable Project Tasks for FY15

Specify, by each quarter of each fiscal year, when critical project tasks (for example, sample collection, data analysis, manuscript submittal, etc.) will be completed, as submitted in your original proposal. Please identify any substantive changes and the reason for the changes. Please format your schedule as in the following example:

FY 15, 1st quarter (February 1, 2015 - April 31, 2015)

April: *Project in progress, no additional funding required*

FY 15, 2nd quarter (May 1, 2015-July 30, 2015)

July: *Project in progress, no additional funding required*

FY 15, 3rd quarter (August 1, 2015 – October 31, 2015)

October: *Project in progress, no additional funding required*

FY15, 4th quarter (November 1, 2015- January 31, 2016)
January: *Report writing*

V. PROJECT PERSONNEL – CHANGES AND UPDATES
See included CV for Tammy Wilson, PhD, NPS SWAN Quantitative Ecologist, Appendix 2. Tammy will be conducting the analysis outlined in this work plan.

VI. BUDGET
A. Budget Forms (Attached)
Please see included program workbook for budget forms.
B. Changes from Original Proposal
See Executive Summary
C. Sources of Additional Funding
In-kind support continues to be provided by NPS in the form of salaried employees' time to oversee this project (H Coletti) as well as continued work on analysis (H Coletti and T Wilson). The value of in-kind support provided by NPS has increased due to the unforeseen changes (NPS conducting analysis, and increased administrative work) to this project. No further EVOSTC funds have been requested to complete this work.

Long-term killer whale monitoring – Matkin (NGOS, 15120114-M)

FY15 PROPOSAL SUMMARY PAGE
Continuing, Multi-Year Projects

Project Title: Long-term Monitoring: Pelagic monitoring component - Long-term killer whale monitoring in Prince William Sound/ Kenai Fjords

Project Period: February 1, 2015 – January 31, 2016

Primary Investigator(s): Craig O. Matkin, Executive Director, North Gulf Oceanic Society 3430 Main St. St B1 Homer, Alaska 99603 907 299-0677

Study Location: Prince William Sound and Kenai Fjords

Project Website: www.whalesalaska.org and North Gulf Oceanic Society on Facebook

Abstract*: The proposed project is a continuation of the annual monitoring of AB pod and the AT1 population killer whales in Prince William Sound-Kenai Fjords. These groups of whales suffered significant losses at the time of the oil spill and have not recovered at projected rates. Monitoring of all the major pods and their current movements, range, feeding habits, and contaminant levels will help determine their vulnerability to future perturbations, including oil spills. The project also extends the scope of the basic monitoring to include an innovative satellite tagging program used to examine habitat preference, feeding ecology and assist in relocating whales for feeding studies. It continues examination of feeding habits using observation, prey sampling and innovative chemical techniques. The study will delineate important habitat, variations in pod specific movements and feeding behavior within a temporal and geographic framework. We will examine the role of both fish eating and mammal eating killer whales in the near-shore ecosystem and their impacts on prey species. Community based initiatives, educational programs (including our websites and Facebook page), and programs for tour boat operators will continue to be integrated into the work to help foster restoration by improving public understanding and reducing harassment of the whales.

Estimated Budget:

EVOSTC Funding Requested* (*must include 9% GA)*:

FY12	FY13	FY14	FY15	FY16	TOTAL
$7.2	$132.3	$132.3	$132.3	$132.3	$536.1

Non-EVOSTC Funds to be used:

FY12	FY13	FY14	FY15	FY16	TOTAL
$23.5	$23.5	$23.5	$23.5	$23.5	$117.5

Date: September 2, 2014

I. EXECUTIVE SUMMARY

Both resident ecotype (AB pod) and transient ecotype (AT1 population) killer whales suffered significant mortalities following the *Exxon Valdez* oil spill in 1989. AB pod is recovering after 22 years but has still not reached pre-spill numbers. The AT1 population is not recovering and may be headed toward extinction. This project has determined that killer whales are sensitive to perturbations such as oil spills, but has not yet determined the long-term consequence (which may include extinction) or the recovery period required. As an apex predator, this species (both fish and mammal eating types) has important impact on the ecosystem; additionally, they are a primary focus of viewing for a vibrant tour boat industry in the region. Data from this project is used by tour boats in the region to enhance viewers experiences and understanding of the local environment and fauna. Unlike many cetaceans, killer whales can be closely monitored. This is a unique opportunity to continue a comprehensive database initiated in the early 1980's for a keystone marine species. The wisdom of long-term killer whale monitoring has been borne out in other regions such as Puget Sound and British Columbia.

In this project we use photo-identification, prey sampling, biopsy sampling, and satellite tagging to develop population parameters and to study feeding ecology, range, and distribution. Analysis includes population dynamics, genetics, lipid /fatty acids in blubber, environmental contaminants, and development of location and dive data from tags. Although we focus on the southern Alaska resident and AT1 transient populations which were impacted by the spill, the study also includes the other two recognized populations in the region, the Gulf of Alaska transients and offshore killer whales and contributes substantially to the NMFS;/NOAA killer whale stock assessments.

Data is collected during a minimum 50-day field season from May through October from the R.V. Natoa, although opportunistic photographic data is contributed from other collaborating vessels. This is the continuation of a long-term project initiated over 30 years ago and has benefited from continued support of coastal communities of the north Gulf coast of Alaska.

II. COORDINATION AND COLLABORATION

A. Within the Program

We have been and will continue to be active collaborators on the studies examining the interaction of humpback whales and herring (John Moran and Jan Straley, PIs). We have contributed our substantial long-term humpback whale photo-identification database to their analysis. We will continue to collect humpback whale fluke identification data from our research vessel and share research platforms when possible. As possible the proposed study will be integrated with near shore studies that focus on sea otters and with the oceanographic studies of the Alaska Coastal Current. We recently collaborated on a publication with members of the Nearshore component of Gulf Watch:

Bodkin, J.L., D. Esler, S.D. Rice, **C.O. Matkin,** and B. E. Ballachey. 2014. The effects of spilled oil on coastal ecosystems: lessons from the *Exxon Valdez* spill. B. Maslo and J.L. Lockwood eds. In: Coastal Conservation, Cambridge University Press, U.K.

B. With Other Council-funded Projects

Although we have indirect links to projects in the herring program, we do not directly share equipment, personnel or assist in data collection in these other Council funded projects.

C. With Trustee or Management Agencies

This work directly contributes and is closely coordinated with NMFS stock assessment work for North Pacific killer whales. We are currently collaborating on a major revision of North Pacific killer whale stocks. One of our staff (Dr. Kim Parsons) is the lead genetics specialist in this project and is using samples collected by this project in her analysis. We are also contributing photo-identification and acoustic data that are being used to look not only at stock definition, but trends in abundance. Dr. Paul

Wade (National Marine Mammal Laboratory) is the lead in this endeavor which will result publications coauthored by Matkin, the P.I. of this project.

We work with National Marine Fisheries Service region and Aleria Jensen in Juneau to continue education and observation of tour boats that view killer whales, particularly in the Kenai Fjords region

We work directly with the Alaska Sea Life Center and Dr. Russ Andrews on the ARGOS tagging project and this data is also being incorporated into Stock Assessments and stock definition of killer whales in the Gulf of Alaska and western Alaska

Finally, we collaborate with the Stranding Network at the Alaska Sea Life Center by assisting UAA professor Dr. Debby Tobin in examining and sampling stranded animals, which has included killer whales from the populations studied in this project.

III. PROJECT DESIGN – PLAN FOR FY15

A. Objectives for FY15

1) Photo-identification of all major resident pods and AT1 transient groups that use Prince William Sound/Kenai Fjords on an annual basis. Realistically, all pods are completely documented on a biennial basis, despite annual field effort. Extension of individual histories, identification catalogues of individuals and an annual update of population model are products of these data.
2) Collection of blubber samples for chemical monitoring of PCBs, DDT's and PBDE's, lipids and fatty acids and stable isotope values to gauge changes in contaminant loads as well as feeding habit changes. Most analytical costs are borne by NOAA fisheries.
3) Collection of fish scale samples and marine mammal tissue from kill sites to monitor potential changes in feeding habits
4) Collection of genetic tissue samples (Genetic analytical costs paid by NMML/UBC)
5) Tracking of individuals/pods using ARGOS satellite telemetry to improve re-sighting rate and foster completion of objectives 1-3. Use of time/depth recorders to examine feeding patterns and diel behavior.
6) Determine details of range of pods/populations using both ARGOS and photo-identification data and identify important habitat on a pod specific basis

B. Changes to Project Design

There are no substantive changes in project design or objectives. There has been some re-alignment in emphasis and budget to insure that basic photo-identification and population dynamics work is not compromised by other aspects of the project. We have shifted fieldwork to focus on periods of highest historic rate of encounter with killer whales to emphasize the population work, which reduces our ability to characterize feeding ecology over the broad course of the season

IV. SCHEDULE

A. Project Milestones for FY 15

Objective 1. To prepare for and complete field collection of data, including identification photos, behavioral observations, prey sampling and biopsy sampling and ARGOS satellite tag attachments. Field work will begin in May 2015 and end by October 2015.

Objective 2. Conduct photo-identification analysis and update catalogues and individual registries. Analyze blubber samples, prey samples, skin samples, and plot results of tagging efforts.

Objective 3. Update all databases and compile and conduct statistical analysis on data for publication and/or compilation of annual report. Update website (Facebook site is updated constantly over the year) and present results

B. Measurable Project Tasks for FY 15

FY14, 1st quarter (October 1, 2014-December 31, 2014)

Workup satellite tag data in GIS format and update databases. Lipid/fatty acid, contaminant, stable isotope and genetic analysis will be initiated. Attend Annual Gulf Watch PI meeting.

FY14, 2nd quarter (January 1, 2015-March 31, 2015)

January 19-23 Annual Alaska Marine Science Symposium. Finish analysis of photographs from fieldwork, update catalogues, work up satellite tag data in GIS format and update databases. Lipid/fatty acid, contaminant, stable isotope, prey sample and genetic analysis completion.

FY14, 3rd quarter (April 1, 2015-June 30, 2015)

Prepare for April fieldwork. Conduct fieldwork in May- June (30+ days)

FY14, 4th quarter (July 1, 2015- September 30, 2015)

Conduct fieldwork in August-September (20+ days). Compile 2015 data and samples.

V. PROJECT PERSONNEL – CHANGES AND UPDATES

There are no major staffing changes at this time, although Dan Olsen (graduate student at UAF Juneau) is being trained to become a principle in the project.

VI. BUDGET

A. Budget Forms

Please see included program workbook for budget forms.

B. Changes from Original Proposal

Because of increased costs of field operations over the past decade (there had been no change in budget for field expense in a decade) and our first increase in salaries of personnel and contractors in eight years there is some realignment in budget. This has reduced the involvement of the Northwest Fisheries Science Center and reduced purchases of ARGOS tags but maintained adequate field time to complete data collection necessary to assess population status of the three killer whale populations. Also, additional monies were re-allocated to travel to fund both annual Gulf Watch meeting and Alaska Marine Science Symposium. There has NOT been an increase in overall budget.

C. Sources of Additional Funding

The Northwest Fisheries Science Center contributes substantial analytical and salaried employee time (approximately $10,000 in kind annually) to aspects of our project. The Norcross Wildlife Foundation, the Stan Stephens Memorial Fund, and other donors contribute funds for purchase all of our equipment and electronics. The North Gulf Oceanic Society contributes approximately $10,000annually in kind for additional vessel time. The Alaska Sea Life center contributes salaried time and ARGOS tracking site expenses (via Russ Andrews) to the project.

Humpback whale predation on herring –Moran (NOAA, NMFS Auke Bay Laboratory, 15120114-N)

FY15 PROJECT PROPOSAL SUMMARY PAGE
Continuing, Multi-Year Projects

Project Title: Long-term Monitoring: Pelagic Monitoring Component – Long-term monitoring of humpback whale predation on Pacific herring in Prince William Sound

Project Period: February 1, 2015 – January 31, 2016

Primary Investigator(s): John R. Moran (NOAA) and Janice M. Straley (UAS)
Collaborating investigator: Terry Quinn (UAF)

Study Location: Prince William Sound

Project Website (if applicable):

Abstract*: We will evaluate the impact by humpback whales on Pacific herring populations in Prince William Sound. Following protocols established during the winters of 2007/08 and 2008/09(EVOSTC project PJ090804). We will continue to monitor the seasonal trends and abundance of humpback whales in Prince William Sound. Prey selection by humpback whales will be determined through acoustic surveys, visual observation scat analysis and prey sampling. Chemical analysis of blubber samples (stable isotopes and fatty acid analysis) will provide a longer term perspective on whale diet and shifts in prey type. These data will be combined in a bioenergetic model to determine numbers of herring consumed by whales, with the long term goal of enhancing the age structure modeling of population with better estimates of predation mortality.

Estimated Budget:

EVOSTC Funding Requested* (*must include 9% GA)*:

FY12	FY13	FY14	FY15	FY16	TOTAL
$127.4	$128.8	$139.6	$141.6	$54.4	$591.9

Non-EVOSTC Funds to be used:

FY12	FY13	FY14	FY15	FY16	TOTAL
$74.7	$83.5	$75.0	$78.5	$25.0	$336.7

Date: September 2, 2014

I. EXECUTIVE SUMMARY

At current herring and whale population levels the loss of pre-spawning herring during the fall and winter months is equivalent to the percentage of herring removed during the final years of the commercial herring fishery. Hence, top down forces (predation and disease) are the likely dominating forces constraining the current recovery. Humpback whales in Prince William Sound have a higher percentage of herring in their diet during the winter months and forage longer on wintering herring shoals than their counterparts in Southeast Alaska. With humpback whale population in the North Pacific increasing at 5-7% annually, there is a need to continue evaluating predation pressure on herring until stocks in Prince William Sound fully recover, and to proceed toward enhancing the age structure model to include a better estimate of predation for a more accurate predictor of the herring population. To date we have completed 13 surveys in Prince William Sound (75 days at sea) and have developed a conceptual model of the relationship between humpback whales and herring in the Sound. Although there is some inter-annual variation in the predation intensity, it appears that humpback whales continue to be major predators on Prince William Sound herring.

II. COORDINATION AND COLLABORATION

A. Within a EVOTC-Funded Program

We share and receive data with the killer whale and forage fish projects. We have provided a berth for a sea bird observer most of our whale surveys. During July of 214 we rendezvoused with the USGS vessel Alaskan Gyre (forage fish crew) to evaluate the potential for survey collaboration. We have scheduled a joint survey during September of 2014 with the forage fish and winter seabird project to describe the fall movements of whales, fish, and birds into the Sound via Montague Strait.

B. With Other EVOSTC-funded Projects

Not Applicable.

C. With Trustee or Management Agencies

Alaska Department of Fish and Game (Steller Sea Lion Program) - Lauri Jemison: We opportunistically collect photographs of branded sea lions during our surveys.

NMFS Auke Bay Laboratories - Bonita Nelson: Assisted student in fulfilling the requirements of the Hollings Scholar Program.

University of Alaska Fairbanks - Brianna Witteveen: Humpback fluke data sharing

III. PROJECT DESIGN – PLAN FOR FY15

A. Objectives for FY15

1) *Population estimates of humpback whales through the use of photographic mark- recapture models.* Knowing the number of whale present in PWS is essential for assessing their impact on the PWS ecosystem.

2) *Monitor the seasonal trends of humpback whales in Prince William Sound relative to prey.* EVOSTC project PJ090804 identified an correlation between the movements of whales and herring in PWS

3) *Estimate inter-annual trends in humpback whale abundance.* This objective allows us to determine if the conclusion from EVOSTC project PJ090804 are an anomaly or typical whale behavior in PWS.

4) *Determine the diet and dietary shifts of humpback whales.* A shift in prey by whales can have profound effects on herring (i.e. in Southeast Alaska, when euphausiids become available pressure on herring by whales is greatly reduced).

5) *Estimate predation rates on herring by humpback whales.* This objective quantifies predation pressure on herring for PWS.

6) *Incorporate mortality rates into herring age structure models.* This is the management component of the study, to evaluate if predation by whales explains fluctuations in herring populations.

B. Changes to Project Design

We are continuing with a previous change, moving the February survey to late March/ early April.

IV. SCHEDULE

A. Project Milestones for FY 15

Objectives

1) Population estimates of humpback whales through the use of photographic mark- recapture models. *To be met September 2015.*

2) Monitor the seasonal trends of humpback whales in Prince William Sound relative to prey. *To be met September 2015.*

3) Estimate inter-annual trends in humpback whale abundance. *To be met September 2015.*

4) Determine the diet and dietary shifts of humpback whales. *To be met September 2015.*

5) Estimate predation rates on herring by humpback whales. *To be met December 2015.*

6) Incorporate mortality rates into herring age structure models. *To be met January 2016.*

B. Measurable Project Tasks for FY 15 (based on federal fiscal year)

See Table 1 for survey schedule proposed for FY 2015.

Table 1. Humpback whale vessel survey schedule for Prince William Sound

Month	**FY12**	**FY13**	**FY 14**	**FY15**	**FY16**
Oct	6 days	6 days	6 days	6 days	Synthesis
Dec	6 days	6 days	6 days	6 days	Synthesis
Apr	6 days	6 days	6 days	6 days	Synthesis
Total vessel days	**18**	**18**	**18**	**18**	**72**

Completed humpback whale surveys for Prince William Sound.

Month	**FY12**	**FY13**	**FY 14**	**FY15**	**FY16**
Sep-Oct	6 days	7 days	7 days	-	Synthesis
Nov-Dec	6 days	7 days	7 days	-	Synthesis
Feb	4 days	4 days	-	-	Synthesis
Mar-Apr	4 days	8 days	7 days	-	Synthesis
Jul	3 days	-	5 days	Synthesis	Synthesis
Total vessel days	**23**	**26**	**26**	**-**	**75**

FFY 15, 1st quarter (October 1, 2014-December 31, 2014)

October: 6 day survey of PWS

December: 6 day survey of PWS

FFY 15, 2nd quarter (January 1, 2015-March 31, 2015)

January: Annual Marine science Symposium

April: 6 day survey of PWS

FFY 15, 3rd quarter (April 1, 2015-June 30, 2015)

Compile and analyze data.

FFY 15, 4th quarter (July 1, 2015-September 30, 2015)

Compile and analyze data.

FFY 16, 1st quarter (October 1, 2015-December 31, 2015)

Compile and analyze data. Begin writing final report.

FFY 16, 2nd quarter (January 1, 2016-March 31, 2016)

January: Annual Marine science Symposium.

Complete final report

FFY 16, 3rd quarter (April 1, 2016-June 30, 2016)

April 30: Submit final report as a draft manuscript for publication to the Trustee Council Office.

V. PROJECT PERSONNEL – CHANGES AND UPDATES

There are no changes to personnel.

VI. BUDGET

Please see included program workbook for budget forms.

A. Changes from Original Proposal

There are no changes from original proposal.

B. Sources of Additional Funding

We have secured additional NOAA funding through FY2015.

Forage fish distribution and abundance –Arimitsu and Piatt (USGS Alaska Science Center, 15120114-O)

FY15 PROJECT PROPOSAL SUMMARY PAGE
Continuing, Multi-Year Projects

Project Title: Long-term monitoring: Pelagic monitoring component - Monitoring long-term changes in forage fish distribution, abundance, and body condition in Prince William Sound.

Project Period: February 1, 2015 – January 31, 2016

Primary Investigator(s): John Piatt and Mayumi Arimitsu, U.S. Geological Survey, Alaska Science Center

Study Location: Prince William Sound

Project Website (if applicable):

Abstract*: This project is a component of the integrated Long-term Monitoring of Marine Conditions and Injured Resources and Services submitted by McCammon *et. al*. In response to a lack of recovery of wildlife populations following the Exxon Valdez Oil Spill (EVOS), and evidence of natural background changes in forage fish abundance, there was a significant effort to document forage fish distribution, abundance, and variability in Prince William Sound (PWS) since the 1990's. We propose to adopt some of these earlier sampling techniques, and also incorporate new methods to monitor forage fish in Prince William Sound with fishing and acoustic surveys of forage fish, and to measure indices of forage fish condition.

Estimated Budget:
EVOSTC Funding Requested* (*must include 9% GA)*:

FY12	FY13	FY14	FY15	FY16	TOTAL
$209.9	$202.5	$202.5	$202.5	$150.0	$967.6

Non-EVOSTC Funds to be used:

FY12	FY13	FY14	FY15	FY16	TOTAL
$297.2	$297.2	$297.2	$297.2	$72.2	$1,260.8

Date: September 2, 2014

I. EXECUTIVE SUMMARY

As originally proposed, the objectives of this work are to 1) identify robust indices for monitoring forage fish populations over time and devise a sampling strategy for long term monitoring of those indices, 2) assess the current distribution, abundance, species composition, and body condition of forage fishes (other than herring) in selected areas of Prince William Sound at selected times of the year, and 3) relate abundance and distribution of forage species to abiotic characteristics of the marine environment. We have made significant progress towards these goals.

During past reporting periods we worked closely with the Herring Research and Monitoring Program Manager and an experienced spotter pilot to come up with an improved survey design that increases encounter rate to sample target species. We supported the juvenile herring aerial survey work by providing equipment and expertise for data collection, management, and mapping. We analyzed a subset of recent aerial survey data collected in 2010-2012 by Evelyn Brown (Flying Fish Ltd.) to identify areas of high density forage fish schools observable from aircraft. We used this data to inform a new aerial-acoustic survey design that combines technologies to estimate near surface school abundance and distribution from the airplane, and simultaneously quantify deeper aggregations unobservable by the airplane with hydracoustic technology. We also devised a plan in collaboration with several GWA PIs to use humpback whales and foraging seabirds as indicators of deep water prey aggregations. We successfully carried out field sampling and validation of aerial observations in Prince William Sound in July, although results were not available at the time of this report.

II. COORDINATION AND COLLABORATION

A. Within the Program

We have undertaken two major collaborative projects within the program:

1) Aerial-acoustic survey for forage fish (see section III part B, below) with Scott Pegau (PWSSC), HRM coordinator. We have been working closely with Dr. Pegau during June 2014 aerial surveys and July 2014 forage fish surveys. We provided equipment and expertise in survey data collection and data management, including data recorders, software, mapping services, cameras and accessories. We analyzed historical aerial survey data and worked directly with the spotter pilot to come up with a statistically sound and feasible survey design with on-the-ground species and size class validation as well as concurrent hydroacoustic data collection.
2) Whale prey study with Jan Straley (UAS) and John Moran (NOAA), GWA humpback whale PIs, and Mary Anne Bishop (PWSSC), GWA fall and winter seabird abundance PI. We have devoted vessel time in July and September 2014 to facilitate a broader understanding of humpback whale and seabird foraging dynamics and forage fish availability in Prince William Sound. We are sharing research platforms and collaborating on survey techniques that will benefit all of our collective program components.

B. With Other Council-funded Projects

N/A

C. With Trustee or Management Agencies

N/A

III. PROJECT DESIGN – PLAN FOR FY15

A. Objectives for FY15

The objectives of this work are to:

1) Identify robust indices for monitoring forage fish populations over time and devise a sampling strategy for long term measurement of those indices,

2) Assess the current distribution, abundance, species composition, and body condition of forage fishes (other than herring) in selected areas of Prince William Sound (PWS) at selected times of the year, and

3) Relate abundance and distribution of forage species to abiotic characteristics of the marine environment.

B. Changes to Project Design

We have made significant progress and are on track to achieve our goals. The following details modifications that were made to the original study plan, and the rational for making those changes.

We developed a pilot study design, details of which are found in the original sampling protocol for this project on the AOOS ocean workspace. Based on findings during historical work on forage fish and our surveys in 2012-13, we modified the study design for the 2014 field season (detailed in a protocol changes for project 12120114 document, available on the AOOS ocean workspace. The changes we implemented in 2014 will improve our ability to meet the project objectives by modifying historical aerial survey methods to increase repeatability and ensure certainty in species composition and school density, as well as simplify the data collection and processing effort. To increase encounter rate for target species we sampled a subset of aerial survey areas with acoustic and net-capture methods, we used a spotter plane to identify forage schools in near-surface (< 10-15 m) waters, and used foraging humpback whales to locate and sample forage aggregations in deeper waters (> 10-15 m). We also collected habitat information to better understand the distribution and abundance of forage species throughout the Sound.

Previous work on forage fish in PWS includes acoustic and aerial survey methods developed during the mid-late 1990's, including the Alaska Predator Ecosystem Experiment (APEX) and the Sound Ecosystem Assessment (SEA). Additionally, the Sound-wide aerial surveys for forage fish were repeated in 2010-12 as part of the PWS herring survey. Although these programs had many useful outcomes, as detailed in numerous reports, publications and datasets, there were some issues with the historical acoustic and aerial survey methods that prevented us from repeating them as they were originally designed. The APEX nearshore acoustic surveys generally had low encounter rate (< 10%) with target species and had no effort in offshore waters. The APEX/SEA project and more recent aerial surveys for forage fish suffered from low validation effort, and methods that are difficult to repeat or estimate density with certainty (i.e., strip transects of unknown width or line transects placed parallel to the density gradient, which confound the estimation of a detection function). Furthermore, logistical constraints hampered coordination with concurrent acoustic and net sampling efforts in the past.

