

EVOSTC PROJECT REPORT

Project Number: 12120114 and 12120120

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

Team Lead Name: Molly McCammon

Time period covered: October 2011 thru May 2012

Date of Report: June 1, 2012

***Report prepared by: Katrina Hoffman, Kris Holderied, and Molly
McCammon***

Project website (if applicable): <http://www.aos.org/EVOS-LTM/>

Work Performed: Summarize work performed during the reporting period, including any results available to date and their relationship to the original project objectives. Explain deviations from the original project objectives, procedural or statistical methods, study area or schedule. Also describe any known problems or unusual developments, and whether and how they have been or can be overcome. Include any other significant information pertinent to the project.

The overarching goal of the long-term monitoring (LTM) program 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. To accomplish this goal we are conducting a five-year ecosystem monitoring program in the spill-affected region, which is anticipated to be the beginning of a twenty year effort. The program includes: 1) four monitoring components (environmental drivers, benthic, pelagic, lingering oil); 2) data management services; 3) integrated syntheses of our monitoring program data; 4) data recovery and syntheses of historical data; and 5) science outreach. The long-term monitoring program has six main objectives.

- Sustain and build upon existing time series in Prince William Sound, lower Cook Inlet and adjacent Gulf of Alaska coast.
- Provide scientific data, data products and outreach to management agencies and a wide variety of users.
- Develop improved monitoring for certain species and ecosystems.
- Develop science synthesis products to assist management actions, inform the public and guide the evolution of monitoring priorities for the next 20 years.
- Enhance connections between and integration of monitoring projects and between the LTM and Herring Research and Monitoring (HRM) program.
- Leverage partnerships with outside agencies and groups to integrate data from a broader monitoring effort than that funded by the Trustee Council.

All projects are listed below, as well as the organizations involved for each one. The LTM program is composed of integrated program management, data services, science synthesis, and outreach efforts (five projects), as well as the 14 ecosystem monitoring projects. Most projects will occur every year, with a note provided below for those projects that will not occur every year.

- A. Integrated program management, data services, outreach and science synthesis
 - 1. A. Program coordination and logistics – Prince William Sound Science Center (PWSSC) and Alaska Ocean Observing System (AOOS)
 - 1.B. Outreach - AOOS
 - 2. Data management –AOOS/Axiom Consulting
 - 3. Historical data management and synthesis – National Center for Ecological Assessment and Synthesis (NCEAS) – EVOS TC Project# 12120120
 - 4. Science coordination and synthesis – NOAA Kasitsna Bay Laboratory (KBL)
 - 5. Conceptual ecological modeling– Alaska Sea Life Center (ASLC)

B. Environmental drivers monitoring component

6. Gulf of Alaska mooring (GAK1) monitoring – University of Alaska Fairbanks (UAF)
7. Seward line monitoring – UAF
8. Oceanographic conditions in Prince William Sound – PWSSC
9. Oceanographic monitoring in Cook Inlet – Alaska Department of Fish and Game (ADFG) / Kachemak Bay Research Reserve (KBRR)/ KBL
10. Continuous plankton recorder –Sir Alister Hardy Foundation for Ocean Science (SAHFOS)

C. Pelagic monitoring component

11. Ability to detect trends in nearshore marine birds – USNPS Southwest Alaska inventory and monitoring Network (SWAN) – year 1 (no year 2 funding)
12. Long-term killer whale monitoring – North Gulf Oceanic Society (NGOS)
13. Humpback whale predation on herring – NOAA National Marine Fisheries Service (NMFS) Auke Bay Laboratory
14. Forage fish distribution and abundance – U. S. Geological Survey (USGS) Alaska Science Center
15. Prince William Sound marine bird surveys – U.S. Fish and Wildlife Service (USFWS)

D. Benthic monitoring component

16. Nearshore benthic systems in the Gulf of Alaska – USGS Alaska Science Center/ USNPS SWAN, Coastal Resources Associates
17. Ecological Communities in Kachemak Bay – UAF

E. Lingering oil component

18. EVOS oil exposure of harlequin ducks and sea otters – USGS Alaska Science Center
19. Oil level and weathering tracking – NOAA/NMFS Auke Bay Laboratory

The fiscal year for the overall program, as determined by the *Exxon Valdez* Oil Spill Trustee Council (EVOSTC), runs from February 1 to January 31 each year. Many agencies have a fiscal year that runs from October 1 to September 30. The Program Management Team and principal investigators will work to accommodate differences in budget years and align with the EVOSTC budget year dates.

Progress to date

A substantial part of the efforts to date has been to get the funding in place for the overall program and the individual projects. The date that funding began has differed between the trustee agency participants and the non-trustee agency participants. The non-trustee agency component is led by the Prince William Sound Science Center (PWSSC), which established a cooperative agreement with NOAA in March 2012. The subawards to the Alaska Ocean Observing System (AOOS), Axiom Consulting (Axiom), National Center for Ecological Assessment and Synthesis (NCEAS), University of Alaska Fairbanks (UAF), Alaska Sea Life Center (ASLC), Sir Alister Hardy Foundation for Ocean Science (SAHFOS),

and North Gulf Oceanic Society (NGOS) were established once the NOAA agreement with the PWSSC was finalized. Administrative differences among institutions led to varied contract execution dates. EVOSTC funding for Trustee agencies was received at different times, from approximately December 2011 to April 2012. Despite the variable funding start and contract execution dates, most of the projects are on schedule with their milestones, and year 2 activities and budgets are not expected to be impacted.

