LTM & Herring Data Plan

Womac, Cherri G (EVOSTC)

From: Hsieh, Elise M (EVOSTC)
Sent: Tuesday, September 06, 2011 11:25 PM
To: Womac, Cherri G (EVOSTC); Boerner, Catherine (EVOSTC sponsored); Pete Hagen; Dede Bohn; C. Peterson; Kilbourne, Linda L (EVOSTC)
Subject: Fwd: data management and synthesis collaboration proposal
Attachments: Data-Management-and-Synthesis-EVOSTC-DPD-v06.pdf; ATT1021530.htm

FYI - a final draft.

We'll circulate this proposal on Wednesday to the Council.

As with all proposals, it is confidential unless funded.

Elise

Begin forwarded message:

From: "Matt Jones" <jones@nceas.ucsb.edu>
To: "Hsieh, Elise M (EVOSTC)" <elise.hsieh@alaska.gov>
Cc: "Mark Schildhauer" <schild@nceas.ucsb.edu>, "Bonnie Williamson" <williamson@msi.ucsb.edu>, "Molly McCammon" <mccammon@aoos.org>, "Rob Bochenek" <rob@axiomalaska.com>, "W. Scott Pegau" <wspegau@pwssc.org>
Subject: data management and synthesis collaboration proposal

Dear Elise,

It pleases me to submit the attached collaborative proposal ("Collaborative Data Management and Holistic Synthesis of Impacts and Recovery Status Associated with the Exxon Valdez Oil Spill") to you for consideration as a portion of the activities under the Long-term Monitoring and Herring Research and Monitoring projects that you are already evaluating. This current project describes a collaboration on data management, technology development, and synthesis aspects of those projects, specifically to introduce synergies from NCEAS in technologies and processes used to manage EVOSTC-related data in the service of cross cutting synthesis. The collaboration between the earlier LTM and HRM investigators and those of us at NCEAS is maturing nicely and we expect it to be a highly productive relationship. The current proposal is meant to highlight the additional value contributed by NCEAS within the context of the already substantive data management and synthesis activities proposed by the LTM and HRM teams, and so it reviews some of the activities previously proposed by those teams and uses them for context for NCEAS' contributions.

I have asked our UCSB financial staff to send you the completed budget forms as you requested, and so those will arrive under separate cover. If our proposal is awarded, Bonnie Williamson (cc'ed) can help to establish the means and arrangements for a subcontract.

Thank you for this opportunity to contribute to the success of the EVOSTC programs.

Sincerely,
Matt

--
Matthew B. Jones
Director of Informatics Research and Development
National Center for Ecological Analysis and Synthesis (NCEAS)
University of California, Santa Barbara

FY12 INVITATION
PROPOSAL SUMMARY PAGE

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

Project Period: FY12-FY16

Primary Investigator(s): Matthew B. Jones and Mark Schildhauer, National Center for Ecological Analysis and Synthesis (NCEAS), UC Santa Barbara, Molly McCammon and Rob Bochenek, Alaska Ocean Observing System (AOOS), and W. Scott Pegau (PWSSC).

Study Location: General Spill Affected Area

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:

NCEAS budget described here of $1,590,748 total over 5 years

Approximate Subtotal for Data Management: $796.2K

Subtotal for Synthesis: $794.5K

NCEAS Funding Requested:
FY12: 409.7K, FY13: 432.4K, FY14: $335.1K, FY15: $346.6K, FY16: $66.8K

LTM/HRM Data Management, Synthesis, and Modeling (described and budgeted separately in prior proposals at $1,840K)

Date: 9-6-2011

PROJECT PLAN

I. NEED FOR THE PROJECT

A. Statement of Problem

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.

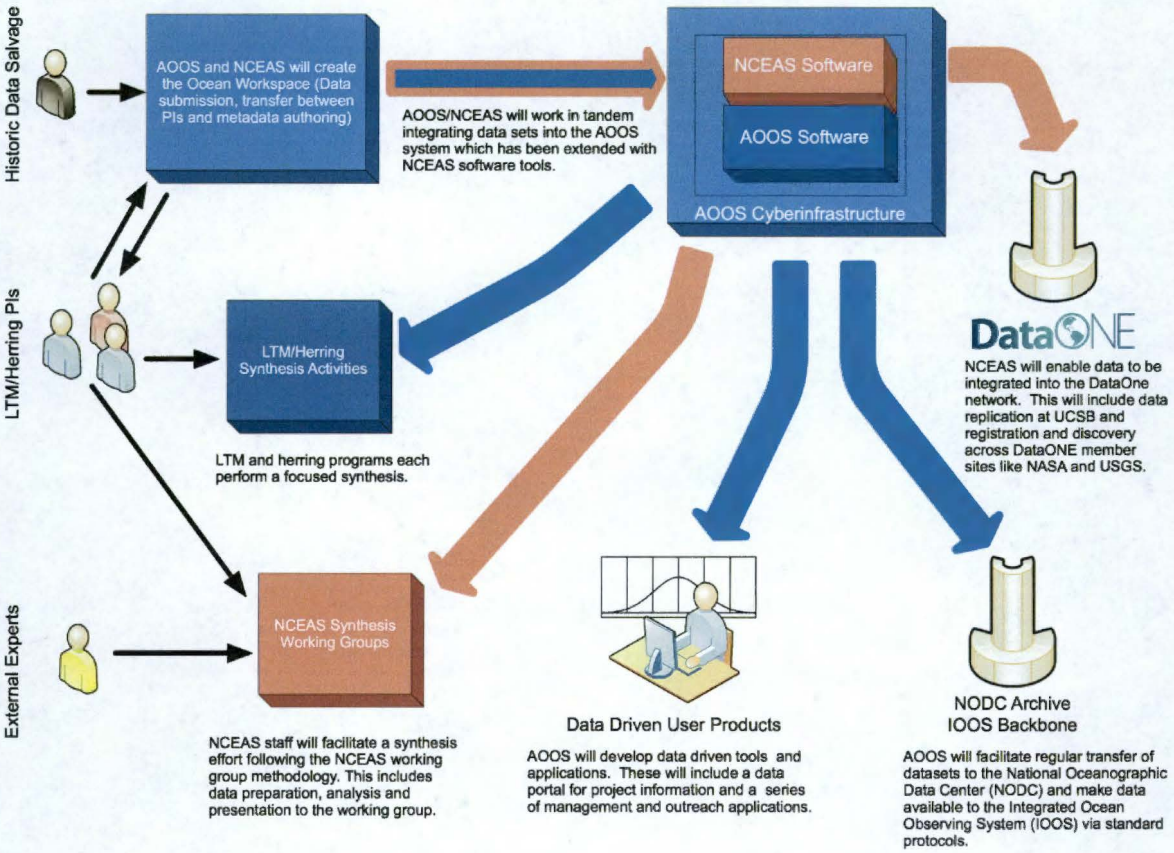

Figure 1. Conceptual description of AOOS/NCEAS/PWSSC collaboration on data management and synthesis activities.

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 two years, NCEAS will focus 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 will conduct a multi-year working group effort using LTM and HRM principal investigators (PIs) and other internationally renowned researchers 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.

B. Relevance to 1994 Restoration Plan Goals and Scientific Priorities

The LTM and HRM program proposals outline the relevance of the proposed monitoring, data management and syntheses efforts to the EVOSTC 1994 Restoration Plan goals. This project will further support Restoration Plan priorities for "strategies that involve multi-disciplinary, interagency, or collaborative partnerships" and for efforts that will "include a synthesis of findings and results, and will also provide an indication of important remaining issues or gaps in knowledge" (Restoration Plan p. 16). This proposed data management and synthesis collaboration builds on the LTM and HRM programmatic efforts and leverages an additional collaboration with the DataONE federation.

II. PROJECT DESIGN

A. Objectives

1) 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).

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

3) 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).

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 synthesis (under LTM and HRM programs and in NCEAS working groups) (NCEAS lead with AOOS contributions).

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 (AOOS lead).

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

7) 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. Procedural and Scientific Methods

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

Details of these efforts are provided in the individual detailed project descriptions for the data management components included in both the LTM and HRM projects. Because project level data is so heterogeneous in nature and is composed of a wide variety of observational types (see Table 1 in LTM data management proposal, which details an initial effort by the AOOS data management team to assess the characteristics of individual LTM data collection activities), a broad range of data management approaches are needed to manage the data in an automated, standard fashion and to facilitate integration. In addition, the project Principal Investigators (PIs) need both flexible and powerful tools to assist them in sharing, archiving and documenting their research products. AOOS data management staff will provide the primary support for these efforts with the AOOS Ocean Workspace, a web-based platform for PIs to post and share data sets and rapidly author metadata. The system will be enabled with security authentication in order to temporarily limit access to LTM and HRM investigators, project managers and administrators before data are quality controlled; non-sensitive data will be publicly released after quality processing. The system will also provide PIs with tools to generate metadata profiles that comply with national standards. Initially, this system will focus on authoring FGDC metadata formats including tools for authoring the biological extension for taxonomic classifications and measurements.

NCEAS engineers will work with the AOOS data team to extend the AOOS data infrastructure to incorporate additional metadata tools and catalogs that are customized for project-based data management for biological data. The design will include both tools for data access and for data contribution and management by the participating scientific staff. The planned AOOS Ocean Workspace (based on non-proprietary open-source standards endorsed by the national Integrated Ocean Observing System) will be enhanced with more biologically-oriented data management tools in order to enable individuals to describe and deposit all of their heterogeneous data in a uniform data repository. Many tools for biological data management, such as metadata generation tools (e.g., Morpho), data analysis tools (e.g., R, Matlab), and synthesis tools (e.g., Kepler) have been developed in parallel to oceanographic tools in use by IOOS; NCEAS will incorporate these tools as appropriate into AOOS systems such as Ocean Workspace, and where that does not make sense, provide interoperability solutions that allow the appropriate tools to work with the AOOS infrastructure (see Objective 6 below). In addition, the heterogeneous data collected by the LTM and HRM projects necessitates a sophisticated data search and discovery system that is effective across data from historical and current LTM and HRM projects. NCEAS will build on their prior work in this area to create a Smart Semantic Search Service that will be deployed as part of the AOOS infrastructure.

This integration of tools from NCEAS contributors into the AOOS cyberinfrastructure will be conducted after a thorough design review and cyberinfrastructure development plan is jointly assembled by AOOS and NCEAS as part of the initial needs and solutions assessment.

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 task will involve isolating and standardizing historic data sets deemed necessary for retrospective analysis by EVOSTC LTM and HRM program synthesis and modeling efforts. Early in the effort the EVOSTC LTM and HRM program researcher teams will be engaged to prioritize sources of relevant data deemed of high value for the synthesis effort. Data will be prioritized by several metrics including its utility to LTM and HRM program syntheses as well as system-wide synthesis efforts (Objective 7), accessibility of the data, length of time series, scientific importance, quality and precision of the data storage format, and the cost of obtaining the data (digitization can be expensive). All data acquired through efforts of this project will be merged into the AOOS data system for long term archival and access.

LTM PIs have already developed a preliminary list of historical data sources under their stewardship which could be of potential value to the LTM program and synthesis effort (see Table 2 in LTM data management proposal), as well as those data PIs would be interested in getting access to are currently unaware of sources (Table 3 in LTM proposal). AOOS funding leverages numerous data sets available through the AOOS website and data system, including the herring and PWS ecosystem data sets that were standardized and made available through the actions of the PWS Herring Portal Project (EVOS Project 070822, 080822 and 090822).

Although data capture will be a collaborative effort, we expect to roughly divide activities into three focal sets of data: 1) LTM and HRM data sets that are newly collected under these projects (AOOS focus); 2) Other EVOSTC project data sets, both current and historical, that lay outside of the LTM and HRM projects (NCEAS focus); and 3) external data sets from other funding groups (joint NCEAS and AOOS focus depending on source).

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

AOOS will take the lead on these efforts, as described in the data management DPDs for the LTM and HRM programs. The AOOS data team will work with project investigators to develop web-based data driven tools based upon prioritization and direction from agency managers, outreach staff and user groups. Effective data summarization and visualization exposes problems, manifests trends, and allows for high-level comparisons with other sources of information. Data visualization products are also ideal tools to communicate information to audiences with varying degrees of familiarity in meaningful and easily understandable ways. NCEAS will provide input and expertise into development of these tools.

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

The current AOOS plan is to emphasize the capture of historical data from previous studies related to the Exxon Valdez oil spill during the first two years of the project, as well as to prepare the system to receive the monitoring data generated during this project. NCEAS will collaborate with the AOOS team in order to collate, summarize, visualize, and integrate these historical data

in order to prepare them for synthesis and analysis. NCEAS has developed a group of scientific programmers who specialize in assisting in cross-cutting analysis and modeling, and we will employ one of these scientific programming specialists along with a graduate student assistant to collate, standardize, integrate, summarize, and visualize the data needed for synthesis activities. Digital, graphical and visualization products generated by NCEAS from the 20-year historical datasets will be used for the cross-cutting synthesis activities of the year three EVOSTC joint workshop between the LTM and HRM programs and for the broader EVOS impact syntheses described in Objective 7. Products from these activities will include: data summaries and visualizations from each of the prioritized EVOSTC data sets; quality assurance analyses on input data to resolve issues prior to analysis; integrated data products that resolve methodological differences to combine multiple related primary data sets into long-term, cross-scale derived data products; and analyses of these derived products that illustrate long-term, cross scale aspects of spill impacts and recovery. These activities will build upon the LTM and HRM program synthesis and conceptual ecological modeling efforts focused on the monitoring program data. Please see the detailed project descriptions on LTM synthesis (Holderied), LTM ecological modeling (Hollmen), HRM synthesis (Pegau), and HRM modeling for additional information, as well as the synthesis activities in Objective 7 regarding cross-cutting 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.

The ultimate goal of this project is to provide services to assist in the organization, documentation and structuring of data collected and made available via EVOS LTM and HRM project activities so that it can be transferred efficiently to long term data archive and storage centers and made available for future use by researchers and other user groups. This task will leverage the AOOS cyberinfrastructure, long-term funding and other active data management projects being undertaken by that organization. Data sets produced from the integrated research effort will be served to users by extending existing data access, analysis and visualization interfaces currently supported and under development by the AOOS data management team. AOOS systems have the capabilities to ingest, archive and serve model output, remote sensing and real time/archived sensor data streams, and, as of fall 2011, ingest and archive GIS and project level data. AOOS is currently developing a mirror site in Portland, OR to ensure long-term security of its data and software. In addition, AOOS has prioritized working with state and federal agencies to ensure long-term access and archiving of agency data and information products.

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

NCEAS will augment the capabilities of the AOOS data system by incorporating the services that are part of the DataONE data federation[1]. These include open services for writing data and metadata, controlling access to data products as they are populated in the system, and services for replication and preservation of data. By using the DataONE service framework, this will also link the AOOS and IOOS system to the DataONE federation, which includes partners such as the U.S. Geological Survey, Knowledge Network for Biocomplexity and NASA Distributed Active

[1] http://dataone.org

Archive Centers. This broader federation will be critical in other stages of the project, especially for access to satellite data during synthesis and analysis activities.

In addition, DataONE services include a comprehensive, cross-institutional data preservation model that involves mirroring of data at multiple DataONE participating institutions and continuous active monitoring to ensure data remain valid and that adequate replication is present even in the event of institutional failures. In this project, we will establish the AOOS Asset Catalog as a Member Node in the DataONE network, and thus be able to replicate all EVOS data to DataONE partner institutions to ensure longevity, accessibility, and validity of EVOS data. Funding for these replicas will largely be supported through storage already available on the DataONE network (approximately 1.2 petabytes available for replication), although exceedingly large data sets (above ten terabytes) will need to be discussed.

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

Since 1995, the National Center for Ecological Analysis and Synthesis (NCEAS)[2] has been advancing the state of ecological and environmental knowledge through synthetic and collaborative research that aims to discover general patterns and principles based on existing data. The premise at NCEAS is that many decades of data have been collected that can be synthesized to produce novel insights into important scientific and societal issues, and that the expertise and information resources necessary to accomplish these syntheses are latent but distributed throughout the science community. To promote effective synthesis of environmental data, NCEAS has sponsored and executed more than 450 working groups over 15 years, many of which have had major scientific and policy impacts (e.g., changes in habitat conservation plans for endangered species, and creation of marine reserve initiatives based on scientific principles). Sociological studies of the working groups in action at NCEAS have demonstrated major shifts in the culture of synthesis in ecology and gains in collaborative productivity via the working group model at NCEAS (Hackett et al. 2008).

Despite decades of monitoring and analysis of EVOS-affected systems, there is still a major lack of understanding of oil spill impacts and recovery at a holistic level. Many of the studies to date have been at the single species level, and recovery status is tracked on a case-by-case basis. In addition, because all of the historical data have never been fully integrated, it has been impossible to conduct a holistic analysis of the effects of the oil spill and recovery of impacted regions. Such a holistic view is critical to guide future monitoring and recovery initiatives, which are expected to continue for decades. NCEAS and PIs from the LTM and HRM programs will conduct two holistic synthesis activities aimed at understanding the long-term, ecosystem-wide consequences of EVOS and the effectiveness of recovery initiatives:

- Synthesis Working Group: Assessing Ecosystem-wide, Long-Term Impacts from the Exxon Valdez Oil Spill
- Synthesis Working Group: Understanding Ecosystem Recovery following the Exxon Valdez Oil Spill

[2] http://www.nceas.ucsb.edu

The first will address system-wide impacts from EVOS, and the second will specifically focus on an assessment of recovery of affected systems and reasons for recovery successes and failures that will assist in future recovery initiatives. As detailed below in methods, the products from these syntheses will include a series of reports and academic papers supported by synthesized data, archived models and analyses, and archived model outputs.

These syntheses will build upon the more focused efforts to be conducted by the LTM and HRM programs. For example the working group on *Understanding Ecosystem Recovery* will benefit from the efforts to understand the recovery of an individual species (herring), but expand upon that to include other species including those in the LTM program. It will also provide an opportunity to further explore the connections between environmental variables to the recovery of herring and other species. Because the working group approach takes a more holistic approach than the individual species approach proposed by the HRM program we expect that in answering the question of *Understanding Ecosystem Recovery* we will provide new findings that will guide the LTM and HRM programs in the future.

C. Data Analysis and Statistical Methods

Data Management and Infrastructure Methods

The overarching strategic plan for the AOOS data system is described in detail in both the LTM and HRM data management detailed project descriptions. It involves implementing an end-to-end technological solution which allows data and information to be channeled and distilled into user-friendly products while simultaneously enabling the underlying data to be assimilated and used by the emerging external data assembly systems. AOOS will lead the development of this system, with NCEAS contributing to the design and implementation, particularly in areas where dealing with data heterogeneity is paramount, such as semantic search. The system has four tiers: 1) data, models and metadata; 2) interoperability systems which facilitate data search, query and delivery; 3) an asset catalogue and Smart Semantic Search Services; and 4) user applications that are web-based. The intended result is the facilitation of rapid data discovery, improved data access, understanding, and the development of knowledge about the physical and biological marine environment. This system meets all the standards of the national Integrated Ocean Observing System.

The asset catalog developed by AOOS will provide an index of all project data and provide direct connections to other Alaska data systems as well as those of the national Integrated Ocean Observing System and Global Ocean Observing Systems. The analysis and synthesis activities described in this proposal however, will also need access to a much broader set of data available not only from AOOS and IOOS, but also from other federated data systems such as NASA's Earth Science Data Information System (ESDIS) and the Earth Observing System Clearinghouse (ECHO). NCEAS engineers will work with the AOOS data team to enhance the AOOS asset catalog, in particular by linking it to the DataONE federated catalog, thereby providing access to non-IOOS data, such as MODIS and other satellite data managed by DataONE Member Nodes. This linkage will require NCEAS to extend AOOS data systems to be compatible with the interoperable web services framework used by DataONE. Current and emerging AOOS web services will be harmonized with DataONE services to allow applications to connect to the asset catalogue and get access to the underlying descriptions of all known data sources. Thus,

EVOSTC data will be directly incorporated at the national and global scales into both the IOOS oceanographic data network as well as other data federations via DataONE, thereby greatly expanding agency and public access. When complete, all data deposited in the AOOS system will also be replicated to participating DataONE member nodes, which are continuously monitored for availability and integrity to enable long-term data preservation.

Due to data heterogeneity, data discovery is difficult for complex, multidimensional and cross-disciplinary data that will be collected by the LTM and HRM program research teams. The AOOS system incorporates a metadata authoring tool that includes extensions for biological metadata. In this project, NCEAS and AOOS will expand on that system and build **Smart Semantic Search Services** that understand the scientific content of data to improve the effectiveness of data searches. The NCEAS team has pioneered a semantic scientific observations model that allows scientists to precisely discover measurements of interest and subset data to only include observations relevant to their studies. NCEAS developed the Extensible Observations Ontology (OBOE; Madin et al. 2008) to enable semantic search and access services that facilitate much higher precision and recall than have been possible with traditional metadata-driven systems. We will incorporate these semantic search services into the AOOS Tier 3 asset catalog, and help to develop the catalog so that semantic markup of data on ingest is easily accomplished. Thus, in addition to managing information about data availability and access methods, the asset catalogue will also contain ontologies that map source data descriptions and metadata to a common set of internally stored terms with strict definitions. This mapping will allow users to easily locate related sets of information without having explicit knowledge of the internal naming conventions of each data-providing agency. The development of an internal ontology will also enable future endeavors to connect the asset catalogue to global ontologies in the semantic web. Because the asset catalogue contains a semantic definition of data sources and maps all known data sources to a common definition, applications can be developed which connect users to vast arrays of data through simple but powerful interfaces.