During 2012-2013 field seasons we conducted fish, seabird, zooplankton, oceanography and nutrients sampling at 27 fixed stations (although one site was sampled in both years) using a stratified systematic design. With the exception of euphausiids near tidewater glaciers, mid-water trawl composition at fixed stations throughout the Sound suggested our encounter rate with target species was not sufficient to assess abundance. Frequency of occurrence in trawls (FO) was low for capelin (3.7%), eulachon (3.7%), and euphausiids (11.1%), and catches were overwhelmingly dominated by non-target species (young of the year walleye pollock, FO = 100%, and jelly fish FO = 81.5%). Likewise, beach seines targeting Pacific

sand lance had low and variable catches (mean CPUE ± SD = 3.5 ± 10.5 fish per set). Thus we began to look for ways to improve our ability to sample target fish species.

In 2013 we explored the use of adaptive cluster sampling, and tested combined aerial and acoustic surveys with validation ("aerial-acoustic surveys") as means to increase our encounter rate with target species. Adaptive cluster sampling (i.e., intensive sampling right over schools we found during surveys or by chance) generally involved a high degree of effort and did not facilitate a quantitative means of assessing abundance and distribution at the sound-wide scale. We devoted 3 days of ship time to validation of limited aerial surveys. An experienced spotting pilot directed the ship or a skiff to forage fish schools visible from the plane. Schools were captured with nets, jigs, video, and hydroacoustics whenever possible. The ground crew recorded, and relayed to the pilot, information about fish species, fish size, and depth of the schools. After the pilot left, we conducted hydroacoustic surveys of the area, and we used mid-water trawls, gill nets, cast nets, dip nets, jigs, or video to confirm the species composition and fish size for conversion of acoustic backscatter to biomass.

Although this work facilitated a better way to target near-surface forage fish schools available for observation from a plane, our sampling efforts resulted in relatively low-encounter rate with forage schools below the depth visible to the spotter pilot (> 10-15 m). We know, however, that humpback whales are efficient predators of forage species (fish and euphausiids), and whale distribution may be a key indicator of high density prey patches at depths that are not visible to observers in a plane. Therefore we have undertaken additional collaboration with GWA humpback whale PIs and have developed a pilot study to quantify prey aggregations near foraging humpback whales.

From the results of past efforts (APEX/SEA programs and our surveys in 2012-13), we believe that use of a redesigned aerial-acoustic survey to assess nearshore, shallow, forage fish distribution and abundance in Prince William Sound will improve upon past survey strategies in quantifying a Sound-wide forage school index. The redesigned aerial-acoustic survey (Figure 1), with more repeatable methods and the ability to apply a detection correction factor to school counts by size and species, has greatest potential to provide a Sound-wide index of forage school availability because on-the-ground validation will provide confidence in species composition, size/age class, depth distribution and biomass. We also measured habitat variables (oceanography, chlorophyll a, nutrients, and zooplankton) at a subset of aerial-acoustic survey blocks. Finally, using humpback whales as indicators of high-density prey aggregations in deep water (> 10-15 m), in July 2014 we undertook a pilot study to measure deep water forage aggregations in humpback whale hotspots as a potential monitoring tool.

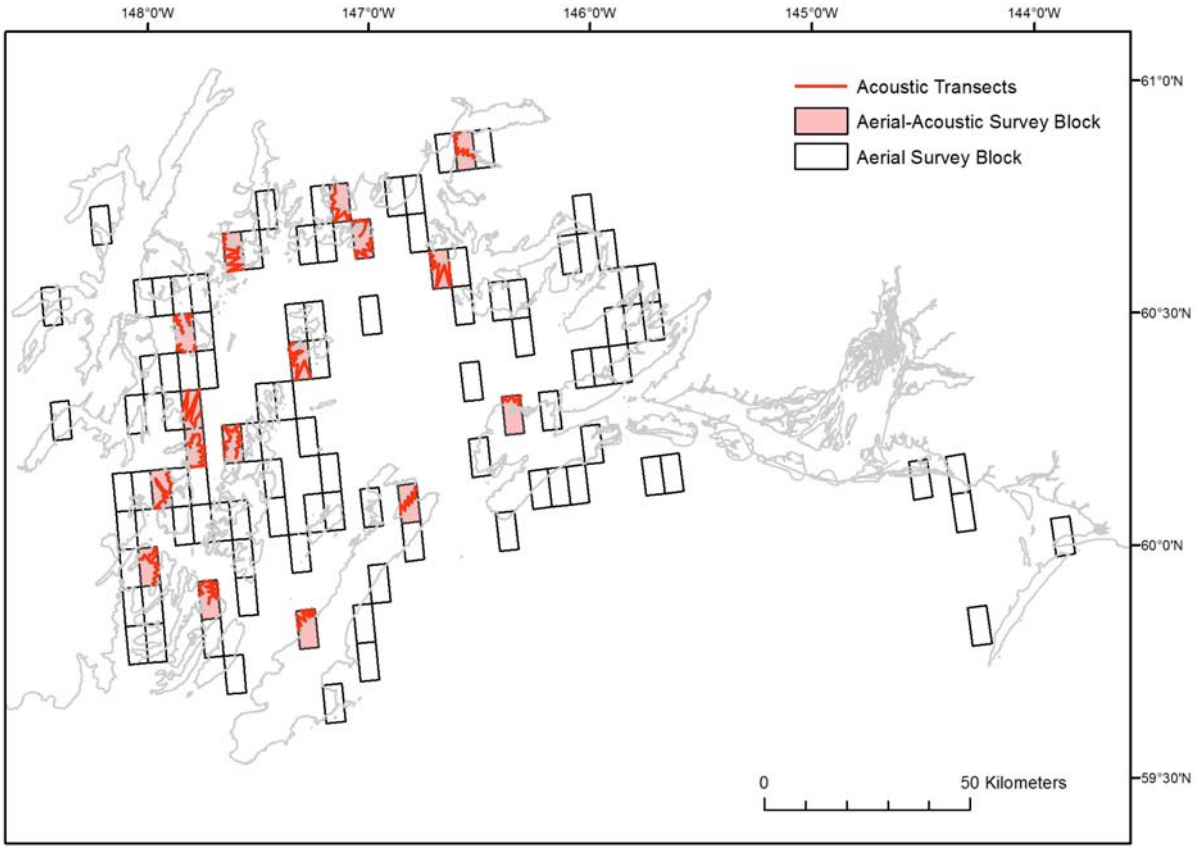

Figure 1. Map of aerial-acoustic survey design including survey blocks and acoustic transects in Prince William Sound, Alaska.

In 2014 we made the following additions to our project:

- Redesigned aerial-acoustic surveys with dedicated validation effort (addresses objectives 1 and 2)
- Continue measuring habitat variables at intensive acoustic sampling blocks (addresses objective 3, detailed in original proposed study plan)
- Pilot Study: target acoustic-trawl sampling near humpback whale hotspots and fixed transects in July and September (addresses objectives 1 and 2)

Although our survey design has changed considerably from the original proposed study plan, we will work within our original proposed budget to accomplish this work. The proposed additions to this project have been reviewed and approved by the following GWA and Herring Research and Monitoring (HRM) program members: Scott Pegau, John Moran, Jan Straley, Mary Anne Bishop, Mandy Lindeberg, and Ron Heintz. Additional comments to elements of the proposed design were discussed with Charlotte Wasting (ADF&G wildlife biologist in Prince William Sound), and Terry Quinn (UAF Fisheries Statistician). This work requires coordination and collaboration among PIs and will improve the quality of information gathered by the forage fish, herring, and humpback whale programs. Scott Pegau (PWSSC) will conduct aerial surveys as part of the collaborative project 1412011-R in 2014 and 2015. The July acoustic-trawl survey aboard the USGS R/V Alaskan Gyre will be reduced by 4 days to redirect some of our effort to collaborating on the 7-day NOAA coordinated whale prey survey aboard the M/V Montague in

September in 2014. Greater collaboration among projects within the GWA and Herring Research Program will ultimately benefit both programs and provide a greater understanding of forage fish availability and predator diets in the Sound.

IV. SCHEDULE

A. Project Milestones for FY 15

Objective 1. Identify robust indices for monitoring forage fish populations over time and devise a sampling strategy for long term monitoring of those indices.
To be met by September 2016

Objective 2. Assess the current distribution, abundance, species composition, and body condition of forage fishes (other than herring) in selected areas of PWS and at selected times of year.
To be met by September 2016

Objective 3. Relate abundance and distribution of forage species to abiotic and biotic characteristics of the marine environment.
To be met by September 2016

B. Measurable Project Tasks for FY 15

FY 15, 1st quarter (February 1, 2015 - April 31, 2015)

February: *Project funding available*
Feb – Mar *Update project outreach website, analyze and summarize data*

FY 15, 2nd quarter (May 1, 2015-July 30, 2015)

June: *upload 2014 data to workspace, update metadata*
July-Aug: *fieldwork*

FY 15, 3rd quarter (August 1, 2015 – October 31, 2015)

September: *2014 field data compilation, lab analyses*
November: *Annual PI meeting*

FY 15, 4th quarter (November 1, 2015- January 31, 2016)

December: *Begin analysis and report writing*

V. PROJECT PERSONNEL – CHANGES AND UPDATES

N/A

VI. BUDGET

C. Budget Forms

Please see the program workbook.

D. Changes from Original Proposal

Our FY15 funding request does not differ from our original proposal.

E. Sources of Additional Funding

N/A

Prince William Sound marine bird surveys – Irons/Kuletz (USFWS Alaska Region, 15120114-K)

FY15 PROJECT PROPOSAL SUMMARY PAGE
Continuing, Multi-Year Projects

Project Title: Continuing the Legacy: Prince William Sound Marine Bird Population Trends.

Project Period: February 1, 2015 – January 31, 2016

Primary Investigator(s): Kathy Kuletz, David Irons, and Robb Kaler, US Fish and Wildlife Service, Migratory Bird Management, Anchorage, Alaska

Study Location: Prince William Sound

Project Website (if applicable):

Abstract: This project is a component of the integrated Long-term Monitoring of Marine Conditions and Injured Resources and Services submitted by McCammon et al. and spans 1989-2014, and includes 13 years of boat-based surveys aimed at monitoring population trends of marine birds and mammals in Prince William Sound after the *Exxon Valdez* oil spill. Data collected will be used to examine trends from summer to determine whether populations in the oiled zone are increasing, decreasing, or stable, as well as to examine overall population trends for the Sound. Data collected from 1989 to 2012 indicated that pigeon guillemots (*Cepphus columba*) and marbled murrelets (*Brachyramphus marmoratus*) are declining in the oiled areas of Prince William Sound. We have found high inter-annual variation in numbers of some bird species and therefore recommend continuing to conduct surveys every two years. These surveys are the only ongoing means to evaluate the recovery of most of these injured marine bird species. Surveys would also benefit the benthic monitoring and forage fish monitoring aspects of the Long-term Monitoring Project as well as the Herring Project.

Estimated Budget:
EVOSTC Funding Requested (*must include 9% GA)*:

FY12	FY13	FY14	FY15	FY16	TOTAL
$206.5	$24.2	$211.1	$24.2	$215.7	$681.6

Non-EVOSTC Funds to be used:

FY12	FY13	FY14	FY15	FY16	TOTAL
$56.0	$22.0	$56.0	$22.0	$56.0	$212.0

Date: September 2, 2014

I. EXECUTIVE SUMMARY

In order to assess population trends in the years following the Exxon Valez Oil Spill (EVOS), the objectives of the proposed project "Continuing the Legacy: Prince William Sound Marine Bird Population Trends are (1) determine population abundance, with 95% confidence limits, of marine bird populations in Prince William Sound during March and July 2012, 2014 and 2016 in both oiled and unoiled regions; and (2) determine population abundance, with 95% confidence limits, of marine bird populations in Prince William Sound during March and July 2012, 2014 and 2016 for Prince William Sound as a whole. During the past reporting period, Daniel Cushing completed his degree of Master of Science at Oregon State University and his thesis titled "Patterns of Distribution, Abundance, and Change over Time in the Marine Bird Community of Prince William Sound, Alaska, 1989-2012" (Cushing 2014). Using data collected during small boat surveys (1989-2012), Cushing (2014) used taxon- and community-centric approaches to examine patterns of marine bird distribution and abundance in Prince William Sound and found marine bird communities as a whole to be spatially structured along a primary onshore-offshore environmental gradient, and secondarily structured along an estuarine-marine environmental gradient. Cushing (2014) also investigated spatial habitat associations and temporal change of *Brachyramphus* murrelets and found that abundance estimates for both marbled murrelets (*Brachyramphus marmoratus*) and (*B. brevirostris*) decreased by more than two-thirds over the study period. There was no evidence that rates of change differed along environmental or geographic gradients and no evidence that changes in seasonal patterns of abundance occurred. Using marine bird data collected in July 2014, in FY15 we will continue to explore the hypothesis that climate change has differentially affected nearshore and offshore components of PWS food webs, and how this may have contributed to the failure of some taxa to recover from the population injury caused by the EVOS.

II. COORDINATION AND COLLABORATION

A. Within the Program

This component will provide the data on marine bird and mammal populations for the: (1) Nearshore Benthic Project; (2) Herring Research and Monitoring Program, and (3) the Forage Fish Distribution and Abundance Project. Long-term population trend information on seabird species (three which rely on Pacific Herring; Pigeon Guillemots, Kittlitz's Murrelets, and Marbled Murrelets) is a critical tool for determining the efficacy of policy and management actions affecting the Gulf of Alaska marine ecosystem.

B. With Other Council-funded Projects

The proposed project complements the Council-funded effort to restore Pigeon Guillemot to the Naked Islands (Naked, Peak, and Storey islands). Dr. David Irons is a Primary Investigator for both the PWS marine bird survey as well as the Pigeon Guillemot restoration study.

C. With Trustee or Management Agencies

The proposed project supports the US Fish and Wildlife Service's Migratory Bird Management mission to advance the conservation of migratory birds. The project will also inform other land management agencies (US Forest Service, National Park Service) with lands and waters adjacent to our study area. Additionally, Co-PI Dr. Kathy Kuletz (USFWS) is also a PI of the seabird component for two other long-term monitoring projects that complement the PWS marine bird survey and will allow us to examine oceanographic and plankton data in conjunction with seabird distribution and relative abundance, with a seasonal component, across the Gulf Watch study area and will inform the fisheries management process in the Gulf of Alaska.

(1) Seabird surveys are a sub-award of the 'Seward Line' project funded by the North Pacific Research Board (Project 1427, "Measuring the pulse of Gulf of Alaska: Oceanographic observations along the Seward Line"; lead PI, Dr. R. Hopcroft, UAF). Dr. Kuletz coordinates pelagic surveys of marine

birds in conjunction with the oceanographic and plankton surveys. The project includes the transit along the outer coast of the Kenai Peninsula between Homer and Seward, the Seward Line (which runs to the shelf break), and transits between stations throughout western PWS. Two sampling cruises (May and September) are conducted each year for the next five years, with plans to continue additional years, pending funding.

(2) Seabird surveys in Lower Cook Inlet funded by the the Bureau of Ocean Energy Management (BOEM; Intra-agency Agreement No. M14PG00031, "Seabird Abundance and Distribution with Respect to Ecological Processes in Lower Cook Inlet"). This project collects data for the upper trophic level component of the BOEM environmental studies program, in partnership with an existing multidisciplinary monitoring program (Monitoring temporal and spatial trends in lower Cook Inlet and Kachemak Bay waters, Gulf Watch, PIs A. Doroff (KBRR) and K. Holderied (NOAA)). The USFWS/BOEM marine bird surveys are conducted in conjunction with oceanographic and plankton sampling across four transect lines in Lower Cook Inlet, four times per year (spring, summer, fall, winter), 2012 - 2016.

III. PROJECT DESIGN – PLAN FOR FY15

A. Objectives for FY15

To determine population abundance, with 95% confidence limits, of marine bird populations in Prince William Sound during July 2012, 2014 and 2016 in both oiled and unoiled regions, as well as in Prince William Sound as a whole, in order to assess population trends in the years following the EVOS. To be met by April 2015.

B. Changes to Project Design

No changes have been made to the project design

IV. SCHEDULE

A. Project Milestones for FY 15

FY 15, 1st quarter (October 1, 2014-December 31, 2014)

Attend Annual PI Meeting

Finish Quality Assurance and Quality Check of 2014 marine bird survey data

FY 15, 2nd quarter (January 1, 2015-March 31, 2015)

Attend Alaska Marine Science Symposium

Complete analysis of 2014 marine bird survey data

Determine population abundance, with 95% confidence limits, of marine birds in Prince William Sound during July 2014.

FY 15, 3rd quarter (April 1, 2015-June 30, 2015)

Summarize results from 2014 survey, incorporate results into annual report

FY 15, 4th quarter (July 1, 2015-September 30, 2015)

Submit annual report

B. Measurable Project Tasks for FY 15

FY 15, 1st quarter (February 1, 2015 - April 31, 2015)

February:	*Project funding available*
Feb – Mar	*Update project outreach website, analyze and summarize data*

FY 15, 2nd quarter (May 1, 2015-July 30, 2015)

June:	*Upload 2014 data to workspace, update metadata*
July-Aug:	*Fieldwork*

FY 15, 3rd quarter (August 1, 2015 – October 31, 2015)

September:	*2014 field data compilation, lab analyses*
November:	*Annual PI meeting*

FY 15, 4th quarter (November 1, 2015- January 31, 2016)
December: *Begin analysis and report writing*

V. PROJECT PERSONNEL – CHANGES AND UPDATES
Curriculum Vitae of new Primary Investigator, Robb Kaler in Appendix 2.
Mr. Kaler will be leading the field component of the PWS marine bird and mammal survey. Mr. Kaler will also be responsible for data analysis and report writing for the remainder of the project.

VI. BUDGET
F. Budget Forms
Please see program budget workbook
G. Changes from Original Proposal
No have no changes to our FY15 request.
H. Sources of Additional Funding
N/A

Seabird abundance in fall and winter – Bishop (PWSSC, 15120114-C)

FY15 PROPOSAL SUMMARY PAGE
Continuing, Multi-Year Projects

Project Title: Long-term monitoring of seabird abundance and habitat associations during late fall and winter in Prince William Sound

Project Period: February 1, 2015 – January 31, 2016

Primary Investigator(s): Mary Anne Bishop, Ph.D., Prince William Sound Science Center, Cordova
mbishop@pwssc.org

Study Location: Prince William Sound

Project Website: www.gulfwatchalaska.org http://pwssc.org/research/birds-2/seabirds/

Abstract: This project is a component of the integrated Gulf Watch Alaska Long-term Monitoring of Marine Conditions and Injured Resources and Services submitted by McCammon *et.al*. The vast majority of seabird monitoring in areas affected by the *Exxon Valdez* oil spill has taken place around breeding colonies during the reproductive season, a time when food is generally at its most plentiful. However, seabirds spend most of the year widely dispersed. Late fall through winter are critical periods for survival as food tends to be relatively scarce or inaccessible, the climate more extreme, light levels reduced, day length shorter and water temperatures colder. Post-spill ecosystem recovery and changing physical and biological factors all have the potential to affect PWS seabird populations. Of the seabirds that overwinter in PWS, nine species were initially injured by the *Exxon Valdez* oil spill, including three species that have not yet recovered (marbled murrelet, Kittlitz's murrelet and pigeon guillemot). Here we propose to continue to monitor from 2012 through 2016 seabird abundance, species composition, and habitat associations using multiple surveys (up to 5 surveys per season) during late fall and winter. The data will improve our predictive models of seabird species abundance and distribution in relation to biological and physical environmental factors. In addition, by monitoring the top-down forcing by seabirds, a major source of herring predation, this project will complement the suite of *PWS Herring Research & Monitoring* studies, including improved mortality estimates for herring population models. This project is part of the pelagic component within the integrated *Gulfwatch Long-term Monitoring of Marine Conditions and Injured Resources and Services* submitted by McCammon *et. al*. Our project uses as observing platforms the vessels associated with the *LTM Humpback Whale surveys, PWS Herring Research & Monitoring Juvenile Herring Abundance Index* and integrates the seabird observations with those studies. In addition, our projects uses vessels associated with Alaska Dept. of Fish and Game October PWS shrimp surveys, and PWS Science Center February acoustic array cruises.

Estimated Budget:

EVOSTC Funding Requested* (*must include 9% GA)*:

FY12	FY13	FY14	FY15	FY16	TOTAL
$51.7	$78.6	$80.9	$83.4	$87.5	$382.1

Non-EVOSTC Funds to be used:

FY12	FY13	FY14	FY15	FY16	TOTAL
$10.5	$45.5	$63.5	$63.5	$63.5	$246.5

Date: September 2, 2014

I. EXECUTIVE SUMMARY

Of the seabirds that overwinter in Prince William Sound (PWS), nine species were initially injured by the *Exxon Valdez* oil spill, including three species that have not yet recovered (marbled murrelet, Kittlitz's murrelet and pigeon guillemot. Nevertheless, the vast majority of seabird monitoring in areas affected by the Exxon Valdez oil spill has taken place around breeding colonies during the reproductive season, a time when food is generally at its most plentiful. Long-term monitoring of seabirds in PWS during winter is needed to understand how post-spill ecosystem recovery and changing physical and biological factors are affecting seabird abundance and species composition, as well as their distribution and habitat use.

This study is a continuation of systematic late fall and winter seabird surveys begun in 2007 by Bishop and Kuletz. Between October 2011 and July 2014, a seabird observer participated in 11 late fall and winter cruises. These include 9 cruises associated with three EVOS-funded projects: Gulfwatch *Humpback Whale systematic surveys* (n = 6), Herring and Research Monitoring *Juvenile Herring Abundance Index* (n = 2), and Herring and Research Monitoring *Expanded Adult Herring Surveys* (n = 1), as well as 1 cruise with Alaska. Department of Fish and Game (ADFG; Oct 2013) and 1 cruise with PWS Science Center Ocean Tracking Network (OTN) project (Feb 2014). We plan to continue placing an observer onboard the October ADFG and the February PWS Science Center OTN cruises. At the end of first 5 years of the long-term monitoring (September 2016), this study will have monthly data sets from broad-scale coverage of PWS ranging from 4 to 10 years.

We continue to use the same methodology on our cruises that we have used since November 2007. That includes a 300m transect width (150 m each side), and recording all observations into dLog software. Data analyses are ongoing. Data is stored in the form of a Microsoft access database. Metadata for the project is currently available. We continue on track to meet our milestones, all of which have completion dates in 2016.

In addition to the above, we are collaborating with two EVOS *Gulfwatch* studies(*Humpback whale predation on Pacific herring* and *Forage fish in PWS*) and one EVOS *Herring* study (*Validation of Acoustic Surveys for Pacific Herring Using Direct Capture*) to investigate fall movements of whales, fish, and birds into the Sound via Montague Strait during September 2014. We placed a seabird observer onboard the NOAA Humpback whale project's vessel in July 2014. This preliminary cruise was designed to evaluate methodology for the September study.

In 2014 we contracted with Quanticipate Consulting (Dr. Ali Arab) to assist us with modeling temporal and spatial trends of seabirds in winter while accounting for sampling issues including detection probability estimation. Results will be provided in tables and figures for constant and temporally-varying variables and in form of maps for spatially-varying estimates.

Publication status:

Bishop, M.A., J. Watson, K. Kuletz, and T. Morgan. *in press.* Pacific herring consumption by marine birds during winter in Prince William Sound, Alaska. *Fisheries Oceanography*

Dawson, N., M.A. Bishop, K. Kuletz and A. Zuur. Winter habitat associations of seabirds in subarctic Alaska. *Northwest Science* Accepted, pending revisions.

Popular press:

Bishop, M.A. 2014. At-sea Seabird Surveys. *Delta Sound Connections*.
With a circulation of ~15,000, this annual newspaper published about the natural history of PWS and the Copper River Delta is distributed each May to airports and tourist areas in southcentral Alaska.

II. COORDINATION AND COLLABORATION

A. Within the Program

Table 1. Shared vessel platforms for this project with other EVOS projects.