As described in detail below, sampling and acquisition of new equipment, where needed, has started as scheduled for most of the monitoring projects. The hiring of a science coordinator by NOAA under the Science Coordination and Synthesis Project (#3) has been delayed since funding for the contract personnel hiring action was not available until late May 2012. We anticipate filling that position by July 2012. There has been some preliminary coordination on how to most effectively integrate the data management and historical data recovery and synthesis efforts of AOOS/Axiom and NCEAS, with details provided below, although more extensive coordination is planned with an all-day session scheduled for June 6. Within the pelagic monitoring component, we are requesting approval to replace the PI for the Prince William Sound marine bird survey project (David Irons) with Kathy Kuletz from the same USFWS office, due to his expected retirement during year 2 of our program.

1. Integrated program management, data services, science synthesis & outreach (Leads – McCammon, Holderied and Hoffman)

Program coordination and logistics – Hoffman (PWSSC)

The focus of the program coordination component has been in establishing the funding contracts for the non-trustee agency principal investigators (PIs). This involved revising the proposal in the format needed for submission to NOAA. Additionally, the Program Management Team has met regularly and coordinated with investigators, Trustee Council staff and NOAA contract officers to establish the reporting requirements and develop a Program Management Plan for the LTM program. The LTM Program Management Plan was finalized in May 2012 and all Program PIs are expected to sign and follow it. In addition, all PIs are expected to post copies of their sampling protocols to the Program administrative website.

An LTM PI meeting was held at the January 2012 Alaska Marine Science Symposium in anticipation of the program launch. Most PIs attended in person. A second PI meeting was hosted by teleconference on May 22, 2012 to check in on year 1 progress and address year 2 planning and other issues. A full PI meeting has been scheduled for the last week of November 2012. The Program Management Team is convening a data management and synthesis and modeling coordination meeting on June 6th, 2012 that will include data management, synthesis and modeling PIs, the Program Management Team, ecosystem component leads (Rice, Ballachey, Hopcroft) and the HRM Program Lead (Pegau).

Outreach – McCammon (AOOS)

The Outreach and Community Involvement Steering Committee was formed and has met three times. The Committee includes key outreach staff from AOOS, the PWS Science

Center, Kachemak Bay Research Reserve, Alaska Sea Life Center, North Pacific Research Board, COSEE Alaska, and NOAA. AOOS staff developed a basic project website to use until a more sophisticated site can be developed: www.aos.org/evos-ltm/. AOOS staff also prepared materials for a 2-page insert included in the summer 2012 *Delta Sound Connections* science newspaper that is printed and circulated by the Prince William Sound Science Center throughout Southcentral Alaska.

The Committee identified the primary tasks to be accomplished in the first half of Year 1. These include development of a basic suite of outreach materials for the program: website, logo, powerpoint and poster templates, pop-up displays, brochures, project profiles, etc. The Committee agreed that AOOS would oversee a contract for development of these materials, with the committee reviewing content. The Committee also is recommending that the Program be given a shorter name for branding purposes and has selected the following: **Gulf Watch Alaska**, the Long-term Monitoring program of the *Exxon Valdez* Oil Spill Trustee Council. Representatives of the Committee will meet with the EVOSTC Public Advisory Committee in July.

Data Management – McCammon/Bochenek (AOOS/Axiom)

During the first few months of the EVOS LTM Program Data Management project, investigators focused on establishing protocols for data transfer and metadata requirements and initiating the data salvage effort. Investigators have been meeting with Matt Jones at NCEAS to coordinate future activities. PIs have participated in several PI meetings and are coordinating activities between the HRM and LTM programs. In addition, the AOOS Ocean Workspace has been rolled out to PIs and individual user and group profiles created. Axiom has hosted several training seminars via webinars and PIs are beginning to use the system to organize and consolidate their project level data. Software engineers at Axiom have also been working to support the Workspace, resolving technical bugs and implementing new functionality in response to user feedback. Software engineers are currently focused on deploying the ability to author metadata documents through the Workspace user interface in addition to tagging projects with keywords to allow filtering and data organization.

Historical data management and synthesis – Jones (NCEAS)

Due to various administrative hurdles, the contract for work was not finalized with the University of California Santa Barbara (UCSB) until May 15, 2012, with a backdated start date of February 1, 2012. A revised schedule has been developed in response to the change in the reporting year to one running from February 1 to January 31. Due to these changes, the PI adjusted his actual work plan to commence in June of 2012, which compresses the FY12 period into 8 months. Jones does not expect these schedule changes to significantly modify the project milestones, except to 1) shift all milestone deadlines to correspond to the new grant period (February to January), and 2) shift some of the year 1 development into year 2. Despite this shift, Jones still expects to accomplish the data collation activities by the end of year 2 as originally planned, and the data management infrastructure development by the end of year 2 as well. Due to Jones' compressed year 1 timeline, some unspent year 1 funds will facilitate completion of the work in year 2. The originally projected year 2 budget does not change. Rather, unspent year 1 funds will carry into year 2. No major delay in accomplishment of milestones is anticipated.