Collaborative Synthesis and Analysis Methods

Two working groups consisting of LTM and HRM program PIs with additional nationally renowned scientists will undertake a broad synthesis of the 20-year data set from EVOSTC-funded projects and other spill area monitoring to improve our assessment of impacts and recovery associated with the EVOS:

- Synthesis Working Group: Assessing Ecosystem-wide, Long-Term Impacts from the Exxon Valdez Oil Spill
- Synthesis Working Group: Understanding Ecosystem Recovery following the Exxon Valdez Oil Spill

The working group syntheses will build on and expand programmatic syntheses conducted under the proposed LTM and HRM programs.

NCEAS has an extensive history of convening highly productive synthesis activities through its use of a working group model, involving face-to-face meetings and ongoing virtual collaboration supported by the Center (Hackett et al. 2008). Under this successful NCEAS model, committed working group participants conduct relevant analysis and modeling on a continuous basis for approximately two years, punctuated by periodic working meetings to come to consensus and drive further work by participants. The momentum of the group is maintained by postdoctoral

fellows, funded by this proposal, that reside at NCEAS, working on the group's analysis, modeling, and other synthesis tasks while being able to take advantage of the computational and analytical support services available at NCEAS. Working Groups are composed to represent a wide variety of scientific expertise, including both scientists that are closely involved in the problem at hand, as well as researchers from adjoining disciplines that help broaden the scientific perspective of the group. In addition, Working Groups typically include a mix of more senior scientists and younger scientists that are eager to dive into the required analysis and modeling activities. Although all travel expenses are paid for by the project, Working Group participants serve voluntarily on these working groups, making the activities especially cost effective.

To initiate these Working Group activities, NCEAS will organize and constitute the groups during year two, and working group activities will commence in year 3. Working Group leaders will be selected for their knowledge of the issues at hand as well as their ability to effectively motivate a group of up to 14 other working group participants. We would expect that many of the PIs from the LTM and HRM programs would be participants in the synthesis working groups along with nationally renowned experts in population and community modeling, ecosystem modeling, and coupled whole-system analysis. In addition, because NCEAS is already running a working group on ecotoxicology associated with the BP Deepwater Horizon spill[3], we would expect significant coordination and cross-pollination with these new EVOS synthesis groups.

Based on the preparatory data analysis and modeling conducted to assemble and integrate the 20-year historical data set with available current data from the LTM and HRM program syntheses (see Objective 4), NCEAS will work with the leaders of the "Assessing Impacts" and the "Understanding Recovery" working groups to outline an initial set of goals and deliverables for each of the two working groups. At a minimum, each group will produce a comprehensive synopsis report of results from analysis and modeling of the impacts and recovery in the historical and current data that will be written into a series of papers targeting both the science and management communities. The groups will also provide input to the LTM and HRM program teams on recommendations for evolution of the EVOSTC-funded monitoring efforts beyond the initial 5-year programs. All analyses, models, results, and data backing these conclusions will be published alongside these papers in the spirit of open science and to maximize reproducibility of the results (see the previous NCEAS Global Marine Impacts[4] synthesis for an example of this type of output). The actual synthesis activities and products will be selected by working group participants and driven by the data analysis and modeling to maximize working group effectiveness and the relevance of their products. However, example synthesis activities might include cross-scale analysis of the relationship between oceanographic processes and the recovery of forage fish; meta-analysis of the relationship between extent of injury and extent of recovery for organisms crossing taxonomic groups (e.g., mammals, birds, fish, plankton); and, performance of forecasting of cross-trophic recovery scenarios in light of observed population trends.

D. Description of Study Area

The study area for this project will include the entire EVOS spill affected area. The north, east, south, and west bounding coordinates of this area are 59.767, -145.837, 61.834, and -154.334

[3] Anderson, Cherr, and Peterson; Ecotoxicology of the Gulf Oil Spill: A holistic Framework for Assessing Impacts

[4] http://www.nceas.ucsb.edu/globalmarine

E. Coordination and Collaboration with Other Efforts

We propose to integrate the efforts in this project as an additional part of the multi-disciplinary "Long-Term Monitoring of Marine Conditions and Injured Resources and Services" program proposal submitted by McCammon et al. to the EVOSTC. The project represents a collaboration among AOOS, NCEAS, and the other LTM and HRM science project PIs both for individual program data management and in developing syntheses that connect individual project results.

Regarding the data management aspect, AOOS brings extensive experience with creation, collation, and access to extensive oceanographic (physical, chemical and biological) data throughout Alaska, as well as a variety of visualization tools and products for resource managers and marine stakeholders. Its initial focus has been on serving up real-time sensor and remote sensing data and forecast models. A new application in October 2011 will include the ability to query, discover and access project level and GIS data sets. In addition, AOOS brings a significant level of leveraged resources, regional data management projects and partnerships to this effort, which could not be accomplished for the budgeted amount without these leveraged resources. These include funded projects for the Alaska Ocean Observing System's Ocean Data Portal, the Prince William Sound Science Center, Northern Forum/USFWS Seabird Data System, the Alaska Department of Fish and Game, and the Cook Inlet Regional Citizens Advisory Council.

NCEAS brings complementary skills to the data management efforts. They have extensive expertise in cyberinfrastructure systems for synthetic environmental science (c.f., Reichman et al. 2011, Jones and Gries 2010, Jones et al. 2006). NCEAS has developed software systems supporting long-term data preservation and sharing, is a leader in metadata systems for science data, and is a progenitor of the DataONE[5] interoperability framework to create a global data federation for open access to scientific data. NCEAS' focus on project-level data management for highly heterogeneous data allow the management of current and legacy data that are critical to synthesis but that often are not captured by large-scale agency data systems, such as the EOSDIS program or the IOOS program. Thus, the initiatives at NCEAS for capturing complex but smaller-scale biological and physical data will be an effective complement to the ocean observatory data management systems that are provided by AOOS.

The syntheses efforts of the LTM, HRM, and NCEAS programs are to be synergistic. The syntheses of the LTM and HRM programs are expected to be program focused. The NCEAS working group syntheses efforts will build upon and augment the programmatic syntheses of the LTM and HRM programs by using a larger-scale synthesis of historical and current monitoring data to provide an assessment of the overall ecosystem impacts of and recovery from the EVOS. There is coupling between the LTM and HRM programs in that the environmental factors important to herring survival are primarily collected in the LTM program and herring represent an important factor in controlling the upper trophic level observations of the LTM. However, the collaboration with NCEAS will allow a more holistic view of how the findings of these programs are connected not only to each other, but with other types of research being conducted. The LTM and HRM program syntheses and personnel are expected to be an important resource for the NCEAS efforts to build upon. In turn the NCEAS led efforts will provide new perspectives

[5] http://dataone.org

to help guide future LTM and HRM efforts. It should be noted that the success of the NCEAS efforts depends on the participation of members of the LTM and HRM programs because of their intimate knowledge of the ecosystem within the EVOS affected region.

III. SCHEDULE

A. Project Milestones focused on NCEAS Activities

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.

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

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.

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.

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 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.

Objective 5. Provide preservation and interoperability with other non-IOOS 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.

Objective 6. 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.

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

Organization of synthesis activities will begin in year 2, with working group meetings and synthesis activities occurring throughout years 3 and 4. Publications and final analyses and conclusions of working groups will be produced in year 5, but we expect some of the publications in earlier years.

B. Measurable Project Tasks by NCEAS

FY12 1st Quarter (October 1, 11 to December 31, 11)

October	Project authorized by trustee council
October	NCEAS staff hiring and reallocation when funds become available
November	Collaborate with AOOS to initiate historic data aggregation effort
November	Attend LTM program PI meeting
December	Draft historic data set manifest
December	Design and begin implementation of DataONE integration

FY12 2nd Quarter

January	Prioritize historic datasets for inclusion into synthesis efforts
January	Design and begin implementation of data discovery and management tools
February	Begin historic data aggregation effort and integration into AOOS
March	Begin ongoing integration, analysis, and modeling (throughout year)

FY12 3rd Quarter

May	Attend HRM program PI meeting

FY12 4th Quarter

August	Submit input for LTM program annual report
September	Initial analysis results drive FY13 data salvage and integration
September	DataONE integration prototype demonstration

FY13 1st Quarter (October 1, 12 to December 31, 12)

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

November	Participate in LTM program PI meeting and support first LTM conceptual modeling workshop
December	Prototype data discovery and management tools demonstration

FY13 2nd Quarter

FY13 3rd Quarter

May	Participate annual HRM program PI meeting
June	Complete integration of data salvaged into AOOS DM System
July	Full release of data discovery and management tools

FY13 4th Quarter

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

FY14 1st Quarter (October 1, 13 to December 31, 13)

October	Assess year 2 datasets and metadata submitted to AOOS
October	Finalize user access tool work plan version 1 and initiate development
November	Participate in LTM program PI meeting

FY14 2nd Quarter

Winter	EVOSTC workshop with LTM and HRM programs supported by LTM and HRM synthesis reports and NCEAS historical data synthesis

FY14 3rd Quarter

May	Participate in annual HRM program PI meeting

FY14 4th Quarter

September	Create synopsis of FY14 synthesis WG meetings, draft publications

FY15 1st Quarter (October 1, 14 to December 31, 14)

October	Assess year 3 datasets and metadata submitted through AOOS
November	Participate in LTM program PI meeting

FY15 3rd Quarter

May	Participate in annual HRM program PI meeting
May	Submit input for five-year plan for FY17-22

FY15 4th Quarter

September	Create synopsis of FY15 synthesis WG meetings, draft and submit publications

FY16 1st Quarter (October 1, 15 to December 31, 15)

October	Assess year 4 datasets and metadata submitted through AOOS
November	Continue working on acceptance of synthesis group publications
November	Participate in LTM program PI meeting

FY16 4th Quarter

September Finalize all synthesis group papers and products

References

Hackett EJ, Parker JN, Conz D, Rhoten D, Parker A. 2008. Ecology transformed: The National Center for Ecological Analysis and Synthesis and the changing patterns of ecological research. Pages 277–296 in Olson GM, Zimmerman A, Bos N, eds. Scientific Collaboration on the Internet. MIT Press.

Jones MB and Gries C. 2010. Advances in environmental information management. Ecological Informatics 5: 1–2. doi:10.1016/j.ecoinf.2010.01.001

Jones MB, Schildhauer M, Reichman OJ, and Bowers S. 2006. The new bioinformatics: integrating ecological data from the gene to the biosphere. Annual Review of Ecology, Evolution, and Systematics. 2006. 37:519–544.

Madin JS, Bowers S, Schildhauer M, and Jones MB. 2008. Advancing ecological research with ontologies. Trends in Ecology and Evolution 23 (3): 159-168. doi:10.1016/j.tree.2007.11.007

Reichman, OJ, Jones MB, and Schildhauer MP. 2011. Challenges and Opportunities of Open Data in Ecology. Science 11 February 2011: 703-705. doi:10.1126/science.1197962

EXXON VALDEZ OIL SPILL TRUSTEE COUNCIL
DETAILED BUDGET FORM FY 12-FY16

Budget Category:	Proposed FY 12	Proposed FY 13	Proposed FY 14	Proposed FY 15	Proposed FY 16	TOTAL PROPOSED
Personnel	$314,045.8	$329,080.4	$148,566.6	$153,685.0	$41,498.6	$986,876.4
Travel	$2,784.0	$2,784.0	$2,784.0	$2,784.0	$2,784.0	$13,920.0
Contractual	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Commodities	$6,500.0	$6,500.0	$119,600.0	$119,600.0	$9,500.0	$261,700.0
Equipment	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Indirect Costs (*will vary by proposer*)	$84,065.7	$87,974.7	$70,447.2	$71,777.9	$13,983.5	$328,249.1
SUBTOTAL	$407,395.5	$426,339.1	$341,397.8	$347,846.9	$67,766.1	$1,590,745.5
General Administration (9% of subtotal)	$36,665.6	$38,370.5	$30,725.8	$31,306.2	$6,098.9	$143,167.1
PROJECT TOTAL	$444,061.1	$464,709.7	$372,123.6	$379,153.2	$73,865.0	$1,733,912.6
Other Resources (Cost Share Funds)	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0

COMMENTS: 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:
Team Leader:

SUMMARY

EXXON VALDEZ OIL SPILL TRUSTEE COUNCIL
DETAILED BUDGET FORM FY 12-FY16

Budget Category:	Proposed FY 12	Proposed FY 13	Proposed FY 14	Proposed FY 15	Proposed FY 16	TOTAL PROPOSED
Personnel	$314,045.8	$329,080.4	$148,566.6	$153,685.0	$41,498.6	$986,876.4
Travel	$2,784.0	$2,784.0	$2,784.0	$2,784.0	$2,784.0	$13,920.0
Contractual	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Commodities	$6,500.0	$6,500.0	$119,600.0	$119,600.0	$9,500.0	$261,700.0
Equipment	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Indirect Costs (*will vary by proposer*)	$84,065.7	$87,974.7	$70,447.2	$71,777.9	$13,983.5	$328,249.1
SUBTOTAL	$407,395.5	$426,339.1	$341,397.8	$347,846.9	$67,766.1	$1,590,745.5
General Administration (9% of subtotal)	$36,665.6	$38,370.5	$30,725.8	$31,306.2	$6,098.9	$143,167.1
PROJECT TOTAL	$444,061.1	$464,709.7	$372,123.6	$379,153.2	$73,865.0	$1,733,912.6
Other Resources (Cost Share Funds)	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0

COMMENTS: 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: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

EXXON VALDEZ OIL SPILL TRUSTEE COUNCIL
DETAILED BUDGET FORM FY 12-FY16

Personnel Costs: Name	Project Title	Months Budgeted	Monthly Costs	Overtime	Personnel Sum
Matthew Jones, Principal Investigator	Data Management & Synthesis	2.0	11666.0		23,332.0
Software Engineer - TBN	Synthesis	12.0	9862.5		118,350.0
Software Engineer - TBN	Synthesis	12.0	9862.5		118,350.0
Scientific Programmer - TBN	Data Management & Synthesis	6.0	9002.3		54,013.8
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
		Subtotal	40393.3	0.0	
				Personnel Total	$314,045.8

Travel Costs: Description	Ticket Price	Round Trips	Total Days	Daily Per Diem	Travel Sum
Project meetings with LTM, HRM, AOOS, and Axiom partners	750.0	2	6	214.0	2,784.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
				Travel Total	$2,784.0

FY12

Program Title:Collaborative Data Management and Holistic Synthesis of Impacts and Recovery Status Associated with the Exxon Valdez Oil Spill
Team Leader:Matthew D. Jones

FORM 3B
PERSONNEL & TRAVEL DETAIL

EXXON VALDEZ OIL SPILL TRUSTEE COUNCIL
DETAILED BUDGET FORM FY 12-FY16

Contractual Costs: Description		Contract 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: Description	Commodities Sum
4 computers with development and analysis software licenses	6,000.0
Communications charges (long-distance, fax, fedex, web conferencing, etc.)	500.0
Commodities Total	$6,500.0

FY12

Program Title:Collaborative Data Management and Holistic Synthesis of Impacts and Recovery Status Associated with the Exxon Valdez Oil Spill
Team Leader:Matthew R. Jones

FORM 3B CONTRACTUAL & COMMODITIES DETAIL

EXXON VALDEZ OIL SPILL TRUSTEE COUNCIL
DETAILED BUDGET FORM FY 12-FY16

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

FY12

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

Team Leader:Matthew R. Jones

FORM 3B
EQUIPMENT DETAIL

EXXON VALDEZ OIL SPILL TRUSTEE COUNCIL
DETAILED BUDGET FORM FY 12-FY16

Personnel Costs:		Months	Monthly		Personnel
Name	Project Title	Budgeted	Costs	Overtime	Sum
Matthew Jones, Principal Investigator	Data Management & Synthesis	2.0	12313.0		24,626.0
Software Engineer - TBN	Synthesis	12.0	10312.9		123,754.8
Software Engineer - TBN	Synthesis	12.0	10312.9		123,754.8
Scientific Programmer - TBN	Data Management & Synthesis	6.0	9490.8		56,944.8
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
		Subtotal	42429.6	0.0	
				Personnel Total	$329,080.4

Travel Costs:	Ticket	Round	Total	Daily	Travel
Description	Price	Trips	Days	Per Diem	Sum
Project meetings with LTM, HRM, AOOS, and Axiom partners	750.0	2	6	214.0	2,784.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
				Travel Total	$2,784.0

FY13

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

FORM 3B
PERSONNEL & TRAVEL DETAIL

EXXON VALDEZ OIL SPILL TRUSTEE COUNCIL
DETAILED BUDGET FORM FY 12-FY16

Contractual Costs: Description		Contract 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: Description	Commodities Sum
Communications charges (long-distance, fax, fedex, web conferencing, etc.)	500.0
4 computers with development and analysis software licenses	6,000.0
Commodities Total	$6,500.0

FY13

Program Title:Collaborative Data Management and Holistic Synthesis of Impacts and Recovery Status Associated with the Exxon Valdez Oil Spill
Team Leader:Matthew R. Jones

FORM 3B CONTRACTUAL & COMMODITIES DETAIL

EXXON VALDEZ OIL SPILL TRUSTEE COUNCIL
DETAILED BUDGET FORM FY 12-FY16

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

FY13

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

Team Leader:Matthew R. Jones

FORM 3B
EQUIPMENT DETAIL

EXXON VALDEZ OIL SPILL TRUSTEE COUNCIL
DETAILED BUDGET FORM FY 12-FY16

Personnel Costs:		Months	Monthly		Personnel
Name	Project Title	Budgeted	Costs	Overtime	Sum
Matthew Jones, Principal Investigator	Data Management & Synthesis	2.0	12884.0		25,768.0
Ecological Postdoctoral Scholar - TBN	Synthesis	12.0	4699.9		56,398.8
Ecological Postdoctoral Scholar - TBN	Synthesis	12.0	4699.9		56,398.8
Scientific Programmer - TBN	Data Management & Synthesis	10.0	1000.1		10,001.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
		Subtotal	23283.9	0.0	
				Personnel Total	$148,566.6

Travel Costs: Description	Ticket Price	Round Trips	Total Days	Daily Per Diem	Travel Sum
Project meetings with LTM, HRM, AOOS, and Axiom partners	750.0	2	6	214.0	2,784.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
				Travel Total	$2,784.0

FY14

Program Title:Collaborative Data Management and Holistic Synthesis of Impacts and Recovery Status Associated with the Exxon Valdez Oil Spill
Team Leader:Matthew D. Jones

FORM 3B
PERSONNEL & TRAVEL DETAIL

EXXON VALDEZ OIL SPILL TRUSTEE COUNCIL
DETAILED BUDGET FORM FY 12-FY16

Contractual Costs: Description		Contract 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: Description	Commodities Sum
Communications charges (long-distance, fax, fedex, web conferencing, etc.)	500.0
Working Group Refreshments (coffee, sodas, etc. Participants and UCSB attendees, ~$5/day/person)	900.0
PARTICIPANT SUPPORT	
"Assessing Impacts" Synthesis Working Group, 15 people, two working groups each	59,100.0
RT airfare @$900/trip, lodgin, 5 nights/trip @$150/night, per diem 5 days/trip @$64/day = $1970/person/trip total 30 person trips	
"Understanding Ecosystem Recovery" Working Group, 15 people, two working groups each	59,100.0
RT airfare @$900/trip, lodgin, 5 nights/trip @$150/night, per diem 5 days/trip @$64/day = $1970/person/trip total 30 person trips	
Commodities Total	$119,600.0

FY14

Program Title:Collaborative Data Management and Holistic Synthesis of Impacts and Recovery Status Associated with the Exxon Valdez Oil Spill
Team Leader:Matthew D. Jones

FORM 3B CONTRACTUAL & COMMODITIES DETAIL

EXXON VALDEZ OIL SPILL TRUSTEE COUNCIL
DETAILED BUDGET FORM FY 12-FY16

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 D. Jones

FORM 3B
EQUIPMENT DETAIL

EXXON VALDEZ OIL SPILL TRUSTEE COUNCIL
DETAILED BUDGET FORM FY 12-FY16

Personnel Costs:		Months	Monthly		Personnel
Name	Project Title	Budgeted	Costs	Overtime	Sum
Matthew Jones, Principal Investigator	Data Management & Synthesis	2.0	13478.0		26,956.0
Ecological Postdoctoral Scholar - TBN	Synthesis	12.0	4841.5		58,098.0
Ecological Postdoctoral Scholar - TBN	Synthesis	12.0	4841.5		58,098.0
Scientific Programmer - TBN	Data Management & Synthesis	10.0	1053.3		10,533.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
		Subtotal	24214.3	0.0	
				Personnel Total	$153,685.0

Travel Costs:	Ticket	Round	Total	Daily	Travel
Description	Price	Trips	Days	Per Diem	Sum
Project meetings with LTM, HRM, AOOS, and Axiom partners	750.0	2	6	214.0	2,784.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
				Travel Total	$2,784.0

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

FORM 3B
PERSONNEL & TRAVEL
DETAIL

EXXON VALDEZ OIL SPILL TRUSTEE COUNCIL
DETAILED BUDGET FORM FY 12-FY16

Contractual Costs: Description		Contract 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: Description	Commodities Sum
Communications charges (long-distance, fax, fedex, web conferencing, etc.)	500.0
Working Group Refreshments (coffee, sodas, etc. Participants and UCSB attendees, ~$5/day/person)	900.0
PARTICIPANT SUPPORT	
"Assessing Impacts" Synthesis Working Group, 15 people, two working groups each	
RT airfare @$900/trip, lodgin, 5 nights/trip @$150/night, per diem 5 days/trip @$64/day = $1970/person/trip total 30 person trips	59,100.0
"Understanding Ecosystem Recovery" Working Group, 15 people, two working groups each	
RT airfare @$900/trip, lodgin, 5 nights/trip @$150/night, per diem 5 days/trip @$64/day = $1970/person/trip total 30 person trips	59,100.0
Commodities Total	$119,600.0