EVOS Program/Project	Agency	Dates
PWS Herring & Research		
Validation of acoustic surveys for Pacific Herring using direct capture	PWS Science Center	Nov 2012-2016
Juvenile herring abundance index	PWS Science Center	Nov 2012-2016
Expanded adult Herring surveys	PWS Science Center	Late Mar/Apr 2013
Gulfwatch		
Long-term monitoring of humpback whale predation on Pacific herring in PWS	NOAA/UAS	Oct 2011 – Dec 2015
Monitoring long-term changes in forage fish distribution, abundance, and body condition in PWS	USGS	Sept. 2014

Seabird observations from this project is shared and integrated into the whale and herring surveys. In addition, information on herring, other fish and zooplankton prey fields around whale foraging areas, juvenile herring schools and adult herring schools is being used for the seabird analyses.

B. With Other Council-funded Projects

None

C. With Trustee or Management Agencies

Alaska Department of Fish and Game: Maria Wessel. ADFG provides a berth for a seabird observer during the October shrimp surveys.

Prince William Sound Science Center: Mary Anne Bishop. PWSSC provides a berth for a seabird observer during the February cruise to upload the Ocean Tracking Network arrays.

III. PROJECT DESIGN – PLAN FOR FY15

A. Objectives for FY15

1) Characterize the spatial and temporal distribution of seabirds in PWS during late fall and winter.
2) Relate seabird presence to prey fields identified during hydroacoustic surveys.
3) Identify critical biological and physical habitat characteristics for seabirds across PWS within and between winters.

4) Utilize increased temporal sampling resolution to improve our estimates of consumption of herring by seabirds during the winter.

B. Changes to Project Design

The only changes to the project design have had to do with shared vessels and timing of cruises. For October, we are now using the Alaska Department of Fish and Game annual shrimp survey. This is a 10-d cruise that samples the exact same locations every year. Originally the Humpback Whale project was going to conduct a cruise in February that a seabird observer would accompany. This cruise is now in April. Similarly, we were going to place an observer on the Expanded Adult Herring Survey cruises, however the timing of these cruises (late March and late April) do not reflect winter bird abundance or habitat use as spring migration and in some cases breeding is already underway by then. As a result, we have placed the seabird observer on an annual February cruise that the PWS Science Center conducts to download acoustic arrays in Hinchinbrook Entrance and Montague Strait.

Finally, we have added a short-term study with the Gulfwatch *Humpback Whale* and *PWS Forage Fish*, and the Herring R& M *Acoustic Validation* projects to investigate fall movements of whales, fish, and birds into the Sound via Montague Strait. For the Montague Strait study we will be conducting the seabird observations. This study is scheduled to take place in September 2014.

IV. SCHEDULE

A. Project Milestones for FY 15

Objective 1. Characterize the spatial and temporal abundance of seabirds in PWS during late fall and winter.
To be met by July 2016.

Objective 2. Model species abundance and distribution in relation to biological and physical environmental factors
To be met by July 2016.

Objective 3. Assess seabird habitat associations within and between winters
To be met by July 2016.

Objective 4. Relate species composition and distribution to prey fields.
To be met by July 2016.

Objective 5. Identify critical marine habitats used by seabirds during late fall and winter
To be met by August 2016.

B. Measurable Project Tasks for FY 15

FY 15, 1st quarter (Feb 1 – Apr 30, 2015)

Feb Field cruise: LTM seabird survey in conjunction with PWSSC Ocean Tracking Network cruise
Mar-Apr Analyze data

FY 15, 2nd quarter (May 1-Jul 31, 2015)

May-Jul Analyze data
Jul FY16 work plan

FY 15, 3rd quarter (Aug 1- Oct 31, 2015)

Aug Submit FY 16 work plan
Aug Submit five-year plan for FY17-22
Aug-Oct Analyze data
Oct Field cruise: LTM seabird survey in conjunction with ADFG shrimp survey for PWS

FY 15, 4th quarter (Nov 1, 2015 – January 31, 2016)

Nov Field cruise: LTM seabird survey in conjunction with *Juvenile herring abundance index* and *Acoustic Validation*

Nov Gulfwatch PI meeting
Nov-Dec Analyze Data
Dec Field cruise: LTM seabird survey in conjunction with EVOS *PWS Humpback Whale survey*
Jan Alaska Marine Symposium
Jan Submit annual report

V. PROJECT PERSONNEL – CHANGES AND UPDATES

Jessica Stocking conducted all the seabird observations and assisted with report writing during years 2-3. In August 2014 Stocking left PWS Science Center for a Ph.D. program. Anne Schaefer has been hired as her replacement. Schaefer completed a M.S. in Wildlife Biology from the University of Montana in May 2014. Schaefer conducted research on monitoring methods for *Brachyramphus* murrelets (Kittltiz's and Marbled) for her Master's thesis.

VI. BUDGET

Please see program workbook for completed budget forms.

A. Changes from Original Proposal

In 2014, we contracted with Quanticipate Consulting (Dr. Ali Arab) to assist us with modeling temporal and spatial trends of seabirds in winter. This contract should be completed by October 2014.

B. Sources of Additional Funding

None

Nearshore benthic systems in the Gulf of Alaska – Ballachey (USGS Alaska Science Center), Coletti (USNPS SWAN) and Dean (Coastal Resources Associates, 15120114-R)

FY15 PROJECT PROPOSAL SUMMARY PAGE
Continuing, Multi-Year Projects

Project Title: Gulf Watch Alaska: Nearshore Benthic Systems in the Gulf of Alaska

Project Period: February 1, 2015 – January 31, 2016

Primary Investigators: B. Ballachey, J. Bodkin, D. Esler, K. Kloecker, D. Monson, B. Weitzman, US Geological Survey; H. Coletti, M. Shephard, National Parks Service, T. Dean, Coastal Resource Associates; M. Lindeberg, NOAA, A. Doroff, Kachemak Bay Research Reserve

Study Location: Gulf of Alaska: Prince William Sound, Kenai Fjords National Park, Katmai National Park and Preserve

Project Website (if applicable): http://www.gulfwatchalaska.org, http://science.nature.nps.gov/im/units/swan/monitor/nearshore.cfm, http://alaska.usgs.gov/science/biology/nearshore_marine/lt_monitoring.php

Abstract: This project is a component of Gulf Watch Alaska: Integrated Long-Term Monitoring of Marine Conditions and Injured Resources and Services. For the Nearshore Benthic ecosystem component, we have implemented a long-term monitoring program at five locations across the GOA, including sampling areas in Western, Northern and Eastern Prince William Sound (PWS), Kenai Fjords National Park, and Katmai National Park and Preserve. Additional nearshore sampling as part of Gulf Watch Alaska is ongoing in Kachemak Bay (Project 12120114-L) and is closely coordinated with this project. The Gulf Watch Alaska nearshore program is integrated with nearshore monitoring implemented in 2006 by the National Park Service to cost-effectively monitor nearshore ecosystems across the central and western Gulf of Alaska, including spill-affected areas, and provide information on recovery and restoration of injured resources. We propose to (1) continue sampling Katmai NPP, Kenai Fjords NP, and Western PWS annually (2015 & 2016; all 3 areas previously sampled in multiple years starting in 2006), and (2) sample Northern PWS in 2015 (previously sampled in 2013) and Eastern PWS in 2016 (previously sampled in 2012 and 2014). We will continue to coordinate with the ongoing nearshore monitoring program in Kachemak Bay. Monitoring metrics include marine invertebrates, kelps, sea grasses, birds, mammals, and physical parameters. In addition to taxa-specific metrics, monitoring includes recognized important ecological relations that include predator-prey dynamics, measures of nearshore ecosystem productivity, and contamination. The nearshore benthic monitoring program also will integrate physical data collected in PWS, along the GOA shelf and in Cook Inlet, under the Environmental Drivers component of the GWA long-term monitoring program.

Estimated Budget:

EVOSTC Funding Requested* (*must include 9% GA)*:

FY12	FY13	FY14	FY15	FY16	TOTAL
282.4	304.1	331.9	309.6	331.9	1,559.9

Non-EVOSTC Funds to be used:

FY12	FY13	FY14	FY15	FY16	TOTAL
274	274	274	274	274	1,370

Date: September 2, 2014

I. EXECUTIVE SUMMARY

The nearshore is an important component of the Gulf of Alaska (GOA) ecosystem, including the region affected by the *Exxon Valdez* oil spill (EVOS), because it provides:

- A variety of habitats for resident organisms (e.g. sea otters, harbor seals, shorebirds, seabirds, nearshore fishes, kelps, seagrasses, clams, mussels, and sea stars).
- Nursery grounds for marine animals that exist as adults in other habitats (e.g. crabs, salmon, herring, and seabirds).
- Feeding grounds for important consumers, including killer whales, harbor seals, sea otters, sea lions, sea ducks, shore birds and many fish and shellfish.
- A source of animals important to commercial and subsistence harvests (e.g. marine mammals, fishes, crabs, mussels, clams, chitons, and octopus).
- An important site of recreational activities including fishing, boating, camping, and nature viewing.
- A source of primary production for export to adjacent habitats (primarily by kelps, other seaweeds, and eelgrass).
- An important triple interface among air, land and sea that provides linkages for transfer of water, nutrients, and species.

Further, the nearshore is sensitive to natural and human disturbances on a variety of temporal and spatial scales. Nearshore systems are especially good indicators of change because organisms in the nearshore are relatively sedentary, accessible, and manipulable, and there is a comparatively thorough understanding of mechanistic links between nearshore species and their physical environment that facilitates understanding causes of change.

With respect to the goals of the Gulf Watch Alaska (GWA) long-term monitoring program, the nearshore is the habitat where we may detect relatively localized sources of change, distinguish human-induced from natural changes, and provide suggestions for policies to reduce human impacts. Because many organisms in the nearshore are sessile or have limited home ranges, they can be linked to sources of change. Finally, the nearshore is critically important because it was the habitat most impacted by the 1989 EVOS, and has been a repository for lingering oil linked to protracted injury to resident species. In 2006, a restoration and ecosystem monitoring plan for the nearshore marine ecosystems in the GOA was completed (EVOSTC Project 050750). The framework for monitoring in the nearshore included sampling of a variety of specified biological and physical parameters (e.g. abundance and growth of intertidal organisms, abundance of selected birds and marine mammals) within specified areas across the GOA. The plan also allowed for conduct of shorter-term studies aimed at identifying important processes regulating or causing changes within a given system. The plan was adopted by the National Park Service Southwest Alaska Network and implemented in Katmai NP (2006) and in Kenai Fjords NP (2007). In 2010, the EVOSTC funded the long-term nearshore benthic monitoring program in western PWS (Project 10100750). In 2012, the GWA project was initiated to continue and expand the long-term nearshore monitoring, in combination with studies of pelagic systems and environmental drivers. As part of the GWA effort, nearshore monitoring is ongoing in Eastern, Northern and Western PWS, and at Katmai and Kenai Fjords national parks (including 5 sites within each area). Here, we propose to continue the long-term nearshore monitoring program across the GOA in 2015 and 2016.
The list of metrics and projected schedule for monitoring within the nearshore benthic component are outlined in Table 1. Standard operating procedures (SOP's) for all data collection have been fully developed as part of the preparation and implementation of nearshore monitoring in Katmai NP, Kenai Fjords NP, and Western PWS. A protocol narrative (Dean et al. 2014) describes the overall monitoring

program, and a series of specific SOP's provide details of each data collection procedure, their relations to one another, and how they can be integrated to provide understanding of causes of change that will be detected. SOP's can be found on the GWA website.
Data analyses and statistical methods used to evaluate changes in the nearshore environment are detailed in Dean et al. (2014). In general, we will examine trends in each metric over time within each location, evaluate similarities among locations over time, and interactions between time and locations (i.e., the extent to which changes within each location track changes across locations over time).
New publication (since February 2014 annual report): Ballachey, B.E., J.L. Bodkin, D. Esler and S.D. Rice. 2014. Lessons from the 1989 *Exxon Valdez* oil spill: A biological perspective. *In* J.S. Alford, M.S. Peterson and C.C. Green, eds. Impacts of Oil Spill Disasters on Marine Habitats and Fisheries in North America. CRC Marine Biology Series, CRC Press. 336 pp.

II. COORDINATION AND COLLABORATION

A. Within a EVOSTC-Funded Program

It is important to note that the Nearshore Benthic component of Gulf Watch is designed as a highly integrated and coordinated set of metrics, which are measured consistently across broad geographic scales and over a long time frame. The Nearshore Benthic group consists of a large number of scientists working together within a coordinated monitoring system that allows unprecedented insights into nearshore ecosystem status and ecological interactions. Although each metric could have been considered a separate project, the Nearshore Benthic component operates as a single, synchronized program, leading to insights and efficiencies that could not be attained otherwise.
We are coordinating closely with the other project within the Nearshore Benthic component of the GWA program, 12120114-L (K. Iken and B. Konar, PIs), which is monitoring nearshore areas within Kachemak Bay. Coordination includes shared protocols for monitoring and data collection, pooling of data sets and a united effort on data analyses and syntheses.

As productivity in the nearshore is strongly influenced by physical oceanographic processes, it is a priority to evaluate whether or not changes noted in nearshore systems are reflected in either oceanographic conditions or in synchronous changes in pelagic species and conditions. To this end, we currently are coordinating with the Environmental Drivers component of the GWA project on data sets that may be relevant to our synthesis and analysis of biological metrics measured at our nearshore sites across the GOA.

B. With Other EVOSTC-funded Projects

In July 2014, during our field work at Katmai NPP, we collected oil samples (asphalt and mousse) from three locations within the park, in cooperation with Gail Irvine of the USGS, who has conducted a long-term study of persistence and degradation of oil from the 1989 spill (most recently as Project 11100112, *Lingering Oil on Boulder-Armored Beaches in the Gulf of Alaska 22 Years after the Exxon Valdez Oil Spill*). These samples have been submitted for laboratory analyses of the oil components.

C. With Trustee or Management Agencies

Our work is contributing to the mission of the US Fish and Wildlife Service, who is the agency charged with management of migratory birds and some marine mammals, including sea otters. We also contribute to the management mission of NOAA, who is responsible for fisheries management Our work also contributes to management of National Parks, including contribution to the nationwide inventory and monitoring program. And our information also may be informative to other land management agencies (e.g., US Forest Service) with units adjacent to our monitoring sites. We also engage scientists from a number of academic and private institutions as Nearshore Benthic component PIs and collaborators.

III. PROJECT DESIGN – PLAN FOR FY15

A. Objectives for FY15

The fundamental objective of this work is the long-term monitoring of a suite of nearshore benthic species at multiple locations across the Gulf of Alaska, with an overall goal of identifying important processes regulating or causing changes within a given nearshore ecosystem. The specific objectives for the period 2012-2016 include:

1. Continue restoration monitoring in the nearshore in order to evaluate the current status of injured resources in oiled areas.

2. Identify if those injured resources being monitored may be considered recovered from EVOS effects.

3. Identify potential factors that could inhibit recovery of injured resources, and recommend potential restoration actions.

B. Changes to Project Design

There have been no changes in design from that described in the original proposal. The monitoring and research generally is proceeding as initially planned. An exception is the aerial surveys of sea otter abundance, planned for Kenai Fjords NP in summer of 2013 and in Katmai NPP in summer 2014. In both cases, we were prepared and ready to conduct the surveys but at the last minute, the pilot designated to fly the surveys changed plans and was not available. We are currently in internal discussions on adjustments to avoid this problem with future surveys. At this time, we are proposing to conduct aerial surveys at Katmai NPP in summer 2015 and at Kenai Fjords in summer 2016.

IV. SCHEDULE

A. Project Milestones for FY 15

Objective 1. Continue restoration monitoring in the nearshore in order to evaluate the current status of injured resources in oiled areas.

To be met by September 2015

Objective 2. Identify if those injured resources being monitored may be considered recovered from EVOS effects.

To be met by December 2016

Objective 3. Identify potential factors that could inhibit recovery of injured resources, and recommend potential restoration actions.

To be met by December 2016

B. Measurable Project Tasks for FY 15

FY 15, 1st quarter (February 1, 2015 - April 31, 2015)

April: *Sea otter carcass collections, WPWS*

FY 15, 2nd quarter (May 1, 2015-July 30, 2015)

June/July: *Nearshore sampling trips, Kenai, Katmai, WPWS, NPWS*

FY 15, 3rd quarter (August 1, 2015 – October 31, 2015)

August/October: *Data entry, verification, and analysis; report writing*

FY 15, 4th quarter (November 1, 2015- January 31, 2016)

November/January *Data analysis and report writing*

January *AMSS, Anchorage*

V. PROJECT PERSONNEL – CHANGES AND UPDATES

There have been no changes in PIs or other senior personnel in the last year.

VI. BUDGET

A. Budget Forms (Attached)

Please see program workbook for completed budget forms.

B. Changes from Original Proposal

The FY15 funding request does not differ from that initially proposed.

C. Sources of Additional Funding

We have estimated the annual in-kind contributions to this project at $274,000. This consists of staff time from the USGS (Esler, Bodkin, Kloecker, Esslinger, Snedgen; $60K), reduced costs for USGS charter vessel ($24K), and significant use of equipment such as inflatables/outboards, GPSs, spotting scopes, field laptops, and sounding equipment for eelgrass sampling ($10K). From NOAA, staff time & expenses (Lindeberg) are estimated at $10K. From NPS, staff time (Coletti, Shephard, and biostatistician) is estimated at $120K and operational support funds for conducting the program are $50K.

Ecological Communities in Kachemak Bay – Iken and Konar (UAF, 15120114-L)

FY15 PROJECT PROPOSAL SUMMARY PAGE
Continuing, Multi-Year Projects

Project Title: Long-term monitoring: Benthic monitoring component - Long-term monitoring of Ecological Communities in Kachemak Bay: a comparison and control for Prince William Sound

Project Period: February 1, 2015 – January 31, 2016

Primary Investigator(s): Brenda Konar and Katrin Iken (UAF)
Co-operating Investigator: Angie Doroff (KBNERR)

Study Location: Kachemak Bay, lower Cook Inlet

Project Website (if applicable): http://www.gulfwatchalaska.org/

Abstract*: This project is a component of the integrated Long-term Monitoring of Marine Conditions and Injured Resources and Services. As part of this component, we monitor rocky intertidal, seagrass and clam gravel beach systems as well as the sea otter abundance and diet in Kachemak Bay. This component is complementary to work being conducted under this program in Prince William Sound, Kenai Fjords and Katmai.

Estimated Budget:

EVOSTC Funding Requested* (*must include 9% GA)*:

FY12	FY13	FY14	FY15	FY16	TOTAL
$48.1	$48.2	$48.1	$48.1	$47.4	$239.8

Non-EVOSTC Funds to be used:

FY12	FY13	FY14	FY15	FY16	TOTAL
$0	**$0**	**$0**	**$0**	**$0**	**$0**

Date: September 2, 2014

I. EXECUTIVE SUMMARY

The purpose of this study is to provide long-term monitoring data for the Gulf of Alaska regions, specifically the nearshore environment that is most affected by anthropogenic influences such as oil spills and to climate fluctuations and changes. The focus of the Gulf of Alaska Long-Term Monitoring program is on Prince William Sound but a larger area has to be monitored to be able to evaluate if any patterns in community dynamics that are seen are locally isolated or reflect larger-scale patterns. Kachemak Bay, contiguous to lower Cook Inlet, is one of these reference sites and is here monitored for rocky intertidal communities, seagrass beds, clam and mussel communities as well as sea otter abundance and diets. We find that Kachemak Bay communities differ in many aspects from other Gulf of Alaska regions and these regional data will be used to document these differences in detail and to create a better understanding of the potential environmental drivers that cause those differences.

II. COORDINATION AND COLLABORATION

A. Within a EVOTC-Funded Program

This project focused on Kachemak Bay is tightly linked conceptually and methodologically to other aspects of the Gulf Watch program, specifically the nearshore benthic monitoring and sea otter work being done in Prince William Sound, Katmai, and Kenai Fjords. Sampling protocols for assessing these communities have been standardized to create comparable data sets without jeopardizing historically available data. These project components share sampling protocols and data management.

B. With Other EVOSTC-funded Projects

This project links tightly with the Herring project funded by the EVOSTC. Herring are known to use kelp in the nearshore environment as essential spawning grounds, so the information collected through the nearshore benthic monitoring work is an important link to the life cycle of this important forage fish.

The Kachemak Bay component also builds on earlier work funded by the EVOSTC for nearshore biodiversity sampling under the NaGISA project. Those historical data are comparable to those collected now and build important components of a time series. Data management is shared for both historical and ongoing projects under the AOOS workspace and data portal.

C. With Trustee or Management Agencies

Within the sea otter component of this project we have partnerships with the USFWS and USGS for aerial-based population surveys. The USFWS Marine Mammals Management, Alaska Maritime National Wildlife Refuge, and the Alaska Marine Mammal Stranding Network all contribute to monitoring the sea otter mortality trends in the Kachemak Bay area. USFWS is conducting regular beach surveys for stranded live and dead sea otters on the north side of the bay (contact: Verena Gill). The Marine Mammal Stranding Network incorporates students from the Kachemak Bay Campus to fill this monitoring role year-around.

III. PROJECT DESIGN – PLAN FOR FY15

A. Objectives for FY15

7) Determine trends in sea otter abundance.
8) Determine the diet and dietary shifts of sea otters.
9) Determine trends in sea otter and seabird mortality.
10) Determine trends in marine debris.
11) Determine trends in the abundance and distribution of rocky intertidal plants and invertebrates
12) Determine trends in the abundance and size frequency of clams and mussels on gravel beaches.
13) Determine trends in selected environmental parameters and relate them to #1-6 above.

The field work for this proposal will be completed annually for four years and followed by a year of data synthesis (year 5), with the outlook of continuing this pattern of monitoring for up to 20 years.

B. Changes to Project Design

There have been no substantive changes to this project. We have experienced some challenges with the recovery of data loggers that are either removed by inclement weather or curious visitors to the beaches. Hence, the collection of temperature information alongside the biological information is not progressing as well as anticipated. Since the Kachemak Bay Research Reserve maintains long-term temperature monitoring in two locations in Kachemak Bay we are confident that we can obtain relevant and appropriate temperature data from those records for those times when we are missing data.

IV. SCHEDULE

A. Project Milestones for FY 15

Objective 1. Monitor intertidal communities in Kachemak Bay.
To be done annually from 2012-2016.

Objective 2. Monitor sea otter diet annually in Kachemak Bay.
To be done annually from 2012-2016.

Objective 3. Synthesize temporal (annual) patterns in intertidal communities and sea otter diet in Kachemak Bay.
To be met by September 2016.

B. Measurable Project Tasks for FY 15

FY 15, 1st quarter (February 1 – April 31, 2015)

February-April, 2015 — *Plan field sampling on intertidal communities, conduct monthly sea otter scat sampling*

FY 14, 2nd quarter (May 1 – July 30, 2015)

May-June 2015 — *Conduct field sampling on intertidal communities and sea otter diet*

July 30: — *Enter data from field sampling, continue sea otter sampling*

August 30: — *Continue data entry, preliminary data analysis, reporting (6-month report)*

FY 14, 3rd quarter (August 1 – October 31, 2015)

November 30: — *Continue data analysis, project presentation at annual PI meeting, discussions with collaborators on joint synthesis products*

FY 14, 4th quarter (November 1, 2015 – January 31, 2016)

January 31: — *Report writing, prepare presentation at scientific conference (Alaska Marine Science Symposium), continue work on synthesis products*

V. PROJECT PERSONNEL – CHANGES AND UPDATES

There are no changes to the project personnel

VI. BUDGET

A. Budget Forms

Please see program workbook for completed budget forms.

B. Changes from Original Proposal

Funding requests do not differ from the original proposal

C. Sources of Additional Funding

EVOS oil exposure of harlequin ducks and sea otters – Ballachey (USGS Alaska Science Center, 14120114-Q)

No funding is requested for this project as it has been completed. Findings from this work will be provided in the 2014 Science Synthesis Report and in the Year 3 Gulf Watch Alaska Annual Program Status Summary.

Oil level and weathering tracking – Carls (NOAA/NMFS Auke Bay Laboratory, 15120114-S)

FY15 PROJECT PROPOSAL SUMMARY PAGE
Continuing, Multi-Year Projects

Project Title: Long-term Oil Monitoring: Lingering Oil - Extending the Tracking of oil levels and weathering (PAH composition) in PWS through time.

Project Period: February 1, 2015 – January 31, 2016

Primary Investigator(s): Mark Carls and Mandy Lindeberg, NOAA/NMSF Auke Bay Laboratories, 907-789-6019, mark.carls@noaa.gov

Study Location: Sites in western Prince William Sound with persistent oil

Project Website (if applicable): n/a

Abstract*: This project is a component of the integrated Long-term Monitoring of Marine Conditions and Injured Resources and Services submitted by McCammon *et al*. The goal is to provide the EVOSTC with an assessment of persistent *Exxon Valdez* oil in Prince William Sound, describe its chemical characteristics, and initiate a routine, long-term monitoring program that will resample the same sites every five years over the next 20 years. Beaches will be sampled similar to surveys conducted by Auke Bay Laboratories during 2001-05 and sediment samples will be collected to estimate amounts of remaining oil. Mussel and passive samplers will provide information about biologically available oil. Objectives are 1) fingerprint oil, 2) determine oil persistence and weathering over decades, 3) determine oil sources, 4) determine biological availability, and 5) archive hydrocarbon data in the Trustee-sponsored hydrocarbon database. These data, together with an ongoing retrospective analysis of biomarkers, the most environmentally persistent components of the oil, will help investigators understand potential exposure levels (past and present) and linkages to species at higher trophic levels.