Science Coordination and Synthesis – Holderied (NOAA KBL)

A principal investigator (PI) meeting for the LTM program was held in Anchorage in November 2011, with a second, shorter meeting held with PIs, NOAA contract staff and EVOS Trustee Council staff at the Alaska Marine Science Symposium in January 2012. A third PI meeting was held via teleconference in May 2012. All investigators attended the PI meetings either in person or through teleconference. PI meeting agendas, summaries and other materials are posted on the Program website. The LTM Program's Science Coordinating Committee has also met via teleconference on several occasions, in addition to the PI meetings, to plan PI meetings, develop the LTM Program Management Plan, provide input on needed data management services, and identify potential members for the LTM Science Technical Oversight Committee. The hiring of a science coordinator for the integrated program by NOAA Kasitsna Bay Laboratory has been delayed since funding for the contract personnel hiring action was not available for use until late May 2012. We anticipate filling that position by July 2012.

To ensure consistency in the monitoring program over time, all PIs are preparing written sampling protocols for their projects and submitting them to the program management team in June 2012. All protocols will be made available to the program PIs via the Ocean Workspace website. PIs with the PWS/Gulf of Alaska (Ballachey) and Kachemak Bay (Konar/Iken) benthic monitoring projects have closely coordinated on nearshore monitoring protocols. Some PIs are planning to participate in each other's research cruises, in order to further increase consistency in sampling across the different sites. Holderied participated in two coordination meetings for the benthic monitoring component, in person at the Alaska Marine Science Symposium and via teleconference. Plankton sampling protocols have been closely coordinated between the PWS (Campbell) and Cook Inlet (Doroff/Holderied) oceanographic monitoring projects and zooplankton analysis for the Cook Inlet project will be conducted by Campbell's group in order to ensure consistency between the two groups.

Conceptual Ecological Modeling – Hollmen (ASLC)

PI attended PI meeting in November 2011 and participated in additional conference calls to coordinate modeling efforts. Her subaward contract was established on April 13, 2012. Hollmen started gathering and reviewing existing data and information about previous modeling efforts in the study area, and began work on other tasks identified in the Year 1 study plan. These tasks include selection of modeling tools, assembling the modeling team, coordination of tasks and input for conceptual models and visualization tools, and planning of options and approaches for visualization tools for selected components of our project. The overall goal of the initial models under development will be to reflect the status of the current knowledge of the system.

2. Environmental Drivers Monitoring Component (lead – Weingartner & Hopcroft)

Gulf of Alaska mooring (GAK1) monitoring – Weingartner (UAF)

The PI has collected monthly CTDs at station GAK1 and recovered the mooring at GAK 1 in March 2012. At that time a replacement mooring was deployed. The instruments from the GAK 1 mooring are now being post-calibrated.

Seward line monitoring – Hopcroft (UAF)

The May 2012 cruise has been successfully conducted. All sampling objectives were accomplished except that a series of storms prevented Multinet collections at GAK3 & GAK4. Data analysis is already underway.

Oceanographic conditions in Prince William Sound – Campbell (PWSSC)

Year 1 of this project is largely a development year, with field operations covered under an existing project that is part of the PWS Herring Survey effort. To date, an Agilent capillary electrophoresis unit (to be used for nutrient analysis) has been purchased and set up in the lab by Agilent. Nutrient analysis protocols are currently being developed. The second major milestone for this year is the installation of a profiling mooring in central PWS. The contract for the profiler hardware has been awarded to WETLabs, Inc, and they are currently in the process of constructing the profiler. All required instruments and hardware have been ordered and sent to WETLabs for integration into the profiler. It is expected that the profiler will be deployed in late summer 2012.

Oceanographic monitoring in Cook Inlet – Doroff (ADFG KBRR) and Holderied (NOAA KBL)

The PIs initiated monthly sampling along the Homer Spit transect (#9 - see figure) in April 2012 and conducted a second run in May 2012, using Kasitsna Bay Laboratory small boats. Ten oceanographic stations are sampled along this transect, with plankton sampling also conducted at three of those stations. The first quarterly oceanographic survey along the lower Cook Inlet/outer Kachemak Bay transects (#3, 4, 6, 7) was conducted in May 2012 on the ADFG vessel Pandalus. A total of 71 oceanographic stations were sampled during the quarterly survey, with plankton sampling also conducted at 15 of those stations and water samples for precise ocean acidification measurements also taken at 8 of the plankton stations. Due to inclement weather during the Transect 7 survey, only every other of the planned oceanographic stations in the center of that transect could be sampled. All planned stations were sampled at each end of the transect; the lower spatial resolution in the center is not expected to adversely affect the overall data analysis. Plankton samples have been preserved for analysis this summer. Ship time was leveraged to redeploy an Alaska Ocean Observing System (AOOS) / KBRR wave buoy west of Anchor Point during the lower Cook Inlet survey. The PIs are coordinating with K. Kuletz to include seabird biologists on the quarterly sampling cruises, but were unable to accommodate a seabird biologist on the first quarterly sampling trip. Ship charter services have been secured for the next three lower Cook Inlet surveys. See Figure 1 for locations of transects.

A moored buoy system was purchased and a YSI data sonde will be deployed to monitor water quality in Bear Cove; installation is planned for the end of May 2012. Monthly

instrument calibration and nutrient sampling will occur throughout the ice-free months once the system is operational. The system will be telemetered so that researchers and local oyster farmers will have unlimited access to the water quality data. In addition to establishing a new water quality monitoring site, probes for continuous monitoring of chlorophyll at all surface stations will be purchased and installed as part of the KBRR System-Wide Monitoring Program (SWMP).