FY15

Program Title:Collaborative Data Management and Holistic Synthesis of Impacts and Recovery Status Associated with the Exxon Valdez Oil Spill
Team Leader:Matthew D. Jones

FORM 3B CONTRACTUAL & COMMODITIES DETAIL

EXXON VALDEZ OIL SPILL TRUSTEE COUNCIL
DETAILED BUDGET FORM FY 12-FY16

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 R. Jones

FORM 3B
EQUIPMENT DETAIL

EXXON VALDEZ OIL SPILL TRUSTEE COUNCIL
DETAILED BUDGET FORM FY 12-FY16

Personnel Costs:		Months	Monthly		Personnel
Name	Project Title	Budgeted	Costs	Overtime	Sum
Matthew Jones, Principal Investigator	Data Management & Synthesis	2.0	14096.5		28,193.0
Scientific Programmer - TBN	Data Management & Synthesis	12.0	1108.8		13,305.6
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
		Subtotal	15205.3	0.0	
				Personnel Total	$41,498.6

Travel Costs: Description	Ticket Price	Round Trips	Total Days	Daily Per Diem	Travel Sum
Project meetings with LTM, HRM, AOOS, and Axiom partners	750.0	2	6	214.0	2,784.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
				Travel Total	$2,784.0

FY16

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

FORM 3B
PERSONNEL & TRAVEL DETAIL

EXXON VALDEZ OIL SPILL TRUSTEE COUNCIL
DETAILED BUDGET FORM FY 12-FY16

Contractual Costs: Description		Contract 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: Description	Commodities Sum
Communications charges (long-distance, fax, fedex, web conferencing, etc.)	500.0
Publication graphics, Open access charges, page charges	9,000.0
Commodities Total	$9,500.0

FY16

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

FORM 3B
CONTRACTUAL & COMMODITIES DETAIL

EXXON VALDEZ OIL SPILL TRUSTEE COUNCIL
DETAILED BUDGET FORM FY 12-FY16

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

FY16

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

Team Leader:Matthew D. Jones

FORM 3B
EQUIPMENT DETAIL

EXXON VALDEZ OIL SPILL TRUSTEE COUNCIL
DETAILED BUDGET FORM FY 12-FY16

EXXON VALDEZ OIL SPILL TRUSTEE COUNCIL
DETAILED BUDGET FORM FY 12-FY16

Budget Category:	Proposed FY 12	Proposed FY 13	Proposed FY 14	Proposed FY 15	Proposed FY 16	TOTAL PROPOSED
Personnel	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Travel	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Contractual	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Commodities	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Equipment	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
SUBTOTAL	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
General Administration (9% of subtotal)	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
PROJECT TOTAL	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Other Resources (Cost Share Funds)	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0

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

Team Leader:Matthew R. Jones

FORM 4A
TRUSTEE AGENCY
SUMMARY

EXXON VALDEZ OIL SPILL TRUSTEE COUNCIL
DETAILED BUDGET FORM FY 12-FY16

Personnel Costs: Name	Project Title	Months Budgeted	Monthly Costs	Overtime	Personnel 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: Description	Ticket Price	Round Trips	Total Days	Daily Per Diem	Travel Sum
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
				Travel Total	$0.0

FY12

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

Team Leader:Matthew R. Jones

FORM 4B PERSONNEL & TRAVEL DETAIL

EXXON VALDEZ OIL SPILL TRUSTEE COUNCIL
DETAILED BUDGET FORM FY 12-FY16

Contractual Costs: Description		Contract 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: Description	Commodities Sum
Commodities Total	$0.0

FY12

Program Title:
Team Leader:
Agency:

FORM 4B
CONTRACTUAL & COMMODITIES DETAIL

EXXON VALDEZ OIL SPILL TRUSTEE COUNCIL
DETAILED BUDGET FORM FY 12-FY16

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

FY12

Program Title:
Team Leader:
Agency:

FORM 4B
EQUIPMENT DETAIL

EXXON VALDEZ OIL SPILL TRUSTEE COUNCIL
DETAILED BUDGET FORM FY 12-FY16

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
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
				Travel Total	$0.0

FY13

Program Title:
Team Leader:
Agency:

FORM 4B
PERSONNEL & TRAVEL DETAIL

EXXON VALDEZ OIL SPILL TRUSTEE COUNCIL
DETAILED BUDGET FORM FY 12-FY16

Contractual Costs: Description		Contract 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: Description		Commodities Sum
	Commodities Total	$0.0

FY13	**Program Title:** **Team Leader:** **Agency:**	**FORM 4B** **CONTRACTUAL &** **COMMODITIES DETAIL**

EXXON VALDEZ OIL SPILL TRUSTEE COUNCIL
DETAILED BUDGET FORM FY 12-FY16

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

FY13

Program Title:
Team Leader:
Agency:

FORM 4B
EQUIPMENT DETAIL

EXXON VALDEZ OIL SPILL TRUSTEE COUNCIL
DETAILED BUDGET FORM FY 12-FY16

Personnel Costs: Name	Project Title	Months Budgeted	Monthly Costs	Overtime	Personnel 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: Description	Ticket Price	Round Trips	Total Days	Daily Per Diem	Travel 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

FY14

Program Title:
Team Leader:
Agency:

FORM 4B
PERSONNEL & TRAVEL
DETAIL

EXXON VALDEZ OIL SPILL TRUSTEE COUNCIL
DETAILED BUDGET FORM FY 12-FY16

Contractual Costs: Description		Contract 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: Description		Commodities Sum
	Commodities Total	$0.0

FY14

Program Title:
Team Leader:
Agency:

FORM 4B
CONTRACTUAL & COMMODITIES DETAIL

EXXON VALDEZ OIL SPILL TRUSTEE COUNCIL
DETAILED BUDGET FORM FY 12-FY16

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

FY14

Program Title:
Team Leader:
Agency:

FORM 4B
EQUIPMENT DETAIL

EXXON VALDEZ OIL SPILL TRUSTEE COUNCIL
DETAILED BUDGET FORM FY 12-FY16

Personnel Costs: Name	Project Title	Months Budgeted	Monthly Costs	Overtime	Personnel 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: Description	Ticket Price	Round Trips	Total Days	Daily Per Diem	Travel Sum
					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:
Team Leader:
Agency:

FORM 4B
PERSONNEL & TRAVEL DETAIL

EXXON VALDEZ OIL SPILL TRUSTEE COUNCIL
DETAILED BUDGET FORM FY 12-FY16

Contractual Costs: Description		Contract 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: Description		Commodities Sum
	Commodities Total	$0.0

FY15

Program Title:
Team Leader:
Agency:

FORM 4B
CONTRACTUAL & COMMODITIES DETAIL

EXXON VALDEZ OIL SPILL TRUSTEE COUNCIL
DETAILED BUDGET FORM FY 12-FY16

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:
Team Leader:
Agency:

FORM 4B
EQUIPMENT DETAIL

EXXON VALDEZ OIL SPILL TRUSTEE COUNCIL
DETAILED BUDGET FORM FY 12-FY16

Personnel Costs: Name	Project Title	Months Budgeted	Monthly Costs	Overtime	Personnel 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: Description	Ticket Price	Round Trips	Total Days	Daily Per Diem	Travel Sum
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
				Travel Total	$0.0

FY16

Program Title:
Team Leader:
Agency:

FORM 4B
PERSONNEL & TRAVEL DETAIL

EXXON VALDEZ OIL SPILL TRUSTEE COUNCIL
DETAILED BUDGET FORM FY 12-FY16

Contractual Costs: Description		Contract 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: Description		Commodities Sum
	Commodities Total	$0.0

FY16

Program Title:
Team Leader:
Agency:

FORM 4B
CONTRACTUAL & COMMODITIES DETAIL

EXXON VALDEZ OIL SPILL TRUSTEE COUNCIL
DETAILED BUDGET FORM FY 12-FY16

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

FY16

Program Title:
Team Leader:
Agency:

FORM 4B
EQUIPMENT DETAIL

EXXON VALDEZ OIL SPILL TRUSTEE COUNCIL
DETAILED BUDGET FORM FY 12-FY16

Exxon Valdez Oil Spill Trustee Council

DRAFT Work Plan for Federal Fiscal Year 2012

Issued March 21, 2011
Revised September 13, 2011

Exxon Valdez Oil Spill Trustee Council
441 W. 5th Avenue, Suite 500
Anchorage, AK 99501
Tel: 907-278-8012 Fax: 907-276-7178
www.evostc.state.ak.us

FISCAL YEAR 2012

DRAFT WORK PLAN

April March 21, 2011
Revised September 13, 2011

Prepared by:
Exxon Valdez Oil Spill Trustee Council

CORA CAMPBELL
Commissioner
Alaska Dept. of Fish and Game

JOHN BURNS
Attorney General
Alaska Department of Law

LARRY HARTIG
Commissioner
Alaska Dept. of Environmental Conservation

JIM BALSIGER
Director, Alaska Region
National Marine Fisheries Service

STEVE ZEMKE
Trustee Alternate
Chugach National Forest
US Department of Agriculture

KIM ELTON
Special Assistant to the Secretary for Alaska
Office of the Secretary
US Department of the Interior

Notice

The abstract of each proposal was written by the authors of the proposals to describe their projects. To the extent that the abstracts express opinions about the status of injured resources they do not represent the views of the Executive Director or other staff of the *Exxon Valdez* Oil Spill Trustee Council, nor do they reflect policies or positions of the Trustee Council.

The Alaska Department of Fish and Game (ADF&G) administers all programs and activities free from discrimination based on race, color, national origin, age, sex, religion, marital status, pregnancy, parenthood, or disability. The department administers all programs and activities in compliance with Title VI of the Civil Rights Act of 1964, Section 504 of the Rehabilitation Act of 1973, Title II of the Americans with Disabilities Act of 1990, the Age Discrimination Act of 1975, and Title IX of the Education Amendments of 1972.

If you believe you have been discriminated against in any program, activity, or facility please write:

- ADF&G ADA Coordinator, P.O. Box 115526, Juneau, AK 99811-5526.
- The department's ADA Coordinator can be reached via phone at the following numbers: (VOICE) 907-465-6077, (Statewide Telecommunication Device for the Deaf) 1-800-478-3648, (Juneau TDD) 907-465-3646, or (FAX) 907-465-6078.
- U.S. Fish and Wildlife Service, 4040 N. Fairfax Drive, Suite 300 Webb, Arlington, VA 22203.
- Office of Equal Opportunity, U.S. Department of the Interior, Washington DC 20240.

PLEASE COMMENT

You can help the Trustee Council by reviewing this draft work plan and letting us know your priorities for Fiscal Year 2012. You can comment by:

Mail:	Exxon Valdez Oil Spill Trustee Council 441 W. 5th Avenue, Suite 500 Anchorage, AK 99501 Attn: Draft Fiscal Year 2012 Work Plan
Telephone:	1-800-478-7745 Collect calls will be accepted from fishers and boaters who call through the marine operator.
Fax:	907-276-7178
E-mail:	elise.hsieh@alaska.gov

FY12 Funding Recommendations

Project Number	Principal Investigator	Project Title (abbr.)	Total Requested	FY12 Requested	Total Approved	Science Panel	Science Coord.	PAC	Executive Director	Trustee Council
12120118	Ammann	Community-based Marine Debris Program	$1,090,000.00	$534,100.00	$0.00	Do Not Fund	Do Not Fund	Do Not Fund	Do Not Fund	Pending
12120115	Anderson	Vessel Wash-Down and Wastewater Recycling Facility	$739,100.00	$97,800.00	$0.00	Fund	Fund	Fund	Fund	Pending
12120100	EVOS Admin	EVOSTC Annual Budget	$1,702,634.00	$1,702,634.00	$0.00	Not Reviewed	Not Reviewed	Fund	Fund	Pending
11100112-A	Irvine	Amendment to Lingering Oil on Boulder-Armored Beaches	$61,700.00	$61,700.00	$0.00	Not Reviewed	Fund	Not Reviewed	Fund	Pending
12120112	Jennings	PWS Harbor Cleanup Project	$1,090,000.00	$79,570.00	$0.00	Do Not Fund	Do Not Fund	Do Not Fund	Fund	Pending
12120120	Jones	Data Management and Synthesis	$1,733,913.00	$444,061.00	$0.00	Fund	Fund	Not Reviewed	Fund	Pending
12120114	McCammon	LTM - Marine Conditions and Injured Resources and Services	$11,938,100.00	$2,460,500.00	$0.00	Fund	Fund	Fund	Fund	Pending
12120117	Nixon	Lingering oil distribution modeling	$177,400.00	$177,400.00	$0.00	Fund	Fund	Fund	Fund	Pending
12120116	Pallister	Marine Debris Removal	$1,106,400.00	$384,400.00	$0.00	Fund	Fund	Fund	Fund	Pending
12120111	Pegau	PWS Herring Research and Monitoring Program	$5,759,600.00	$990,500.00	$0.00	Fund	Fund	Fund	Fund	Pending
12120113	Pegau	Lessons learned and implications to future spill response	$762,673.00	$528,868.00	$0.00	Do Not Fund	Do Not Fund	Do Not Fund	Do Not Fund	Pending
12120119	Whissel	Maine Debris Program	$1,082,830.00	$1,082,830.00	$0.00	Do Not Fund	Do Not Fund	Do Not Fund	Do Not Fund	Pending
		TOTAL REQUESTED	**$27,244,350.00**	**$8,544,363.00**						

FY12 Continuing Projects

Project #	Principal Investigator	Project Title (abbr.)	FY12 Funding	First Year Funded
10100132-G	Bishop	PWS Herring Survey: Top-Down Regulation by Predatory Fish	$193,400	FY10
10100750	Bodkin	Evaluation of Recovery and Restoration of Injured Nearshore Resources	$165,329	FY10
10100132-F	Brown	PWS Herring Survey: Herring, Predator, and Competitor Density	$153,055	FY10
10100624	Bychkov	Measuring Interannual Variability in the Herring's Forage Base	$65,100	FY10
10100132-A	Campbell	PWS Herring Survey: Plankton and Oceanographic Observations	$200,100	FY10
10100290	Carls	The Exxon Valdez Trustee Hydrocarbon Database	$9,300	FY10
10100132-E	Gay	PWS Herring Survey: Nursery Habitats of Juvenile Pacific Herring	$90,000	FY10
10100132-D	Heintz	PWS Herring Survey: Predictors of Winter Performance	$99,000	FY10
10100132-I	Hershberger	PWS Herring Survey: Herring Disease Program (HDP)	$295,800	FY10
11100853	Irons	Pigeon Guillemot Restoration in PWS	$580,081	FY11
11100112	Irvine	Lingering Oil on Boulder-Armored Beaches	$25,600	FY11
10100132-C	Kline	PWS Herring Survey: Pacific Herring Energetic Recruitment Factors	$265,000	FY10
10100132-H	Kuletz	PWS Herring Survey: Seasonal & Interannual Trends in Seabird Predation	$150,900	FY10
10100574	Lees	Re-Assessment of Bivalve Recovery	$32,600	FY10
10100742	Matkin	Killer Whales in Prince William Sound/Kenai Fjords	$125,775	FY10
10100132	Pegau	PWS Herring Survey: Comm. Involvem., Outreach, Logistics, & Synthesis	$354,300	FY10
10100132-B	Thorne	PWS Herring Survey: Assessment of Juvenile Herring Abundance	$173,600	FY10
10100340	Weingartner	Long-Term Monitoring of the Alaska Coastal Current	$133,600	FY10
		FY12 Continuing Project Funding Total:	**$3,112,540**	

Descriptions of New FY12 Proposals

Project Number: 12120118

Project Title: Community-based Marine Debris Program

Principal Investigator: Erika Ammann

Affiliation: NOAA

Co-PIs/Personnel: Laurel Jennings

Project Location: Prince William Sound

Funding Requested by Fiscal Year:

FY12: $534,100.00	**FY13:** $555,900.00	**FY14:** $0.00
FY15: $0.00	**FY16:** $0.00	**FY17:** $0.00

Total Funding Requested: $1,090,000.00

Abstract:
Marine debris is a persistent and continual threat to the coastal environment of Alaska. These threats range from the direct and acute impacts of ingestion and entanglement to the subtle and chronic impacts of habitat smothering and scarring. These impacts have been documented by scientists as early as 1923 (Williams and Ammann 2009), and continue to be visible in scientific literature as well as the popular press.

The sources of marine debris are as varied as its impacts – ranging from land-based improperly disposed consumer waste to ocean-based recreational and commercial fishing gear and even the contents of shipping containers lost at sea. Addressing marine debris in any area requires a holistic, collaborative and targeted approach that leverages local expertise with established best practices to achieve results. For example, a program that focuses exclusively on beach removal will reduce the amount of debris in the environment, but only for a brief time. Likewise, a program focused strictly on outreach without removal may target the wrong audiences due to a lack of understanding of debris sources, resulting in negligible long-term reduction of new debris.

The complexity of Alaska's coastlines and communities makes a coordinated and complementary approach even more critical. To achieve this result, we propose using EVOS funding to implement a focused two-year marine debris program within the spill affected area. This program will not only perform general debris removal, but will utilize survey data to maximize cost effectiveness and impact reduction by targeting areas with the highest concentrations of debris. Data on debris removal will be combined with existing information to populate an online portal with information on marine debris in Prince William Sound, enabling the public to view results of the efforts as well as gain perspective on the marine debris issue within the EVOS impacted areas. Information from this portal will be combined with existing materials to conduct targeted outreach to communities throughout the region, working to raise awareness and reduce the introduction of new debris as well as encourage active participation in volunteer cleanups, both as part of this program and in the future. Lastly, the program will work with local fishers and communities to establish a recycling program that gives a reasonable alternative to improper or unsustainable disposal practices for fishing nets and other plastics. Specialized potential partners have been consulted to form a proposed program team that will be coordinated by staff from the NOAA Restoration Center and the NOAA Marine Debris Division. These two NOAA programs have partnered since 2005 on a Community Based marine debris removal grant that has been at the forefront of marine debris activities. Through this partnership approach, the team will be able to use EVOS funding to create a program that leverages the invaluable experience of local Alaskan groups with the local experience and national perspective of NOAA staff to address marine debris impacts throughout the EVOS impacted area.

Science Panel Comments:
The panel has several key concerns regarding the proposed program. A significant portion of the funding requested will

be spent in travel costs for the Seattle, WA and Anchorage, AK based team. Also, the public outreach portion of the project appears to be a web portal for information which is not sufficient for meaningful public participation. It appears that while NOAA will be matching for personnel time that it will not be matching the projects. The NOAA staff time provided is for overhead, coordination and some technical assistance. It seems like some projects could provide matching funds. More detail for each proposed project would have to be provided for a more comprehensive review.

Science Panel Recommendation: Do Not Fund

Science Coordinator Comments:
I concur with the science panel.

Science Coordinator Recommendation: Do Not Fund

Public Advisory Committee Comments:
Not Available

Public Advisory Committee Recommendation: Do Not Fund

Executive Director Comments:
I concur with the science panel.

Executive Director Recommendation: Do Not Fund

Trustee Council Comments:
Not Available

Trustee Council Decision: Pending

Project Number: 12120115

Project Title: Seward Marine Industrial Center Vessel Wash-Down and Wastewater Recycling Facility

Principal Investigator: Kari Anderson

Affiliation: City of Seward

Co-PIs/Personnel: None

Project Location: Prince William Sound

Funding Requested by Fiscal Year:

FY12: $97,800.00	**FY13:** $641,300.00	**FY14:** $0.00
FY15: $0.00	**FY16:** $0.00	**FY17:** $0.00

Total Funding Requested: $739,100.00

Abstract:

The City of Seward is requesting $739,100 from the Exxon Valdez Oil Spill Trustee Council (EVOSTC) to construct a Vessel Wash-Down and Wastewater Recycling Facility at the Seward Marine Industrial Center. The project would include a concrete pad that drains into a system that collects, treats, and recycles 100 percent of the wastewater for subsequent vessel washing. The project would involve hiring consultants to design and permit the facility and a contractor to build the facility. To engage the public, newsletters, meetings, website updates, and other activities would occur throughout the project. It is expected that the project would take two years to complete. The Vessel Wash-Down and Wastewater Recycling Facility is proposed under the Harbor Protection and Marine Restoration focus area under the Storm Water, Wastewater, and Harbor Projects subject area of the EVOSTC FY 2012 grant program. Seward was initially impacted by EVOS in April 1989. In the years following the Spill, the area has struggled to recover. The City of Seward is proposing the Vessel Wash-Down and Wastewater Recycling Facility because standard vessel wash-down procedures can release toxic metals and liquid and solid wastes from antifoulants and hull maintenance debris into the marine environment. The project would help protect Resurrection Bay from incremental pollution associated with vessel cleaning and maintenance activities, which could keep the area from recovering from Spill.

Science Panel Comments:

Marine pollution from vessel washdown is a concern in the spill area and can negatively affect the injured and recovering species. The proposal is detailed and the PIs have a high degree of experience.

The project should describe how the long term maintenance of the facility will be supported by the community or harbor operators. It is not clear if there is a long term operating and maintenance commitment by City of Seward. A 5-month timeline (including design) may not be enough time to acquire all necessary permits.