Estimated Budget:

EVOSTC Funding Requested* (*must include 9% GA)*:

FY12	FY13	FY14	FY15	FY16	TOTAL
$19.6	$13.1	$8.7	$169.2	$6.5	$217.1

Non-EVOSTC Funds to be used:

FY12	FY13	FY14	FY15	FY16	TOTAL
$50.0	$50.0	$50.0	$50.0	$50.0	$250.0

Date: September 2, 2014

I. EXECUTIVE SUMMARY

The goal of this project is to provide the EVOSTC with an assessment of persistent *Exxon Valdez* oil in Prince William Sound (PWS) and describe its chemical characteristics. The proposed sampling protocol is designed to be simple and relatively inexpensive so that future assessments of persistence are cost-effective. Intertidal areas in western PWS were extensively coated with *Exxon Valdez* oil (EVO) (Neff, 1995). Despite unprecedented clean-up efforts and decades of natural processes, oil persists in some beaches (Short et al., 2006-07). The end point where EVO is no longer detectable is unknown and thus there is a need for long term monitoring of lingering EVO in PWS. Within the umbrella of the Gulf Watch Alaska long term monitoring program we are proposing to develop a lingering EVO monitoring plan for PWS and conduct a monitoring survey. The design and methodology will be consistent with previous lingering oil surveys funded by the EVOS Trustee Council but slightly modified and focused for manageable long term monitoring. In general our strategy is to revisit and survey about 10 to 12 of the worst case sites with lingering oil in 2015. These sites will become the established long term monitoring sites for lingering oil and be re-sampled every 5 years over the next 20 years (Figure 1). Sites with a history of persistent subsurface oil were prioritized for monitoring based on: heavy subsurface oil surveyed in most recent years, a variety of shore types prone to oil retention, and those sites with a high probability of oil persisting (Michel et al. 2010).

This project fills the following basic information needed for monitoring lingering EVO in the future:

(1) *Fingerprinting oil* – Polynuclear aromatic hydrocarbon (PAH), alkane, and biomarker composition will be measured in sediment samples. The biomarkers (triterpanes, hopanes, and steranes) will provide definitive long-term source oil identification
(2) *Persistence and Weathering of oil* - Understanding the quantity and natural degradation of oil over time in PWS beaches. Monitoring oil loss over time is important for determining full recovery of the habitat; in Alaska, this time course is longer than in lower latitude environments and has already exceeded estimates.
(3) *Bioavailability of oil* - Understanding exposure levels (past and present) for key prey species near lingering oil such as mussels will help make linkages to species recovering at higher trophic levels (e.g. cytochrome P4501 levels in sea otters and sea ducks).
(4) *Archiving Hydrocarbon Analyses* – continued management of the Trustee hydrocarbon database for archiving future analyses.

Sediment sampling techniques in 2015 will allow extension of time series data (where they exist), detailed examination of hydrocarbons present (including PAHs, alkanes, and biomarkers), verification of hydrocarbon source, weathering state, and estimation of the amount of remaining oil at specific sites. In addition to sediment samples, mussel tissue will also be examined for hydrocarbon loads to determine if PAHs are biologically available without sediment disturbance (such as that created by foraging activities by sea otters and sea ducks). A limited number of passive samplers will also be deployed to detect dissolved oil constituents.

To ensure integration between current projects and with past monitoring, we will also analyze a limited number of sediment samples as needed by other Gulf Watch investigators and maintain the Trustee hydrocarbon database including proper chain of custody and entry of all new sample data.

Ongoing analyses for this project will continue into FY15. Biomarkers in *Exxon Valdez* oil samples collected over time are being analyzed for comparison with contemporary results. Chemical analyses of biomarkers will yield a more complete picture of oil weathering over the last ≥ 25 years and future 20 years because they are more resistant to biodegradation and weathering than alkanes and PAHs. Biomarker data were not originally collected in PWS sediment studies but were incorporated in the bioremediation studies of 2011 - 2012. Thus we are in the process of re-

analyzing past PWS samples to compliment future sampling. Biomarkers are also being measured in several sources (*Exxon Valdez* oil, Constantine Harbor, coal, and Monterey oil) for interpretation. These efforts extend and complement the previous work of EVOS Trustee Council funded remediation studies by Boufadel in 20011-12 as well as the Irvine study outside of PWS in 2011-12. The historical biomarker samples have been processed and most have been run on the GC. Data analysis will commence later this summer.

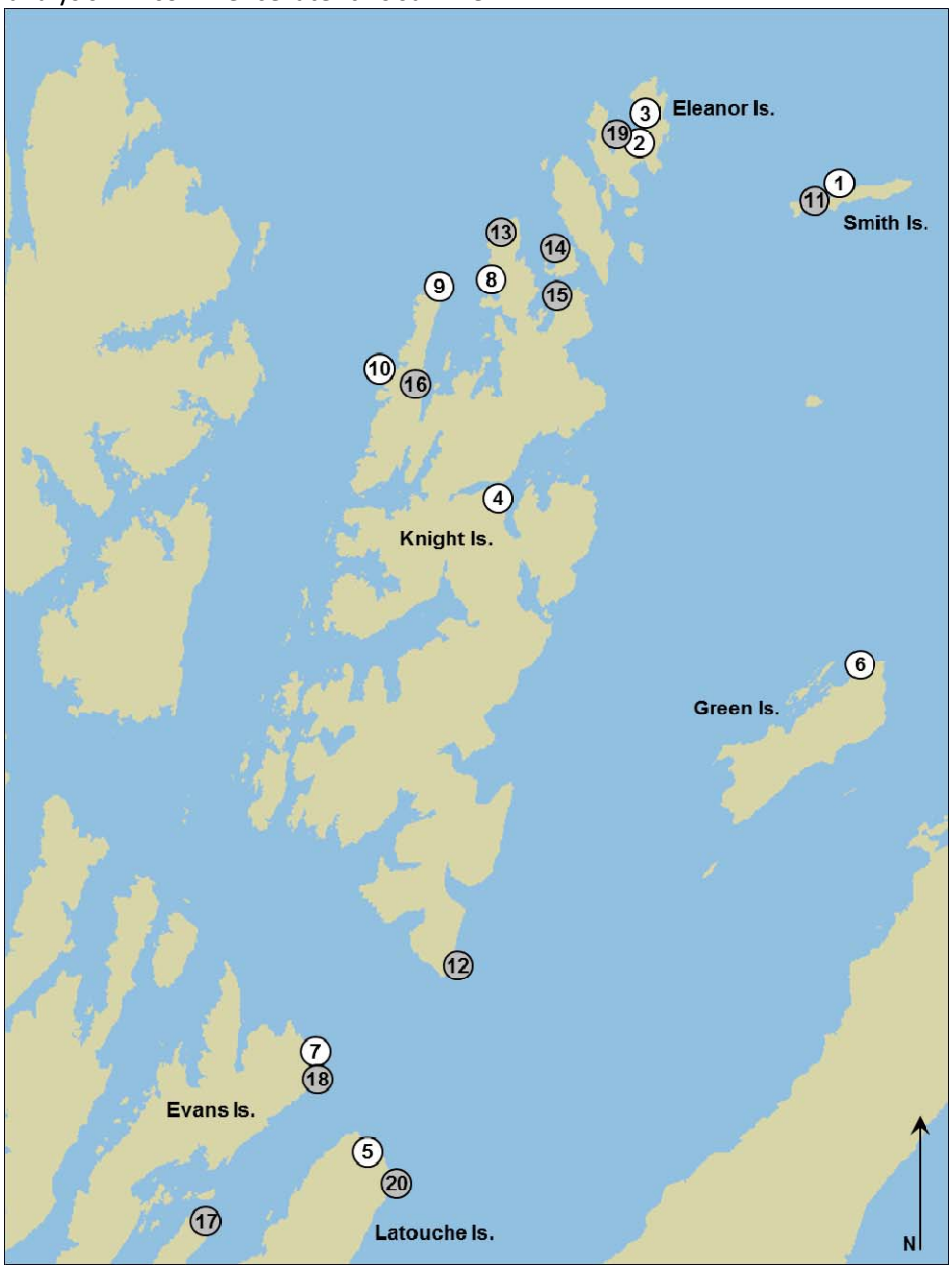

Fig. 1. Map of prioritized sites for monitoring lingering oil in western Prince William Sound. Alternate sites are gray icons, #11-20.

II. COORDINATION AND COLLABORATION

A. Within a EVOTC-Funded Program

This study is closely linked with the benthic component of the Gulf Watch Alaska program and is designed to provide insight into the persistence and nature of EVO in the nearshore ecosystem and a method for long term monitoring. Contaminant samples (mussels and sediments) collected by the benthic component surveys have been sent through Auke Bay Laboratories (ABL) to maintain proper handling and chain of custody. Analyses not provided by ABL were managed by ABL staff to other NOAA contracted labs. ABL staff has also been available for interpretation of these analyses for deliverables and publications.

This project provides a chemical frame of reference for other studies in PWS and the Gulf of Alaska, including 1) definitive long-term source identification of lingering oil, (2) the weathering status of lingering oil, and 3) an understanding of exposure levels (past and present) for key prey species being monitored by the benthic component such as mussels for sea otters and sea ducks. This study complements and extends previous lingering oil work (Short et al., 2004, 06, 07; Michele et al., 2010; Nixon et al., 2013-14), continued management of the Trustee hydrocarbon database, analyses for the remediation studies by Boufadel during 2011-2012, and long term monitoring by Irvine studies outside of PWS (Irvine et al., 1999, 2006).

The field effort in 2015 will require a local charter, a field crew of up to six people. Federal personnel will lead the cruise effort, although contract labor will likely be used for the labor intensive beach surveys. Sample analyses will be completed at the Auke Bay Laboratories in Juneau, Alaska. Senior staff will conduct the instrumental analyses, but sample processing and preparation will be conducted by contractors.

B. With Other EVOSTC-funded Projects

N/A

C. With Trustee or Management Agencies

NOAA has trust responsibilities for oil spill response and restoration. Data collected under this study furthers our understanding of oil persistence in coastal habitats.

III. PROJECT DESIGN – PLAN FOR FY15

A. Objectives for FY15

1. Determine quantity and weathering state on select beaches in PWS, in 2015.
    a. Visit 10-12 beaches known to have lingering EVO, collect sediment samples for PAH concentration and weathering profiles.
    b. Using stratified random sampling (SRS), measure the quantity of oil in samples to estimate the quantity present at each beach.
    c. Collect mussels near oil patches to determine bioavailability in tissues.
    d. Place passive samplers at one beach at the beginning of the cruise and retrieve at the end of the cruise before sampling that beach as an alternative method to sample dissolved PAHs.
    e. Begin chemical analysis of samples using gas chromatography to measure alkane, polynuclear aromatic hydrocarbons, and geochemical biomarker content. Analyses will be completed in study year 5 (FY16).
2. Complete retrospective survey of archived samples to establish biomarker content in historic samples.
3. Supplemental support analyses: support on-going intertidal projects with chemical analyses, such as determining PAH levels in sediments or prey items. This may involve 10-20 samples per year depending on requests from other Gulf Watch investigators.
4. Maintain and expand the Trustee hydrocarbon database and sample collection.
    a. Add new information to hydrocarbon database. (This database contains data from all NRDA hydrocarbon samples from 1989 to present, including numerous data sets from investigators outside ABL.)
    b. Prepare a complete FOIA (Freedom of Information Act) package. 100% of the chemical analyses have been FOIAed in the past, and these data will likely be FOIAed in the future.

5. Products: prepare annual and final reports as needed; supply collaborators with appropriate data (e.g. Gulf Watch benthic monitoring). Prepare synthesis manuscript summarizing environmental progress after 25 years in study year 5.

Methods.

1. *Chemical analyses*: Standard operating procedures developed at the Auke Bay Laboratories for hydrocarbon analysis will be used for all sample analyses (Short, 1996; Carls, 2004). These have resulted in numerous peer-reviewed publications. Senior staff will conduct the instrumental analyses, but the processing effort will be by contractors.
    a. Analytes: alkanes, PAHs, biomarkers

2. *Site Selection*:
   Prioritization of beaches selected for monitoring lingering subsurface oil (SSO) is summarized in Table 1. Factors considered for prioritization were based on: initial oiling, shore types prone to oil retention (Michel and Hayes, 1993; Hayes and Michel, 1998-99; Michel et al., 2010), past oil surveys to aid our understanding of loss rates (NOAA ORR 1989-1992; Gibeaut and Piper, 1993; NOAA ABL 2001-05; Research Planning, Inc. 2007-08), most recently observed oil in heaviest categories (HOR and MOR), and a high probability of oil persistence (Michel model).

   We acknowledge sites selected for long term monitoring have a history of man-made disturbance and loss of SSO could be variable among these sites over time. Since the onset of the spill, oiled beaches have been surveyed and treated using a gamut of techniques: mechanical removal (high pressure water flushing, berm relocation), and remediation (Inipol EAP22, Customblen, Corexit, PES-51®). Certain sites were identified with persistent SSO and repeatedly excavated in the 2000s by EVOSTC and Exxon Corporation surveys. Additional experimental remediation techniques by Boufadel were applied to a suite of sites in recent years. Due to these factors we will estimate loss of SSO at each site individually, not stratified by initial oiling or treatment history. We have selected alternate sites in case additional survey time is available or weather becomes an issue on more exposed sites. Further review and consideration of the prioritized sites will be conducted prior to the summer 2015 surveys and Table 1 will be finalized.

Table 1. This is a list of prioritized sites for monitoring lingering oil on beaches in Prince William Sound. Summarized here are the various treatments and surveys these sites had in the past. Priority has been given to sites with heavy subsurface oil (SSO) surveyed in most recent years, a variety of shore types prone to oil retention, and a high probability of oil persisting. Prioritization of alternative sites have been included (shaded in gray) if needed.

	Location Name	Shore Segment	Initial oiling/cleanup	Remediation	Oil Survey Excavation History	Shore type prone to persistent oil	Michel Model Heavy SSO
1	Smith Is.	SM006B	Heavy oil 1990-1993	Boufadel 2005-12	1989-92[1], 2001[3], 2008[4]	armored	>30%
2	Northwest Bay, Eleanor Is.	EL056C	Medium oil 1990-1993	Boufadel 2005-12	2001[3], 2007[4]	rubble accumulations	>30%
3	Northwest Bay, Eleanor Is.	EL058B	Heavy oil1989 only	Boufadel 2005-12	2001[3], 2005[3]	breakwater	>30%
4	Bay of Isles, Knight Is.	KN0136A	Heavy oil 1989 only		1993[2], 2003[3], 2008[3]	lagoon, peat	5-15%
5	Sleepy Bay, Latouche Is.	LA018A-1	Heavy oil1990-1993		1989-92[1], 2001[3], 2005[3]	rubble, slope	5-15%
6	Green Is.	GR103B	Heavy oil 1990-1993		2001[3], 2005[3], 2007[4]	armored, slope	1-5%
7	N. Evans Is.	EV039A	Heavy oil 1990-1993	PES-51® 1997	1993[2], 2005[3]	edge effect	1-5%
8	Herring Bay, Knight Is.	KN0114A	Heavy oil1990-1993		2003[3]	breakwater	>30%
9	Herring Pt., Knight Is.	KN0300A-2	Medium oil 1990-1993		1993[2], 2005[3]	breakwater	1-5%
10	Herring Pt., Knight Is.	KN0506A	Heavy oil 1990-1993		2001[3], 2005[3]	edge effect	0-1%
11	Smith Is.	SM006C-1	Heavy oil 1990-1993	Boufadel 2005-12	2001[3]	armored	>30%
12	Pt Helen, Knight Island	KN0405A-1	Heavy oil1990-1993		2001[3], 2008[4]	armored	5-15%
13	NW Pt. of Knight Island	KN0109A	Medium oil1990-1993	Boufadel 2005-12	2003[3], 2007[4]	breakwater	5-15%
14	Disk Is.	DI067A	Medium oil 1990-1993		1993[2], 2003[3]	rubble accumulations	5-15%
15	Louis Bay, Knight Island	KN0107	Heavy oil1990-1993		2003[3], 2008[4]	rubble accumulations	1-5%
16	Herring Bay, Knight Is.	KN0132D	Medium oil 1990-1993		2001[3], 2005[3]	rubble accumulations	1-5%
17	Elrington Is.	ER020B	Heavy oil 1990-1993		1993[2], 2001[3], 2005[3]	edge effect	1-5%
18	Northwest Bay, Eleanor Is.	EL056A	Heavy oil 1990-1993		2001[3], 2005[3]	rubble accumulations	1-5%
19	N. Evans Is.	EV037A	Medium oil 1990-1993	PES-51® 1997	2001[3]	edge effect	1-5%
20	N. Latouche Is.	LA015E	Heavy oil 1990-1993	Boufadel 2011	1989-92[1], 2001[3]	armored	1-5%

Note for oil survey excavation history: 1. NOAA ORR surveys; 2. Gibeaut surveys; 3. NOAA ABL surveys; 4. Michel surveys.

3. *Field logistics*: Beaches will be accessed by charter boat during spring or summer months during one cruise. Federal personnel will lead the cruise effort, although some contract labor will likely be used for the labor intensive beach surveys. The crew size will be ≤ 6.

4. *Site Surveys*: Our methods will follow those established by ABL in 2001 and then modified in 2003 (Short et al., 2004, 2006).
    a. Survey Grid – using surveying equipment, a typical 100 m length of shoreline will be divided into 5 contiguous columns of 20 m width, each of which is partitioned into 5 rectangular blocks by 1-m vertical tidal elevation intervals, beginning at – 0.2 m and extending to + 4.8 m tide height. Shorter shoreline segments are divided into correspondingly fewer ~ 20 m sampling columns. We will randomly locate two sampling quadrats (each 0.25 m^2) within each block, resulting in a maximum of 50 quadrats per 100 m of shoreline distributed throughout nearly the full range of the tidal excursion (MHHW to zero tide).
    b. Quadrat Sampling - Each quadrat will be examined visually for the presence of surface oil and subsurface oil, using the oil classification scheme given by (Gibeaut and Piper, 1998). After examining the uppermost 5 cm of sediments for surface oil, quadrats will be excavated to a depth of 0.5 m, or until boulders or bedrock are encountered, and examined for oil by sight and smell. Surface oil classifications include asphalt pavement (AP), surface oil residue (SOR), oil coat or oil cover (CT/CV), tar balls (TB) and oil film (OF). Subsurface oil classifications include light, medium and heavy oil residue (LOR, MOR, HOR). Additional methods may be field tested to classify oil in a more rigorous scheme. All oiled quadrats will be photo documented.

5. *Hydrocarbon Sampling Effort and Analysis*: standard hydrocarbon sampling protocols established at ABL will be followed to maintain Chain of Custody and quality assurance requirements.
    a. Sediment. Oiled sediment samples will be collected and archived from all oiled quadrats. If no visible oil is found, sediment will be collected at 2 random quadrats from each meter vertical drop block (upper, middle, and lower; n= 6). We have budgeted for 100 gravimetric samples and 50 GC analyses (PAH, alkanes, and biomarkers). If more samples are collected in the field, then an analysis subset will be chosen at random within beach, column, and zone.
    b. Mussels. Two composite mussel samples will be collected from each beach. One of these will be collected as close as possible to the most oiled quadrat on that beach (~25 individuals). The other will be collected randomly within the mussel zone across the entire beach to represent general conditions. If no oil is discovered, both samples will be collected across the entire beach. We have budgeted for 30 tissue samples.
    c. Passive samplers will be placed on one beach at the beginning of the cruise and picked up at the end before any digging on that beach. Paired samplers will be placed in each of the vertical zones for a total of six. They will be anchored in the intertidal using bolts or duck bill anchors depending on the substrate. All passive samplers will be analyzed.

6. *Statistical methods*:
Oil area at each beach segment and tidal zone (5 zones) will be calculated based on the proportion of oiled quadrats to total quadrats sampled and expanded to total area in the given tidal zone. The total oiled area for a given beach segment will then be calculated by summing the oiled areas at each tidal zone.

$$\hat{A}_i = \sum_{j=1}^{B} \sum_{k=1}^{C} N_{ijk} \frac{o_{ijk}}{n_{ijk}},$$

Where: $\hat{A}_i$ is the total oiled area in ith beach segment, N_{ijk} is the total number of 0.25 m^2 quadrats at ith beach, jth tidal zone (j=1,2,3,4,5) and kth column, .o_{ijk} is the number of oiled quadrats found (0,1,2) at ith beach, jth tidal zone and kth column. n_{ijk} is the number of quadrats sampled (2 in this case) at ith beach, jth tidal zone and kth column. $\frac{o_{ijk}}{n_{ijk}}$ can also be written as p_{ijk}, or the proportion of oiled quadrats at ith beach, jth tidal zone and kth column. Additionally, each quadrat where oil is detected will be sampled for oil volume and weight. First, all oiled substrate within the 0.25 m^2 by 0.5 meter deep quadrat will be collected. Subsequently gravimetric analysis on the substrate will be done in the field or the laboratory in order to obtain total oil volume and weight contained within each of the oiled quadrats. Oil volume and weight calculations for each beach segment will be done in the same fashion as oil area except the amount of oil in each quadrat will be used for the computation:

$$\hat{W}_i = \sum_{j=1}^{B} \sum_{k=1}^{C} N_{ijk} \hat{\omega}_{ijk} p_{ijk},$$

Where W_i is the total weight of oil at ith beach, $\hat{\omega}_{ijk}$ is the estimated weight of oil found from gravimetric analysis in the jth tidal zone, and kth column of ith beach segment. p_{ijk} is the proportion of oiled quadrats in the jth tidal zone, and kth column of ith beach segment. Variance calculations will be done using standard stratified (blocked) design methods.

$$\widehat{var}(A_i) = \sum_{j=1}^{B} \sum_{k=1}^{C} N_{ijk}^2 \frac{s_{ijk}^2}{n_{ijk}} \frac{N_{ijk} - n_{ijk}}{N_{ijk}}$$

B. Changes to Project Design

The project design remains as proposed and implemented in FY14, which delayed the field effort by one year.

IV. SCHEDULE

A. Project Milestones for FY 15

Objective 1. Determine oil quantity and weathering in 12 PWS beaches 25 years post spill.
To be met by September 2016. (Field work will be completed in 2015; measurements and analysis will be completed in 2016)

Objective 2. Supplemental analyses as needed.
To be met yearly as information is requested by other long-term monitoring collaborators

Objective 3. Maintain and add new data to the hydrocarbon database
Additions to the data base to be met yearly.

Objective 3. Prepare annual and final reports
To be met annually. A synthesis manuscript is expected in 2016.

B. Measurable Project Tasks for FY 15

FFY 15, 1st quarter (Feb 1, 2015-Apr 30, 2015)

February	*Prepare for field sampling*

FFY 15, 2nd quarter (May 1, 2015-Jul 31, 2015)

May	*Field sampling this quarter*

FFY 15, 3rd quarter (Aug 1, 2015-Oct 31, 2015)

September 30	*Begin analysis of new samples*

FFY 16, 1st quarter (Feb 1, 2015-April 30, 2016)

December	*Summarize available data*
January	*Annual Marine Science Symposium, meetings*

V. PROJECT PERSONNEL – CHANGES AND UPDATES

NA

VI. BUDGET

A. Budget Forms

Please see program workbook for completed budget forms.

B. Changes from Original Proposal

The project design remains as proposed and implemented in FY14, which delayed the field effort by one year.

C. Sources of Additional Funding

N/A

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Boufadel, M. C. and J. Michel. 2011. Pilot studies of bioremediation of the *Exxon Valdez* oil in Prince William Sound beaches. Proposal to EVOS Trustee Council Project 111000836-A. Anchorage, AK, *Exxon Valdez* Trustee Council.

Gibeaut, J. C. and E. Piper 1998. Shoreline oiling assessment of the *Exxon Valdez* oil spill. EVOS Restoration Project Final Report 93038. Anchorage, AK, *Exxon Valdez* Trustee Council.

Hayes, M. O. and Michel, J. 1998. Evaluation of the condition of Prince William Sound shorelines following the *Exxon Valdez* oil spill and subsequent shoreline treatment, 1997 geomorphology monitoring survey. NOAA Technical Memo. NOS ORCA 126 , 115 p + appendices.