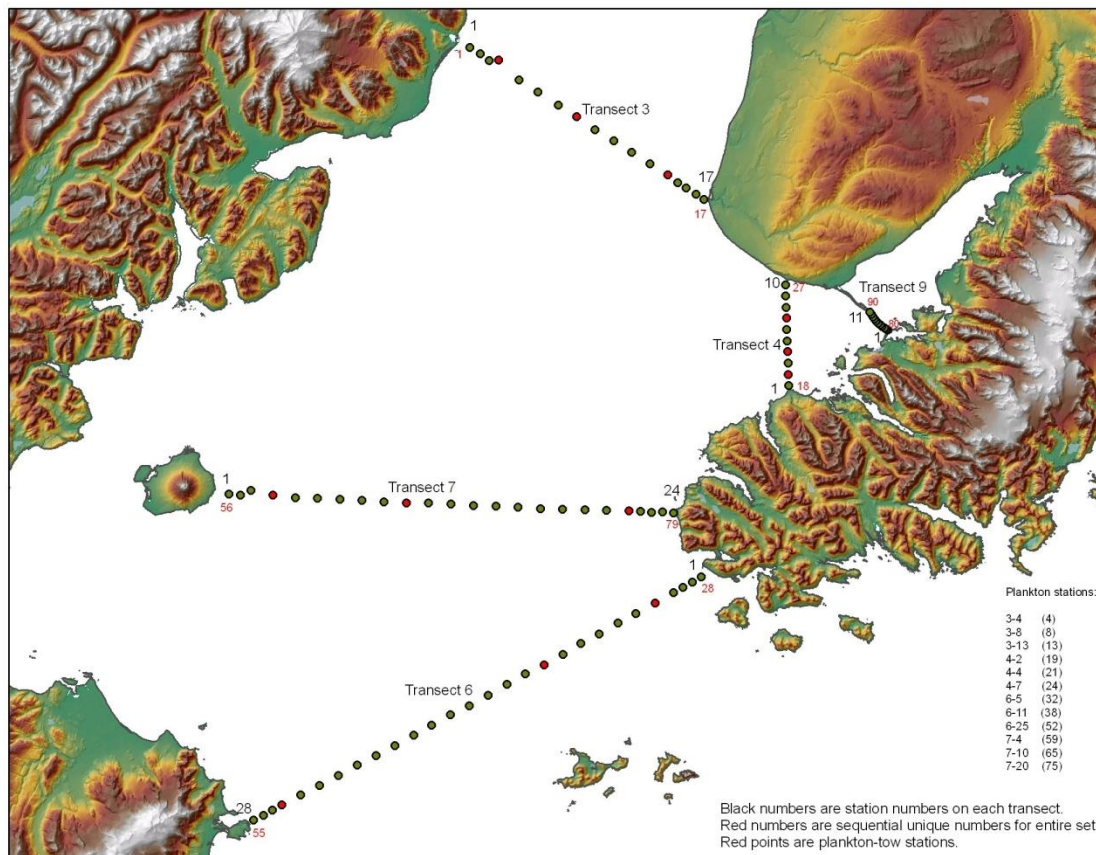


Figure 1. Lower Cook Inlet oceanographic sampling transect locations.

Continuous plankton recorder – Batten (SAHFOS)

The PI continues to sample the existing transect (Cook Inlet to Puget Sound), approximately monthly, spring through fall. Although not funded by the LTM project in 2012, CPR sampling is being maintained under a previous EVOS contract (project 10100624) and data from 2012 will be available for the LTM program and participants. Sampling for 2012 commenced in April with a successful transect sampled 7-10 April and a second completed in May 2012. Sample processing has begun, although there are no results from this year yet available.

3. Pelagic Monitoring Component (lead – Rice)

Ability to detect trends in nearshore marine birds – Coletti (USNPS SWAN)

This project is only being conducted for one year as part of the LTM Program. Due to the late allocation of funds and the somewhat protracted contracting process, the final project deliverable is anticipated to occur at the end of September 2013, later than originally anticipated. The Year 1 effort to date primarily dealt with developing the project as a “request for proposals” through contracting. It is the intent of this project to put out for bid and allocate the funds in year 1 of the overall Program. The Request for Proposals is now being reviewed and is anticipated to be circulated by mid-June. Funds will be allocated in this fiscal year and work completed in Year2.

Long-term killer whale monitoring – Matkin (NGOS)

The PI's field season begins on 24 May 2012 and operational funds will come primarily through the previous EVOS contract from National Marine Fisheries Service. The only funds coming from the LTM Program will be used this year to purchase satellite tags and fuel for use later in the season. Preparations for the field work that begins in late May are on schedule and no issues or problems are anticipated at this time.

Humpback whale predation on herring – (NOAA, NMFS Auke Bay Laboratory)

The PI completed two humpback whale surveys of PWS when the highest winter abundance of whales are present (October and December 2011), prior to initiation of the LTM Program, so as not to lose a year of data. With year 1 LTM funding, the PI has completed two surveys so far (Feb and April 2012), with two more scheduled later in the year (Oct and Dec). The February 2012 trip was cut short due to weather. An additional partial (4 day) survey of the herring spawning grounds was completed in mid-April by combining the remaining days from the February survey with an Auke Bay Laboratory ocean acidification water sampling cruise. This opportunity allowed the PI to evaluate whale predation on herring staging for spawning.

Although poor weather dominated the first three surveys, PIs saw a pattern in humpback whale distribution and diet similar to previous years. Counts of whales were lower than previous years, likely the result of poor weather conditions. An abundance estimate for this field season has not yet been made, so comparisons between years cannot be made at this time. Raw counts of humpback whales for the first three surveys were: 61 in October 2011, 38 in December 2011 and 3 in February 2012 (see Figure 2).