Science Panel Recommendation: Fund

Science Coordinator Comments:

I concur with the science panel and Executive Director.

Science Coordinator Recommendation: Fund

Public Advisory Committee Comments:

Outstanding legal issues have been resolved and Trustee Council questions have been answered.

Public Advisory Committee Recommendation: Fund

Executive Director Comments:

I concur with the Science Panel's recommendations. I have requested and received needed additional information and recommend this project for funding.

Executive Director Recommendation: Fund

Trustee Council Comments:

April 2011 comments:
The Council requests the proposer provide additional detail and confirmation that the proposed facility is not legally required. In addition, the Council requests additional information regarding which other spill communities have such a facility, the fee structure for those facilities, and a rationale as to why the Council funding this facility would not disadvantage these other communities economically. .

June 2011 comments:
With regard to the question of whether the proposed Facility is legally required, the proposer has submitted an ADEC APDES Inspection report from June 2010 and the City attorney's letter summarizing the status of the 2005 lawsuit against the City of Seward. It appears that there are no outstanding legal requirements. ADOL and USDOJ are currently reviewing this additional information and have not indicated that they have reached an alternate conclusion.

With regard to whether the Council funding of the proposed project give the City of Seward an unfair economic advantage over other Harbor's facilities: The proposed project is for a vessel wash down and wastewater recycling facility. The City notes that vessel owners chose a facility based upon their homeport, fuel cost involved to reach the facility, size/cost of the travelift services and the availability of parts and maintenance. The availability of a wash-down pad, as proposed in this project, is not typically a consideration. Each spill-area community had the opportunity to submit an application, though only the City of Seward made the effort to do so.

With regard to the timeline of construction, there is a two-year planning and construction plan.

Trustee Council Decision: Pending

Project Number: 12120114-Q

Project Title: Long Term Monitoring Program - Evaluating Chronic Exposure of Harlequin Ducks and Sea Otters to Lingering EVO in Western PWS

Principal Investigator: Brenda Ballachey

Affiliation: Not Available

Co-PIs/Personnel: Jim Bodkin, Liz Bowen, Dan Esler, Keith Miles

Project Location: Prince William Sound

Funding Requested by Fiscal Year:

FY12: $204,200.00	FY13: $0.00	FY14: $0.00
FY15: $0.00	FY16: $0.00	FY17: $0.00

Total Funding Requested: $204,200.00

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 spring 2011. Sea otter and sea duck populations in PWS were injured as a result of the Exxon Valdez oil spill, with evidence for both immediate acute mortality and longer term injury from chronic exposure to oil spilled in 1989. For both species, it appears that full recovery is not yet complete. Prior EVOSTC projects have examined continuing exposure to lingering oil as a factor constraining recovery, using biomarker assays (the cytochrome P4501A biomarker, CYP1A, to evaluate oil exposure in harlequins, and gene expression assays to evaluate exposure and health of sea otters). Harlequin ducks have continued to show elevation of CYP1A in oiled areas through 2009, suggesting exposure is still a concern; harlequin populations were resampled in spring 2011 and results of CYP1A assays on those samples are pending. For sea otters, recent studies have shown that abundance in the vicinity of northern Knight Island has not yet returned to pre-spill levels, and that otters are foraging in areas where lingering oil persists in sediments. Most recently, gene expression assays have been developed, using an array of genes to specifically quantify oil exposure and health status of sea otters. We propose to resample harlequin and sea otter populations in western PWS in 2012 to assess biomarker levels, as a continued effort to measure exposure of these nearshore residents to lingering oil and monitor the status of their recovery as injured species, and as indicators of recovery of the overall nearshore ecosystem.

Science Panel Comments:

Not Available

Science Panel Recommendation: Fund

Science Coordinator Comments:

Not Available

Science Coordinator Recommendation: Fund

Public Advisory Committee Comments:

Not Available

Public Advisory Committee Recommendation: Fund

Executive Director Comments:
Continuing project authorized in prior fiscal year, no issues. Recommend fund.

Executive Director Recommendation: Fund

Trustee Council Comments:
Not Available

Trustee Council Decision: Pending

Project Number: 12120114-R

Project Title: LTM Program - Nearshore benthic systems in the Gulf of Alaska

Principal Investigator: Brenda Ballachey

Affiliation: Not Available

Co-PIs/Personnel: Tom Dean

Project Location: Prince William Sound

Funding Requested by Fiscal Year:

FY12: $282,400.00	**FY13:** $304,100.00	**FY14:** $331,900.00
FY15: $309,600.00	**FY16:** $331,900.00	**FY17:** $0.00

Total Funding Requested: $1,559,900.00

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 2011. This component focuses on resources within the nearshore ecosystem. The primary objective is to continue recovery and restoration monitoring in nearshore areas in the Gulf of Alaska, including study areas within Prince William Sound, Kenai Fjords, Katmai, and Kachemak Bay, following the plan initially developed in Restoration Project 050750 and tested in Restoration Project 070750. We will evaluate the current status of EVOS injured resources and services (recreational, subsistence, and passive use) to determine when populations may be considered recovered, and to foster recovery of those resources by identifying and recommending actions in response to any factors that may be limiting recovery. The USGS, National Park Service and the University of Alaska Fairbanks are partnering to accomplish these goals. Information collected will include data sets that have been used previously to assess recovery of injured resources in Prince William Sound (e.g., population abundance and survival of sea otters, abundance estimates for mussels, clams, and other intertidal organisms). Contrasts among trends in injured resources across study areas, including both oiled and unoiled areas, will provide the primary means of resource valuation. Our purpose is to implement a nearshore monitoring program that is comparable at multiple locations across the Gulf of Alaska. The nearshore sampling in Prince William Sound, in conjunction with sampling of other areas, will provide the foundation of a comprehensive restoration nearshore monitoring program for the entire oil spill area and form an integral part of the larger Long-Term Monitoring project.

Science Panel Comments:

Not Available

Science Panel Recommendation: Fund

Science Coordinator Comments:

Not Available

Science Coordinator Recommendation: Fund

Public Advisory Committee Comments:

Not Available

Public Advisory Committee Recommendation: Fund

Executive Director Comments:
Not Available

Executive Director Recommendation: Fund

Trustee Council Comments:
Not Available

Trustee Council Decision: Pending

Project Number: 12120114-A

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

Principal Investigator: Sonia Batten

Affiliation: Not Available

Co-PIs/Personnel: Alex Bychkov

Project Location: Prince William Sound

Funding Requested by Fiscal Year:

FY12: $0.00	**FY13:** $66,800.00	**FY14:** $68,800.00
FY15: $70,700.00	**FY16:** $73,100.00	**FY17:** $0.00

Total Funding Requested: $279,400.00

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. Many important species, including herring, forage outside of Prince William Sound for at least some of their life history (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 propose to continue sampling this transect through 2016. 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.

Science Panel Comments:

Not Available

Science Panel Recommendation: Fund

Science Coordinator Comments:

Not Available

Science Coordinator Recommendation: Fund

Public Advisory Committee Comments:

Not Available

Public Advisory Committee Recommendation: Fund

Executive Director Comments:
Not Available

Executive Director Recommendation: Fund

Trustee Council Comments:
Not Available

Trustee Council Decision: Pending

Project Number: 12120114-B

Project Title: LTM Program - Administration, Science Review Panel and PI Meeting Logistics, and Outreach and Community Involvement

Principal Investigator: Nancy Bird

Affiliation: Not Available

Co-PIs/Personnel: None

Project Location: Prince William Sound

Funding Requested by Fiscal Year:

FY12: $263,300.00	**FY13:** $274,700.00	**FY14:** $298,600.00
FY15: $293,400.00	**FY16:** $288,100.00	**FY17:** $0.00

Total Funding Requested: $1,418,100.00

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 Detailed Project Description(DPD) addresses administration and fiscal management of the program, travel and logistics for science review, principal investigator annual meetings, and the Outreach Steering Committee, and administrative support for the Outreach and Community Involvement component of the LTM program.

In order to be most fiscally efficient, the Prince William Sound Science Center is serving as the administrative lead and fiscal agent for the consortium submitting this proposal, as well as for the Herring Program. The Outreach and Community Involvement component will be coordinated by the Alaska Ocean Observing System.

Science Panel Comments:

Not Available

Science Panel Recommendation: Fund

Science Coordinator Comments:

Not Available

Science Coordinator Recommendation: Fund

Public Advisory Committee Comments:

Not Available

Public Advisory Committee Recommendation: Fund

Executive Director Comments:

Not Available

Executive Director Recommendation: Fund

Trustee Council Comments:
Not Available

Trustee Council Decision: Pending

Project Number: 12120111-A

Project Title: PWS Herring Program - Validation of Acoustic Surveys for Pacific Herring Using Direct Capture

Principal Investigator: Mary Anne Bishop

Affiliation: Not Available

Co-PIs/Personnel: None

Project Location: Prince William Sound

Funding Requested by Fiscal Year:

FY12: $68,000.00	**FY13:** $90,600.00	**FY14:** $148,000.00
FY15: $141,000.00	**FY16:** $145,300.00	**FY17:** $0.00

Total Funding Requested: $592,900.00

Abstract:

Acoustic surveys provide a relatively low-cost, remote sensing tool to estimate species-specific fish biomass and abundance. Interpreting acoustic data requires accurate ground truthing. In Prince William Sound, juvenile herring acoustic surveys have been conducted at the beginning (November) and end (March) of every winter since March 2007. Until now, a variety of methods have been used with limited success to ground truth these surveys.

Pelagic trawls are the recommended method for validating species composition and for obtaining relatively unbiased information on length frequency distribution, age, and other biological information.
Here we propose to use a low-resistance, light-weight midwater trawl capable of increased towing speeds (up to 4 knots) as a method to ground truth acoustic surveys for juvenile and adult herring. Our pelagic trawl surveys will take place in conjunction with and onboard the same vessel as three studies in the PWS Herring Research and Monitoring program: a) Juvenile Herring Abundance Index (years 2-5); b) Acoustic Consistency: Intensive Surveys of Juvenile Herring (year 3); and, c) Expanded Adult Herring Surveys (years 2-5). In year 1 we will also use the trawl to collect juvenile herring during the 9-month intensive Study to Validate the Separate Herring Condition Monitoring Programs. Our project will provide data on species composition and length frequency to aid in the interpretation of current and historical acoustic surveys. In addition it will provide adult herring samples to Alaska Department of Fish and Game for the adult herring age-structure-analyses model and will provide juvenile herring samples to researchers investigating juvenile herring fitness and disease. Our trawls will also provide fishery-independent surveys for non-herring species, thus increasing our knowledge of pelagic fishes in Prince William Sound.

Science Panel Comments:

Not Available

Science Panel Recommendation: Fund

Science Coordinator Comments:

Not Available

Science Coordinator Recommendation: Fund

Public Advisory Committee Comments:

Not Available

Public Advisory Committee Recommendation: Fund

Executive Director Comments:
Not Available

Executive Director Recommendation: Fund

Trustee Council Comments:
Not Available

Trustee Council Decision: Pending

Project Number: 12120111-B

Project Title: PWS Herring Program - Tracking Seasonal Movements of Adult Pacific Herring in Prince William Sound

Principal Investigator: Mary Anne Bishop

Affiliation: Not Available

Co-PIs/Personnel: Sean Powers

Project Location: Prince William Sound

Funding Requested by Fiscal Year:

FY12: $70,700.00	**FY13:** $19,700.00	**FY14:** $17,400.00
FY15: $0.00	**FY16:** $0.00	**FY17:** $0.00

Total Funding Requested: $107,800.00

Abstract:

Knowledge of fish movements and migrations are critical to understanding fish population dynamics. In Prince William Sound (PWS) adult herring disperse after spawning, however their movement patterns are poorly understood. Currently the only information on adult herring movements are a small number of observations from fishers that suggest PWS herring are regularly migrating out of PWS and onto the shelf. This proposal focuses on verifying adult Pacific herring movements using detections of tagged fish. The Herring Marking Workshop sponsored by EVOS in December 2008, reviewed all potential marking methods for herring and conditionally endorsed acoustic tagging as a method for determining herring movements. This pilot project will acoustic tag adult herring during November around Port Gravina, a spring spawning area. During the second season a small sample of adult herring will be tagged during spring at other spawning areas. We will then examine detections from two, established Pacific Ocean Shelf Tracking (POST) Project's acoustic arrays as well as new arrays to be deployed at the major entrances and passages to Prince William Sound. These acoustic arrays will enable us to determine seasonal movement patterns within and out of Prince William Sound. The proposed project builds on our previous and current research on acoustic-tagged fishes. This project will synergize with efforts of POST and the Ocean Tracking Network (OTN). The ability to track herring is critical to answer many questions including those about stock structure, migration habits, and the occurrence of skip-spawning. Determining the capabilities of this technology will help guide our choice of future research emphasis.

Science Panel Comments:

Not Available

Science Panel Recommendation: Fund

Science Coordinator Comments:

Not Available

Science Coordinator Recommendation: Fund

Public Advisory Committee Comments:

Not Available

Public Advisory Committee Recommendation: Fund

Executive Director Comments:
Not Available

Executive Director Recommendation: Fund

Trustee Council Comments:
Not Available

Trustee Council Decision: Pending

Project Number: 12120114-C

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

Principal Investigator: Mary Anne Bishop

Affiliation: Not Available

Co-PIs/Personnel: None

Project Location: Prince William Sound

Funding Requested by Fiscal Year:

FY12: $51,700.00	**FY13:** $78,600.00	**FY14:** $80,900.00
FY15: $83,400.00	**FY16:** $86,300.00	**FY17:** $0.00

Total Funding Requested: $380,900.00

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 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 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 and PWS Herring Research & Monitoring Juvenile Herring Abundance Index as well as the Extended Adult Herring Biomass Surveys and integrates the seabird observations with those studies.

Science Panel Comments:

Not Available

Science Panel Recommendation: Fund

Science Coordinator Comments:

Not Available

Science Coordinator Recommendation: Fund

Public Advisory Committee Comments:

Not Available

Public Advisory Committee Recommendation: Fund

Executive Director Comments:
Not Available

Executive Director Recommendation: Fund

Trustee Council Comments:
Not Available

Trustee Council Decision: Pending

Project Number: 12120111-C

Project Title: PWS Herring Program - Data Management Support

Principal Investigator: Robert Bochenek

Affiliation: Not Available

Co-PIs/Personnel: None

Project Location: Prince William Sound

Funding Requested by Fiscal Year:

FY12: $120,000.00	**FY13:** $120,000.00	**FY14:** $20,500.00
FY15: $21,200.00	**FY16:** $22,000.00	**FY17:** $0.00

Total Funding Requested: $303,700.00

Abstract:
This project supports the EVOS Integrated Herring Research Program 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 utilized by a wide array of technical and non technical users. This effort leverages, coordinates and cost shares with a series of existing data management projects, cyber-infrastructure and partnerships which contribute capacity and information to this effort. During year one and two, this project would focus or 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. This work would scale down in year three thru five to provide support for general project level data management and archival.

Science Panel Comments:
Please refer to comments which can be found under 12120114 - McCammon and 1210120 - Jones.

Science Panel Recommendation: Modify

Science Coordinator Comments:
Not Available

Science Coordinator Recommendation: Modify

Public Advisory Committee Comments:
Not Available

Public Advisory Committee Recommendation: Modify

Executive Director Comments:
Not Available

Executive Director Recommendation: Modify

Trustee Council Comments:
Not Available

Trustee Council Decision: Pending

Project Number: 12120114-D

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

Principal Investigator: Robert Bochenek

Affiliation: Not Available

Co-PIs/Personnel: None

Project Location: Prince William Sound

Funding Requested by Fiscal Year:

FY12: $163,500.00	**FY13:** $163,400.00	**FY14:** $164,000.00
FY15: $164,000.00	**FY16:** $162,600.00	**FY17:** $0.00

Total Funding Requested: $817,500.00

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 utilized by a wide array of technical and non technical users. This effort leverages, coordinates and cost shares with a series of existing data management projects which are parallel in scope to the data management needs of the long term monitoring program. In the first two years, this project would 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 would continue into year three through five but efforts would also focus on developing management and outreach applications for the data and data products produced from the LTM program.

Science Panel Comments:
Please refer to comments which can be found under 12120114 - McCammon and 1210120 - Jones.

Science Panel Recommendation: Modify

Science Coordinator Comments:
Not Available

Science Coordinator Recommendation: Modify

Public Advisory Committee Comments:
Not Available

Public Advisory Committee Recommendation: Modify

Executive Director Comments:
Not Available

Executive Director Recommendation: Modify

Trustee Council Comments:
Not Available

Trustee Council Decision: Pending

Project Number: 12120111-D

Project Title: PWS Herring Program - Non lethal sampling: In situ estimation of juvenile herring sizes

Principal Investigator: Kevin Boswell

Affiliation: Not Available

Co-PIs/Personnel: None

Project Location: Prince William Sound

Funding Requested by Fiscal Year:

FY12: $94,900.00	**FY13:** $0.00	**FY14:** $0.00
FY15: $0.00	**FY16:** $0.00	**FY17:** $0.00

Total Funding Requested: $94,900.00

Abstract:
A common source of bias in acoustic surveys is proper partitioning of size classes and their respective contribution to biomass estimates (see Simmonds and MacLennan 2005). This is particularly evident when considering the probability of encountering multiple size classes (or age classes) within a given survey region, or even within a large school. Severa approaches have been successful in estimating in situ size distributions, though many require appropriate light fields to determine target sizes (Foote and Traynor 1988; Gauthier and Rose 2001; Kloser and Horne 2003). Recent application of imaging sonars have proven useful for acquiring high-resolution measurements of target-length distribution, without the need for ambient or external light sources, thereby reducing the potential of behaviorally mediated bias in length estimation. Further, automated analysis software has been refined to rapidly provide length estimates and target tracking parameters, even for tightly schooling fishes.

Science Panel Comments:
Not Available

Science Panel Recommendation: Fund

Science Coordinator Comments:
Not Available

Science Coordinator Recommendation: Fund

Public Advisory Committee Comments:
Not Available

Public Advisory Committee Recommendation: Fund

Executive Director Comments:
Not Available

Executive Director Recommendation: Fund

Trustee Council Comments:
Not Available

Trustee Council Decision: Pending

Project Number: 12120111-Q

Project Title: PWS Herring Research and Monitoring Program - Modeling the Population Dynamics of PWS Herring

Principal Investigator: Trevor Branch

Affiliation: University of Washington

Co-PIs/Personnel: None

Project Location: Prince William Sound

Funding Requested by Fiscal Year:

FY12: $36,907.00	**FY13:** $87,013.00	**FY14:** $97,836.00
FY15: $100,406.00	**FY16:** $104,920.00	**FY17:** $0.00

Total Funding Requested: $427,082.00

Abstract:

Robust Pacific herring (Clupea pallasii) populations, suitable for exploitation by commercial fisheries, are typically sustained by periodic recruitment of strong year classes into the adult spawning population. However, the Prince William Sound (PWS) herring population has not had a strong recruitment class since 1989, when the Exxon Valdez Oil Spill (EVOS) occurred. In the EVOS settlement herring were identified as an injured resource and they remain listed as an unrecovered species by the EVOS Trustee Council (EVOSTC). Understanding why herring have not recovered in Prince William Sound requires understanding potential bottlenecks in the herring life cycle. The identification of the limiting conditions to herring recovery requires a series of focused process studies combined with monitoring of the natural conditions that affect herring survival.

Described here is a single project that is a part of an integrative program that will enhance the current monitoring efforts of the Alaska Department of Fish and Game (ADF&G), and examine aspects of particular life stages to allow better modeling of herring populations. The long-term goal of the program is to improve predictive models of herring stocks through observations and research. While we do not anticipate that there will be a major change in our modeling ability in the next five years, we expect that the combination of monitoring and focused process studies will provide incremental changes over the next twenty years and result in a much better understanding of herring populations by the end of the program.

Science Panel Comments:

The Herring Program team clearly gave careful thought to how modeling should be done and who should do it. Their choice and recruitment of Trevor Branch at UW is superb. This is a young rising star in fisheries dynamics modeling, who has many experienced colleagues with whom to interact. His proposal represents a good guideline for the modeling work he will begin, identifying some key processes of high value to the herring program. We expect to see evolution of the modeling as the project develops and see Branch as a leader who will make adaptive additions and modifications as new issues arise. We would like to have seen a more overt mention of how competing drivers of herring mortality will be tested against one another – physiological stress, starvation, top-down predation, and disease. These are clearly embedded in the life history modeling, but model fits to choose the factor or combinations of factors that best fit observed abundance changes would be welcome.

Science Panel Recommendation: Fund

Science Coordinator Comments:

I concur with the Science Panel's comments. The PI's identified are skilled and well-respected in their field and will bring valuable experience to this complex project.

Science Coordinator Recommendation: Fund

Public Advisory Committee Comments:

The PAC concurs with the Science Panel recommendation to fund the Branch modeling project. There were no objections.