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APPENDIX 2. Additional Project Leader *Curriculum vitae*

Robb Kaler, PWS Marine birds (15120114-K)

Robb S.A. Kaler
U.S. Fish and Wildlife Service
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Education

2007	M.S. in Ecology, Kansas State University, Division of Biology, Kansas State University, Manhattan, Kansas
1997	B.S. in Wildlife Biology, The Evergreen State College, Olympia, Washington

Recent Professional Experience

2010-present	Alaska Seabird Data Coordinator, Migratory Bird Management, U.S. Fish and Wildlife Service
2008-2010	Seabird Researcher, Alaska Maritime National Wildlife Refuge, USFWS
2005-2007	Graduate Research Assistant, Kansas State University

Honors and Awards

2010	Edwards Prize for Best Article of the Year in The Wilson Journal of Ornithology (Vol. 122), Wilson Ornithological Society
2007	Recipient, Best Student Presentation Award, The Wildlife Society annual meeting, Tucson, Arizona
2007	Nominee, Golden Key Award for Excellence in Undergraduate Teaching, Kansas State University
2007	Recipient, James Ackert Award for Outstanding Student Presentation, Division of Biology, Kansas State University

Professional Societies

American Ornithologists' Union (2005), Pacific Seabird Group (2007), Wilson Ornithological Society (2005), Cooper Ornithological Society (2010)

Related Publications

Kaler, R.S.A., L.A. Kenney, A.L. Bond, and C.A. Eagles-Smith. 2014. Mercury concentrations in breast feathers of three upper trophic level predators from the western Aleutian Islands, Alaska. *Marine Pollution Bulletin* <http://dx.doi.org/10.1016/j.marpolbul.2014.02.034>

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Kaler, R., L. Kenney, and B. Sandercock. 2009. Breeding ecology of Kittlitz's Murrelets at Agattu Island, Aleutian Archipelago, Alaska. *Waterbirds* 32:363-373.

Other Publications

Gregory, A.J., R.S.A. Kaler, T.J. Prebyl, B.K. Sandercock, and S.M. Wisely. 2012. Influence of translocation strategy and mating system on the genetic structure of a newly established population of island ptarmigan. Conservation Genetics 13:465-474.

Kaler, R.S.A., and B.K. Sandercock. 2011. Effects of translocation on the behavior of island ptarmigan *in* B.K. Sandercock, K Martin, and G. Degelbacher (eds.). Ecology, conservation, and management of grouse. *Studies in Avian Biology* 39:295-306.

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Kaler, R., S. Ebbert, C. Braun, and B. Sandercock. 2010. Demographic measures of translocation success: reintroduction of an island population of Evermann's Rock Ptarmigan. *Wilson Journal of Ornithology* 122:1-14 (*Winner of 2010 Edwards Prize*)

Sullivan, B., and E. Kershner *with* J. Dunn, R. Kaler, S. Lynn, N. Munkwitz, and J. Plissner. 2005. The birds of San Clemente Island. *Western Birds* 36: 158-273.

Tammy Wilson, Detection of Marine Bird Trends (15120114-F)

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Quantitative Ecologist
National Park Service
Southwest Alaska Network
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CURRICULUM VITAE

EDUCATION

2010 Ph.D. Wildlife Ecology. Utah State University, Logan, UT
2005 M.S. Wildlife Ecology. Utah State University, Logan, UT
1994 B.A. EPO-Biology. University of Colorado, Boulder, CO

PROFESSIONAL EXPERIENCE

2011 - Present: Quantitative Ecologist- NPS, Southwest Alaska Network, Anchorage, AK.
2010: Postdoctoral Research Associate- Utah State University, Logan, UT
2005 - 2010: Graduate Research Assistant (Ph.D.)- Utah State University, Logan, UT
2002 - 2005: Graduate Research Assistant (M.S.)- Utah State University, Logan, UT
2002 (Summer): Wildlife Technician- Colorado Division of Wildlife, Montrose, CO
2001-02, 1999-00, 1998-99, and 1997-98 (Winters): GIS Analyst- Southwest Data Center, Ridgway, CO
2000 - 2001: GIS Analyst- Natural Resources Ecology Laboratory, Fort Collins, CO
1999, 1998, 1997, 1995, and 1994 (Summers): Biological Science Technician- Bureau of Land Management, Montrose, CO
1996 (Summer): Natural Resources Park Ranger- South Platte Park, Littleton, CO
1995 (Spring): Biological Technician- Missouri Department of Conservation, Columbia, MO
1993 (Summer): Intern- Center for Limnology, University of Colorado, Boulder, CO

PUBLICATIONS

Peer reviewed:

Wilson, T.L., J.H. Schmidt. Evaluating scale dependence in occupancy models using repeated surveys of bear dens. Landscape Ecology. *In prep*.

Wilson, T.L., J.H. Schmidt, W.L. Thompson, L.M. Phillips. 2014. Using double-observer aerial surveys to monitor nesting bald eagles in Alaska: Are all nests available for detection? Journal of Wildlife Management 78: 1096–1103.
Wilson, T.L., A.P. Rayburn, T.C. Edwards Jr. 2012. Spatial ecology of refuge selection by an herbivore under risk of predation. Ecosphere 3: art. 6.
Wilson, T.L., F.P. Howe, T.C. Edwards Jr. 2011. Effects of sagebrush treatments on multi-scale resource selection by pygmy rabbits. Journal of Wildlife Management 75: 393–398.
Wilson, T.L., J.B. Odei, M.B. Hooten, T.C. Edwards Jr. 2010. Hierarchical spatial models for pygmy rabbit distribution and relative abundance. Journal of Applied Ecology 47: 401-409.
Larsen, R.T., J.A. Bissonette, J.T. Flinders, M.B. Hooten and T.L. Wilson. 2010. Summer spatial patterning of chukars in relation to free water in western Utah. Landscape Ecology 25: 135-145.
Wilson, T.L., E. J. Johnson, and J.A. Bissonette. 2009. Relative importance of habitat area and isolation for bird occurrence patterns in a naturally patchy landscape. Landscape Ecology 24:351-360.
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Wilson T.L., C. Moore. 2013. A review of lake vertical profile monitoring in the Southwest Alaska Network: recommendations for future efforts. Natural Resource Technical Report NPS/SWAN/NRTR—2013/689. National Park Service, Fort Collins, Colorado.
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Edwards, T.C., Jr., F.P. Howe, R.E. Norvell, T.L. Wilson, J. Ripplinger, and J. Gibson. 2009. Disturbance as a management tool: effects on selected wildlife species in Rich County, Utah. Final Project Report No. 2009-3, USGS Utah Cooperative Fish and Wildlife Research Unit, Utah State University, Logan, Utah
Bissonette, J.A., E.J. Johnson, and T.L. Wilson. 2006. Sagebrush-Dominated Mountain Meadows Bird and Small Mammal Community Dynamics. Project Report No. 2006-4. USGS Utah Cooperative Fish and Wildlife Research Unit, Utah State University, Logan, Utah.
Theses:
Wilson, T.L. 2010. A multi-scale evaluation of pygmy rabbit space use in a managed landscape. Dissertation. Utah State University, Logan, Utah.
Wilson, T.L. 2005. Landscape Dynamics of bird and small mammal communities in sagebrush-dominated mountain meadows in the Wasatch-Cache National Forest: part of a hierarchical, multi-level study. Thesis. Utah State University, Logan, Utah.
PRESENTATIONS
How does sample unit size affect the detection process? Invited seminar, International Association for Landscape Ecology- US Chapter, Anchorage, AK 2014
How does sample unit size affect occupancy models? Invited seminar, The Wildlife Society, Alaska Chapter, Anchorage, AK 2014.
Down the rabbit hole: using spatial process models to make inference about ecological processes. Webinar, Natural Resources Biometrics Webinar Series. 2012.
What can we learn from holes in the ground? Contributed Seminar, The Wildlife Society, Alaska Chapter, Anchorage, AK, 2012.
Navigating the methodological landscape: a roadmap for landscape ecologists. Contributed Seminar, US-International Association for Landscape Ecology, Portland, OR. 2011
Using spatial null models to assess potential conflicts: wildlife and range management practices. Poster, The Wildlife Society, Snowbird, UT. 2010.
Effects of seismic exploration on pygmy rabbits. Contributed Seminar, 16th Wildland Shrub Symposium, Logan, UT. 2010.
Overcoming the challenges of monitoring rare and cryptic species: the pygmy rabbit as an example. Seminar, USGS National Headquarters, Reston, VA. 2010.
Multiscale investigations of pygmy rabbit spatial ecology. Seminar, Patuxent National Wildlife Research Center, Laurel, MD. 2010.

A multiscale evaluation of pygmy rabbit space use. Invited Seminar, Utah Cooperative Fish and Wildlife Research Unit Coordinating Committee Meeting, Salt Lake City, UT. 2010.
Spatial patterns of burrow use by pygmy rabbits. Contributed Seminar, US-International Association for Landscape Ecology, Athens, GA. 2010.
Pygmy rabbit space use in a managed landscape: a multi-scale evaluation. Post-project seminar, Utah State University, Logan UT. 2010.
Effects of sagebrush restoration treatments on pygmy rabbit space use. Poster, Restoring the West, Logan, UT. 2009.
Hierarchical spatial models for pygmy rabbit distribution and abundance. Contributed seminar, US-International Association for Landscape Ecology, Snowbird, UT. 2009.
Improving habitat models for rare and inconspicuous species. Poster, Ecological Society of America, Milwaukee, WI. 2008.
Evaluating habitat use and connectivity using occupancy and density indices. Poster, US-International Association for Landscape Ecology, Tucson, AZ. 2007.
Responses of pygmy rabbits (*Brachylagus idahoensis*) to sagebrush removal treatments in Rich County, Utah. Pre-project seminar, Utah State University, Logan, UT. 2006
Moving beyond area-density relationships- a challenge for conservation planning. Poster, US-International Association for Landscape Ecology, San Diego, CA. 2006.
Landscape dynamics of shrub-steppe associated bird species in Northern Utah's mountain meadows.**"** Invited seminar, Louisiana Tech University, Ruston, LA. 2005.
Landscape dynamics of bird and small mammal communities in sagebrush-dominated mountain meadows in the Wasatch-Cache National Forest: Part of a hierarchical, multi-level study. Post-project seminar, Utah State University, Logan UT. 2005.
Landscape supplementation of sagebrush specialists in sagebrush-dominated mountain meadows. Contributed seminar, US-International Association for Landscape Ecology, Syracuse, NY. 2005.
An examination of meadow and landscape characteristics in bird and small mammal species diversity- Technical considerations. Poster, The Wildlife Society, Calgary, AB. 2004.

TEACHING

2009 USIALE Bayesian Methods Workshop- Co-instructor
2008-2009 Weekend Research Retreats for Undergraduates- Instructor
2008 Biometry- Teaching Assistant
2006-2008 Junior block field course- Teaching Assistant

GRANTS

2014 Co-Principal Investigator: National Park Foundation $800,000 Changing Tides - The convergence of intertidal invertebrates, bears, and people
2013 Principal Investigator: USGS/NPS Park Monitoring Project $136,399
Developing Tools for Managing Bears in Inventory and Monitoring Networks in Alaska: Evaluation of Population and Harvest Monitoring Methods for Brown Bear Populations
2012 Co-Principal Investigator 2012: PMIS (NPS internal funding) $161,944
Evaluation of coastal grizzly population and harvest monitoring methodologies: the challenge of cost.
2012 Co-Principal Investigator 2012: OASLC Pacific Ocean Parks Technical Assistance Award $9,000
Bald Eagle Nest Productivity Monitoring
2009 Principal Investigator 2009: Ecology Center Graduate Research Support Award $3,000
Pygmy Rabbit Burrow GPS project

AWARDS

2013 Outstanding performance award
2012 Outstanding performance award
2010 Scholarship: Natural resources management in Costa Rica
2008 USU Stokes-Leopold Scholar
2007 Xi Sigma Pi, Lambda chapter, Natural Resources Honor Society
2006 NASA-MSU Professional Enhancement Award

2005 AAAS Program for Excellence in Science
OUTREACH AND MEDIA
2013 Brown bear resource brief
http://science.nature.nps.gov/im/units/swan/assets/docs/reports/resourcebriefs/SWAN_Bear_RB_20131115.pdf
2013 Bald eagle resource brief
http://science.nature.nps.gov/im/units/swan/assets/docs/reports/resourcebriefs/SWAN_BaldEagle_RB_201311.pdf
2013 Consultant on pygmy rabbit ecology, Discovery Channel.
http://dsc.discovery.com/tv-shows/north-america/videos/tiny-bunny-outruns-a-weasel.htm
2012 Manuscript Wilson et al., 2011, Ecosphere was featured on the cover of Volume 3, Issue 1
2010 Manuscript Wilson et al., 2010 Journal of Applied Ecology was featured on the BBC news web page "the big picture" on 14 January 2010
2010 Manuscript Wilson et al., 2010 Journal of Applied Ecology was featured on the cover of Volume 47, Issue 2
2010 Seminar, Coordinated Resource Management Committee: Sagebrush management recommendations for pygmy rabbits.
2008 Seminar, Coordinated Resource Management Committee: Rich county Project progress report.
2008 Lecture, Logan High School: Wildlife Biology and Radio Telemetry.
2007 Seminar, Coordinated Resource Management Committee: Pygmy rabbit studies in Rich County, Utah: Preliminary findings.
SERVICE
Reviewer for Oikos, Ecological Applications, Journal of Mammalogy, Journal of Wildlife Management, Environmental Management, Western North American Naturalist, and Belgian Journal of Zoology
Co-Founder- College of Natural Resources Medical Emergency Scholarship (est. 2005)
2011 – Present Foreign Scholar Travel Award Committee (US-IALE)
2009 US International Association for Landscape Ecology- Annual Meeting Committee
2009 The Wildlife Society Western States Student Conclave- Judge
2008 – 2009 Ecology Center Seminar Series- Speaker Selection Committee
MEMBERSHIPS
International Association for Landscape Ecology (US-IALE)
The Wildlife Society (TWS)
Xi Sigma Pi

Daniel Monson, Nearshore Benthic Habitats in the Gulf of Alaska (15120114-R)

Daniel H. Monson
Research Wildlife Biologist
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Education
2009 – PhD, University of California Santa Cruz, Santa Cruz, CA. (Ecology and Evolutionary Biology)
1995 - MS, University of California Santa Cruz, Santa Cruz, CA. (Marine Biology)
1983 - BA, Luther College, Decorah, Iowa (Biology)

Current Activities

Currently, I am the scientific lead within the Alaska Science Center's Coastal Marine Ecosystem Team for the Gulf Watch Alaska monitoring program funded through the *Exxon Valdez* Oil Spill (EVOS) trustee counsel. This project monitors nearshore communities within four areas of South Central Alaska including Prince William Sound, Kenai Fjords National Park, Katmai National Park and Kachemak Bay. The project incorporates data on intertidal community structure, habitat classification, biological and physical oceanography, and higher trophic level abundance and population status including sea otters, black oystercatchers as well as other seabirds, marine mammals, marine invertebrates and marine fishes in a multi-disciplinary research effort to monitor change in the nearshore coastal ecosystems of the North Pacific. I am responsible for synthesizing data collected during the development phase of this monitoring program, and integrating short-term value-added research components that address questions arising from the emerging monitoring data sets.

From 2009 through 2012, I led research to assess the status of the Pacific walrus in response to a rapidly changing Arctic environment as a member of the Pacific Walrus research team at the Alaska Science Center. I was the Principal Investigator for two projects focused on developing methods to quantify walrus demographic parameters that will be used to forecast walrus population responses to a changing Arctic ecosystem. (1) I developed image-based methods to determine age structure of walrus herds forced to utilize coastal haulouts in the Chukchi Sea during fall ice-free conditions. The data gathered will allow estimation of female walrus reproductive rates and calf / juvenile survival rates. (2) I developed methods to examine calf-weaning age via the stable isotope profiles within the growth layers of walrus teeth. These components required finding novel, creative solutions to complex and challenging problems that have limited our ability to acquire this basic information prior to this time.

Prior to 2009, I was a long time member (since 1987) of the sea otter research project and the coastal ecosystems team within the Alaska Science Center.

Selected Publications

Esslinger, G. G., J. L. Bodkin, A. Brenton, J. M. Burns, and D. H. Monson. 2014. Temporal patterns in the foraging behavior of sea otters in Alaska. J. Wildlife Management 78:689-700.

Ballachey, B. E., J. L. Bodkin and D. H. Monson. 2013. Quantifying long-term risks to sea otters from the 1989 'Exxon Valdez' oil spill: Reply to Harwell & Gentile (2013). Marine Ecological Progress Series 488:297-301.

Monson, D. H., M. S. Udevitz, and C. V. Jay. 2013. Estimating Age Ratios and Size of Pacific Walrus Herds on Coastal Haulouts using Video Imaging. PLoS ONE 8(7): e69806. doi:10.1371/journal.pone.0069806.

Bodkin, J. L., B. E. Ballachey, H. A. Coletti, G. G. Esslinger, K. A. Kloecker, S. D. Rice, J. A. Reed, and D. H. Monson. 2012. Long-term effects of the *Exxon Valdez* oil spill: Sea otter foraging in the intertidal as a pathway of exposure to lingering oil. Marine Ecology Progress Series 447: 273-287.

Monson, D. H., D.F. Doak, B.E. Ballachey, and J.L. Bodkin. 2011. Could residual oil from the *Exxon Valdez* spill create a long-term population "sink" for sea otters in Alaska? Ecological Applications 21:2917-2932.

Goldstein, T., V. A. Gill., P. Tuomi, D. Monson, A. Burdin, P. A. Conrad, J. L Dunn, C. Field, C. Johnson, D. A. Jessup, J. Bodkin, and A. Doroff. 2011. Assessment of clinical pathology and pathogen exposure in sea otters (*Enhydra lutris*) bordering the threatened population in Alaska. Journal of Wildlife Diseases. 47:579-592.

Newsome, S.D., M.T. Tinker, D. Monson, O.T. Oftedal, K. Ralls, M.M. Staedler, M.L. Fogel, and J.A. Estes. 2009. Using stable isotopes to investigate individual diet specialization in California sea otters (*Enhydra lutris nereis*). Ecology 90:961-974.

Larson, S, D. Monson, B. Ballachey, R. Jameson, and S.K. Wasser. 2009. Stress related hormones and genetic diversity in sea otters (*Enhydra lutris*). Mar. Mamm. Sci. 25(2):351-372.

Newsome, S.D., M.A. Etnier, D.H. Monson, and M.L. Fogel. 2009. Retrospective characterization of ontogenetic shifts in killer whale diets via δ13C and δ15N analysis of teeth. Marine Ecology Progress Series. 374:229-242.

Doak, D.F., J.A. Estes, B.S. Halpern, U. Jacob, D.R. Lindberg, J. Lovvorn, D.H. Monson, M.T. Tinker, T.M. Williams, J.T. Wootton, I. Carroll, M. Emmerson, F. Micheli, and M. Novak. 2008. Understanding and Predicting Ecological Dynamics: Are Major Surprises Inevitable? Ecology 89:952-961.
Bodkin, J.L., D.H. Monson, and G.G. Esslinger. 2007. Population status and activity budgets derived from time-depth recorders in a diving mammal. J. Wildlife Management 71(6):2034-2044.
Laidre, K.L., J. A. Estes, M. T. Tinker, J. Bodkin, D. Monson, and K. Schneider. 2006. Patterns of growth and body condition in sea otters from the Aleutian archipelago before and after the recent population decline. J. Animal Ecology 75:978-989.
Monson, D.H., C. McCormick, and B.E. Ballachey. 2001. Chemical anesthesia of northern sea otters (*Enhydra lutris*): Results of past field studies. J. Zoo Wildl. Medicine 32:181-189.
Monson, D.H., J. A. Estes, J.L. Bodkin, and D.B. Siniff. 2000. Life history plasticity and population regulation in sea otters. Oikos 90:457-468.
Monson, D.H., D.F. Doak, B.E. Ballachey, A. Johnson, and J.L. Bodkin. 2000. Long-term impacts of the *Exxon Valdez* oil spill on sea otters, assessed through age-dependent mortality patterns. Proceedings of the National Academy of Sciences. 97:6562-6567.
Monson, D.H., and A.R. DeGange. 1995. Reproduction, preweaning survival, and survival of adult sea otters at Kodiak Island, Alaska. Can. J. Zool 73:1161-1169.

Budget Category:	FY 12	Proposed FY 13	Proposed FY 14	Proposed FY 15	Proposed FY 16	TOTAL PROPOSED	ACTUAL CUMULATIVE
Personnel	$1,214.9	$1,443.1	$1,464.8	$1,345.4	$1,548.5	$6,587.7	$2,221.3
Travel	$123.9	$108.6	$247.6	$243.0	$128.0	$839.0	$151.5
Contractual	$708.0	$544.0	$659.8	$649.3	$566.1	$2,953.9	$915.0
Commodities	$150.6	$130.7	$154.5	$122.4	$126.5	$684.7	$198.9
Equipment	$304.4	$27.8	$27.8	$20.3	$62.7	$362.7	$278.5
Indirect Costs (*will vary by proposer*)	$166.0	$202.7	$195.2	$194.4	$194.3	$846.9	$252.4
SUBTOTAL	$2,667.7	$2,457.0	$2,749.7	$2,574.9	$2,626.1	$12,275.0	$4,017.6
General Administration (9% of subtotal)	239.8	220.9	247.2	231.5	198.6	1138.0	$361.6
PROGRAM TOTAL	**$2,907.5**	**$2,677.9**	**$2,996.9**	**$2,803.4**	**$2,824.7**	**$13,413.0**	**$4,379.2**
Other Resources (In-Kind Funds)	**$1,784**	**$1,738**	**$1,823**	**$1,802**	**$1,536**	**$8,614**	

COMMENTS: All amounts are give in dollars.

FY12-16

Program Title: 15120114 and 15120120
LTM - Long Term Monitoring
Team Leader:
Hoffman/McCammon/Holderied

SUMMARY

Note: includes change of $24,987. between NCEAS and Axiom per Gulf Watch Management Team memo dated July 5, 2012
Note: includes addition of $102,100. Ballachy and Esler - Lingering Oil for Harlequin Duck for FY14

Budget Category:	Proposed FY 12	Proposed FY 13	Proposed FY 14	Proposed FY 15	Proposed FY 16	TOTAL PROPOSED	Actual Cumulative
Personnel	$12.4	$121.6	$125.4	$131.2	$136.3	$526.8	$64.05
Travel	$0.0	$1.0	$1.0	$1.0	$1.0	$4.0	$2.38
Contractual	$1.0	$43.7	$43.7	$43.7	$43.7	$175.8	$45.05
Commodities	$0.0	$11.0	$11.0	$11.0	$11.0	$44.0	$12.30
Equipment	$205.0	$0.0	$0.0	$0.0	$0.0	$205.0	$209.11
Indirect Costs (will vary by proposer)	waived	waived	waived	waived	waived	waived	
SUBTOTAL	$218.4	$177.3	$181.1	$186.9	$192.0	$955.6	$332.87
General Administration (9% of subtotal)	$19.7	$16.0	$16.3	$16.8	$17.3	$86.0	NA
PROJECT TOTAL	$238.1	$193.2	$197.3	$203.7	$209.3	$1,041.6	$332.87
Other Resources (Cost Share Funds)	$23.3	$23.3	$23.3	$145.0	$135.0	$349.9	$46.60

COMMENTS: The Science Center waives Indirect Costs for this project due to its administration of the overall proposal. PWSSC provides a CTD profiler (SBE model 25plus) with several auxiliary sensors (chlorophyll fluorometer, backscatter turbidometer, oxygen sensor, solid state active fluorometer and nitrate analyser), which is used for all field surveys, and to cross-calibrate with the profiler (value ~$75K). Extracted chlorophyll-a is read on a Turner Designs TD-700 fluorometer (replacement cost ~$10K). As well as the moored profiler, PWSSC provides a pair of acoustic releases, and a 1-m diameter syntactic foam float with upward and downward looking RDI ADCP current profilers (value ~$50K). The Alaska Ocean Observing System has also contributed $10K in FY14 for surveys in PWS.