During the first whale survey conducted during herring spawning, PIs made three noteworthy observations. 1) 29 humpback whales were observed associated with spawning herring. 2) A gray whale was seen feeding on herring spawn or herring at Hell's Hole. A single gray had been reported in previous years and efforts will be made to determine if this is the same animal. Similar behavior from gray whales has been reported in Sitka Sound. 3) More than 150 harbor porpoises were observed off Knowles Head associated with spawning herring. This species was infrequently encountered as singles or in pairs in the previous 2011 whale surveys in the PWS.

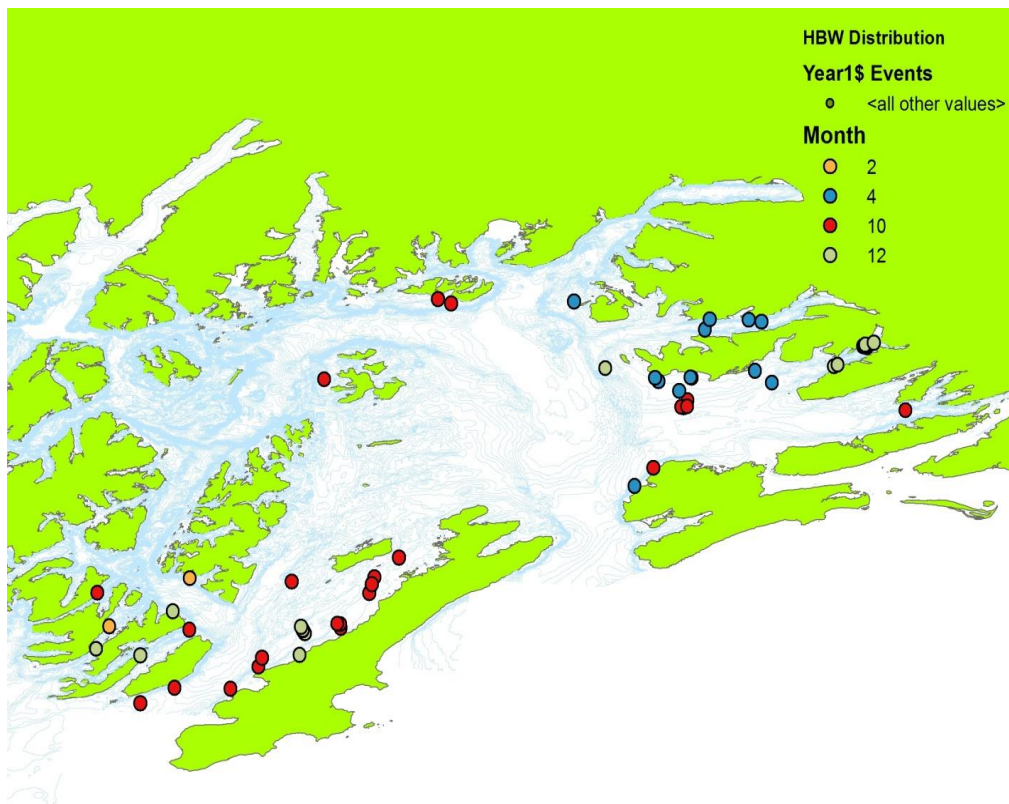


Figure 2. Humpback whale distribution by month from Year 1 of the EVOS LTM Program. (2= Feb 2012, 4=April 2012, 10=Oct 2011, 12= Dec 2011)

Straley has yet to receive funding from NOAA grants and contracting due to an administrative error. As a result QA/QC and data entry for the winter 2011/2012 has not been completed. Pending funding, these tasks will be completed in year 1. The PIs have provided killer whale photos from each survey to Craig Matkin with the killer whale project. Bobby Hsu from PWSSC was present on the Oct, Dec, and Feb surveys as a seabird observer. The PIs provided brand resights and haulout photos of northern sea lions to the Alaska Department of Fish and Game.

Forage fish distribution and abundance – USGS Alaska Science Center

The PIs attended the PI planning meetings on Nov. 7-8, 2011 and Jan 19, 2012. During the winter of 2011/2012, PIs focused on accomplishing the first objective in the original study proposal: identify robust indices for detecting change in forage fish populations over time and devise a sampling strategy for long-term monitoring of those indices. This work included meetings with fisheries scientists and statisticians familiar with past and current monitoring efforts, the target species, and/or the study area (Lew Haldorsen, emeritus UAF; Scott Johnson, NMFS; John Thedinga, NMFS; Darcie Neff, NMFS; Ron Heinz, NMFS; JJ Vollenweider, NMFS; John Moran, NMFS; Steve Moffitt, ADF&G; Dick Beamish, retired Fisheries and Oceans Canada; Jeff Fujioka, retired NMFS; Terry Quinn, UAF; Jamal Moss, NMFS; Olav Ormseth, NMFS; Brenda Ballachey, USGS; Russ Hopcroft, UAF; Chris Zimmerman, USGS; Vanessa von Biela, USGS; Kris Monk, ADF&G; and Scott Pegau, PWSSC).

There was broad agreement that monitoring should include a core program of hydroacoustic surveys combined with net-sampling of acoustic targets to identify school composition and obtain samples for analysis of fish condition. Sampling protocols have been developed to meet these goals. An additional recommendation that was repeatedly received was to include a component to measure the age structure of forage fish populations. To that end, the PIs propose to collaborate with Vanessa von Biela, a research fisheries biologist who specializes in fish aging techniques at the USGS Alaska Science Center, to determine the age structure of capelin and sand lance in Prince William Sound. This pilot project will be implemented in summer 2012 with LTM funding.