Public Advisory Committee Recommendation: Fund

Executive Director Comments:

Not Available

Executive Director Recommendation: Fund

Trustee Council Comments:

Not Available

Trustee Council Decision: Pending

Project Number: 12120111-E

Project Title: PWS Herring Program - Expanded Adult Herring Surveys

Principal Investigator: Michele Buckhorn

Affiliation: Prince William Sound Science Center

Co-PIs/Personnel: Dick Thorne

Project Location: Prince William Sound

Funding Requested by Fiscal Year:

FY12: $6,500.00	**FY13:** $84,400.00	**FY14:** $68,100.00
FY15: $90,600.00	**FY16:** $84,400.00	**FY17:** $0.00

Total Funding Requested: $334,000.00

Abstract:

Prince William Sound herring stock biomass estimates from hydroacoustic surveys provide a direct measure of the stock abundance and are also a primary input into the age-structured assessment (ASA) model that is the forecasting tool used for managment. Prior to 2001, the hydroacoustic surveys were conducted exclusively by the Prince William Sound Science Center (PWSSC). Since 2001, the effort has been shared between PWSSC and the Cordova office of Alaska Department of Fish and Game (ADF&G). While the ADF&G considers the hydroacoustic surveys to be critical (Steve Moffitt, personal communication) the lack of a commercial herring fishery in PWS since 1998 has reduced management priorities for herring. Thus the PWSSC contribution has become critically important for the long-term, especially if a future fishery appears only a remote possibility. With the level of effort available over the past several years, PWSSC and ADF&G individually have achieved herring biomass estimates with a precision of about ±30%, which is insufficient for management purposes. However, the combined effort currently meets management requirements for precision. Current stock assessment efforts by ADF&G resource managers in PWS focus on the largest spawning aggregations. The objective of this study is to increase the current survey area of adult spawning beyond the Port Gravina and Fidalgo areas to provide a more precise estimate of spawning biomass. We propose to extend the PWSSC acoustic surveys to help identify the relative contributions of additional spawning aggregations over temporal and spatial scales. This will help establish more accurate estimates of the total herring biomass in PWS and provide an alert to changes in biomass in different regions. Beginning in FY2013 and continuing until 2016, hydroacoustic surveys will be conducted in late spring (April-May) to assess adult spawning biomass. ADF&G will continue to conduct direct sampling for age/length/weight. Additional direct capture will be conducted using a midwater trawl at adult spawning sites (See Bishop proposal).

Science Panel Comments:

Not Available

Science Panel Recommendation: Fund

Science Coordinator Comments:

Not Available

Science Coordinator Recommendation: Fund

Public Advisory Committee Comments:

Not Available

Public Advisory Committee Recommendation: Fund

Executive Director Comments:
Not Available

Executive Director Recommendation: Fund

Trustee Council Comments:
Not Available

Trustee Council Decision: Pending

Project Number: 12120111-F

Project Title: PWS Herring Program - Juvenile Herring Abundance Index

Principal Investigator: Michele Buckhorn

Affiliation: Not Available

Co-PIs/Personnel: Dick Thorne

Project Location: Prince William Sound

Funding Requested by Fiscal Year:

FY12: $90,100.00	**FY13:** $80,100.00	**FY14:** $66,100.00
FY15: $84,900.00	**FY16:** $82,900.00	**FY17:** $0.00

Total Funding Requested: $404,100.00

Abstract:
Management of the Pacific herring stock in Prince William Sound (PWS), Alaska, is based primarily on an age-structured-assessment (ASA) model. The current model, developed in 2005, incorporates both hydroacoustic estimates of the adult herring biomass and an index of the male spawning, called the "mile-days of spawn". Unfortunately, the forecast is based on measurements from the previous year and does not have a direct measure of future age 3 recruitment. Current knowledge suggests that most mortality occurs during the first winter of life, so the relative recruitment may be fixed by the end of the first year. Consequently, estimates of relative abundance of age 1 and age 2 fish should provide an index of future recruitment. An index of age 0 fish would also provide a forecast of recruitment if additional information were available on the magnitude of the first year mortality. We will conduct annual fall surveys (FY2013-2016) of 8 bays; four of which will be the Sound Ecosystem Assessment (SEA) bays (Cooney et al. 2001). This will maintain a continual database from these locations. The other 4 bays will be selected based upon the survey results of the current EVOSTC FY10 Herring Survey Project (# 10100132). Surveys will be conducted using 120 kHz split-beam hydroacoustic unit in a stratified systematic survey design (Adams et al. 2006). For this study, direct capture will be directed to size and species composition. A midwater trawl will be used to sample randomized transects within each strata.

Science Panel Comments:
Not Available

Science Panel Recommendation: Fund

Science Coordinator Comments:
Not Available

Science Coordinator Recommendation: Fund

Public Advisory Committee Comments:
Not Available

Public Advisory Committee Recommendation: Fund

Executive Director Comments:
Not Available

Executive Director Recommendation: Fund

Trustee Council Comments:
Not Available

Trustee Council Decision: Pending

Project Number: 12120111-G

Project Title: PWS Herring Program - Intensive surveys of juvenile herring

Principal Investigator: Michele Buckhorn

Affiliation: Prince William Sound Science Center

Co-PIs/Personnel: Dick Thorne

Project Location: Prince William Sound

Funding Requested by Fiscal Year:

FY12: $50,100.00	**FY13:** $0.00	**FY14:** $76,300.00
FY15: $6,800.00	**FY16:** $0.00	**FY17:** $0.00

Total Funding Requested: $133,200.00

Abstract:

Hydroacoustic surveys of juvenile herring nursery areas in Prince William Sound have been conducted during fall and late-winter for the last several years. The number of locations surveyed have varied from 5-9, including the 4 Sound Ecosystem Assessment (SEA) bays. However, each seasonal effort has conducted only a single night survey in each of these locations. Thorne (2010) examined seasonal changes from fall 2006 to spring 2009. He showed that apparent overwinter mortality of age 0 herring appeared to be greatest in Simpson Bay and least in Whale Bay. However, the differences in seasonal abundance could be attributed to mortality, emigration, or changes in ambient light. We propose to address these uncertainties with an intensive fall and late winter/spring intensive survey. The fall series will start mid-October 2014 and extend to the first week of December. The late winter/spring series will begin the 3rd week of February 2015, and extend into the 2nd week of April. We propose to conduct the surveys in two bays sufficiently adjacent to cover each bay each night, such as Simpson Bay, Port Gravina, Windy Bay or St. Mathews Bay. In addition to the hydroacoustic surveys, we propose a single night of direct capture effort in each location for each of the survey weeks (See Bishop, this proposal). The survey design will follow the historic zig zag transects run by Thorne since 1993 in order to remain consistent with that sampling design and to put the long term fall and spring surveys into context.

Science Panel Comments:

Not Available

Science Panel Recommendation: Fund

Science Coordinator Comments:

Not Available

Science Coordinator Recommendation: Fund

Public Advisory Committee Comments:

Not Available

Public Advisory Committee Recommendation: Fund

Executive Director Comments:

Not Available

Executive Director Recommendation: Fund

Trustee Council Comments:
Not Available

Trustee Council Decision: Pending

Project Number: 12120114-E

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

Principal Investigator: Robert Campbell

Affiliation: Not Available

Co-PIs/Personnel: None

Project Location: Prince William Sound

Funding Requested by Fiscal Year:

FY12: $238,100.00	**FY13:** $193,200.00	**FY14:** $197,300.00
FY15: $203,700.00	**FY16:** $209,300.00	**FY17:** $0.00

Total Funding Requested: $1,041,600.00

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 that will be telemetered out in near real-time. 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., and will analyze plankton samples collected during intensive studies of juvenile herring feeding and energetics.

Science Panel Comments:
Not Available

Science Panel Recommendation: Fund

Science Coordinator Comments:
Not Available

Science Coordinator Recommendation: Fund

Public Advisory Committee Comments:
Not Available

Public Advisory Committee Recommendation: Fund

Executive Director Comments:
Not Available

Executive Director Recommendation: Fund

Trustee Council Comments:
Not Available

Trustee Council Decision: Pending

Project Number: 12120114-S

Project Title: LTM Program - Extending the Tracking of oil levels and weathering (PAH composition) in PWS through time.

Principal Investigator: Mark Carls

Affiliation: Not Available

Co-PIs/Personnel: Mandy Lindeberg, Jeep Rice

Project Location: Prince William Sound

Funding Requested by Fiscal Year:

FY12: $19,600.00	**FY13:** $13,100.00	**FY14:** $169,200.00
FY15: $8,700.00	**FY16:** $6,500.00	**FY17:** $0.00

Total Funding Requested: $217,100.00

Abstract:
Intertidal areas in western Prince William Sound were extensively coated with Exxon Valdez oil; oil still remains in many beaches, presumably with declining impacts on intertidal invertebrates such as mussels, and also predators such as sea otters and harlequin ducks. This project would revisit approximately 12 of the worst case sites to continue the long term data set that tracks oil quantity and weathering composition in the contaminated sediments, and establish long term oil monitoring sites that would be re-sampled every 5 years over the next 20 years.

This project fills two needs: understanding the "dose" levels (past and present) for species such as mussels, intertidal invertebrates, sea otters, and harlequin ducks; and (2) understanding the natural degradation of quantity and composition of PAH over a long time course. Understanding exposure doses is important to injured species, and this would complement the biomarker analyses of lingering exposure on sea otters and harlequin ducks (Ballachey; Esler). Understanding oil loss over time is important for understanding full recovery of the habitat; in Alaska, this time course is apparently longer than in lower latitude environments. This study would complement and extend previous work, and would complement the remediation studies by Boufadel in 2011-12 as well as the Irvine study outside of PWS in 2011-12.

Science Panel Comments:
Not Available

Science Panel Recommendation: Fund

Science Coordinator Comments:
Not Available

Science Coordinator Recommendation: Fund

Public Advisory Committee Comments:
Not Available

Public Advisory Committee Recommendation: Fund

Executive Director Comments:
Not Available

Executive Director Recommendation: Fund

Trustee Council Comments:
Not Available

Trustee Council Decision: Pending

Project Number: 12120114-F

Project Title: **LTM Program - 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**

Principal Investigator: Heather Coletti

Affiliation: Not Available

Co-PIs/Personnel: None

Project Location: Prince William Sound

Funding Requested by Fiscal Year:

FY12: $32,700.00	**FY13:** $0.00	**FY14:** $0.00
FY15: $0.00	**FY16:** $0.00	**FY17:** $0.00

Total Funding Requested: $32,700.00

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 5 and 20 years, respectively. The results of these surveys provide estimates of the 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, glaucouswinged
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, using a Bayesian framework, 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.

Science Panel Comments:

Not Available

Science Panel Recommendation: Fund

Science Coordinator Comments:

Not Available

Science Coordinator Recommendation: Fund

Public Advisory Committee Comments:

Not Available

Public Advisory Committee Recommendation: Fund

Executive Director Comments:
Not Available

Executive Director Recommendation: Fund

Trustee Council Comments:
Not Available

Trustee Council Decision: Pending

Project Number: 12120114-G

Project Title: LTM Program - Long-term monitoring of oceanographic conditions in Cook Inlet/Kachemak Bay to understand recovery and restoration of injured near-shore species. Project Period: October 1,

Principal Investigator: Angela Doroff

Affiliation: Not Available

Co-PIs/Personnel: Kris Holderied

Project Location: Lower Cook Inlet

Funding Requested by Fiscal Year:

FY12: $191,900.00	**FY13:** $177,400.00	**FY14:** $166,500.00
FY15: $133,700.00	**FY16:** $108,800.00	**FY17:** $0.00

Total Funding Requested: $778,300.00

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 Kachemak Bay Research Reserve (KBRR) and NOAA Kasitsna Bay Laboratory jointly propose to continue and enhance oceanographic monitoring in Kachemak Bay and lower Cook Inlet, in order to provide the physical data needed for a comprehensive restoration monitoring program in the Exxon Valdez oil spill (EVOS) affected area. This project will leverage and enhance KBRR water quality monitoring stations, establish routine small boat oceanographic and plankton surveys to assess spatial, seasonal and inter-annual variability in water mass movement, leverage information from previous oceanographic surveys, provide environmental information to aid separately proposed benthic monitoring projects, and benefit from a new NOAA ocean circulation model for Cook Inlet. Longterm monitoring of physical changes and connectivity in the marine environment is essential to understand what drives both gradual and sudden changes in coastal ecosystems and estuarine systems in the affected area, including Prince William Sound and Cook Inlet. In addition to longterm effects from the EVOS, these coastal waters and habitats are impacted by the other physical stressors including climate change, ocean acidification, and continuing land-level and sedimentation changes from the 1964 earthquake and isostatic rebound from melting glaciers. The Cook Inlet/Kachemak Bay oceanographic information from this project will allow determination of patterns and trends in ocean circulation and plankton and aid in interpretation of biological monitoring data on the status and trends of injured resources in the near-shore environment. In conjunction with separately proposed oceanographic monitoring projects in PWS and the Gulf of Alaska, the project will enable assessment of whether circulation patterns in the Gulf of Alaska are synchronous with near-shore trends, which has implications for biological abundance and diversity. Our objective is to implement an enhanced, long-term Cook Inlet near-shore oceanographic monitoring program that directly informs management for sustained recovery and restoration of EVOS-injured resources in the face of environmental variability, shifts and long-term changes.

Science Panel Comments:

Not Available

Science Panel Recommendation: Fund

Science Coordinator Comments:

Not Available

Science Coordinator Recommendation: Fund

Public Advisory Committee Comments:
Not Available

Public Advisory Committee Recommendation: Fund

Executive Director Comments:
Not Available

Executive Director Recommendation: Fund

Trustee Council Comments:
Not Available

Trustee Council Decision: Pending

Project Number: 12120111-I

Project Title: PWS Herring Program - Fatty Acid Analysis as Evidence for Winter Migration of Age-0 Herring in Prince William Sound

Principal Investigator: Ronald Heintz

Affiliation: Not Available

Co-PIs/Personnel: JJ Vollenweider

Project Location: Prince William Sound

Funding Requested by Fiscal Year:

FY12: $18,400.00	**FY13:** $47,100.00	**FY14:** $0.00
FY15: $0.00	**FY16:** $0.00	**FY17:** $0.00

Total Funding Requested: $65,500.00

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. Monitoring of age-0 herring should be an important component of the Trustee herring program, but the appropriate spatial scale for monitoring is unknown. The current program assumes age-0 herring remain in their nursery bays over winter. If true, observations of differences among bays in terms of age-0 condition and marine conditions will allow for identifying conditions that lead to improved recruitment to age-1. We propose to test the assumption by monitoring the fatty acid (FA) composition of age-0 herring over winter. The FA composition of depot lipids derives from diets (Budge et al. 2006), so differences in the prey fields in different bays should produce differences in the FA compositions of herring in those bays (Otis et al. 2009). Therefore, the FA composition of age-0 herring in fall can act as a natural tag for identifying migration. Changes in FA composition due to winter feeding are likely to be minimal because age-0 herring experience energy deficits in winter, proscribing lipid storage. We plan to test this assumption in a laboratory study. We hypothesize that migration of herring will result in increasing similarity of herring FA compositions over winter. Alternatively, if the FA composition of age-0 herring in given bays remains constant over winter then migration must be limited.

Science Panel Comments:
Not Available

Science Panel Recommendation: Fund

Science Coordinator Comments:
Not Available

Science Coordinator Recommendation: Fund

Public Advisory Committee Comments:
Not Available

Public Advisory Committee Recommendation: Fund

Executive Director Comments:
Not Available

Executive Director Recommendation: Fund

Trustee Council Comments:
Not Available

Trustee Council Decision: Pending

Project Number: 12120111-J

Project Title: PWS Herring Program - What is the age at first spawning for female herring in PWS?

Principal Investigator: Ronald Heintz

Affiliation: Not Available

Co-PIs/Personnel: JJ Vollenweider

Project Location: Prince William Sound

Funding Requested by Fiscal Year:

FY12: $49,600.00	**FY13:** $21,800.00	**FY14:** $0.00
FY15: $0.00	**FY16:** $0.00	**FY17:** $0.00

Total Funding Requested: $71,400.00

Abstract:
The predictive capabilities of current population models of herring in Prince William Sound may be improved by validating the estimated proportions of fish in each age class that spawn and knowing the proportions of primiparous individuals in each age class. Determination of age at first spawn has been accomplished via 1) analysis of differential growth increments on scales, 2) histological analysis of egg development in ovaries. While the histological method provides direct observation of the spawning history of individuals it is unlikely that developing oocytes can be observed among spawners. Hence the histological analysis must occur some months after spawning. We propose to examine scales of female herring collected from spawning aggregates in PWS to identify the spawning history of each year class. We will also validate the scale technique by comparing the results of scale analysis with that of histological analysis of oocyte development. The validation will likely be used on fish sampled some time after spawning. In order to identify the optimal time we will iteratively sample ovaries in fish held in the lab after spawning. Estimates of the proportion of primiparous fish in the spawning population will provide a means for adjusting estimates of the total post-spawning biomass in the ASA by indicating proportion of each age class that was not on the spawning grounds in the previous year. This study will consequently serve to develop an inexpensive method for improving the accuracy of spawning stock biomass estimates.

Science Panel Comments:
Not Available

Science Panel Recommendation: Fund

Science Coordinator Comments:
Not Available

Science Coordinator Recommendation: Fund

Public Advisory Committee Comments:
Not Available

Public Advisory Committee Recommendation: Fund

Executive Director Comments:
Not Available

Executive Director Recommendation: Fund

Trustee Council Comments:
Not Available

Trustee Council Decision: Pending

Project Number: 12120111-K

Project Title: PWS Herring Program -Herring Disease Program

Principal Investigator: Paul Hershberger

Affiliation: Not Available

Co-PIs/Personnel: None

Project Location: Prince William Sound

Funding Requested by Fiscal Year:

FY12: $0.00	**FY13:** $0.00	**FY14:** $281,900.00
FY15: $291,900.00	**FY16:** $298,000.00	**FY17:** $0.00

Total Funding Requested: $871,800.00

Abstract:
The Herring Disease Program (HDP) is part of a larger integrated effort, Prince William Sound Research and Monitoring (outlined in a separated proposal by Dr. Scott Pegau). Within this integrated effort, the HDP is intended to evaluate the impact of infectious and parasitic diseases on the failed recovery of the PWS herring population. The framework for the 2012 – 2016 HDP involves a combination of field surveillance efforts, field-based disease process studies, and laboratory-based controlled studies. Field surveillance efforts will provide continued and expanded infection and disease prevalence data for herring populations in Prince William Sound (PWS), Sitka Sound, and Puget Sound. Additionally, samples from field surveillance efforts will be processed using newly developed disease forecasting tools to provide annual risk assessments that quantify the potential for future disease epizootics. Laboratory-based empirical studies will provide an understanding of cause-and effect epidemiological relationships between the host, pathogen, and environment; understanding of these relationships represents a first step towards developing additional disease forecasting tools. Specific emphasis will be placed on refining our understanding disease processes specific to viral hemorrhagic septicemia (VHS) and ichthyophoniasis, two primary diseases of herring in PWS. Additionally, a novel diagnostic tool for Ichthyophonus, a fluorescent in situ hybridization (FISH) probe, will be developed.

Science Panel Comments:
Not Available

Science Panel Recommendation: Fund

Science Coordinator Comments:
Not Available

Science Coordinator Recommendation: Fund

Public Advisory Committee Comments:
Not Available

Public Advisory Committee Recommendation: Fund

Executive Director Comments:
Not Available

Executive Director Recommendation: Fund

Trustee Council Comments:
Not Available

Trustee Council Decision: Pending

Project Number: 12120114-H

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

Principal Investigator: Kristine Holderied

Affiliation: Not Available

Co-PIs/Personnel: None

Project Location: Prince William Sound

Funding Requested by Fiscal Year:

FY12: $123,500.00	**FY13:** $139,000.00	**FY14:** $148,300.00
FY15: $146,100.00	**FY16:** $151,600.00	**FY17:** $0.00

Total Funding Requested: $708,500.00

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. Long-term monitoring has been implemented within the Exxon Valdez Oil Spill (EVOS)-affected region, with support from the EVOS Trustee Council (TC), agencies, North Pacific Research Board, Alaska Ocean Observing System, other research grant organizations, and citizen science programs. However, many of these efforts have been conducted independently, with emphasis on monitoring of single species or within individual disciplines. By explicitly providing for science coordination and syntheses of data from our proposed long-term monitoring program, as well as incorporating an interdisciplinary framework into program development and implementation, we seek to improve open access to multi-disciplinary data and promote use of integrated information from the entire program for both research and resource management in the EVOS-affected region. The science coordination and synthesis component of our integrated program will improve 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 will include 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 will help integrate information across the entire program and will be closely coordinated with the conceptual ecological modeling and data management teams in our integrated program.

Science Panel Comments:
Not Available

Science Panel Recommendation: Fund

Science Coordinator Comments:
Not Available

Science Coordinator Recommendation: Fund

Public Advisory Committee Comments:
Not Available

Public Advisory Committee Recommendation: Fund

Executive Director Comments:
Not Available

Executive Director Recommendation: Fund

Trustee Council Comments:
Not Available

Trustee Council Decision: Pending

Project Number: 12120114-I

Project Title: LTM Program - Conceptual Ecological Modeling

Principal Investigator: Tuula Hollmen

Affiliation: Not Available

Co-PIs/Personnel: None

Project Location: Prince William Sound

Funding Requested by Fiscal Year:

FY12: $83,100.00	**FY13:** $91,900.00	**FY14:** $95,600.00
FY15: $78,600.00	**FY16:** $81,900.00	**FY17:** $0.00

Total Funding Requested: $431,100.00

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. 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 further long term monitoring priorities, and support ecosystem based understanding, monitoring, and management of resources within our study area. 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 offer
outreach opportunities for our project by using data visualization and interactive web-based tools. Development of conceptual ecological models is a multi-step, iterative process, responding to evolving understanding of the structure and dynamics of the system by
revising and refining models throughout the process. Specific steps of the process involve: defining goals and scope of the modeling, summarizing current understanding of system structure and processes, defining environmental and anthropogenic influences included in the modeling, development of relevant hierarchies and submodels, refining models with increased understanding of system function, and development of interactive and visualization tools to provide methods to use models for long term planning, development of hypotheses, data exploration, and outreach.