FY12-16

Program Title: 15120114-E PWS Oceanographic monitoring
Team Leader: Robert Campbell

FORM 3A
NON-TRUSTEE AGENCY SUMMARY

Personnel Costs:		Months	Monthly		Personnel
Name	Project Title	Budgeted	Costs	Overtime	Sum
Robert Campbell	Principle Investigator	5.0	9.4		47.0
Robert Campbell - at sea rate	Principle Investigator	0.5	10.0		5.0
Technician: Caitlin McKinstry	Field/lab technician	12.0	6.6		79.2
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
		Subtotal	26.0	0.0	
				Personnel Total	$131.2

Travel Costs:	Ticket	Round	Total	Daily	Travel
Description	Price	Trips	Days	Per Diem	Sum
Alaska Marine Science Symposium	0.4	1	3	0.2	1.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
				Travel Total	$1.0

FY15

Program Title: PWS Oceanographic monitoring
Team Leader: Robert Campbell

FORM 3B
PERSONNEL & TRAVEL DETAIL

Contractual Costs:	Contract
Description	Sum
Instrument calibration	3.0
Vessel Charter	37.8
Network and telephone	2.6
Printing	0.3
If a component of the project will be performed under contract, the 4A and 4B forms are required. **Contractual Total**	$43.7

Commodities Costs:	Commodities
Description	Sum
Reagents and lab supplies	5.0
Mooring supplies	5.0
Sampling Hardware	1.0
Commodities Total	$11.0

FY15

Program Title: PWS Oceanographic monitoring
Team Leader: Robert Campbell

FORM 3B
CONTRACTUAL & COMMODITIES DETAIL

New Equipment Purchases: Description	Number of Units	Unit Price	Equipment Sum
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
		New Equipment Total	$0.0

Existing Equipment Usage: Description	Number of Units	Inventory Agency
Seabird Conductivity Temperature Depth (CTD) meter	1	PWSSC
WETlabs fluorometer	1	PWSSC
Satlantic SUNA	1	PWSSC
Mooring releases	2	PWSSC
Mooring flotation	4	PWSSC

FY15

Program Title: PWS Oceanographic monitoring
Team Leader: Robert Campbell

FORM 3B
EQUIPMENT DETAIL

Budget Category:	Proposed FY 12	Proposed FY 13	Proposed FY 14	Proposed FY 15	Proposed FY 16	TOTAL PROPOSED	Actual Cumulative
Personnel	$28.8	$35.3	$68.8	$71.8	$75.1	$279.7	$63.6
Travel	$2.5	$2.6	$1.4	$1.5	$1.6	$9.5	$5.5
Contractual	$49.0	$3.0	$1.5	$1.5	$1.5	$56.5	$49.6
Commodities	$1.2	$3.0	$2.1	$1.5	$0.9	$8.7	$5.1
Equipment	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Indirect Costs (will vary by proposer)	$8.6	$11.0	$18.4	$19.1	$19.8	$76.9	$19.2
SUBTOTAL	$90.0	$54.9	$92.2	$95.4	$98.8	$431.4	$143.1
General Administration (9% of subtotal)	$8.1	$4.9	$8.3	$8.6	$8.9	$38.8	NA
PROJECT TOTAL	$98.1	$59.9	$100.5	$104.0	$107.7	$470.2	$143.1
Other Resources (Cost Share Funds)	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	

COMMENTS:

FY12-16

Program Title: 15120114-J Seward Line
Team Leader: R. Hopcroft

FORM 3A
NON-TRUSTEE AGENCY SUMMARY

Personnel Costs:		Months	Monthly		Personnel
Name	Project Title	Budgeted	Costs	Overtime	Sum
Hopcroft, R.	Principal Investigator	0.5	13.60		6.80
Mathis, J.	co-Investigator	0.5	13.45		6.73
Post doctoral fellow	Investigator	3.0	6.69		20.07
Technician 1	zooplankton	1.0	9.44		9.44
Technician 2	zooplankton	2.0	10.32		20.64
Technician 3	chlorophyll	0.5	9.73		4.87
Technician 4	CTD	0.3	13.18		3.30
					0.0
					0.0
					0.0
					0.0
					0.0
		Subtotal	76.4	0.0	
				Personnel Total	$71.84

Travel Costs:	Ticket	Round	Total	Daily	Travel
Description	Price	Trips	Days	Per Diem	Sum
Fairbanks to Seward (to cruise) - per diem only			16	0.03	0.48
Fairbanks to Seward (to cruise) - vehicle rental			1	1.00	1.00
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
				Travel Total	$1.48

FY15

Program Title: Seward Line
Team Leader: R. Hopcroft

FORM 3B
PERSONNEL & TRAVEL DETAIL

Contractual Costs:	Contract
Description	Sum
shipping	1.0
CTD calibration	0.5
If a component of the project will be performed under contract, the 4A and 4B forms are required. **Contractual Total**	$1.5

Commodities Costs:	Commodities
Description	Sum
project supplies	1.5
Commodities Total	$1.5

FY15

Program Title: Seward Line
Team Leader: R. Hopcroft

FORM 3B
CONTRACTUAL & COMMODITIES DETAIL

New Equipment Purchases: Description	Number of Units	Unit Price	Equipment Sum
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
		New Equipment Total	$0.0

Existing Equipment Usage: Descriptior	Number of Units	Inventory Agency

FY15

Program Title: Seward Line
Team Leader: R. Hopcroft

FORM 3B
EQUIPMENT DETAIL

Budget Category:	Proposed FY 12	Proposed FY 13	Proposed FY 14	Proposed FY 15	Proposed FY 16	TOTAL PROPOSED	Actual Cumulative
Personnel	$52.7	$55.1	$57.5	$60.1	$62.8	$288.2	$94.75
Travel	$1.4	$1.5	$1.5	$1.6	$1.7	$7.8	$1.95
Contractual	$22.9	$22.9	$22.9	$22.9	$22.9	$114.6	$33.07
Commodities	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.00
Equipment	$10.0	$10.0	$10.0	$10.0	$10.0	$50.1	$9.85
Indirect Costs (will vary by proposer)	$13.4	$13.8	$14.2	$14.5	$14.9	$70.8	$22.55
SUBTOTAL	$100.5	$103.2	$106.2	$109.2	$112.4	$531.5	$162.16
General Administration (9% of subtotal)	$9.0	$9.3	$9.6	$9.8	$10.1	$47.8	NA
PROJECT TOTAL	$109.5	$112.5	$115.7	$119.1	$122.5	$579.3	$162.16
Other Resources (Cost Share Funds)	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	

COMMENTS: *The General Administration line item is distributed to the management agency and is not part of the project's annual fiscal reporting. Actual expeditures are those through July 31, 2013

FY12-16	**Program Title: 15120114-P GAK1** **Team Leader: T. Weingartner**	**FORM 3A** **NON-TRUSTEE AGENCY SUMMARY**

Personnel Costs:		Months	Monthly		Personnel
Name	Project Title	Budgeted	Costs	Overtime	Sum
T. Weingartner	PI	0.5	14.408		7.204
Technician 1		2.0	12.038	14.508	38.584
Technician 2		1.0	14.336		14.336
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
		Subtotal	40.8	14.5	
				Personnel Total	$60.1

Travel Costs:	Ticket	Round	Total	Daily	Travel
Description	Price	Trips	Days	Per Diem	Sum
Fairbanks to Seward (for cruise)	0.466	1	4	0.291	1.630
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
				Travel Total	$1.6

FY15	**Program Title: GAK Component** **Team Leader: T. Weingartner**	**FORM 3B** **PERSONNEL & TRAVEL DETAIL**

Contractual Costs: Description	Contract Sum
vessel charter for CTDs (8 1-day trips, $1500/day)	12.000
vessel charter for morrings (1 2-day trip, $2000/day)	4.000
MicroCat and SeaCat calibrations (6 @ $600, 1 @ $1000)	4.600
SEBE-25 calibration	1.520
shipping	0.800
If a component of the project will be performed under contract, the 4A and 4B forms are required. **Contractual Total**	$22.9

Commodities Costs: Description	Commodities Sum
Project Supplies	0.0
Commodities Total	$0.0

FY15	**Program Title: GAK Component** **Team Leader: T. Weingartner**	**FORM 3B** **CONTRACTUAL & COMMODITIES DETAIL**

New Equipment Purchases: Description	Number of Units	Unit Price	Equipment Sum
Seabird 37SMP Microcat with pressure	1.0	4.565	4.565
miscellaneous mooring hardware	1.0	5.450	5.450
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
		New Equipment Total	$10.0

Existing Equipment Usage: Descriptic	Number of Units	Inventory Agency

FY15	**Program Title: GAK Component** **Team Leader: T. Weingartner**

FORM 3B
EQUIPMENT DETAIL

Budget Category:	Proposed FY 12	Proposed FY 13	Proposed FY 14	Proposed FY 15	Proposed FY 16	TOTAL PROPOSED	Actual Cumulative
Personnel	$66.0	$69.3	$72.8	$64.2	$63.2	$335.5	$103.8
Travel	$7.8	$7.8	$7.8	$12.7	$7.8	$44.1	$8.2
Contractual	$52.3	$54.3	$54.3	$28.3	$14.3	$203.5	$66.5
Commodities	$21.1	$23.6	$17.8	$17.4	$14.5	$94.4	$22.7
Equipment	$28.8	$7.7	$0.0	$0.0	$0.0	$36.5	$12.0
Indirect Costs (*will vary by proposer*)	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
SUBTOTAL	$176.0	$162.7	$152.7	$122.7	$99.8	$714.0	$213.2
General Administration (9% of subtotal)	$15.8	$14.6	$13.7	$11.0	$9.0	$64.3	NA
PROJECT TOTAL	$191.9	$177.4	$166.5	$133.7	$108.8	$778.2	$213.2
Other Resources (Cost Share Funds)	$180.0	$180.0	$180.0	$155.0	$155.0	$850.0	

COMMENTS:
In-Kind contributions: FY12 - FY16: $25.0K in CTD equipment ($5.0K/year)
FY12 - FY16: $125.0K in salary support for NOAA Kasitsna Bay Lab staff ($25.0K/year).
Cost share funds: $25K/yr from AOOS in FY12-14 for oceanographic monitoring in Kachemak Bay.FY15 will depend on federal appropriations. Prior year spending: Obligations for new oceanography sensors and a field computer from FY12-14 funds have been delayed due to better than expected equipment endurance, but purchases are expected by the end of year 3, assuming no delays in fiscal year fund carryover. We also propose to use some savings from prior year travel (limited by federal travel restrictions) for additional nutrient and carbonate chemistry analysis contracts. This is the budget summary for the Trustee Agency, State of Alaska, Kachemak Bay Research Reserve. There are no revisions to the proposed funding requested in project year 4 for this study.

FY12-16

Project Title: 15120114-G Kbay/Cook Inlet Oceanography
Team Leaders: Angela Doroff, Kris Holderied

SUMMARY

Budget Category:	Proposed FY 12	Proposed FY 13	Proposed FY 14	Proposed FY 15	Proposed FY 16	TOTAL PROPOSED	Actual Cumulative
Personnel	$66.0	$69.3	$72.8	$64.2	$63.2	$335.5	$103.8
Travel	$3.7	$3.7	$3.7	$6.1	$3.7	$20.9	$4.2
Contractual	$49.8	$51.8	$51.8	$25.8	$11.8	$191.0	$66.5
Commodities	$8.1	$16.6	$10.8	$8.4	$8.5	$52.4	$22.7
Equipment	$23.8	$0.0	$0.0	$0.0	$0.0	$23.8	$12.0
SUBTOTAL	$151.4	$141.4	$139.0	$104.6	$87.2	$623.5	$209.2
General Administration (9% of subtotal)	$13.6	$12.7	$12.5	$9.4	$7.8	$56.1	NA
PROJECT TOTAL	$165.0	$154.1	$151.6	$114.0	$95.0	$679.6	$209.2
Other Resources (In kind Funds)	$125.0	$125.0	$125.0	$125.0	$125.0	$625.0	$250.0

COMMENTS: This is the budget summary for the Trustee Agency, State of Alaska, Kachemak Bay Research Reserve. There are no revisions to the proposed funding requested in project year 4 for this study.

FY12-16

Project Title: 15120114-G Kbay/Cook Inlet Oceanography
Team Leader: Angela Doroff

FORM 4A
TRUSTEE AGENCY SUMMARY

Personnel Costs:		Months	Monthly		Personnel
Name	Project Title	Budgeted	Costs	Overtime	Sum
Doroff, Angela		3.0	9.3	0.0	27.8
Fishery Biologist		4.5	8.1	0.0	36.5
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
		Subtotal	17.4	0.0	
				Personnel Total	$64.2

Travel Costs:	Ticket	Round	Total	Daily	Travel
Description	Price	Trips	Days	Per Diem	Sum
Marine Science Symposium - F&G	0.3	2	5	0.4	2.6
Water/Air taxi within Kachemak Bay - F&G	0.1	6			0.5
National Conference - F&G	1.2	1	5	0.3	2.5
Principal Investigator Meeting - Anchorage	0.2	1	2	0.2	0.6
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
				Travel Total	$6.1

FY15

Program Title: Long-Term Monitoring
Team Leader: Angela Doroff
Agency: Fish & Game/SF/KBRR

FORM 4B
PERSONNEL & TRAVEL DETAIL

Contractual Costs:	Contract
Description	Sum
Calibration and repair	2.5
Shipping - samples	1.3
Boat charter	22.0
If a component of the project will be performed under contract, the 4A and 4B forms are required. **Contractual Total**	$25.8

Commodities Costs:	Commodities
Description	Sum
Boat fuel and repair	6.5
Probes	1.9
Commodities Total	$8.4

FY15

Program Title: Long-Term Monitoring
Team Leader: Angela Doroff
Agency: Fish & Game/SF/KBRR

FORM 4B
CONTRACTUAL & COMMODITIES DETAIL

New Equipment Purchases: Description	Number of Units	Unit Price	Equipment Sum
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
		New Equipment Total	$0.0

Existing Equipment Usage: Description	Number of Units	Inventory Agency

FY15

Program Title: Long-Term Monitoring
Team Leader: Angela Doroff
Agency: Fish & Game/SF/KBRR

FORM 4B
EQUIPMENT DETAIL

Budget Category:	Proposed FY 12	Proposed FY 13	Proposed FY 14	Proposed FY 15	Proposed FY 16	TOTAL PROPOSED	Actual Cumulative
Personnel	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Travel	$4.2	$4.2	$4.2	$6.6	$4.2	$23.3	$4.0
Contractual	$2.5	$2.5	$2.5	$2.5	$2.5	$12.5	$0.0
Commodities	$13.0	$7.0	$7.0	$9.0	$6.0	$42.0	$0.0
Equipment	$5.0	$7.7	$0.0	$0.0	$0.0	$12.7	$0.0
SUBTOTAL	$24.7	$21.4	$13.7	$18.1	$12.7	$90.5	$4.0
General Administration (9% of subtotal)	$2.2	$1.9	$1.2	$1.6	$1.1	$8.1	NA
PROJECT TOTAL	$26.9	$23.3	$14.9	$19.7	$13.8	$98.6	$4.0
Other Resources (In kind Funds)	$55.0	$55.0	$55.0	$30.0	$30.0	$225.0	$110.0

COMMENTS:
In-Kind contributions: In-Kind contributions: FY12 - FY16: $25.0K in CTD equipment ($5.0K/year), FY12 - FY16: $125.0K in salary support for NOAA Kasitsna Bay Lab staff ($25.0K/year).
Cost share funds: $25K/yr from AOOS in FY12-14 for oceanographic monitoring in Kachemak Bay.FY15 will depend on federal appropriations.
Prior year spending: Obligations for new oceanography sensors and a field computer from FY12-14 funds have been delayed due to better than expected equipment endurance, but purchases are expected by the end of year 3, assuming no delays in fiscal year fund carryover. We also propose to use some savings from prior year travel (limited by federal travel restrictions) for additional nutrient and carbonate chemistry analysis contracts.

FY12-16

Project Title: 15120114-G Kbay/Cook Inlet Oceanography
Team Leader: Kris Holderied

FORM 4A
TRUSTEE AGENCY SUMMARY

Personnel Costs:		Months	Monthly		Personnel
Name	Project Title	Budgeted	Costs	Overtime	Sum
				0.0	0.0
				0.0	0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
		Subtotal	0.0	0.0	
				Personnel Total	$0.0

Travel Costs:	Ticket	Round	Total	Daily	Travel
Description	Price	Trips	Days	Per Diem	Sum
Marine Science Syposium - NOAA	0.3	2	5	0.4	2.6
Water/Air taxi within Kachemak Bay - NOAA	0.1	12			1.0
National Conference - NOAA	1.2	1	5	0.3	2.5
Principal Investigator Meeting - Anchorage	0.2	1	2	0.2	0.6
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
				Travel Total	$6.6

FY15

Program Title: Long-Term Monitoring
Team Leader: Kris Holderied
Agency: NOAA

FORM 4B
PERSONNEL &
TRAVEL DETAIL

Contractual Costs:	Contract
Description	Sum
Calibration and repair	2.5
If a component of the project will be performed under contract, the 4A and 4B forms are required. **Contractual Total**	$2.5

Commodities Costs:	Commodities
Description	Sum
Supplies	1.0
KBL Computer	3.0
KBL boat fuel	5.0
Commodities Total	$9.0

FY15

Program Title: Long-Term Monitoring
Team Leader: Kris Holderied
Agency: NOAA

FORM 4B
CONTRACTUAL & COMMODITIES DETAIL

New Equipment Purchases: Description	Number of Units	Unit Price	Equipment Sum
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
		New Equipment Total	$0.0

Existing Equipment Usage: Description	Number of Units	Inventory Agency

FY15

Program Title: Long-Term Monitoring
Team Leader: Kris Holderied
Agency: NOAA

FORM 4B
EQUIPMENT DETAIL

Budget Category:	Proposed FY 12	Proposed FY 13	Proposed FY 14	Proposed FY 15	Proposed FY 16	TOTAL PROPOSED	Actual Cumulative
Personnel	$0.0	$31.8	$32.7	$33.8	$35.0	$133.3	$31.80
Travel	$0.0	$1.0	$1.0	$1.0	$1.1	$4.1	$1.00
Contractual	$0.0	$7.2	$7.4	$7.5	$7.9	$30.0	$7.20
Commodities	$0.0	$4.5	$4.7	$4.8	$4.8	$18.8	$4.50
Equipment	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	
Indirect Costs (will vary by proposer)		$16.8	$17.3	$17.8	$18.3	$70.2	$16.80
SUBTOTAL	$0.0	$61.3	$63.1	$64.9	$67.1	$256.4	$61.30
General Administration (9% of subtotal)	$0.0	$5.5	$5.7	$5.8	$6.0	$23.1	N/A
PROJECT TOTAL	$0.0	$66.8	$68.8	$70.7	$73.1	$279.5	$61.30
Other Resources (in kind Funds)	$0.0	$94.7	$148.0	$180.8	$169.0	$592.5	$94.70

COMMENTS: Committed funding for the duration of this contract is given in the table shown in Batten, CPR section VI.C of the project proposal narrative. Note that in addition to money DFO also provides laboratory and other facilities as in-kind support. Direct funds from DFO, NPRB and SAHFOS are used to fund sample collection and analysis, data analysis, travel, and report/manuscript writing. In-kind support by Dr Chiba covers analysis of western Pacific samples, freeing up the other funding for eastern Pacific sample analysis. SAHFOS in-kind support includes equipment, archiving and miscellaneous costs that ensure the sampling intensity is maintained.

FY12-16

Program Title:15120114-A CPR
Team Leader: S. Batten

FORM 3A
NON-TRUSTEE AGENCY SUMMARY

Personnel Costs:		Months	Monthly		Personnel
Name	Project Title	Budgeted	Costs	Overtime	Sum
					0.0
S Batten	Long term monitoring of zooplankton	1.2	7.9		9.5
Doug Moore	populations on the Alaskan Shelf and Gulf	1.4	5.9		8.3
Technicians - workshop	of Alaska using Continuous Plankton recorders	0.3	5.7		1.7
Technicians - analysts		2.0	5.4		10.8
D Stevens		0.3	6.1		2.0
P Pritchard		0.2	7.9		1.6
					0.0
					0.0
					0.0
					0.0
					0.0
		Subtotal	38.9	0.0	
				Personnel Total	$33.8

Travel Costs:	Ticket	Round	Total	Daily	Travel
Description	Price	Trips	Days	Per Diem	Sum
					0.0
Portion of PI's travel to Alaska marine Science meeting and PICES annual					1.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
				Travel Total	$1.0

FY15

Program Title:15120114-A CPR
Team Leader: S. Batten

FORM 3B
PERSONNEL & TRAVEL DETAIL

Contractual Costs: Description	Contract Sum
Portion of local CPR servicing in Anchorage	2.6
Portion of CPR leasing	3.6
Portion of computing services	0.2
Portion of website maintenance by PICES	0.4
Portion of tow payment to ship	0.7
If a component of the project will be performed under contract, the 4A and 4B forms are required. **Contractual Total**	$7.5

Commodities Costs: Description	Commodities Sum
lab consumables	0.8
Shipping of gear	1.3
shipping of samples	0.4
filtering mesh	1.8
Tow wires	0.5
Commodities Total	4.8

FY15

Program Title:15120114-A CPR
Team Leader: S. Batten

FORM 3B
CONTRACTUAL & COMMODITIES DETAIL

New Equipment Purchases: Description	Number of Units	Unit Price	Equipment Sum
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
		New Equipment Total	$0.0

Existing Equipment Usage: Description	Number of Units	Inventory Agency
existing CPRs will be used. Lease costs charged above cover replacement/repair		
external bodies	1	
internal mechanisms	4	
Existing microscopes will also be used, (including one purchased in FY03)	7	

FY15

Program Title:15120114-A CPR
Team Leader: S. Batten

FORM 3B
EQUIPMENT DETAIL

Budget Category:	Proposed FY 12	Proposed FY 13	Proposed FY 14	Proposed FY 15	Proposed FY 16	TOTAL PROPOSED	Actual Cumulative
Personnel	$0.0	$34.3	$37.0	$37.0	$37.0	$145.3	$25.9
Travel	$0.0	$1.7	$2.7	$2.7	$2.7	$9.8	$0.4
Contractual	$0.0	$38.5	$41.5	$44.5	$44.5	$169.0	$16.2
Commodities	$6.0	$35.6	$29.2	$26.2	$26.2	$123.2	$27.5
Equipment	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Indirect Costs (will vary by proposer)	$0.6	$11.0	$11.0	$11.0	$11.0	$44.6	$7.0
SUBTOTAL	$6.6	$121.4	$121.4	$121.4	$121.4	$491.9	$77.0
General Administration (9% of subtotal)	$0.6	$10.9	$10.9	$10.9	$10.9	$44.3	N/A
PROJECT TOTAL	$7.2	$132.3	$132.3	$132.3	$132.3	$536.1	$77.0
Other Resources (In kindFunds)	$23.5	$23.5	$23.5	$23.5	$23.5	$117.5	$47.0

Original Comment: Annually in kind funds include $15,000 Northwest Fisheries Science Center Environmental Contaminant Lab additional analytical and reporting services; $3,500 Norcross Wildlife Foundation equipment grant; $5,000 NGOS in kind equiment use> ***Note: There has been a funding allocation change between categories to accomodate staffing shortages in 2015-2016. This results in a small reduction in the in the overall proposal request for those years and a shift from commodities to contractual categories.

FY12

Program Title: 15120114-M Long Terrm Killer Whale Monitoring in Prince William Sound/Kenai Fjords
Team Leader: Craig Matkin

FORM 3A
NON-TRUSTEE AGENCY SUMMARY

New Equipment Purchases: Description	Number of Units	Unit Price	Equipment Sum
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
		New Equipment Total	$0.0

Existing Equipment Usage: Description	Number of Units	Inventory Agency

FY15

Program Title: Long Terrm Killer Whale Monitoring in Prince William Sound/Kenai Fjords
Team Leader: Craig Matkin

FORM 3B
EQUIPMENT DETAIL

Personnel Costs:			Months	Monthly		Personnel
Name	Project Title		Budgeted	Costs	Overtime	Sum
						0.0
Craig Matkin	P.I. Field Biologist		5.0	5.1		25.5
Eva Saulitis	Field Biologist/Data analysis		2.5	3.5		8.8
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
			Subtotal	8.6	0.0	
					Personnel Total	$34.3

Travel Costs:	Ticket	Round	Total	Daily	Travel
Description	Price	Trips	Days	Per Diem	Sum
					0.0
Attend annual Alaska Marine Science Symposium	0.9	1	3	0.2	1.5
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
				Travel Total	$1.5

FY15

Program Title: Long Terrm Killer Whale Monitoring in Prince William Sound/Kenai Fjords
Team Leader: Craig Matkin

FORM 3B
PERSONNEL & TRAVEL DETAIL

Contractual Costs: Description	Contract Sum
Vessel Lease (R.V. Natoa/ 40 days @500/day)	20.0
NWFSC Environmental Contaminant Lab, Analytical Fees	12.0
GIS/Statistical Analysis	3.0
Photoidentification/Catalogue	3.5
If a component of the project will be performed under contract, the 4A and 4B forms are required. **Contractual Total**	$38.5

Commodities Costs: Description	Commodities Sum
Misc tagging and biopsy supplies	2.0
8 satellite tags @3000 apiece	24.0
Field Food ($40/day for 40 days)	1.6
Fuel ($150/day for 40 days)	6.0
Film, Photo processing	1.8
Field Communication, Tracking, Shipping, and Misc supplies	0.8
Commodities Total	$36.2

FY15

Program Title: Long Terrm Killer Whale Monitoring in Prince William Sound/Kenai Fjords
Team Leader: Craig Matkin

FORM 3B
CONTRACTUAL & COMMODITIES DETAIL

Budget Category:	Proposed FY 12	Proposed FY 13	Proposed FY 14	Proposed FY 15	Proposed FY 16	TOTAL PROPOSED	Actual Cumulative
Personnel	$2.0	$2.0	$2.0	$2.0	$0.0	$8.0	$3.4
Travel	$5.4	$5.4	$5.4	$5.4	$1.8	$23.4	$13.7
Contractual	$103.5	$104.8	$114.7	$116.5	$46.1	$485.6	$188.4
Commodities	$6.0	$6.0	$6.0	$6.0	$2.0	$26.0	$6.6
Equipment	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	
Indirect Costs (*will vary by proposer*)	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	
SUBTOTAL	$116.9	$118.2	$128.1	$129.9	$49.9	$543.0	$212.1
General Administration (9% of subtotal)	$10.5	$10.6	$11.5	$11.7	$4.5	$48.9	N/A
PROJECT TOTAL	$127.4	$128.8	$139.6	$141.6	$54.4	$591.9	$212.1
Other Resources (In kind Funds)	$83.5	$74.7	$75.0	$78.5	$25.0	$336.7	$158.2

COMMENTS: In-kind contribution from NOAA - $25K/year in salary for Moran. An addition $58.5K in FY12 , $49.7K in FY13, $50.0K in FY14,and $53.5K in FY15 of NOAA ship time was used to increase survey effort.