A formal study plan for the proposed research is undergoing USGS Fundamental Science Practices review. An initial plan was reviewed internally, and is now undergoing revisions and soon will be submitted to external peer review. Final approval is expected well in advance of the first planned cruise in July. PIs have applied for an ADF&G Fish Resource Permit and obtained project approval from the USGS Animal Care and Use Committee. Twenty days of vessel time have been scheduled aboard the USGS R/V Alaskan Gyre starting July 8, 2012. The project team is coordinating with Mary Anne Bishop, Michelle Buckhorn, Evelyn Brown and Scott Pegau (PWSSC, Herring Research and Monitoring team) and Brenda Ballachey (USGS, nearshore benthic monitoring) regarding upcoming fieldwork and linkages with other LTM components.

Prince William Sound marine bird surveys – Irons/Kuletz (USFWS Alaska Region)
PIs have been preparing to conduct a three-week survey of marine birds in PWS in July. They have hired a project leader and eight other observers to conduct the fieldwork. The boats are being taken out of storage and prepared for work. Contracts have been put into place. While surveying in the southwest portion of PWS, the PIs are contracting with lodges and fuel companies rather than using a “mother” ship. Due to the pending retirement of Dave Irons, Dr. Kathy Kuletz is expected to become the PI for this component.

Seabird abundance in fall and winter – Bishop (PWSSC)
A seabird observer participated in the LTM Humpback Whale cruises for October and December 2011, as well as the February 2012 survey. Although the October and December cruises were pre-award, the PI felt it was important to not miss out on a data collection opportunity that had been part of the original proposal. Due to the low numbers of whales and harsh weather conditions during February cruises, beginning in Year 2 an April cruise will be conducted instead of February to coincide with herring spawning in northeast Prince William Sound. The bird observer during the humpback whale cruises, Bob Hsu, has left the project as of May 2012 in order to go to graduate school. For future whale cruises, the team plans to use an observer who is skilled at both seabird and whale observations.

4. Benthic Monitoring Component (lead – Ballachey)

Nearshore benthic systems in the Gulf of Alaska – Ballachey (USGS Alaska Science Center), Coletti (USNPS SWAN) and Dean (Coastal Resources Associates)
Work in year 1 has proceeded with no problems or concerns. PIs are preparing now for a total of five additional field trips in June and July, to Katmai, Kenai, and PWS. Within PWS, PIs will sample sites in both western and eastern PWS (eastern sites newly established for

year 1). Winter bird surveys were conducted at Katmai in March. Shoreline surveys for collection of sea otter carcasses/skulls for ages at death were done in western PWS in late April/early May, with recovery of 57 carcasses or parts thereof. An additional observer is being trained to conduct aerial surveys at Katmai, PWS and Kachemak Bay later in the summer. A report entitled “Intertidal Invertebrate and Algae Monitoring: Power to Detect Temporal Trends” was submitted to NPS by WEST, Inc. and is in review; further work on these statistical analyses with WEST is anticipated in year 2 (funding for this component provided by NPS). The scope of work for the stable isotope component of the project has been expanded, and identifying species and locations for collections (see above, under year 2 Work Plan) and exploratory analyses on gene expression of mussels has been initiated as a potential tool for monitoring long-term health of the nearshore.

Ecological Communities in Kachemak Bay – Iken and Konar (UAF)

Field work for year 1 in Kachemak Bay was conducted May 4-9, 2012 with some follow-up work to be done June 3-7, 2012. So far, five rocky sites were monitored for rocky intertidal composition along the high, mid, low and -1m tidal elevations. These sites were Outside Beach, Port Graham, Cohen Island, Bishop’s Beach and Bluff Point. At all sites, limpet (*Lottia* spp.) size frequency was also determined. At three of these rocky sites (Outside Beach, Port Graham and Cohen Island), the PIs also monitored a mussel bed for area coverage, size-frequency distribution and density. No mussel beds were found at or close to the other two rocky beaches. Permanent elevation markers were put in place at all rocky sites. In June, these sites will be revisited to deploy temperature loggers at the low strata.

Three seagrass sites were monitored, conducting shoot counts and percent cover estimates along 50 m transects through the seagrass bed. Two beds (Jakolof Bay and Herring Island) were also measured for area of the seagrass bed. The third bed, along the Homer Spit, could not be measured for area because the bed is too large to feasibly monitor size. A fourth seagrass bed will be surveyed in June, and all seagrass sites will be revisited to re-do the surveys to assess seasonal changes.

Monitoring sea otter abundance and foraging (Doroff): Activities on this objective include: 1) meeting with USGS and FWS to arrange an aerial-based survey for this summer (funded by FWS and conducted by USGS); 2) receipt of the standard protocols for monitoring sea otter foraging behavior from NPS and discussions of data handling and storage with USGS; and 3) continued collection of sea otter scat at one long-term monitoring site in Kachemak Bay (information has not been processed). In the next reporting period, the team’s collaborators will have completed a survey and the PIs will have collected observations of sea otter foraging behavior in the study area.

5. Lingering Oil Monitoring Component (lead – Ballachey)

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

Sea otters are scheduled for sampling in year 1 (July 2012), with a decision on the need for further capture and sampling of sea otters to be made following examination of the 2012 data. Plans for the capture of sea otters in western PWS in July 2012 are proceeding with no issues or concerns. Harlequin duck sampling was not scheduled in year 1, but is planned

for year 2 (March 2013). Analyses of all samples collected in years 1 & 2 (blood from sea otters, liver from harlequin ducks) will be done during year 2.