Science Panel Comments:
Not Available

Science Panel Recommendation: Fund

Science Coordinator Comments:
Not Available

Science Coordinator Recommendation: Fund

Public Advisory Committee Comments:
Not Available

Public Advisory Committee Recommendation: Fund

Executive Director Comments:
Not Available

Executive Director Recommendation: Fund

Trustee Council Comments:
Not Available

Trustee Council Decision: Pending

Project Number: 12120114-J

Project Title: LTM Program - The Seward Line: Marine Ecosystem monitoring in the Northern Gulf of Alaska.

Principal Investigator: Russell Hopcroft

Affiliation: Not Available

Co-PIs/Personnel: None

Project Location: Prince William Sound

Funding Requested by Fiscal Year:

FY12: $98,104.00	**FY13:** $59,900.00	**FY14:** $100,500.00
FY15: $104,000.00	**FY16:** $107,700.00	**FY17:** $0.00

Total Funding Requested: $470,204.00

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 ocean undergoes year-to-year variability in the physical environment, superimposed on longerterm 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 longerterm. 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.

Science Panel Comments:

Not Available

Science Panel Recommendation: Fund

Science Coordinator Comments:

Not Available

Science Coordinator Recommendation: Fund

Public Advisory Committee Comments:

Not Available

Public Advisory Committee Recommendation: Fund

Executive Director Comments:
Not Available

Executive Director Recommendation: Fund

Trustee Council Comments:
Not Available

Trustee Council Decision: Pending

Project Number: 12120114-K

Project Title: LTM Program - Continuing the Legacy: Prince William Sound Marine Bird Population Trends

Principal Investigator: David Irons

Affiliation: Not Available

Co-PIs/Personnel: Kathy Kuletz

Project Location: Prince William Sound

Funding Requested by Fiscal Year:

FY12: $206,300.00	**FY13:** $24,200.00	**FY14:** $211,100.00
FY15: $24,200.00	**FY16:** $215,700.00	**FY17:** $0.00

Total Funding Requested: $681,500.00

Abstract:
We propose to conduct small boat surveys to monitor abundance of marine birds in Prince William Sound, Alaska, during July 2012, 2014, and 2016. Eleven previous surveys have monitored population trends for marine birds and mammals in Prince William Sound after the Exxon Valdez oil spill. We will use data collected to examine trends from summer to determine whether populations in the oiled zone are increasing, decreasing, or stable. We will also examine overall population trends for the Sound. Continued monitoring of marine birds and synthesis of the data are needed to determine whether populations injured by the spill are recovering. Data collected from 1989 to 2010 indicated that pigeor 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.

Science Panel Comments:
Not Available

Science Panel Recommendation: Fund

Science Coordinator Comments:
Not Available

Science Coordinator Recommendation: Fund

Public Advisory Committee Comments:
Not Available

Public Advisory Committee Recommendation: Fund

Executive Director Comments:
Not Available

Executive Director Recommendation: Fund

Trustee Council Comments:
Not Available

Trustee Council Decision: Pending

Project Number: 11100112-A

Project Title: Lingering Oil on Boulder-Armored Beaches in the Gulf of Alaska 22 Years after the Exxon Valdez Oil Spill

Principal Investigator: Gail Irvine

Affiliation: USGS

Co-PIs/Personnel: Mark Carls, Dan Mann

Project Location: Gulf of Alaska

Funding Requested by Fiscal Year:

FY12: $61,700.00	**FY13:** $0.00	**FY14:** $0.00
FY15: $0.00	**FY16:** $0.00	**FY17:** $0.00

Total Funding Requested: $61,700.00

Abstract:
This FY12 amendment to Project 11100112 solely requests funding to complete sampling that was detailed in the original proposal, but which could not be accomplished in 2011 because of extremely bad weather. Costs, primarily in logistics (contracts) and personnel time, were incurred in the attempted sampling and form the main part of our request. In 2011 we were on a vessel in Cook Inlet/Shelikof Strait for 7 days and were only able to sample on 2 low tides. After five days of bad weather, when it became clear that we could not sample our suite of sites, we concentrated on accomplishing Objective 2 (determining if oil is leaking out of the sites), which involved placing passive samplers at just 2 sites and nearby controls. Since these samplers are extremely sensitive to waterborne hydrocarbons, finishing Objective 2 reduces the conflict between that sampling and some of our traditional sampling that can disrupt the oil at a site (e.g., taking oiled sediment samples, and assessing the depth of subsurface oil via dip stones). Thus, even though we visited two sites – and visually observed appreciable persistent oil at both, we could not do those disruptive forms of sampling which are extremely important components of the long-term monitoring. This amendment to our proposal will allow the complete re-sampling of our 6 Gulf of Alaska long-term monitoring sites in 2012. Our overall objectives have not changed, but we have modified the due dates for this study and have provided a budget that addresses the additional costs required.

Science Panel Comments:
Not Applicable

Science Panel Recommendation: Not Reviewed

Science Coordinator Comments:
Not Available

Science Coordinator Recommendation: Fund

Public Advisory Committee Comments:
Not Applicable

Public Advisory Committee Recommendation: Not Reviewed

Executive Director Comments:
Not Available

Executive Director Recommendation: Fund

Trustee Council Comments:
Not Available

Trustee Council Decision: Pending

Project Number: 12120112

Project Title: PWS Harbor Cleanup Project

Principal Investigator: Laurel Jennings

Affiliation: NOAA

Co-PIs/Personnel: Erika Ammann

Project Location: Prince William Sound

Funding Requested by Fiscal Year:

FY12: $79,570.00	**FY13:** $355,340.00	**FY14:** $303,565.00
FY15: $330,815.00	**FY16:** $20,710.00	**FY17:** $0.00

Total Funding Requested: $1,090,000.00

Abstract:
The National Oceanic and Atmospheric Administration (NOAA) Restoration Center (RC) proposes to establish a new funding opportunity for Prince William Sound coastal communities to help them prevent small but damaging toxic releases originating from harbors and marinas. This opportunity will build upon existing resources and knowledge and provide communities with a long serving set of methods for handling small spills and re-engage an already informed group of concerned citizens to help run the program after the five years of EVOS funding is completed. This effort will review past EVOS assistance to harbors ensuring that past EVOS expenditures for equipment are utilized to the maximum efficiency, identify technology advancements that can improve current activities in the marinas, and create a local investment and ownership in the success of chosen projects. The purpose of this project will be to protect marine resources negatively affected in EVOS from future aggravation and pollution.

Science Panel Comments:
April 2011 comments below. In response, the Proposer has reduced their budget to $1 million and has indicated funding from NOAA in the final proposal.

The panel has several key concerns regarding the proposed program. First, a significant portion of the funding requested will be spent in administrative and travel costs for the Seattle, WA and Anchorage, AK based team. Second, the narrative does not provide enough information to determine the potential effectiveness of the program. Finally, there is no established plan for outreach and education that would be critical for this type of effort.

There are only general descriptions of types of activities that might be included in community-specific plans. There are references other Best Management Practices (BMP) but does not commit to following any particular BMP. There seems to be overlap in scoping and assessment phases with an already existing Alaska Clean Harbor project funded for $282,615 by CIAP grant (see CIAP approved state plan, http://dnr.alaska.gov/coastal/CIAP/ciap_Fall.htm). Unless coordination is required, there may be duplication of effort with the Clean Harbor program at significantly higher expense in this project. Travel costs seem high, especially in the implementation phases that do not involve public outreach. Most of the staff is coming from Seattle which increases the cost, but there is not much justification in the proposal other than relationship building with communities. The listed project managers do not seem to have much experience with harbor operations, so technical assistance may be limited.

Science Panel Recommendation: Do Not Fund

Science Coordinator Comments:
The team has reduced their budget as requested by the Council. I continue to be concerned that the first projects will not even be selected until June 2013 leaving only three field seasons available for the actual work. Also, the current timeline would not allow the Council (who will only be meeting annually in Aug/Sep) the opportunity to review the projects

prior to their selection and implementation.

Science Coordinator Recommendation: Do Not Fund

Public Advisory Committee Comments:

A revised proposal with funds leveraged has reduced the cost of this effort, which will be managed by NOAA staff. While there are merits to the cleanup of harbors, the Trustee Council should proceed with caution, as there are few details at this time explaining what this project will accomplish.

Public Advisory Committee Recommendation: Do Not Fund

Executive Director Comments:

The proposer has responded to SP and TC concerns and submitted a reduced-budget proposal that mitigates issues identified prior. However, the PAC has identified concerns with funding an largely administrative process and I agree with the Science Coordinator's concerns. This is an important focus area, as also discussed by the PAC, but due to those issues, my "fund" recommendation is fairly soft.

Executive Director Recommendation: Fund

Trustee Council Comments:

Below are the April 2011 comments from the Council after review of the draft proposal. A revised proposal has been submitted in response to their concerns.

The Council requests the proposer review the Science Panel comments and strengthen it's proposal and adjust the budget to $1 million dollars.

Trustee Council Decision: Pending

Project Number: 12120120

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

Principal Investigator: Matthew Jones

Affiliation: Not Available

Co-PIs/Personnel: None

Project Location:

Funding Requested by Fiscal Year:

FY12: $444,061.00	**FY13:** $464,709.00	**FY14:** $372,123.00
FY15: $379,153.00	**FY16:** $73,865.00	**FY17:** $0.00

Total Funding Requested: $1,733,911.00

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.

Science Panel Comments:

These comments are from the two science panel members that have been tasked by the panel to with work with the EVOSTC staff on the data management and synthesis topic.

The Panel does not believe that Axiom currently has the capacity to conduct the most effective management of the data. The biological investigations produced by the suite of projects included in this proposal package generate data that are challenging to code in ways that facilitate their combination with other data such as physical or chemical variables. The discipline that handles these challenges is known as informatics. The Science Panel views the inexperience of Axiom personnel as a critical problem. This concern does not imply inadequate capability of the key staff of Axiom. It is a reflection of their limited experience. Consequently, establishing a partnership between Axiom and NCEAS makes sense because Matt Jones and NCEAS are willing to share their cutting-edge expertise. NCEAS is the "National" Center for Ecological Analysis and Synthesis and the principals of the NCEAS proposal are leaders in this field. Pairing NCEAS with Axiom, would promote information sharing of NCEAS' expertise, such emerging data standards as DateOne and on a suite of data manipulation and synthesis tools, such as meta-analysis methods. This information transfer represents critical capacity building within Alaska that would greatly benefit EVOSTC, AOOS, NPRB, and other important research and monitoring enterprises.

The willingness of NCEAS to collaborate with Axiom is evident from their proposals and discussions with Rob Bochenek, Elise, Molly, and others. Nevertheless, the most creative and appealing aspect of the proposal provided by NCEAS, and which builds on technical metadata processing that NCEAS excels in, relates to the second phase of work – the synthesis activities. Some syntheses have indeed been supported by the EVOS Trustee Council over the years. These include very important outputs of the program – a synthesis of novel oil toxicity mechanisms in pink salmon by Rice et al. 2003; a book edited by Spies that placed the oil and natural resources of coastal Alaska in a context of changing climate;

reviews of the delayed and indirect mechanisms by which EVOS oil caused ecological injuries by Peterson et al. (2003); and reviews of multi-year EVOS oil persistence on Alaskan beaches by Short and colleagues. Despite these valuable legacies, more synthesis is needed into the future, including on herring, where numerous potential explanations for its lack of recovery exist and a growing body of diverse data requires synthesis to extract now cryptic insights.

Phase II of the NCEAS proposal promises facilitation of just such synthesis outputs. This activity is extremely important for both the Herring and especially the Long-term Monitoring programs. The Panel recommends funding of this Phase II, under conditions that reflect engagement of the PIs from these two programs to develop the questions to be addressed and help select the experts who will participate in the study groups and synthesis efforts.

The Panel notes that failure to solve the problem of creating an enduring depository for EVOS-Trustee funded data is a long-standing problem. At least 10 year ago, the EVOS Trustee Council and staff endorsed the responsible and ethically necessary principle that each study funded by the Council must deliver all resulting data in electronic form to the council staff as part of their final reporting obligations. Despite this mandate, there exists now no data base of the historically-funded projects. This issue has great capacity to embarrass the Council and the memory of the past failures motivates the Panel to recommend finally solving this problem by engaging the undeniable expertise and pre-eminence of NCEAS to collaborate in this venture.

Science Panel Recommendation: Fund

Science Coordinator Comments:

I concur with the science panel and strongly recommend that this proposal be funded. Data may be the single largest legacy of these programs and it is critical that the work starts on the strongest foundation possible.

Science Coordinator Recommendation: Fund

Public Advisory Committee Comments:

Not Applicable

Public Advisory Committee Recommendation: Not Reviewed

Executive Director Comments:

I also strongly concur with the science panel and science coordinator. The PAC was also strongly in favor of this very important collaboration, historical data recovery and the synthesis work.

Executive Director Recommendation: Fund

Trustee Council Comments:

Not Available

Trustee Council Decision: Pending

Project Number: 12120111-L

Project Title: PWS Herring Program - Herring Condition Monitoring

Principal Investigator: Thomas Kline

Affiliation: Not Available

Co-PIs/Personnel: Ron Heintz

Project Location: Prince William Sound

Funding Requested by Fiscal Year:

FY12: $0.00	**FY13:** $230,000.00	**FY14:** $238,700.00
FY15: $251,500.00	**FY16:** $253,900.00	**FY17:** $0.00

Total Funding Requested: $974,100.00

Abstract:

Outlined here is a single herring monitoring project that is a part of an integrative program that will enhance the current herring monitoring efforts and examine aspects of particular life stages to allow better modeling of Prince William Sound herring populations. The long-term goal of the program is to improve predictive models of herring stocks through observations and research.

This project will be furthering the development of a herring overwintering mortality model that began with an ongoing monitoring project that began in 2007 and incorporates results from Prince William Sound herring research dating as far back as the 1990's. The model runs by applying herring condition observations made before and after winter. Accordingly, herring are sampled in November and the following March. Present sampling will end in March 2012. Proposed sampling will commence in November 2012 and end in March 2016. A future project is expected to continue the time series beginning in November 2016. The purpose of the time series is to relate overwinter mortality to herring recruitment.

This project will be furthering the development of a herring overwintering mortality model with additional data types as well energy levels per se. The goal is use physiological indicators to realistically modify the daily energy loss rate in the overwintering model. The results of model improvement will be tested using the March data model validation approach begun during the project that began in 2007.

Additionally, we will be assessing effects of competition of other juvenile fishes on condition of age-0 herring using stable isotope analysis on an opportunistic basis.

Science Panel Comments:

Not Available

Science Panel Recommendation: Fund

Science Coordinator Comments:

Not Available

Science Coordinator Recommendation: Fund

Public Advisory Committee Comments:

Not Available

Public Advisory Committee Recommendation: Fund

Executive Director Comments:
Not Available

Executive Director Recommendation: Fund

Trustee Council Comments:
Not Available

Trustee Council Decision: Pending

Project Number: 12120111-M

Project Title: PWS Herring Program - A high temporal and spatial resolution study to validate the separate herring condition monitoring program.

Principal Investigator: Thomas Kline

Affiliation: Not Available

Co-PIs/Personnel: Ron Heintz

Project Location: Prince William Sound

Funding Requested by Fiscal Year:

FY12: $207,000.00	**FY13:** $77,300.00	**FY14:** $20,400.00
FY15: $0.00	**FY16:** $0.00	**FY17:** $0.00

Total Funding Requested: $304,700.00

Abstract:

Described here is a single process study project that is a part of an integrative program that will enhance the current monitoring efforts, and examine aspects of particular life stages to allow better modeling of Prince William Sound herring populations. The long-term goal of the program is to improve predictive models of herring stocks through observations and research. The herring monitoring program is necessarily of coarse temporal and spatial resolution with just two observations per year at narrowly defined sampling sites spread around the large area comprising Prince William Sound. Data interpretation requires a greater context to impart greater meaning. In the case of temporal variation of herring condition it would be useful to know (1) how sensitive the herring overwinter mortality model is to starting time, and (2) the timing of recovery from winter starvation. In the case of spatial variation of herring condition it would be useful to know how sensitive the herring overwinter mortality model is to immigration and emigration from areas immediately adjacent to where herring are sampled at the time of our November and March surveys.

Fine-scale temporal and spatial variability at designated herring monitoring sites has never been characterized and therefore remains a data gap with potential ramifications for interpreting observed variation of herring condition that is part of the herring monitoring program as well as the aforementioned modeling. This will be addressed by sampling at Simpson Bay, which has been a key monitoring site for juvenile herring since the 1990's. Energy content and RNA/DNA will be measured monthly from September 2011 until June 2012 to assess fine-scale temporal variability. Fine-scale spatial variability will be assessed by sampling in November and March five separate sub-areas of a more extensive Simpson Bay than what is typically done during surveys. The results of the analysis will be contributed to the herring synthesis effort that will take place in FY14.

Science Panel Comments:

Not Available

Science Panel Recommendation: Fund

Science Coordinator Comments:

Not Available

Science Coordinator Recommendation: Fund

Public Advisory Committee Comments:

Not Available

Public Advisory Committee Recommendation: Fund

Executive Director Comments:
Not Available

Executive Director Recommendation: Fund

Trustee Council Comments:
Not Available

Trustee Council Decision: Pending

Project Number: 12120114-L

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

Principal Investigator: Brenda Konar

Affiliation: Not Available

Co-PIs/Personnel: Katrin Iken

Project Location: Prince William Sound

Funding Requested by Fiscal Year:

FY12: $48,100.00	**FY13:** $48,200.00	**FY14:** $48,100.00
FY15: $48,100.00	**FY16:** $47,400.00	**FY17:** $0.00

Total Funding Requested: $239,900.00

Abstract:
This project will evaluate ecological communities in Kachemak Bay. Following protocols established for Prince William Sound, we will monitor sea otter abundance, diet and carcasses, seabird carcasses, marine debris, abundance and distribution of rocky intertidal plants and invertebrates, abundance and size frequency of clams and mussels on gravel beaches, and selected environmental parameters in Kachemak Bay. All protocols have been established and are described for Prince William Sound. These same protocols as will be used in this study. These Kachemak Bay data will be compared with those being collected in Prince William Sound and may be able to act as a control if an oil spill were to occur in the Sound again. The data will also be comparable to data being collected in Kenai and Katmai National Parks (National Park Service SWAN Nearshore Monitoring Program) using the same methods as used in Prince William Sound.

Science Panel Comments:
Not Available

Science Panel Recommendation: Fund

Science Coordinator Comments:
Not Available

Science Coordinator Recommendation: Fund

Public Advisory Committee Comments:
Not Available

Public Advisory Committee Recommendation: Fund

Executive Director Comments:
Not Available

Executive Director Recommendation: Fund

Trustee Council Comments:
Not Available

Trustee Council Decision: Pending

Project Number: 12120114-M

Project Title: LTM Program - Long-term killer whale monitoring in Prince William Sound/ Kenai Fjords

Principal Investigator: Craig Matkin

Affiliation: Not Available

Co-PIs/Personnel: None

Project Location: Prince William Sound

Funding Requested by Fiscal Year:

FY12: $7,200.00	**FY13:** $132,800.00	**FY14:** $132,800.00
FY15: $132,900.00	**FY16:** $132,900.00	**FY17:** $0.00

Total Funding Requested: $538,600.00

Abstract:

The proposed project is a continuation of the monitoring of AB pod and the AT1 population killer whale populations in Prince William Sound on an annual basis. These groups of whales suffered serious 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 observational 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 describe 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, 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.

Science Panel Comments:

Not Available

Science Panel Recommendation: Fund

Science Coordinator Comments:

Not Available

Science Coordinator Recommendation: Fund

Public Advisory Committee Comments:

Not Available

Public Advisory Committee Recommendation: Fund

Executive Director Comments:

Not Available

Executive Director Recommendation: Fund

Trustee Council Comments:
Not Available

Trustee Council Decision: Pending

Project Number: 12120114

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

Principal Investigator: Molly McCammon

Affiliation: Alaska Ocean Observing System

Co-PIs/Personnel: Nancy Bird, Kris Holderied

Project Location: Prince William Sound

Funding Requested by Fiscal Year:

FY12: $2,460,457.00	**FY13:** $2,211,065.00	**FY14:** $2,671,372.00
FY15: $2,264,148.00	**FY16:** $2,331,183.00	**FY17:** $0.00

Total Funding Requested: $11,938,225.00

Abstract:

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 spil

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 assessed holistically 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 impacts of ecosystem change. We propose to develop and implement a long-term monitoring program that meets the need for information to guide restoration activities, including data on the status and condition of resources, whether they are recovering, and what factors may be constraining recovery. The ultimate 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.

Science Panel Comments:

April 2011 Comments:

This proposal is well presented and provides a thorough long-term monitoring program for the spill area. The team is experienced and well -qualified to complete the proposed work. The outreach and education strategies and partnerships are well thought-out and have the potential to provide effective means to disseminate information and engage community members in understanding the results of the integrated monitoring program. The potential future development of a citizen monitoring program would provide another effective strategy. The Science Panel was especially impressed with the section called 'cross-cutting' that showed the linkages with the Herring Program.