FY12-16

Program Title: 15120114-N Humpback Whale Monitoring
Team Leader: Moran/Straley

SUMMARY

Personnel Costs:		Months	Monthly		Personnel
Name	Project Title	Budgeted	Costs	Overtime	Sum
Moran	Humpback Whale Monitoring			2.0	2.0
					0.0
			Subtotal	2.0	
				Personnel Total	$2.0

Travel Costs:	Ticket	Round	Total	Daily	Travel
Description	Price	Trips	Days	Per Diem	Sum
JNU-CDV	0.6	6	12	0.0	3.6
Jnu ANC AMSS	0.6	1	4	0.3	1.8
					0.0
				Travel Total	$5.4

FY15

Program Title: Humpback Whale Monitoring
Team Leader: Moran/Straley
Agency: NOAA Fisheries/Auke Bay Labs

FORM 4B
PERSONNEL &
TRAVEL DETAIL

Contractual Costs:		Contract
Description		Sum
Straley (UAS)		54.5
Vessel Charters		28.0
Chemistry lab analysis contract labor- ABL		14.0
Opportunistic Surveys		10.0
Contract labor		10.0
If a component of the project will be performed under contract, the 4A and 4B forms are required.	**Contractual Total**	$117

Commodities Costs:	Commodities
Description	Sum
Shipping	3.0
Field Supplies	3.0
Commodities Total	$6.0

FY15

Program Title: Humpback Whale Monitoring
Team Leader: Moran/Straley
Agency: NOAA Fisheries/Auke Bay Labs

FORM 4B
CONTRACTUAL & COMMODITIES DETAIL

New Equipment Purchases: Description	Number of Units	Unit Price	Equipment Sum
			0.0
		New Equipment Total	$0.0

Existing Equipment Usage: Descriptior	Number of Units	Inventory Agency

FY15

Program Title: Humpback Whale Monitoring
Team Leader: Moran/Straley
Agency: NOAA Fisheries/Auke Bay Labs

FORM 4B
EQUIPMENT DETAIL

Budget Category:	Proposed FY 12	Proposed FY 13	Proposed FY 14	Proposed FY 15	Proposed FY 16	TOTAL PROPOSED	Actual Cumulative
Personnel	$123.1	$123.1	$123.1	$123.1	$119.8	$612.2	$251.21
Travel	$11.4	$10.5	$10.5	$10.5	$3.3	$46.2	$21.12
Contractual	$14.6	$28.9	$28.9	$28.9	$14.8	$115.9	$48.05
Commodities	$20.0	$20.0	$20.0	$20.0	$0.0	$80.0	$6.37
Equipment	$23.5	$3.3	$3.3	$3.3	$0.0	$33.4	$31.06
SUBTOTAL	$192.6	$185.7	$185.7	$185.7	$137.9	$887.7	$357.80
General Administration (9% of subtotal)	$17.3	$16.7	$16.7	$16.7	$12.4	$79.9	N/A
PROJECT TOTAL	$209.9	$202.5	$202.5	$202.5	$150.3	$967.6	$357.80
Other Resources (in kind Funds)	$297.2	$297.2	$297.2	$297.2	$72.2	$1,260.8	$594.32

Over life of the project, USGS will make a substantial contribution of salary (360.8K) for PIs (0.5 FTE GS-11, 0.2 FTE GS-15), half of the vessel costs for annual cruises (80K), and in each year all the field equipment required including sampling nets (9K; purse seine, beach seine, modified herring trawl, zooplankton nets), oceanography equipment (90K; CTD with rosette and external sensors, thermosalinograph), SIMRAD split beam dual frequency hydroacoustic equipment (141K), and small boats (10.5K).

FY12-16

Program Title: 15120114-O Forage Fish
Team Leader: John Piatt / M. Armitsu

FORM 4A
TRUSTEE AGENCY
SUMMARY

Personnel Costs:		Months	Monthly		Personnel
Name	Project Title	Budgeted	Costs	Overtime	Sum
Piatt GS-15 (in kind)	LTM Forage Fish Project/Team Leader	2.0	0.0		0.0
Arimitsu GS-12 (in kind)	LTM Forage Fish Project/Project Leader	6.0	0.0		0.0
GS-9	LTM Forage Fish Project/ Fisheries Biologist	12.0	6057.0		72.7
GS-7	LTM Forage Fish Project/ Fisheries Biologist	8.0	4286.0		34.3
GS-5	LTM Forage Fish Project/ Seasonal Tech	5.0	3225.0		16.1
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
		Subtotal	13568.0	0.0	
				Personnel Total	$123.1

Travel Costs:		Ticket	Round	Total	Daily	Travel
Description		Price	Trips	Days	Per Diem	Sum
PI-Field Site	Airfare, M&IE	1,184	1	40	20.0	2.0
PI-Meeting	Airfare, hotel, M$IE	1,077	1	5	175.0	2.0
CO-PI Field Site	Airfare, M&IE	1,158	1	40	20.0	2.0
CO-PI Meeting	Airfare, hotel, M$IE	477	1	5	175.0	1.4
GS 9 Field Site	Airfare, M&IE	450	1	25	20.0	1.0
GS 7 Field Site	Airfare, M&IE	450	1	25	20.0	1.0
Volunteer Field Site	Airfare, M&IE	850	1	25	20.0	1.4
						0.0
						0.0
						0.0
						0.0
					Travel Total	$10.5

FY15

Program Title: LTM Pelagic Monitoring
Team Leader: John Piatt
Agency: USGS

FORM 4B
PERSONNEL & TRAVEL DETAIL

Contractual Costs:	Contract
Description	Sum
Zooplankton (60*$185/sample)	11.1
Nutrients, chla (120*$25/sample)	3.0
Stable isotope analyses	14.3
Outreach	0.5
If a component of the project will be performed under contract, the 4A and 4B forms are required. **Contractual Total**	$28.9

Commodities Costs:	Commodities
Description	Sum
Research Vessel Operations (including fuel, food, supplies)	20

Commodities Total	$20.0

FY15

Program Title: LTM Pelagic Monitoring
Team Leader: John Piatt
Agency: USGS

FORM 4B
CONTRACTUAL & COMMODITIES DETAIL

New Equipment Purchases: Description	Number of Units	Unit Price	Equipment Sum
Calibration of CTD/sensors			1.80
EchoView Data license renewal (x2)			1.00
Other Sampling equipment			0.50
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
		New Equipment Total	$3.3

Existing Equipment Usage: Description	Number of Units	Inventory Agency
Research Vessel M/V Gyre (with mid-water trawl capability)	1	USGS
Nets (beach seine, trawl, zooplankton)	5	USGS
Oceanographic equipment (CTD, Rossette, Thermosalinograph)	1	USGS
BIOSONICS DT-4000 Hydroacoustic system	2	USGS
Small boats (Naiad RIB, Zodiac)	2	USGS

FY15

Program Title: LTM Pelagic Monitoring
Team Leader: John Piatt
Agency: USGS

FORM 4B
EQUIPMENT DETAIL

Budget Category:	Proposed FY 12	Proposed FY 13	Proposed FY 14	Proposed FY 15	Proposed FY 16	TOTAL PROPOSED	Actual Cumulative
Personnel	$100.0	$22.2	$100.0	$22.2	$100.0	$344.3	$100.65
Travel	$11.8	$0.0	$11.8	$0.0	$11.8	$35.4	$24.06
Contractual	$37.1	$0.0	$37.1	$0.0	$37.1	$111.3	$12.00
Commodities	$34.6	$0.0	$38.8	$0.0	$43.0	$116.3	$46.39
Equipment	$6.0	$0.0	$6.0	$0.0	$6.0	$18.0	$2.20
SUBTOTAL	$189.4	$22.2	$193.6	$22.2	$197.8	$625.3	$185.29
General Administration (9% of subtotal)	$17.0	$2.0	$17.4	$2.0	$17.8	$56.3	N/A
PROJECT TOTAL	$206.5	$24.2	$211.1	$24.2	$215.7	$681.6	$185.29
Other Resources (Cost Share Funds)	$56.0	$22.0	$56.0	$22.0	$56.0	$212.0	$78.00

COMMENTS: In-kind contribution from USFWS includes $11K/year in salary for Irons and $11K/year in salary for Kuletz. We proposed to hire a Project Leader in FY 13 but had difficulty filling the position due to the federal hiring freeze. In March 2014, we received approval of a hiring request waiver and were able to hire Project Leader (Robb Kaler).

FY12-16

Program Title: 15120114-K Continuing the Legacy: Prince William Sound Marine Bird Population Trends.
Team Leader: Robert Kaler

FORM 4A
TRUSTEE AGENCY SUMMARY

Personnel Costs:		Months	Monthly		Personnel
Name	Project Title	Budgeted	Costs	Overtime	Sum
Unknown - Project Leader	PWS Marine Bird Population Trends	3.0	7.4		22.2
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
		Subtotal	7.4	0.0	
				Personnel Total	$22.2

Travel Costs:	Ticket	Round	Total	Daily	Travel
Description	Price	Trips	Days	Per Diem	Sum
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
				Travel Total	$0.0

FY15

Program Title: Long-term monitoring: Pelagic monitoring component - Continuing the Legacy: Prince William Sound Marine Bird Population Trends.
Team Leader: Irons and Kuletz

FORM 4B
PERSONNEL & TRAVEL DETAIL

Contractual Costs:	Contract
Description	Sum
If a component of the project will be performed under contract, the 4A and 4B forms are required. **Contractual Total**	$0.0

Commodities Costs:	Commodities
Description	Sum
Commodities Total	$0.0

FY15

Program Title: Long-term monitoring: Pelagic monitoring component - Continuing the Legacy: Prince William Sound Marine Bird Population Trends.
Team Leader: Irons and Kuletz

FORM 4B CONTRACTUAL & COMMODITIES DETAIL

New Equipment Purchases: Description	Number of Units	Unit Price	Equipment Sum
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
		New Equipment Total	$0.0

Existing Equipment Usage: Description	Number of Units	Inventory Agency

FY15

Program Title: Long-term monitoring: Pelagic monitoring component - Continuing the Legacy: Prince William Sound Marine Bird Population Trends.
Team Leader: Irons and Kuletz

FORM 4B
EQUIPMENT DETAIL

Budget Category:	Proposed FY 12	Proposed FY 13	Proposed FY 14	Proposed FY 15	Proposed FY 16	TOTAL PROPOSED	Actual Cumulative
Personnel	$46.0	$70.0	$72.0	$74.3	$77.3	$339.6	$71.1
Travel	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$1.1
Contractual	$1.4	$2.1	$2.1	$2.1	$1.8	$9.5	$1.1
Commodities	$0.0	$0.0	$0.1	$0.1	$0.1	$0.3	$0.2
Equipment	$0.0	$0.0	$0.0	$0.0	$1.1	$1.1	$0.0
Indirect Costs (will vary by proposer)	waived	waived	waived	waived	waived	waived	waived
SUBTOTAL	$47.4	$72.1	$74.2	$76.5	$80.3	$350.5	$73.4
General Administration (9% of subtotal)	$4.3	$6.5	$6.7	$6.9	$7.2	$31.5	N/A
PROJECT TOTAL	$51.7	$78.6	$80.9	$83.4	$87.5	$382.1	$73.4
Other Resources (In kind Funds)	$10.5	$45.5	$63.5	$63.5	$63.5	$246.5	$56.0

COMMENTS: Prince William Sound Science Center waives the indirect cost on this proposal due to its administration of the overall proposal.
This project relies on using ships of opportunity to conduct seabird observations. Past & projected ship time from non-EVOSTC funds:
in-kind ship time: $140.0 Alaska Dept. Fish & Game ($3.5/d @ 10 d/yr @ 4 yrs; began 2013, projected to continue atleast through 2016)
in-kind ship time: $48.0 Ocean Tracking Network ($3.0/d @ 6 d/yr @ 3 yrs; begins Feb. 2014. projected to continue atleast through 2016)
in-kind ship time: $21.0 NOAA ($1.5/d @ 7 d/yr, since Oct 2011; depends on year on amount non-evostc funds used)

Please note that the remaining vessel costs are covered by the EVOSTC projects: PWS Herring Research & Monitoring and LTM Humpback whale project.

FY12-16

Project Title:15120114-C Long-term monitoring of seabird abundance & habitat associations during late fall & winter in PWS
Project PI: M.A. Bishop

FORM 3A
NON-TRUSTEE
AGENCY SUMMARY

Personnel Costs:		Months	Monthly		Personnel
Name	Project Title	Budgeted	Costs	Overtime	Sum
B. Hsu	Research Assistant	6.5	7.0		45.5
M.A. Bishop	Principal Investigator	2.4	12.0		28.8
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
		Subtotal	19.0	0.0	
				Personnel Total	74.3

Travel Costs:	Ticket	Round	Total	Daily	Travel
Description	Price	Trips	Days	Per Diem	Sum
					0
					0
					0
					0
					0
					0
					0
					0
					0
					0
					0
				Travel Total	0

FY15

Project Title:Long-term monitoring of seabird abundance & habitat associations during late fall & winter in Prince William Sd
Project PI: M.A. Bishop, PWS Science Center

FORM 3B
PERSONNEL & TRAVEL DETAIL

Contractual Costs:	Contract
Description	Sum
network & software subscriptions $150/staff mo	1.4
communications (phone & fax) $50/staff mo	0.5
printing & copying $25/staff mo	0.2
If a component of the project will be performed under contract, the 4A and 4B forms are required. **Contractual Total**	2.1

Commodities Costs:	Commodities
Description	Sum
supplies	0.1
Commodities Total	0.1

FY15

Project Title:Long-term monitoring of seabird abundance & habitat associations during late fall & winter in Prince William Sd
Project PI: M.A. Bishop, PWS Science Center

FORM 3B
CONTRACTUAL & COMMODITIES DETAIL

New Equipment Purchases: Description	Number of Units	Unit Price	Equipment Sum
			0
			0
			0
			0
			0
			0
			0
			0
			0
			0
			0
			0
			0
		New Equipment Total	0

Existing Equipment Usage: Description	Number of Units	Inventory Agency
Desktop computer (2) and ruggedized computer (1)	3	PWSSC

FY15

Project Title:Long-term monitoring of seabird abundance & habitat associations during late fall & winter in Prince William Sd
Project PI: M.A. Bishop, PWS Science Center

FORM 3B
EQUIPMENT DETAIL

Budget Category:	Proposed FY 12	Proposed FY 13	Proposed FY 14	Proposed FY 15	Proposed FY 16	TOTAL PROPOSED	Actual Cumulative
Personnel	$110.0	$160.0	$160.0	$160.0	$160.0	$750.0	$267.4
Travel	$3.5	$5.0	$5.0	$5.0	$5.0	$23.5	$23.9
Contractual	$118.5	$103.0	$125.0	$103.0	$125.0	$574.5	$199.0
Commodities	$5.1	$9.0	$9.0	$9.0	$9.0	$41.1	$28.8
Equipment	$22.0	$2.0	$5.5	$7.0	$5.5	$42.0	$13.3
Indirect Costs (will vary by proposer)							
SUBTOTAL	$259.1	$279.0	$304.5	$284.0	$304.5	$1,431.1	$532.4
General Administration (9% of subtotal)	$23.3	$25.1	$27.4	$25.6	$27.4	$128.8	N/A
PROJECT TOTAL	$282.4	$304.1	$331.9	$309.6	$331.9	$1,559.90	$532.4
All amounts are in thousands of dollars.							
Other Resources (in kind Funds)	$274.0	$274.0	$274.0	$274.0	$274.0	$1,370.0	$548.0

COMMENTS: Annual in-kind contributions from USGS consist of staff time (Esler, Bodkin, Kloecker, Esslinger, Snedgen: $60K), reduced charter costs ($24K), use of equipment such as inflatables/outboards, GPSs, spotting scopes, field laptops, sounding equipment (eelgrass sampling), 10K. From NOAA: staff time & expenses (Lindeberg), 10K; from NPS: staff time (Coletti, Shephard, others), 120K, operations, 50K.

FY12-16

Program Title: 15120114-R Nearshore Monitoring

Team Leader: Ballachey & Dean

FORM 4A
TRUSTEE AGENCY SUMMARY

Personnel Costs:		Months	Monthly		Personnel
Name	Project Title	Budgeted	Costs	Overtime	Sum
Senior scientist, Ballachey		2.0	10.0		20.0
Field Leader: Daniel Monson		12.0	7.5		90.0
Biotech		8.0	5.0		40.0
NOAA staff		1.0	10.0		10.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
		Subtotal	32.5	0.0	
				Personnel Total	$160.0

Travel Costs:	Ticket	Round	Total	Daily	Travel
Description	Price	Trips	Days	Per Diem	Sum
Field travel					3.0
AMSS & LTM PI meeting	1.0	2			2.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
				Travel Total	$5.0

FY15

Program Title: Nearshore Monitoring
Team Leader: Ballachey & Dean
Agency: USGS

FORM 4B
PERSONNEL &
TRAVEL DETAIL

Contractual Costs:	Contract
Description	Sum
Vessel charter: PWS, $1.0/day * 23 days	23.0
Vessel charter: Katmai	20.0
Aerial Survey (sea otters) in Katmai/Kenai (alternating years)	17.5
Sea otter carcass tooth cementum age analysis	0.5
Stable Isotope analyses, PWS mussels	6.0
Coastal Resource Associates (CRA, Dr. Tom Dean)	36.0
If a component of the project will be performed under contract, the 4A and 4B forms are required. **Contractual Total**	$103.0

Commodities Costs:	Commodities
Description	Sum
fuel for skiffs	3.0
field & safety gear	3.0
software	3.0
Commodities Total	$9.0

FY15

Program Title: Nearshore Monitoring
Team Leader: Ballachey & Dean
Agency: USGS

FORM 4B
CONTRACTUAL & COMMODITIES DETAIL

New Equipment Purchases: Description	Number of Units	Unit Price	Equipment Sum
data logging instruments (HOBOs, Star-Oddis, etc)	1.0	2.0	2.0
skiff/outboard for use on charters	1.0	5.0	5.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
		New Equipment Total	$7.0

Existing Equipment Usage: Description	Number of Units	Inventory Agency
Questar spotting scopes & high-power binocs for sea otter forage data collection	3	USGS
Existing small skiffs for charters (3 skiffs/nearshore trip are needed, more if trips are concurrent)	2	USGS
Field computers	3	USGS
Cameras	2	USGS
GPS units	3	USGS
25 ft Boston Whaler, if needed for carcass surveys, monitoring work	1	USGS
airplane GPS unit for sea otter surveys	1	USGS

FY15

Program Title: Nearshore Monitoring
Team Leader: Ballachey & Dean
Agency: USGS

FORM 4B
EQUIPMENT DETAIL

Personnel Costs:		Months	Monthly		Personnel
Name	Project Title	Budgeted	Costs	Overtime	Sum
chief scientist, Dr. Dean		3.0	11.0		33.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
		Subtotal	11.0	0.0	
				Personnel Total	$33.0

Travel Costs:	Ticket	Round	Total	Daily	Travel
Description	Price	Trips	Days	Per Diem	Sum
Field travel					1.0
AMSS & LTM PI meeting	1.0	2			2.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
				Travel Total	$3.0

FY15

Program Title: Nearshore Monitoring
Team Leader: Ballachey & Dean
Agency: CRA (Dr. Tom Dean)

FORM 4B
CONTRACTOR
PERSONNEL &
TRAVEL DETAIL

Contractual Costs:	Contract
Description	Sum
If a component of the project will be performed under contract, the 4A and 4B forms are required. **Contractual Total**	$0.0

Commodities Costs:	Commodities
Description	Sum
Commodities Total	$0.0

FY15

Program Title: Nearshore Monitoring
Team Leader: Ballachey & Dean
Agency: CRA (Dr. Tom Dean)

FORM 4B
CONTRACTOR
CONTRACTUAL &
COMMODITIES DETAIL

New Equipment Purchases: Description	Number of Units	Unit Price	Equipment Sum
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
		New Equipment Total	$0.0

Existing Equipment Usage: Description	Number of Units	Inventory Agency

FY15

Program Title: Nearshore Monitoring
Team Leader: Ballachey & Dean
Agency: CRA (Dr. Tom Dean)

FORM 4B
CONTRACTOR
EQUIPMENT DETAIL

Budget Category:	Proposed FY 12	Proposed FY 13	Proposed FY 14	Proposed FY 15	Proposed FY 16	TOTAL PROPOSED	Actual Cumulative
Personnel	$20.0	$20.7	$21.3	$22.0	$21.8	$105.8	$16.6
Travel	$1.0	$1.0	$1.0	$1.0	$1.0	$5.0	$3.8
Contractual	$6.4	$5.9	$5.2	$4.5	$4.5	$26.5	$3.2
Commodities	$2.1	$2.0	$2.0	$2.0	$1.5	$9.6	$1.3
Equipment	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Indirect Costs (will vary by proposer)	$14.6	$14.6	$14.6	$14.6	$14.7	$73.1	$12.3
SUBTOTAL	$44.1	$44.2	$44.1	$44.1	$43.5	$220.0	$37.2
General Administration (9% of subtotal)	$4.0	$4.0	$4.0	$4.0	$3.9	$19.8	N/A
PROJECT TOTAL	$48.1	$48.2	$48.1	$48.1	$47.4	$239.8	$37.2
Other Resources (in kind Funds)	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0

COMMENTS:

FY12-16

Project Title:15120114-L Kachemak Bay Intertidal
Team Leader: Konar/IkenF

FORM 3A
NON-TRUSTEE AGENCY SUMMARY

Personnel Costs:		Months	Monthly		Personnel
Name	Project Title	Budgeted	Costs	Overtime	Sum
Brenda Konar	PI	0.5	13.9		7.0
Katrin Iken	co-PI	0.5	12.9		6.5
MS Graduate Student	Student	2.0	4.3		8.6
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
		Subtotal	31.1	0.0	
				Personnel Total	$22.0

Travel Costs:	Ticket	Round	Total	Daily	Travel
Description	Price	Trips	Days	Per Diem	Sum
Travel to Kasitsna Bay Laboratory	1.0	1			1.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
				Travel Total	$1.0

FY15

Project Title:15120114-L Kachemak Bay Intertidal
Team Leader: Konar/IkenF

FORM 3B
PERSONNEL & TRAVEL DETAIL

Contractual Costs:	Contract
Description	Sum
Kasitsna Bay Laboratory Fees	0.5
Angie Doroff KBNERR	4.0
If a component of the project will be performed under contract, the 4A and 4B forms are required. **Contractual Total**	$4.5

Commodities Costs:	Commodities
Description	Sum
Project Supplies	1.0
Data Loggers	1.0
Commodities Total	$2.0

FY15

Project Title:15120114-L Kachemak Bay Intertidal
Team Leader: Konar/IkenF

FORM 3B
CONTRACTUAL &
COMMODITIES DETAIL

New Equipment Purchases: Description	Number of Units	Unit Price	Equipment Sum
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
		New Equipment Total	$0.0