Oil level and weathering tracking – Carls (NOAA/NMFS Auke Bay Laboratory)

Thus far PIs have completed measurements of geochemical biomarkers in Exxon Valdez source oil and in a few beaches 22 years post-oil spill (Boufadel bioremediation study). A source recognition model reliant on geochemical biomarkers is under development and testing and historical samples to be processed for geochemical biomarkers have been identified. No current requests for supportive analyses have been received from other long-term monitoring collaborators. The PIs are supporting lingering oil efforts by Gail Irvine in the Gulf of Alaska (preparation and analysis of passive samplers) and supporting bioremediation efforts by Boufadel et al in PWS (analysis of sediment samples). The hydrocarbon database is being maintained with updates underway.

Future Work: Summarize work to be performed during the upcoming year, if different from the original proposal. Describe any proposed changes in objectives, procedural or statistical methods, study area or schedule. **NOTE:** Significant changes in a project's objectives, methods, schedule or budget require submittal of a new proposal subject to the standard process of proposal submittal, technical review and Trustee Council approval.

We do not anticipate major changes to the year 2 work plan. The only changes from the original year 2 work plan are as follows:

Ballachey – Nearshore Benthic Ecosystems: Co-investigator, Dan Monson of USGS, will join the project in year 1 and continue to contribute in year 2. Team will expand stable isotope work to a suite of nearshore species with supplementary funding provided by USGS and NPS.

Bishop – Long-term monitoring of seabird abundance and habitat associations: Add April bird observation cruise through use of a vessel of opportunity.

Jones – Data Management and Holistic Synthesis: Milestones as follows:

FY13 1st Quarter (February 1, 13 to January 31, 14)

February Assess/Validate year 1 datasets and metadata submitted through AOOS and NCEAS

March Participate in LTM program PI meeting and support first LTM conceptual modeling workshop

April Prototype data discovery and management tools demonstration

FY13 2nd Quarter

May Participate annual HRM program PI meeting

FY13 3rd Quarter

Sept Complete integration of data salvaged into AOOS DM System

October Full release of data discovery and management tools

FY13 4th Quarter

January Select synthesis working group leaders, organize WG activities
January DataONE Integration services released

Year 2 Milestones, Overall Program, from Original EVOS Proposal:

FY13 1st Quarter (October 1, 2012 to December 31, 2012)

October Conduct PWS humpback whale and seabird survey
November Conduct annual PI meeting & conceptual ecological modeling workshop.
December Conduct PWS humpback whale and seabird survey

FY13 2nd Quarter

January Annual Marine Science Symposium
January Update Ocean Workspace system
February Conduct PWS humpback whale and seabird survey

FY13 3rd Quarter

April Initiate summer CPR surveys/ PWS Sea otter survey
May Seward Line cruise
June Submit FY14 work plan for review by EVOS Trustee Council
June Kachemak Bay intertidal survey/ PWS nearshore monitoring cruise

FY13 4th Quarter

August Submit semi-annual report
September Conclude summer CPR surveys/ Seward Line cruise

FY14 1st Quarter (October 1, 2013 to December 31, 2013)

October Submit synthesis to EVOS science council
October Conduct PWS humpback whale and seabird survey
November Conduct annual PI meeting
December Conduct PWS humpback whale and seabird survey

Coordination/Collaboration: Describe efforts undertaken during the reporting period to achieve the coordination and collaboration provisions of the proposal, if applicable.

As described in detail above, the LTM program has already established coordinated program management, data services, science coordination and outreach for the integrated monitoring program. This report covers all active projects contained within the LTM program. The LTM Program activities are also coordinated with those in the PWS Herring Survey and Research and Monitoring program. There are shared data management efforts and coordination in cruise activity, as described in several of the individual project updates above.

Community Involvement/TEK & Resource Management Applications: Describe efforts undertaken during the reporting period to achieve the community involvement/TEK and resource management application provisions of the proposal, if applicable.

Planning for community involvement was initiated during three Outreach Committee teleconferences in April and May 2012 with the next meeting scheduled for June 2012. The Outreach and Community Involvement Steering Committee plans to meet in July 2012 with the EVOSTC Public Advisory Committee to begin discussions on community involvement in various components of the LTM Program. More activity relating to community involvement and resource management applications will be reported on in later reports.

Information Transfer: List (a) publications produced during the reporting period, (b) conference and workshop presentations and attendance during the reporting period, and (c) data and/or information products developed during the reporting period. **NOTE:** *Lack of compliance with the Trustee Council's data policy and/or the project's data management plan will result in withholding of additional project funds, cancellation of the project, or denial of funding for future projects.*

A principal investigator (PI) meeting for the LTM program was held in Anchorage in November 2011, with a second, shorter meeting held with PIs, NOAA contract staff and EVOS Trustee Council staff at the Alaska Marine Science Symposium in January 2012. A third PI meeting was held via teleconference in May 2012. During this teleconference, all PIs received training in how to upload data and reports to the Ocean Workspace, a collaborative tool shared among all LTM and HRM PIs. Some documents and data have already been entered into this system. Meetings of the program management team and science coordinating committee have been held regularly. The team is anticipating PI participation in the Prince William Sound Science Center's Ocean Fest in Cordova and Valdez in September 2012.