Gathering and making data available will be the keystone of this program. The Science Panel expressed serious concerns about past performance of some participants and that the data management team does not have sufficient expertise or scientific guidance to deliver a useable data system. In addition, it is not clear at all there is a plan for the inclusion of structurally diverse data: where and how will such data be organized so that relevant data and metadata from a broad array of disciplines can be assembled in one database. The panel viewed this as this as an informatics problem that, if not resolved at the onset, will jeopardize the long-term program. There is a very clear need to overcome critical technological impediments to accomplishing synthetic, integrative environmental science, while at the same time promoting more open access to information and data sharing. It is critical that this database be open source and be

compliant with the Knowledge Network for Biocomplexity metadata compliant with Ecological Metadata Language. In addition, there should be a plan from the outset as to how to incorporate this data into NPRB's GOAIERP program at the end of the first five-year contract cycle.

Therefore, we strongly recommend that the Council provide assistance from an organization such as the National Center for Ecological Analysis and Synthesis (NCEAS) for peer review and technical assistance to the data management team.

With regard to the separate lingering oil monitoring proposal included within the Program proposal, the Panel has no objection to the funding of this additional project.

June 2011 Individual panel member comments:
Seabird monitoring costs double in year 3 – The explanation is clear, although the basis for why two surveys may be needed in year 3 and what is lost when only 1 is done is unclear.

Cost breakdown for Coordination, data management, outreach, and administration – The suite of activities included under this heading is now explicit as are the total costs associated with each one in the budgets provided. I wish to note, however, the "conceptual modeling" project of Hollmen does not fall into any of these categories – it is a scientific study, not an administrative service, outreach activity, coordination, or data management task, and should be reviewed as such. In that context, I examined the Hollmen proposal and have some concerns. Although intended to be "conceptual modeling", I find no mention of any concepts in the proposal. I cannot find indication of the methodological approaches to be used and why they were chosen. For example, will this be a Bayesian process? Will modeling be ecosystem based? Will ECOPATH of something analogous be employed? There are no literature cotations in this proposal. For 395K over 5 years, more detail would seem to be called for. I cannot find a CV included for the PI, Hollmen. Does she have modeling experience, and, if so, in what types of models?

Synthesis concerns – the PIs provide a thoughtful and compelling response to this issue, providing an excellent overview and demonstrating potential for meaningful syntheses.

Data management – The PIs make a strong case for the cost efficiencies associated with leveraging that lower the costs of the data management for EVOS Trustee projects by joining with AOOS in a coordinated effort with a single consultant-provider. The response also makes a justifiable case for why teaming up with AOOS makes sense – because of their presumed permanence as compared to other science programs. I am impressed that Phil Mundy chairs the AOOS external advisory committee and concur that he has the experience and wisdom to provide rational advice and guidance. Nevertheless, the bottom line after all is said and done is – Does Axiom deliver the data products that are acceptable to the scientists it is serving. This response document appears to argue that the scientists that participate in the Monitoring Program are indeed satisfied. So that helps me side with continuing the relationship with Axiom. Nevertheless, this document implies a willingness to interact with NCEAS and to discuss their recommendations for improvements in all aspects of Axiom's data management services and I think that facilitating that set of interactions in a meaningful way (meaning to sufficient depth and not just superficial) is important for piece-of-mind given delays in delivery of reports from Axiom on past EVOS Trustee contracts. I am also curious to know of the outstanding final reports have indeed been completed successfully at this time. I see argued in this response document that the past scientist clients of AXIOM are satisfied with the company's services, which addresses one major issue raised by the science Panel.

I am pleased by the acceptance of specific suggestions by the science panel.

Science Panel Recommendation: Fund

Science Coordinator Comments:

I agree with the science panel and Executive Director. I also have serious concerns regarding the data program and would encourage the Council to assist the team by providing funding for a collaborator to assist the data team in their development of the data program. My concerns regarding the proposed contractor are based on a poor past performance with meeting deadlines and producing deliverables. I also believe that the final product would greatly benefi if Axiom was given assistance from a group that has experience working with large heterogeneous data sets.

The PI's that are included in this program proposal have extensive experience gathering data in PWS and have contributed to several long-term data sets that will be the foundation of this program. The team's quick response to our

data set questions demonstrates their ability to work together and to openly share information with their fellow researchers.

Science Coordinator Recommendation: Fund

Public Advisory Committee Comments:
Not Available

Public Advisory Committee Recommendation: Fund

Executive Director Comments:
There was strong concern about the program's data manager serving the entire program. Since April, the data manager's work has been favorably reviewed, has submitted late deliverables to the Council and several data management options have been produced by this program and outside entities. These options presented are in conjunction with leaders in the field of heterogeneous scientific database management and are excellent options. I recommend the Council pursue one of these options to ensure successful management of the data produced by this and past Council-funded efforts.

Executive Director Recommendation: Fund

Trustee Council Comments:
April 2011 comments:
This team is selected as a preferred proposer.

Trustee Council Decision: Pending

Project Number: 12120111-N

Project Title: PWS Herring Program - Scales as growth history records for Pacific herring

Principal Investigator: Steven Moffitt

Affiliation: Not Available

Co-PIs/Personnel: None

Project Location: Prince William Sound

Funding Requested by Fiscal Year:

FY12: $86,150.00	FY13: $43,240.00	FY14: $0.00
FY15: $0.00	FY16: $0.00	FY17: $0.00

Total Funding Requested: $129,390.00

Abstract:
Robust Pacific herring (Clupea pallasii) populations, suitable for exploitation by commercial fisheries, are typically sustained by periodic recruitment of strong year classes into the adult spawning population. However, the Prince William Sound (PWS) herring population has not had a strong recruitment class since 1989, when the Exxon Valdez Oil Spill (EVOS) occurred. Identification of conditions limiting herring recovery requires a series of focused process studies combined with monitoring of the natural conditions that affect herring survival.

Fish grow in response to the extrinsic influences of their environment constrained by the intrinsic influences of genetic predisposition for growth and of size already attained. Understanding how these intrinsic and extrinsic sources of variability influence growth is important for several reasons. Variation in growth has a strong affect on the selection of appropriate harvest policies that are based on demographic models that reflect the natural processes.

Analysis of growth increments between annular patterns on scales can provide a means to reconstruct past growth changes that can assist in determining the possible environmental and density-dependent causes of growth variation. Growth increment information incorporates a longitudinal history of growth that increases the effective degrees of freedom and can be used in modeling changes in growth in relationship to environmental and population indices Determining the underlying distribution of individual growth patterns can provide improved inputs into population dynamics models that are used to establish harvest guidelines.

Science Panel Comments:
Not Available

Science Panel Recommendation: Fund

Science Coordinator Comments:
Not Available

Science Coordinator Recommendation: Fund

Public Advisory Committee Comments:
Not Available

Public Advisory Committee Recommendation: Fund

Executive Director Comments:

Not Available

Executive Director Recommendation: Fund

Trustee Council Comments:

Not Available

Trustee Council Decision: Pending

Project Number: 12120114-N

Project Title: LTM Program - Long-term monitoring of humpback whale predation on Pacific herring in Prince William Sound

Principal Investigator: John Moran

Affiliation: Not Available

Co-PIs/Personnel: Jan Straley

Project Location: Prince William Sound

Funding Requested by Fiscal Year:

FY12: $127,400.00	**FY13:** $128,800.00	**FY14:** $139,600.00
FY15: $141,600.00	**FY16:** $54,400.00	**FY17:** $0.00

Total Funding Requested: $591,800.00

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. □

Science Panel Comments:

Not Available

Science Panel Recommendation: Fund

Science Coordinator Comments:

Not Available

Science Coordinator Recommendation: Fund

Public Advisory Committee Comments:

Not Available

Public Advisory Committee Recommendation: Fund

Executive Director Comments:

Not Available

Executive Director Recommendation: Fund

Trustee Council Comments:

Not Available

Trustee Council Decision: Pending

Project Number: 12120117

Project Title: Spatial synthesis of lingering oil distribution modeling with population and biomarker data for recovering species

Principal Investigator: Zachary Nixon

Affiliation: Research Planning, Inc.

Co-PIs/Personnel: Brenda Ballachey, Jim Bodkin, Dan Esler, Jacqui Michel

Project Location: Prince William Sound

Funding Requested by Fiscal Year:

FY12: $177,400.00	FY13: $0.00	FY14: $0.00
FY15: $0.00	FY16: $0.00	FY17: $0.00

Total Funding Requested: $177,400.00

Abstract:
Much recent work has been carried out in Prince William Sound (PWS) to characterize the distribution and ongoing impacts of lingering subsurface oil from the Exxon Valdez Oil Spill (EVOS). The ongoing work of Bodkin et al., Esler et al., and Monson et al., (1994, 1999, 2000, 2002, 2010, in press) have provided an unprecedented understanding of the ongoing recovery status of certain recovering species via detailed population dynamics and measures of individual health: biomarker expression, contaminant concentrations, and pathological effects. In parallel, Michel et al.,(2009) and Boufadel et al., (2010) have successfully characterized, synoptically, and in spatial detail, the distribution of and factors contributing to the ongoing presence of lingering oil reservoirs within PWS and the wider EVOS impact area. We propose to synthesize these two bodies of work by rigorously examining the strength of spatial correlations between measures of recent and ongoing impact to recovering species, at both the individual and population level, and where lingering subsurface oil is specifically estimated to persist. Presence or absence of such links will provide insight into the recent and potentially ongoing nature of the impact of this oil, and could guide proposed remediation efforts with specificity not previously possible.

Science Panel Comments:
The science panel recommends this proposal for funding.

Science Panel Recommendation: Fund

Science Coordinator Comments:
Not Available

Science Coordinator Recommendation: Fund

Public Advisory Committee Comments:
Not Available

Public Advisory Committee Recommendation: Fund

Executive Director Comments:
Not Available

Executive Director Recommendation: Fund

Trustee Council Comments:
Not Available

Trustee Council Decision: Pending

Project Number: 12120116

Project Title: Marine Debris Removal

Principal Investigator: Chris Pallister

Affiliation: Gulf of Alaska Keeper

Co-PIs/Personnel: None

Project Location: Gulf of Alaska

Funding Requested by Fiscal Year:

FY12: $384,400.00	**FY13:** $411,300.00	**FY14:** $310,700.00
FY15: $0.00	**FY16:** $0.00	**FY17:** $0.00

Total Funding Requested: $1,106,400.00

Abstract:

GoAK is submitting a comprehensive 3-part marine debris cleanup program. We understand that the call of this grant is to provide $1,000,000 of funding for marine debris removal over a 2-year period. Immediately following are two proposed cleanup projects for 2012 and 2013 that request a total EVOSTC funding level of $730,000. The proposed projects for 2012 and 2013 have also been included as part of the marine debris proposal submitted to EVOSTC by the NOAA team. However, at the urging of Peter Murphy, NOAA's MD Regional Coordinator (see attached letter from Peter Murphy, NOAA MD Regional Coordinator, pg.54), and after consultation with EVOSTC staff, GoAK is also submitting an alternative proposal. This alternative proposal includes the proposed 2012 and 2013 removal projects, plus a request for a third year of funding for a project in 2014. We hope this proposal is considered carefully. These three projects in total request $1,015,000 in EVOSTC funding. Over a three year period, GoAK can match EVOSTC funding at more than a 1 to 1 level. Stretching the funding over three years allows GoAK to raise more matching funds to help clean another 20 miles of horribly fouled coast and remove an additional 80 to 100 tons of plastic marine debris. We submit these projects with the intention that if EVOSTC decides not to fund a third year project, then it would consider the 2012 and 2013 projects as the complete proposal. For that reason, we have submitted complete project budgets and descriptions for each individual cleanup season.

GoAK solicited project proposals from five separate organizations with past experience in marine debris work and community outreach. The Center for Alaskan Coastal Studies, the Chugach National Forest and Alaska Geographic jointly submitted Proposal 1. The Marine
Conservation Alliance Foundation submitted Proposals 2 and 3. The Alaska Sea Life Center submitted Proposal 4. Each of the proposed outreach projects are stand-alone programs. As such, the Council can select any combination of the projects to satisfy the public outreach objective. All projects selected by the Council will coordinate in such than components of each project do not overlap. Projects will also use the same educational data, such as miles cleaned, the amount of marine debris removed per mile up in the cleanup area, the types and quantities of marine debris, habitat and animals impacted, etc., in their individual projects so that a consistent message is delivered.

Outreach Proposal 1: The Center for Alaskan Coastal Studies, Chugach Forest Service and Alaska Geographic "Youth Action on Marine Debris: from the field to the classroom". Total Cost: $151,946

Outreach Proposal 2: Marine Conservation Alliance Foundation "EVOSTC Marine Debris Cleanup Documentation Film". Total Cost: $30,584

Outreach Proposal 3: Marine Conservation Alliance Foundation "EVOSTC Outreach Marine Debris Prevention Tide Book Project". Total cost: $26,090

Outreach Proposal 4: Alaska SeaLife Center "Marine Debris Exhibit at the Alaska SeaLife Center". Total Cost: $166,051

Science Panel Comments:

This long term marine debris removal program has been ongoing for the past 10 years. The costs seem to be reasonable considering the logistics, although it was unclear if they are relying on the NOAA grant to complete the work. The PI's are experienced but outreach efforts are weak and the project lead is in Anchorage. The team leader should speak with Village of Eyak team to see if there might be an opportunity for partnership.

Science Panel Recommendation: Fund

Science Coordinator Comments:

I concur with the science panel and the Executive Director.

Science Coordinator Recommendation: Fund

Public Advisory Committee Comments:

Not Available

Public Advisory Committee Recommendation: Fund

Executive Director Comments:

I concur with the Science Panel's recommendations. The proposal is extremely detailed and the PIs are already achieving a high level of debris survey and removal. Their familiarity with and effectiveness in this area is impressive.

Gulf of Alaska Keeper has worked to strengthen their public outreach and determine whether Council funds would be eligible for fed match. In between debris cleanup trips this summer, they have are collaborating with the Chugach Children's Forest.org project, Alaska Geographic, and the Chugach School District to involve students from Chenega and Tatitlek, and the Alaska Sealife Center regarding an interactive marine debris exhibit. They have made excellent inroads to expand their outreach.

As requested by the Council, GoAK has submitted an addendum with a menu of four public outreach proposals. My preliminary recommendation is in favor of funding Proposal 1, Youth Action on Marine Debris, with the Center for Alaskan Coastal Studies, Chugach Forest Service and Alaska Geographic. This proposal is diversified, highly leveraged and well-designed.

Executive Director Recommendation: Fund

Trustee Council Comments:

The Council recommends this proposal's outreach component be strengthened. In particular, the Council encourages the Proposer to consult with Village of Eyak with regard to enhancing GoAK outreach in that community and to pursue additional involvement from other spill communities and organizations that reach youth involvement, such as the Alaska Geographic program and the USFS Chugach Childrens' Group. Please consult with NOAA as to whether Council funds would be eligible for matching fund programs, as noted in your proposal, and provide this information to us and as part of your final proposal. If this proposal is funded by the Council, Council staff will request that NOAA be the project manager, which may lend additional, NOAA expertise to the project.

Trustee Council Decision: Pending

Project Number: 12120111

Project Title: PWS Herring Research and Monitoring Program

Principal Investigator: William Pegau

Affiliation: Prince William Sound Science Center

Co-PIs/Personnel: None

Project Location: Prince William Sound

Funding Requested by Fiscal Year:

FY12: $990,500.00	**FY13:** $1,074,100.00	**FY14:** $1,364,100.00
FY15: $1,194,400.00	**FY16:** $1,136,400.00	**FY17:** $0.00

Total Funding Requested: $5,759,500.00

Abstract:

Robust Pacific herring (Clupea pallasii) populations, suitable for exploitation by commercial fisheries, are typically sustained by periodic recruitment of strong year classes into the adult spawning population. However, the Prince William Sound (PWS) herring population has not had a strong recruitment class since 1989, when the Exxon Valdez Oil Spill (EVOS) occurred. In the EVOS settlement herring were identified as an injured resource and they remain listed as an unrecovered species by the EVOS Trustee Council (EVOSTC). Understanding why herring have not recovered in Prince William Sound requires understanding potential bottlenecks in the herring life cycle. The identification of the limiting conditions to herring recovery requires a series of focused process studies combined with monitoring of the natural conditions that affect herring survival.

Described here are projects for a program that will enhance the current monitoring efforts of the Alaska Department of Fish and Game (ADF&G), and examine aspects of particular life stages to allow better modeling of herring populations. The long-term goal of the program is to improve predictive models of herring stocks through observations and research. While we do not anticipate that there will be a major change in our modeling ability in the next five years, we expect that the combination of monitoring and focused process studies will provide incremental changes over the next twenty years and result in a much better understanding of herring populations by the end of the program.

Science Panel Comments:

April 2011 comments:

This program seeks to add to the existing body of knowledge that began under the PWS Herring Survey program in FY10. The proposed projects will provide both new and continuing information regarding the current status of herring in PWS. The data collected under this program will be made available to researchers and the public and will provide critical information for resource managers. The continuation of current outreach and education strategies from the PWS Herring Survey projects and the additional strategies in the proposal have the potential to provide effective means to disseminate information and engage the fishing community and other community members in understanding the results of the integrated monitoring program.

The Panel recommends funding most components of this proposal, but reiterates the same serious concern about the data management components. Again the science panel strongly recommends that the Council provide assistance from an organization such as the National Center for Ecological Analysis and Synthesis (NCEAS) for peer review and technical assistance to the data management team.

The success of this proposal will depend on the reliability of herring spawn surveys which are not part of the present groups of proposals. Herring assessments in PWS, and everywhere else in the eastern Pacific, use spawn surveys as an essential part of the assessment. The approach currently used in PWS differs from all others in the use of mile-days, whereas all other jurisdictions use a static measure of spawn, once spawning is completed. Also, the completeness of the spawn surveys has been questioned. (Note: these comments should not be construed as criticism of ADFG or their

staff because the panel recognizes the effort and dedication made by such staff. On the contrary, the comments and recommendations related to spawn surveys should be seen as an initiative to provide assistance to field staff associated with herring assessment. The benefits of such assistance will accrue both to the science and management of PWS herring). Nearly all of the proposals are predicated on the availability of reliable herring spawning biomass assessments that are, in turn, dependent on accurate spawn surveys. To provide credible support for these proposals and for management advice future estimation of spawn must be made with a level of accuracy that consistent with that used in other jurisdictions. To provide credible management advice future estimation of spawn must be made with a level of accuracy that is required to support the assessments. There are concerns that substantial amounts of spawn may have gone undetected in some years and that some of the past spawn estimates may have been made inaccurately through error in the estimated width and density of spawn. Such concerns may not be valid but there is no way to determine this without additional work. Therefore to evaluate whether the accuracy and reliability of present and past estimation of herring spawn in PWS is accurate, we recommend developing diver-assisted surveys. The science panel noted that diver surveys, yielded different results in the past (details provided in Recommendations to Team Leader). This would also include an assessment model and biological sampling review.

Herring Stock Assessment Modeling: A Science Panel Recommendation for Review
Success of the herring program will depend on the reliability of ADF&G herring spawn surveys. Nearly all of the proposals are predicated on the availability of reliable herring spawning biomass assessments that are, in turn, dependent on accurate herring assessments.

Herring assessments in PWS, like everywhere else in the eastern Pacific, use spawn surveys as an essential part of the assessment. The approach used in PWS, however, differs from all others in that PWS uses mile-days, whereas all other jurisdictions use a static measure of spawn, once spawning is completed. Herring assessments also rely on accurate bio-sampling for estimates of size and age of herring. Recently, the completeness of the spawn surveys has been questioned and many have questioned the reliability of the present assessments. Additional effort may be required for all aspects of herring assessments to ensure that they are done well and are well-regarded. These comments above should not be construed as criticism of ADFG or their staff, as their present staff are clearly dedicated and hard-working.

To provide credible support for these proposals and for management advice future estimation of spawn must be made with a level of accuracy that consistent with that used in other jurisdictions. To provide credible management advice future estimation of spawn must be made with a level of accuracy that is required to support the assessments.

June 2011 Individual panel member comments:
Linkages among the projects is done in a thoughtful and detailed fashion. I see huge progress in how well the leaders of the herring program are viewing this Program as a whole and integrating its pieces. I commend the PIs. Specifically, the logistic coordination is compelling and achieves cost efficiencies as well as intellectual linkages. The temporal staging of various research efforts is likewise logical and well conceived. And I concur that the acoustics studies do involve three different efforts with different gear, sampling methods, and targets, so that any synergies are limited, largely to whether adult herring are encountered during sampling targeting juveniles and this is addressed.

Science Panel Recommendation: Fund

Science Coordinator Comments:

I concur with the science panel. I also have serious concerns regarding the data program and would encourage the Council to assist the team by providing funding for a comprehensive review of the data program.

I also concur with the science panel that the fundamental data that will be utilized by the program should be rigorously reviewed to ensure the best possible platform for the herring projects. I do believe that the data that has been gathered by ADF&G for PWS herring has been carefully gathered and reviewed. I would like to continue working with staff at ADF&G to determine what actions would have the greatest benefit to both the herring program and ADF&G managers. The possible addition of a staff position at ADF&G that would work closely with herring program would be of tremendous value to both the program and the management agency.

Science Coordinator Recommendation: Fund

Public Advisory Committee Comments:
Not Available

Public Advisory Committee Recommendation: Fund

Executive Director Comments:
April 2011 Comments
There has been strong concern about the program's data manager serving the entire program. Since April, the data manager's work has been favorably reviewed, has submitted late deliverables to the Council and several data management options have been produced by this program and outside entities. These options presented are in conjunction with leaders in the field of heterogeneous scientific database management and are excellent options. I recommend the Council pursue one of these options to ensure successful management of the data produced by this and past Council-funded efforts.