Existing Equipment Usage: Description	Number of Units	Inventory Agency

FY15

Project Title:15120114-L Kachemak Bay Intertidal
Team Leader: Konar/IkenF

FORM 3B
EQUIPMENT DETAIL

Budget Category:	Proposed FY 12	Proposed FY 13	Proposed FY 14	Proposed FY 15	Proposed FY 16	TOTAL PROPOSED	Actual Cumulative
Personnel	$90.0	$111.6	$115.2	$117.6	$121.2	$555.6	$191.6
Travel	$10.8	$9.4	$11.4	$9.9	$11.4	$52.9	$11.9
Contractual	$7.5	$5.5	$5.5	$5.5	$5.5	$29.5	$2.7
Commodities	$1.0	$1.0	$1.0	$1.0	$1.0	$5.0	$0.0
Equipment	$4.0	$0.0	$3.0	$0.0	$0.0	$7.0	$1.0
Indirect Costs (*will vary by proposer*)							
SUBTOTAL	$113.3	$127.5	$136.1	$134.0	$139.1	$650.0	$207.2
General Administration (9% of subtotal)	$10.2	$11.5	$12.2	$12.1	$12.5	$58.5	N/A
PROJECT TOTAL	$123.5	$139.0	$148.3	$146.1	$151.6	$708.5	$207.2
Other Resources (in kind Funds)	$13.0	$13.0	$13.0	$13.0	$13.0	$65.0	$26.0

In-Kind contributions: FY12 - FY16: $65.0K in salary support for Kris Holderied ($13.0K/year)

FY12-16

Program Title: 15120114-H Coordination & Synthesis
Team Leader: Kris Holderied
Agency: NOAA

FORM 4A
TRUSTEE AGENCY
SUMMARY

Personnel Costs:		Months	Monthly		Personnel
Name	Project Title	Budgeted	Costs	Overtime	Sum
Physical scientist/ Ecologist	Synthesis coordinator	12.0	9.8	0.0	117.6
				0.0	0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
		Subtotal	9.8	0.0	
				Personnel Total	$117.6

Travel Costs:	Ticket	Round	Total	Daily	Travel
Description	Price	Trips	Days	Per Diem	Sum
Marine Science Symposium (2 people for 5 days)	0.4	2	10	0.2	2.7
Coordination mtgs w/EVOSTC and LTM team (2 people/ 2 days @2/yr)	0.4	4	8	0.2	3.0
Principal Investigator Meeting - Anchorage (2 people for 3 days)	0.4	2	6	0.2	1.9
Coordination mtg with Herring Program - Cordova (2 people for 3 days)	0.6	2	6	0.2	2.3
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
				Travel Total	$9.9

FY15

Program Title: LTM - Coordination & Synthesis
Team Leader: Kris Holderied
Agency: NOAA

FORM 4B
PERSONNEL &
TRAVEL DETAIL

Contractual Costs:	Contract
Description	Sum
Office space rental - Homer	3.5
Computer software license update (data analysis/visualization)	2.0
If a component of the project will be performed under contract, the 4A and 4B forms are required. **Contractual Total**	$5.5

Commodities Costs:	Commodities
Description	Sum
Supplies	1.0
Commodities Total	$1.0

FY15

Program Title: LTM - Coordination & Synthesis
Team Leader: Kris Holderied
Agency: NOAA

FORM 4B
CONTRACTUAL & COMMODITIES DETAIL

New Equipment Purchases: Description	Number of Units	Unit Price	Equipment Sum
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
		New Equipment Total	$0.0

Existing Equipment Usage: Description	Number of Units	Inventory Agency

FY15

Program Title: LTM - Coordination & Synthesis
Team Leader: Kris Holderied
Agency: NOAA

FORM 4B
EQUIPMENT DETAIL

Budget Category:	Proposed FY 12	Proposed FY 13	Proposed FY 14	Proposed FY 15	Proposed FY 16	TOTAL PROPOSED	Actual Cumulative
Personnel	$138.5	$118.0	$122.300	$122.3	$121.3	$622.4	$268.2
Travel	$0.0	$0.0	$0.000	$0.0	$0.0	$0.0	$0.0
Contractual	$0.0	$0.0	$0.000	$0.0	$0.0	$0.0	$0.0
Commodities	$0.0	$0.0	$0.000	$0.0	$0.0	$0.0	$0.3
Equipment	$5.1	$4.8	$0.000	$0.0	$0.0	$9.9	$0.0
Indirect Costs (*will vary by proposer*)	$31.4	$27.1	$28.129	$28.1	$27.9	$142.7	$56.4
SUBTOTAL	$175.0	$149.9	$150.429	$150.4	$149.2	$774.9	$324.9
General Administration (9% of subtotal)	$15.8	$13.5	$13.5	$13.5	$13.4	$69.7	N/A
PROJECT TOTAL	$190.8	$163.4	$164.0	$164.0	$162.6	$844.7	$324.9
Other Resources (in kind Funds)	$683.0	$640.0	$620.0	$500.0	$500.0	$2,943.0	$1,323.0

Leveraged Funding Sources

AOOS - Data management Activities (FY12 - 500K, FY13 - 500K, FY14 - 500K, FY15 - 500K, FY16 - 500k)

PWSSC -Project level data management system (FY12 - 48K)

Northern Forum/USFWS - North Pacific Seabird Data System (FY12 - 50K, FY13 - 50K, FY14 -50K)

ADF&G/AOOS - Data integration partnership/sharing (FY12 - 60K, FY13 - 90K, FY14 -70K)

CIRCAC - Regional Data Management Support for CI (FY12 - 25K)

Kenai Fish Habitat Partnership: FY15-28K

NPRB GOAIERP- FY15-80k

USFWS Seabird program: FY15- 50k

FY12-16

Program Title: 15120114-D Data Maanagement
Team Leader: Rob Bochenek, AOOS

SUMMARY

Personnel Costs:			Months	Monthly		Personnel
Name	Project Title		Budgeted	Costs	Overtime	Sum
Shane StClair	Senior Software Engineer		1.5	9.3		14.0
Rob Bochenek	Infortmation Architect		1.0	10.1		10.1
Shared: Luc Mehl, Chris Turner and Jordar	Data Analyst		7.0	8.5		59.5
John Dunaway	Software Engineer/		2.0	8.5		17.0
Ross Martin	Software Engineer/		2.5	8.7		21.8
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
			Subtotal	45.1	0.0	
					Personnel Total	$122.3

Travel Costs:	Ticket	Round	Total	Daily	Travel
Description	Price	Trips	Days	Per Diem	Sum
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
				Travel Total	$0.0

FY15

Program Title: LTM Data Maanagement
Team Leader: Rob Bochenek, AOOS

FORM 3B
PERSONNEL & TRAVEL DETAIL

Contractual Costs:	Contract
Description	Sum
If a component of the project will be performed under contract, the 4A and 4B forms are required. **Contractual Total**	$0.0

Commodities Costs:	Commodities
Description	Sum
Commodities Total	$0.0

FY15

Program Title: LTM Data Maanagement
Team Leader: Rob Bochenek, AOOS

FORM 3B
CONTRACTUAL & COMMODITIES DETAIL

New Equipment Purchases: Description	Number of Units	Unit Price	Equipment Sum
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
		New Equipment Total	$0.0

Existing Equipment Usage: Description	Number of Units	Inventory Agency

FY15

Program Title: LTM Data Maanagement
Team Leader: Rob Bochenek, AOOS

FORM 3B
EQUIPMENT DETAIL

Budget Category:	Proposed FY 12	Proposed FY 13	Proposed FY 14	Proposed FY 15	Proposed FY 16	TOTAL PROPOSED	Actual Cumulative
Personnel	$10.0	$14.4	$19.200	$20.1	$21.0	$84.7	$5.1
Travel	$5.7	$5.7	$5.700	$5.7	$5.7	$28.5	$7.5
Contractual	$38.4	$40.2	$42.000	$29.2	$30.6	$180.4	$40.3
Commodities	$4.0	$4.0	$0.000	$0.0	$0.0	$8.0	$3.3
Equipment	$0.0	$0.0	$0.000	$0.0	$0.0	$0.0	
Indirect Costs (*will vary by proposer*)	$18.1	$20.0	$20.800	$17.1	$17.8	$93.8	$18.5
SUBTOTAL	$76.2	$84.3	$87.700	$72.1	$75.1	$395.4	$74.8
General Administration (9% of subtotal)	$6.9	$7.6	$7.9	$6.5	$6.8	$35.6	N/A
PROJECT TOTAL	$83.1	$91.9	$95.6	$78.6	$81.9	$431.0	$74.8
Other Resources (Cost Share Funds)	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	

COMMENTS:
This summary page provides an five-year overview of proposed funding and actual cumulative spending. The column titled 'Actual Cumulative' should be updated each fiscal year to provide information on the total amount actually spent for all completed years of the project. On the Project Annual Report Form, if any line item exceeds a 10% deviation from the originally-proposed amount; provide detail regarding the reason for the deviation..

In this box, identify non-EVOSTC funds or in-kind contributions used as cost-share for the work in this proposal. List the amount of funds, the source of funds, and the purpose for which the funds will be used. Do not include funds that are not directly and specifically related to the work being proposed in this proposal.

FY12-16

Program Title: 15120114-I Conceptual Modeling
Team Leader: Tuula Hollmen

SUMMARY

Personnel Costs:		Months	Monthly		Personnel
Name	Project Title	Budgeted	Costs	Overtime	Sum
	Long-Term Monitoring of Marine Conditions				0.0
Post-Doctoral Researcher - TBD	and Injured Resources and Services -	3.0	6700.0		20,100.0
	Synthesis Component				0.0
		Subtotal	6700.0	0.0	
				Personnel Total	$20,100.0

Travel Costs:	Ticket	Round	Total	Daily	Travel
Description	Price	Trips	Days	Per Diem	Sum
PI meeting in Anchorage	800.0	1	3	430.00	2,090.00
Modeling Workshop in Anchorage	800.0	1	3	430.00	2,090.00
Alaska Marine Science Symposium	200.0	1	6	230.00	1,580.00
					0.0
				Travel Total	$5,760.0

FY15

Program Title: Long-Term Monitoring of Marine Conditions and Injured Resources and Services - Synthesis Component
Team Leader: Tuula Hollmen

FORM 3B
PERSONNEL & TRAVEL DETAIL

Contractual Costs:	Contract
Description	Sum
Salary Support - PI Tuula Hollmen @ $14,600/mo x 2 months	29,200.0
If a component of the project will be performed under contract, the 4A and 4B forms are required **Contractual Total**	$29,200.0

Supplies Costs:	Supplies
Description	Sum
Supplies Total	$0.0

FY15

Program Title: Long-Term Monitoring of Marine Conditions and Injured Resources and Services - Synthesis Component
Team Leader: Tuula Hollmen

FORM 3B
CONTRACTUAL & Supplies DETAIL

New Equipment Purchases: Description	Number of Units	Unit Price	Equipment Sum
			0.0
		New Equipment Total	$0.0

Existing Equipment Usage: Description	Number of Units	Inventory Agency

FY15

Program Title: Long-Term Monitoring of Marine Conditions and Injured Resources and Services - Synthesis Component
Team Leader: Tuula Hollmen

FORM 3B
EQUIPMENT DETAIL

Personnel Costs: Name	Project Title			Months Budgeted	Monthly Costs	Overtime	Personnel Sum
							0.0
Post-Doctoral Researcher - TBD				3.0	7000.0		21,000.0
							0.0
				Subtotal	7000.0	0.0	
						Personnel Total	$21,000.0

Travel Costs: Description	Ticket Price	Round Trips	Total Days	Daily Per Diem	Travel Sum
PI meeting in Anchorage	800.0	1	3	430.00	2,090.00
Modeling Workshop in Anchorage	800.0	1	3	430.00	2,090.00
Alaska Marine Science Symposium	200.0	1	6	230.00	1,580.00
					0.0
					0.0
				Travel Total	$5,760.0

FY16

Program Title: Long-Term Monitoring of Marine Conditions and Injured Resources and Services - Synthesis Component
Team Leader: Tuula Hollmen

FORM 3B
PERSONNEL & TRAVEL DETAIL

Budget Category:	Proposed FY 12	Proposed FY 13	Proposed FY 14	Proposed FY 15	Proposed FY 16	TOTAL PROPOSED	Actual Cumulative
Personnel	$118.8	$122.4	$130.4	$127.3	$129.9	$628.8	$202.3
Travel	$48.3	$51.6	$55.6	$59.7	$61.7	$276.9	$14.5
Contractual	$69.5	$75.0	$84.5	$81.2	$70.2	$380.5	$57.8
Commodities	$5.0	$3.0	$3.4	$1.0	$2.5	$14.9	$6.3
Equipment	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	
Indirect Costs (*will vary by proposer*)	waived	waived	waived	waived	waived	waived	waived
SUBTOTAL	$241.6	$252.1	$273.9	$269.2	$264.3	$1,301.1	$280.9
General Administration (9% of subtotal)	$21.7	$22.7	$24.7	$24.2	$23.8	$117.1	N/A
PROJECT TOTAL	$263.3	$274.7	$298.6	$293.4	$288.1	$1,418.2	$280.9
Other Resources (Cost Share Funds)	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	

COMMENTS: PWSSC proposes a flat rate in lieu of its federal recognized IDC rate. This $200K itemized budget includes expenses that would normally be charged to IDC, and ALSO INCLUDES travel and meeting setup costs that are direct program charges.

FY12-16

Program Title: 15120114-B Administration and Meeting Travel/Logistics
Team Leader: Hoffman

SUMMARY

Personnel Costs:		Months	Monthly		Personnel
Name	Project Title	Budgeted	Costs	Overtime	Sum
Exec Director		2.0	13.5		27.0
Finance Director		3.0	9.0		27.0
Bookkeeper		7.0	6.0		42.0
Admin. Assistant		2.5	5.0		12.5
IT support		2.5	7.5		18.8
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
		Subtotal	41.0	0.0	
				Personnel Total	$127.3

Travel Costs:	Ticket	Round	Total	Daily	Travel
Description	Price	Trips	Days	Per Diem	Sum
Adminstrative staff Cordova to Anchorage	0.5	2	2	0.2	1.4
Travel for Science/Technical Committee review meetings					12.0
Travel for Outreach & Communications meetings & activities					20.0
Travel for LTM Annual Project mtg in Anchorage - 15 P.I.s plus 2 nights					18.0
Support for KRRB, ASLC, PWSSC/OSRI reps to attend TC PAC mtg	0.400	3	1.0	0.100	1.3
Two annual P.I. mtgs (herring & LTM) - outreach representatives travel	0.400	6	1.5	0.175	2.7
Regional science symposiums - attendance by outreach representatives	0.400	10	2.0	0.175	4.4
					0.0
					0.0
					0.0
					0.0
				Travel Total	$59.7

FY15

Program Title: 15120114-B Administration and Meeting Travel/Logistics
Team Leader: Hoffman

FORM 3B
PERSONNEL & TRAVEL DETAIL

Contractual Costs:	Contract
Description	Sum
Meeting space rental for LTM Annual Project Meeting in Anchorage	1.0
Mini-grant program to support activities directed by Outreach Team	36.0
Develop project profiles 6 each year @ $1,000 each	6.0
Participate in *Delta Sound Connections* annual publication	2.0
AOOS personnel support for facilitation of project	6.0
Shared costs through the PWSSC:	
Electricity @$450/month	5.4
Office space rent @ $690/month	8.3
Vehicle use in Cordova	1.0
Postage @ $75/month	0.9
Audit (total cost estimated at $20K)	10.0
Insurance (total cost estimated at $30K)	2.0
Telephone @ $220/month	2.6
Contractual Total	$81.2

Commodities Costs:	Commodities
Description	Sum
Misc. office supplies	1.0
Computer and/or software	0.0
Commodities Total	$1.0

FY15

Program Title: 15120114-B Administration and Meeting Travel/Logistics
Team Leader: Hoffman

FORM 3B
CONTRACTUAL & COMMODITIES DETAIL

New Equipment Purchases: Description	Number of Units	Unit Price	Equipment Sum
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
		New Equipment Total	$0.0

Existing Equipment Usage: Description	Number of Units	Inventory Agency

FY15

Program Title: 15120114-B Administration and Meeting Travel/Logistics
Team Leader: Hoffman

FORM 3B
EQUIPMENT DETAIL

Budget Category:	Proposed FY 12	Proposed FY 13	Proposed FY 14	Proposed FY 15	Proposed FY 16	TOTAL PROPOSED	Actual Cumulative
Personnel	$294.2	$329.1	$148.6	$153.7	$41.5	$967.1	$414.9
Travel	$2.8	$2.8	$121.0	$121.0	$2.8	$250.3	$6.0
Contractual	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Supplies	$6.5	$6.5	$1.4	$1.4	$9.5	$25.3	$8.5
Equipment	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Indirect Costs (will vary by proposer)	$78.9	$88.0	$70.5	$71.8	$14.0	$323.1	$99.6
SUBTOTAL	$382.4	$426.3	$341.4	$347.9	$67.8	$1,565.8	$529.0
General Administration (9% of subtotal)	$34.4	$38.4	$30.7	$31.3	$6.1	$140.9	N/A
PROJECT TOTAL	$416.8	$464.7	$372.1	$379.2	$73.9	$1,706.7	$529.0
Other Resources (Cost Share Funds)	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	

COMMENTS: Working groups and post docs were delayed and will now be included in FY15. We plan to use rollover funds to support the engineering and data support of the project. Additionally, upon request from EVOSTC staff, the working group costs that were originally listed in the Supplies category have been shifted to the Travel category. This reflects approximately $118.2k/year in FY14 and FY15.

FY12-16

Program Title:12120120 Collaborative Data Management and Holistic Synthesis of Impacts and Recovery Status Associated with the Exxon Valdez Oil Spill
Team Leader:Matthew B. Jones

FORM 3A
NON-TRUSTEE AGENCY SUMMARY

New Equipment Purchases: Description	Number of Units	Unit Price	Equipment Sum
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
		New Equipment Total	$0.0

Existing Equipment Usage: Descriptior	Number of Units	Inventory Agency

FY14

Program Title:Collaborative Data Management and Holistic Synthesis of Impacts and Recovery Status Associated with the Exxon Valdez Oil Spill
Team Leader:Matthew B. Jones
Agency: NCEAS, MSI, UC Santa Barbara

FORM 3B
EQUIPMENT DETAIL

Personnel Costs:		Months	Monthly		Personnel
Name	Project Title	Budgeted	Costs	Overtime	Sum
Matthew Jones, Principal Investigator	Data Management & Synthesis	2.0	13.5		27.0
Ecological Postdoctoral Scholar - TBN	Synthesis	12.0	4.8		58.1
Ecological Postdoctoral Scholar - TBN	Synthesis	12.0	4.8		58.1
Scientific Programmer - TBN	Data Management & Synthesis	10.0	1.1		10.5
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
		Subtotal	24.2	0.0	
				Personnel Total	$153.7

Travel Costs:	Ticket	Round	Total	Daily	Travel
Description	Price	Trips	Days	Per Diem	Sum
Project meetings with LTM, HRM, AOOS, and Axiom partners	0.8	2	6	0.2	2.8
"Assessing Impacts" Synthesis Working Group, 15 people, two working groups each	0.9	30	5	0.214	59.1
Understanding Ecosystem Recovery Working Group, 15 people, two working groups each	0.9	30	5	0.214	59.1
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
				Travel Total	$121.0

FY15

Program Title:Collaborative Data Management and Holistic Synthesis of Impacts and Recovery Status Associated with the Exxon Valdez Oil Spill
Team Leader:Matthew B. Jones
Agency: NCEAS, MSI, UC Santa Barbara

FORM 3B
PERSONNEL & TRAVEL DETAIL

Contractual Costs:	Contract

Description	Sum
If a component of the project will be performed under contract, the 4A and 4B forms are required. **Contractual Total**	$0.0

Supplies Costs:	Supplies
Description	Sum
Communications charges (long-distance, fax, fedex, web conferencing, etc.)	0.5
Working Group Refreshments (coffee, sodas, etc. Participants and UCSB attendees, ~$5/day/person)	0.9
Supplies Total	$1.4

FY15

Program Title:Collaborative Data Management and Holistic Synthesis of Impacts and Recovery Status Associated with the Exxon Valdez Oil Spill
Team Leader:Matthew B. Jones
Agency: NCEAS, MSI, UC Santa Barbara

FORM 3B
CONTRACTUAL & Supplies DETAIL

New Equipment Purchases: Description	Number of Units	Unit Price	Equipment Sum
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
		New Equipment Total	$0.0

Existing Equipment Usage: Descriptior	Number of Units	Inventory Agency

FY15

Program Title:Collaborative Data Management and Holistic Synthesis of Impacts and Recovery Status Associated with the Exxon Valdez Oil Spill
Team Leader:Matthew B. Jones
Agency: NCEAS, MSI, UC Santa Barbara

FORM 3B
EQUIPMENT DETAIL

Budget Category:	Proposed FY 12	Proposed FY 13	Proposed FY 14	Proposed FY 15	Proposed FY 16	TOTAL PROPOSED	Actual Cumulative
Personnel	$0.0	$0.0				$0.0	$44.9
Travel	$10.0	$0.0				$10.0	$3.2
Contractual	$141.9	$0.0				$141.9	$128.3
Commodities	$35.5	$0.0				$35.5	$5.3
Equipment	$0.0	$0.0				$0.0	
Indirect Costs (will vary by proposer)							
SUBTOTAL	$187.4	$0.0	$0.0	$0.0	$0.0	$187.4	$181.7
General Administration (9% of subtotal)	$16.9	$0.0	$0.0	$0.0	$0.0	$16.9	N/A
PROJECT TOTAL	$204.2	$0.0	$0.0	$0.0	$0.0	$204.2	$181.7
All amounts are in thousands of dollars.							
Other Resources (Cost Share Funds)	$70.0	$0.0	$0.0	$0.0	$0.0	$0.0	

COMMENTS:

FY12-16

Program Title: 15120114-Q Harlequin Ducks and Sea Otters
Team Leader: Esler & Ballachey
Agency: USGS

FORM 4A
TRUSTEE AGENCY SUMMARY

Budget Category:	Proposed FY 12	Proposed FY 13	Proposed FY 14	Proposed FY 15	Proposed FY 16	TOTAL PROPOSED	Actual Cumulative
Personnel	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Travel	$1.5	$1.5	$1.5	$4.2	$1.5	$10.2	$1.5
Contractual	$14.0	$9.0	$5.5	$130.0	$4.0	$162.5	$16.5
Commodities	$2.5	$1.5	$1.0	$21.0	$0.5	$26.5	$13.3
Equipment	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	
Indirect Costs (will vary by proposer)							
SUBTOTAL	$18.0	$12.0	$8.0	$155.2	$6.0	$199.2	$31.3
General Administration (9% of subtotal)	$1.6	$1.1	$0.7	$14.0	$0.5	$17.9	N/A
PROJECT TOTAL	$19.6	$13.1	$8.7	$169.2	$6.5	$217.1	$31.3
Other Resources (in kind Funds)	$50.0	$50.0	$50.0	$50.0	$50.0	$250.0	$100.0

Original COMMENTS: Portions of permanent staff salaries will be donated, including Dr. Jeep Rice, Mark Carls, Marie Larsen, Larry Holland, Josie Lunasin, and Mandy Lindeberg.

FY12-16

Program Title: 15120114-S Lingering Oil Monitoring
Team Leader: Mark Carls

FORM 4A
TRUSTEE AGENCY SUMMARY

Personnel Costs:		Months	Monthly		Personnel
Name	Project Title	Budgeted	Costs	Overtime	Sum
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
		Subtotal	0.0	0.0	
				Personnel Total	$0.0

Travel Costs:	Ticket	Round	Total	Daily	Travel
Description	Price	Trips	Days	Per Diem	Sum
					0.0
one trip, Alaska Marine Science Symposium	0.5	1	5	0.2	1.5
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
				Travel Total	$1.5

FY15

Program Title: Lingering Oil Monitoring
Team Leader: Mark Carls
Agency: NOAA / NMFS / Auke Bay Laboratories

FORM 4B
PERSONNEL & TRAVEL DETAIL

Contractual Costs: Description	Contract Sum
technician, hydrocarbon processing	5.5
If a component of the project will be performed under contract, the 4A and 4B forms are required. **Contractual Total**	$5.5

Commodities Costs: Description	Commodities Sum
solvents and supplies for hydrocarbon processing	1.0
Commodities Total	$1.0

FY15

Program Title: Lingering Oil Monitoring
Team Leader: Mark Carls
Agency: NOAA / NMFS / Auke Bay Laboratories

FORM 4B
CONTRACTUAL & COMMODITIES DETAIL

New Equipment Purchases: Description	Number of Units	Unit Price	Equipment Sum
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
		New Equipment Total	$0.0

Existing Equipment Usage: Description	Number of Units	Inventory Agency
muffle furnace		
HPLC		
GC/FID		
GC/MS		
ACE - accelerated solvent extractor		
steam tables		
glassware		
freezers		
balances		
computers		

FY15

Program Title: Lingering Oil Monitoring
Team Leader: Mark Carls
Agency: NOAA / NMFS / Auke Bay Laboratories

FORM 4B
EQUIPMENT DETAIL