Budget: Explain any differences and/or problems between actual and budgeted expenditures, including any substantial changes in the allocation of funds among line items on the budget form. Also provide any new information regarding matching funds or funds from non-EVOS sources for the project.

NOTE: *Any request for an increased or supplemental budget must be submitted as a new proposal that will be subject to the standard process of proposal submittal, technical review, and Trustee Council approval.*

A detailed budget for the five years is provided to show the funding needed in year 2 has not changed. The budget modifications are within individual projects and do not increase the total funds needed in year 2 over what was originally proposed. They are as follows (all changes occur in year 2):

Ballachey – Nearshore Benthic Ecosystems (net zero change)

These changes are reflected in the summary budget in the attached Excel budget spreadsheet. Budget detail will be revised to reflect this.

- Add \$40,000 in salary for NPS technician support; remove equivalent amount from USGS budget

- Add \$2,000 in NPS equipment costs going directly to the NPS instead of to the USGS as originally requested
- Subtract \$10,000 in salary for NOAA
- Add \$5,000 to supplies for NOAA
- Add \$5,000 to travel for NOAA

For all PIs, it is intended that any unspent year 1 funds will be spent in year 2.

The revised detailed budgets can be found in the accompanying workbook. The overview showing the totals each year is provided below. This budget also includes the Lingering Oil Monitoring project and Historical Data Management and Synthesis project that were approved as additions to the core LTM program.

Long-Term Monitoring Proposal Budget - 2011-2016 - Costs in \$K							6/17/2011 CORRECTED
Principal Investigators and Institution	Activity - short project title	Yr1	Yr2	Yr3	Yr4	Yr5	5 Yr TOTAL
	Environmental Drivers						
Campbell, PWSSC	Prince William Sound Oceanographic	218.4	177.3	181.1	186.9	192.0	955.6
Weingartner, UAF	GAK1 (Gulf of Alaska) Mooring	100.5	103.2	106.2	109.2	112.4	531.5
Hopcroft, UAF	Seward Line	90.0	54.9	92.2	95.4	98.8	431.4
Doroff, ADFG; and Holderied, NOAA	Lower Cook Inlet Oceanographic	176.0	162.7	152.7	122.7	99.8	714.0
Batten, SAHFOS	Continuous plankton recorder (CPR)	0.0	61.3	63.1	64.9	67.1	256.4
	Environmental Drivers Total	584.9	559.5	595.2	579.1	570.2	2,888.9
	Pelagic Monitoring						
Matkin, NGOS	Killer whale monitoring	6.6	121.9	121.9	122.0	122.0	494.2
Moran, NOAA; and Straley, UAS	Humpback whale monitoring	116.9	118.2	128.1	129.9	49.9	543.0
Piatt, USGS	Forage fish	192.6	185.7	185.7	185.7	137.9	887.7
Irons, USGS; and Kuletz, USFWS	Nearshore marine birds surveys	189.3	22.2	193.6	22.2	197.8	625.2

Coletti, NPS	Bird synthesis	30.0	0.0	0.0	0.0	0.0	30.0
Bishop, PWSSC	Seabird monitoring in late fall/winter	47.4	72.1	74.2	76.5	79.2	349.4
	Pelagic Monitoring Total	582.7	520.1	703.6	536.3	586.8	2,929.5

	Benthic Monitoring						
Ballachey, USGS; and Dean, CRA, Inc.	Nearshore benthic PWS (sea otters, seagrass/kelp, intertidal invertebrates/ algae, benthic voraging seabirds)	259.1	279.0	304.5	284.0	304.5	1,431.1
Konar and Iken, UAF	Kachemak Bay Intertidal	44.1	44.2	44.1	44.1	43.5	220.0
	Benthic Monitoring Total	303.2	323.2	348.6	328.1	348.0	1,651.1

	Coordination, Data Management, Outreach and Administration						
Holderied, NOAA	Science Synthesis/ Coordination	113.3	127.5	136.1	134.0	139.1	650.0
McCammon, AOOS/Bochenek, Axiom	Data Management	150.0	149.9	150.4	150.4	149.2	749.9
Hollmen, ASLC	Ecological modeling	76.2	84.3	87.7	72.1	75.1	395.4
Bird, PWSSC / McCammon, AOOS	Administration, science review and LTM mtg logistics, Outreach & Communications	241.6	252.1	273.9	269.2	264.3	1,301.1
	Coordination, Data Management, Outreach and Administration Total	581.1	613.7	648.2	625.7	627.7	3,096.4

Overall Program Total Cost	2,051.9	2,016.5	2,295.6	2,069.2	2,132.7	10,565.9
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M. Jones, NCEAS	Collaborative Data Management and Holistic Synthesis of Impacts and Recovery Status Associated with the Exxon Valdez Oil Spill	407,395.5	426,339.1	341,397.8	347,846.9	67,766.1	1,590,745.5
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	Lingering Oil Monitoring						
Carls, NOAA	1 - Extending tracking oil composition and weathering in PWS	18.0	12.0	155.2	8.0	6.0	199.2
Ballachey, NOAA, & Esler, Simon Fraser Univ. & Pacific	2a & b - Evaluate chronic exposure of sea otters and harlequin ducks in PWS	187.4	0.0	0.0	0.0	0.0	187.4

Wildlife Fdtn							
	Lingering Oil Monitoring Total	205.4	12.0	155.2	8.0	6.0	386.6

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***We appreciate your prompt submission of your annual report
and thank you for your participation.***