In addition, the program and ADF&G have discussed what actions would enhance the program's value to the management of herring. Both entities recommend the Council fund 70% of a ADF&G biometrician III or a fisheries scientist I to coordinate with the herring program and to also focus on a modeling effort. This is included in our draft administrative budget and has the strong support of individual Science Panel members. We have continued to decrease our admin budget, but are also positioning our staff and agency staff to support the long-term programs.

Executive Director Recommendation: Fund

Trustee Council Comments:
This team is selected as a preferred proposer.

Trustee Council Decision: Pending

Project Number: 12120111-H

Project Title: PWS Herring Program - Outreach and Education Program

Principal Investigator: William Pegau

Affiliation: Not Available

Co-PIs/Personnel: None

Project Location: Prince William Sound

Funding Requested by Fiscal Year:

FY12: $16,500.00	**FY13:** $30,500.00	**FY14:** $32,700.00
FY15: $35,900.00	**FY16:** $38,300.00	**FY17:** $0.00

Total Funding Requested: $153,900.00

Abstract:
The Outreach & Education project is designed to enhance the PWS Herring Program research activities by showcasing their relevancy, broadening their applicability and extending their impact to people in the community. PWSSC educators will work with PWS Herring Research and Monitoring principal investigators (PI) and project collaborators to prepare public education materials that communicate the purpose, goals and results of the research program to "non-scientist" audiences and stakeholders in communities in and beyond the spill affected area.
Outreach and education products will extend and transfer Pacific herring and marine ecosystem information to inform the public of local research activities and improve their ecological and ocean science literacy.

The specific objectives of this proposal, which includes the outreach and education components of the PWS Herring Research and Monitoring Program, are to:

1) Disseminate PWS herring research information and lessons learned in this program to individuals, groups, policy makers, resource managers and institutions in PWS, including the effected fishing community.

2) Extend and transfer PWS herring research-based outreach and education products to general audiences in and beyond the spill affected areas of PWS.

3) Integrate community involvement into the planning and sampling programs through citizen science opportunities and public workshops

Science Panel Comments:
Not Available

Science Panel Recommendation: Fund

Science Coordinator Comments:
Not Available

Science Coordinator Recommendation: Fund

Public Advisory Committee Comments:
Not Available

Public Advisory Committee Recommendation: Fund

Executive Director Comments:
Not Available

Executive Director Recommendation: Fund

Trustee Council Comments:
Not Available

Trustee Council Decision: Pending

Project Number: 12120111-O

Project Title: PWS Herring Program - Coordination and Logistics

Principal Investigator: William Pegau

Affiliation: Not Available

Co-PIs/Personnel: None

Project Location: Prince William Sound

Funding Requested by Fiscal Year:

FY12: $327,200.00	**FY13:** $349,300.00	**FY14:** $364,200.00
FY15: $238,600.00	**FY16:** $233,700.00	**FY17:** $0.00

Total Funding Requested: $1,513,000.00

Abstract:

This project is for the coordination and logistics aspects of the proposed program titled, "PWS Herring Research and Monitoring". The objectives of the program are 1) Provide information to improve input to the age-structure-analysis (ASA) model, or test assumptions within the ASA model, 2) Inform the required synthesis effort, 3) Address assumptions in the current measurements, and 4) Develop new approaches to monitoring. The Coordination and Logistics program objectives are to 1) ensure coordination between projects to achieve the program objectives, 2) Provide a synthesis from existing results, and 3) provide logistical support to the various projects.

Coordination includes scheduling of projects to ensure the maximum sharing of vessel time and so that projects dependent on results or samples from another project are in the correct order. Coordination will be primarily through email and teleconference, but each year all the investigators are required to meet in person. Coordination is also taking place with the existing Herring Survey program, the Long-Term monitoring program, and ADF&G herring sampling.

Logistics is primarily in providing vessel time although a remotely operated vehicle is requested in this budget to support non-lethal fish identification and being able to search under the ice.
The synthesis to be provided by this project is leveraging the required synthesis of the existing Herring Survey program. We intend to update that effort with new results and add a section on how environmental conditions affect herring growth

Science Panel Comments:

Not Available

Science Panel Recommendation: Fund

Science Coordinator Comments:

Not Available

Science Coordinator Recommendation: Fund

Public Advisory Committee Comments:

Not Available

Public Advisory Committee Recommendation: Fund

Executive Director Comments:
Not Available

Executive Director Recommendation: Fund

Trustee Council Comments:
Not Available

Trustee Council Decision: Pending

Project Number: 12120113

Project Title: EVOS twenty five years later: Lessons learned and implications to future spill response

Principal Investigator: William Pegau

Affiliation: Prince William Sound Science Center

Co-PIs/Personnel: None

Project Location: Prince William Sound

Funding Requested by Fiscal Year:

FY12: $528,868.00	**FY13:** $233,805.00	**FY14:** $0.00
FY15: $0.00	**FY16:** $0.00	**FY17:** $0.00

Total Funding Requested: $762,673.00

Abstract:

The Exxon Valdez oil spill created fundamental changes to our approach to oil spill response and recovery. It led to sweeping federal and state legislation, such as the Oil Pollution Act of 1990 and Alaska State House Bill 567. It also led to sweeping changes in our approach to spill response. Some of the lessons learned have become standard practice, such as not using high-pressure hot water washes on natural beaches, while others appear not to have become ingrained in modern spill response. Now that nearly 25 years have passed we have the opportunity to look back at the decisions that were made and see the full impact of those choices to ensure we pass on the important lessons learned from the Exxon Valdez oil spill.

It is far from the first time that we have stopped to examine the impact of the oil spill. The amount of reports, conference presentations, books, and journal articles about the Exxon Valdez oil spill is staggering. Lessons learned documents start while the spill was still being cleaned up [Skinner and Reilly, 1989]. With more published within a year of the spill [Alaska Oil Spill Commission, 1990; Steiner and Byers, 1990]. There was the Exxon Valdez Oil Spill Symposium [1993a] that examined the damages caused by the spill. Conference proceedings examining the fate and effects [1995]. There have been conferences and reviews associated with the fifth, tenth, and twentieth anniversaries [1994a; 1999; 2009]. The early reviews of the science being conducted spawned the annual Alaska Marine Science Symposium. The main body of the existing work is focused on the ecological impacts and recovery. The fifth anniversary document has the most focus on response and damage assessment aspects and even then it focuses on what occurred or programs implemented rather than the lessons learned. It remains important to document the lessons learned in response, assessment, and restoration phases for future generations. At this point much of the existing knowledge is being lost as people with experience begin to retire.

Science Panel Comments:

This proposal is motivated by a legitimate concern that management agencies have the opportunity to benefit from the experience of the responders following EVOS. A specific goal is to ensure publication of information about a summary of response actions following EVOS with regard to effectiveness and collateral injury caused unintentionally by from clean-up responses or restoration actions.

The science panel endorsed the rationale for this specific proposal but retain a number of serious concerns about a number of aspects of the proposal.

First, it is unclear that sufficient scientific analysis has been done on all the questions identified in the proposal to support a valid, rigorous analysis of benefits and costs of each. Second, NOAA HAZMAT program has extensive experience in the arena and should be consulted in the planning. Third, related data are needed from other spills in other countries, such as Norway, to provide other independent sources of data that should be incorporated into each chapter. Fourth, the authors are not identified for the chapters so it is not clear who knows the data sufficiently well to address the questions. Fifth, the science panel expressed concern about whether the PI has sufficient time available to effective

conduct this work. Sixth, we have concerns about the appropriateness of a book as opposed to publications in the literature of technical reports. Specifically books can be expensive and have limited circulation. Finally, the US Coast Guard has responsibility for oil spill response and their guidance documents need to be discussed and used to guide the project.

Science Panel Recommendation: Do Not Fund

Science Coordinator Comments:
I concur with the science panel.

Science Coordinator Recommendation: Do Not Fund

Public Advisory Committee Comments:
Not Available

Public Advisory Committee Recommendation: Do Not Fund

Executive Director Comments:
I concur with the science panel.

Executive Director Recommendation: Do Not Fund

Trustee Council Comments:
Not Available

Trustee Council Decision: Pending

Project Number: 12120114-O

Project Title: LTM Program - Monitoring long-term changes in forage fish distribution, abundance, and body condition in Prince William Sound.

Principal Investigator: John Piatt

Affiliation: Not Available

Co-PIs/Personnel: Mayumi Arimitsu

Project Location: Prince William Sound

Funding Requested by Fiscal Year:

FY12: $209,900.00	**FY13:** $202,500.00	**FY14:** $202,500.00
FY15: $202,500.00	**FY16:** $150,300.00	**FY17:** $0.00

Total Funding Requested: $967,700.00

Abstract:
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) in the 1990's. We propose to adopt some of these earlier sampling schemes and protocols to continue monitoring forage fish in Prince William Sound with fishing and acoustic surveys of forage fish, and to measure indices of forage fish condition and foraging success.

Science Panel Comments:
Not Available

Science Panel Recommendation: Fund

Science Coordinator Comments:
Not Available

Science Coordinator Recommendation: Fund

Public Advisory Committee Comments:
Not Available

Public Advisory Committee Recommendation: Fund

Executive Director Comments:
Not Available

Executive Director Recommendation: Fund

Trustee Council Comments:
Not Available

Trustee Council Decision: Pending

Project Number: 12120114-P

Project Title: LTM Program - Long-term Monitoring of Oceanographic Conditions in the Alaska Coastal Current from Hydrographic Station GAK 1.

Principal Investigator: Thomas Weingartner

Affiliation: Not Available

Co-PIs/Personnel: None

Project Location: Prince William Sound

Funding Requested by Fiscal Year:

FY12: $109,500.00	**FY13:** $112,500.00	**FY14:** $115,700.00
FY15: $119,100.00	**FY16:** $122,500.00	**FY17:** $0.00

Total Funding Requested: $579,300.00

Abstract:

This program continues a 40-year time series of temperature and salinity measurements at hydrographic station GAK 1. The data set, which began in 1970, now consists of monthly CTDs and a mooring with 6 temperature/conductivity recorders throughout the water column, a fluorometer and nitrate sensor at 20 m depth and a nitrate sensor at 150 m depth. 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. Near and subsurface nitrate supply on the inner shelf,
4. Fluorescence as an index of phytoplankton biomass, and

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.

Science Panel Comments:

Not Available

Science Panel Recommendation: Fund

Science Coordinator Comments:

Not Available

Science Coordinator Recommendation: Fund

Public Advisory Committee Comments:

Not Available

Public Advisory Committee Recommendation: Fund

Executive Director Comments:

Not Available

Executive Director Recommendation: Fund

Trustee Council Comments:
Not Available

Trustee Council Decision: Pending

Project Number: 12120119

Project Title: Maine Debris Program

Principal Investigator: John Whissel

Affiliation: Native Village of Eyak

Co-PIs/Personnel: Keith Van den Broek

Project Location: Prince William Sound

Funding Requested by Fiscal Year:

FY12: $1,082,830.00	FY13: $0.00	FY14: $0.00
FY15: $0.00	FY16: $0.00	FY17: $0.00

Total Funding Requested: $1,082,830.00

Abstract:

Marine Debris (MD) is of great concern to the Native Village of Eyak's (NVE) tribal membership, and the commercial fishing community of Cordova, Alaska where NVE is based. Cordova is located in the southeast corner of Prince William Sounds where the tanker Exxon Valdez ran aground in 1989 spilling oil into Prince William Sound (PWS) at Bligh Reef. The Exxon Valdez Oil Spill (EVOS) contaminated the western half of PWS and continued into the Gulf of Alaska (GOA) past the Alaska Peninsula impacting a huge area where recovery efforts are still underway.

Just as these currents from the east pushed EVOS oil out of PWS and into GOA to the west, the recovery area is populated with water that passes the shores of the GOA to the southeast of PWS. This area is known to NVE, its partners and the National Oceanic and Atmospheric Association (NOAA) to have high accumulation rates of MD, with plastic debris being the most prevalent. A 2010 cleanup effort on Egg Island showed that the dominant type of MD was plastic, and this finding was repeated in NOAA surveys conducted in 2008 where plastic was prevalent in the MD surveyed on Kayak and Middleton Island.

The beaches of Kayak Island, Kanak Island, Egg Island, Katalla and Okalee Spit are in this area immediately "upstream" of the EVOS recovery zone, and have all been observed to hold large amounts of MD, and several reefs in the area around the Copper River Delta are known to have derelict fishing gear. This area, therefore, is a source of MD that winter storms could easily wash off the beaches and reefs and into the GOA where dominant currents would bring the MD directly into the EVOS recovery zone

There are significant challenges in addressing MD in this part of the GOA, which is largely why MD cleanup efforts here have been minimal compared to other more accessible areas.

Science Panel Comments:

This proposal an attractive program based on its focus on local community involvement, cost matching ability, and suite of ongoing projects that the funds would serve. However, the activities suggested and current level of involvement do not suggest that this proposal will be highly effective in the removal of marine debris.

The costs of the program appear reasonable, but without a detailed breakdown it was hard to tell if the various components of the project were cost effective (e.g. how much they are spending assessing, cleaning up, or doing the recycling program). Although the proposal gives a scientific review committee, it lacks process engineer. Also, it mentions that the US Coast Guard will sling load the debris out, but this could be very costly and could significantly influence how much gets done. A single fiscal year seems tight for all the activities including planning, MD analysis, data collection, cleanup and disposal as well as recycling and public outreach events.

Science Panel Recommendation: Do Not Fund

Science Coordinator Comments:
I concur with the science panel.

Science Coordinator Recommendation: Do Not Fund

Public Advisory Committee Comments:
Not Available

Public Advisory Committee Recommendation: Do Not Fund

Executive Director Comments:
I concur with the science panel.

Executive Director Recommendation: Do Not Fund

Trustee Council Comments:
Not Available

Trustee Council Decision: Pending

Project Number: 12120111-P

Project Title: PWS Herring Program - Herring Genetics

Principal Investigator: Sharon Wildes

Affiliation: Not Available

Co-PIs/Personnel: Jeff Guyon

Project Location: Prince William Sound

Funding Requested by Fiscal Year:

FY12: $0.00	FY13: $0.00	FY14: $50,500.00
FY15: $53,100.00	FY16: $0.00	FY17: $0.00

Total Funding Requested: $103,600.00

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 purpose of this proposal is to determine the genetic stock structure of Pacific herring in Prince William Sound using available microsatellite markers. Samples will be collected and their genetic characteristics compared between locations, spawning times and years. In addition, year classes within spawning stocks will also be analyzed for genetic differences. Herring will be collected from two geographical disparate locations within Prince William Sound, one from the east and one from the west. Each location will be extensively sampled such that at least 200 samples from each group (for a specific location, year, spawn time, and age class) will be available for analysis. As a control, a small group of 200 Pacific herring will also be collected from Lynn Canal. Lynn Canal herring are (1) easily accessible from Auke Bay Laboratories, (2) of high priority to the National Marine Fisheries Service and the Alaska Department of Fish and Game, and (3) have been part of our herring program for the last 2 years. DNA will be isolated from each collection of 200 herring and the samples genotyped using a group of microsatellite markers, many of which have already been standardized in our laboratory for Pacific herring (Wildes et al., accepted Fish Bull). To date, over 40 herring microsatellite markers have been described and each loci contains multiple alleles making them ideal genetic markers for analyzing migratory fish like herring with limited stock structure. Resulting genotypes will be compared to determine the genetic uniqueness of each collection using standard analyses (FST and G test). Principle component analyses will be performed to illustrate stock separations. Chord distances will be calculated and a phlyogenetic tree constructed to illustrate genetic relationships. Finally, genetic results will be summarized to communicate their biological significance, as well as their significance to management and restoration.

Science Panel Comments:

Not Available

Science Panel Recommendation: Fund

Science Coordinator Comments:

Not Available

Science Coordinator Recommendation: Fund

Public Advisory Committee Comments:

Not Available

Public Advisory Committee Recommendation: Fund

Executive Director Comments:
Not Available

Executive Director Recommendation: Fund

Trustee Council Comments:
Not Available

Trustee Council Decision: Pending

June 1, 2011

Elise Hsieh, Executive Director
Exxon Valdez Oil Spill Trustee Council
441 W. 5th Ave., Suite 500
Anchorage, AK 99501

Box 705 Cordova, AK

Please find below the reply to your request for additional information regarding the proposed PWS Herring Research and Monitoring program. In addition to the items included in your April 27th letter, I have added the question regarding data management that was included in the letter to the Long-Term Monitoring team.

Proposal: PWS Herring Research and Monitoring Program
Team Leader: Scott Pegau
Organization/Agency: Prince William Sound Science Center

Request for Additional Information

1. Please provide a detailed budget for the administration of this program.

Please see the Coordination project budget sheet included in the program budget work book. The education and outreach component has a separate budget. Fiscal oversight is provided through the negotiated indirect rate of the Prince William Sound Science Center.

2. Please provide additional information including budgets for each of the projects recommended.

See combined budget sheets and DPDs. The budgets in the Excel workbook (**PWS herring merged.xls**) are provided in thousands of dollars. There is a summary for the entire program, summaries for each organization, and detailed budgets for each project proposed. Budget justifications are provided for each of the detailed budgets (subdirectory). There are occasional small differences between the Budget and Budget Justification that arose because of the need to eliminate rounding errors that were evident in the Budget Excel spreadsheets when the various projects were merged. The differences do not affect the total request or the funding to any organization.

There are differences in the budgets of individual years compared to the original proposal. These changes have been included in Tables 1 and 2 of the main proposal.

Detailed Project Descriptions (subdirectory) are provided in the forms sent to us. The proposal was modified to indicate budget changes, and the increased text concerning project collaboration. Two versions are being provided. The "**herring research and monitoring.doc**" is a clean version of the proposal, the "**herring research and monitoring tc.doc**" has the track changes feature engaged so you can see where changes were made to the proposal.

3. Demonstrate the linkages between the herring projects, for example: currently, more than one team is using acoustics, but there does not appear to be a sharing of the methodologies.

We added the following text in the Coordination section of the proposal text.

The wide array of projects that make up this program required careful integration to ensure the maximum collaboration between projects. Not all projects are connected directly to each other, but are connected through the objectives of the program. The full benefits of the linkages will be seen at the points where synthesis efforts occur. Direct project overlap occurs in the area of logistics. We intend to have the acoustic surveys, direct capture, and non-lethal collection components sharing a vessel. The direct capture and non-lethal collection are intended to provide validation to the acoustics. The direct capture component will be responsible for providing fish to the RNA condition, energetic condition, disease research, fatty acid indicators, and genetic stock indicator projects. Another direct project overlap occurs between the herring scale analysis and primiparous herring projects, which will share growth information as determined from the scales. The combined efforts will lead to a greater number of scales becoming digitized and improving the statistics for both projects. All projects will also interact with the data management efforts to ensure the data is properly archived and maintained.

Indirect project overlap occurs between projects through the scheduling. Projects like the genetic stock indicators are pushed back in the cycle to ensure that the methodologies used by the direct capture program are mature enough to ensure collection of the required samples. Non-lethal collection is also later in the program to ensure new direct capture techniques are fully tested. Fish collected from the RNA and energetics intensive studies will also be used by the fatty acid indicator project. The acoustic tagging project is early in the program to take advantage of the acoustic receiver array that is in place and has a limited life span. Some projects like the disease research component also start later in the program because of coordination with the existing herring monitoring program. We worked hard to ensure that there isn't duplication between the proposed program and the existing program. One apparent exception is the RNA and energetic condition intensives. By moving these projects early in the program we intend to fill what is seen as a major gap in the existing program and hopefully more quickly resolve the information value that each project provides.

We are a little confused by the reference to the coordination of acoustic techniques we are proposing. There are three acoustic techniques proposed: split beam sonar for surveys, imaging sonar for non-lethal validation, and acoustic tags for fish monitoring. These three systems are extremely different in purpose, equipment, and methodologies. The imaging sonar and survey sonar are intended to be deployed off the same vessel but not on the same platform as they need to be at different depths due to the differences in ranges. Care must be taken to ensure there isn't interference between the two systems. The comment (about coordination of acoustic techniques) may have come about because of the adult and juvenile surveys, but the timing, geographic area, and approach needed for each survey is different, plus it is the same P.I. so it would be hard to integrate them any closer. We anticipate seeing some adults in the juvenile survey and visa versa, but the approaches are different enough not to allow one type of survey to function for both purposes.

4. There was a great deal of interest in the addition of a modeling component to the program. Please provide a proposal would add a modeling component to the program. It is understood that this funding would be in addition to the limits originally set forth in the FY12 Invitation for Proposals.

The lack of a modeling program is a weakness in the proposed integrated herring research program. Successful integrated programs, such as NSF's Globec and NPRB's BSIERP programs have modeling and measurement projects that can inform each other and build from one another. Several of the Science Panel comments of April 4th (e.g. #5, 6 and 7) refer to determining how well existing modeling and measurements are working, and our overall goal is to improve predictive capability, all of which requires bringing in a modeling effort somewhere along the line. As we put the Herring Research and Monitoring proposal together it wasn't clear what the results would be from the EVOSTC sponsored herring modeling project. Discussions with the modeling investigators were extremely beneficial for helping understand modeling gaps and how the measurement program might fit with the modeling. At the same time there is concern that the modeling results have been slow to materialize.

We investigated different approaches (statistical versus deterministic) and groups that we might work with to add a modeling component to the Herring Research and Monitoring program. We want a modeling project that can help prioritize future observation research needs, work with the observation programs to improve modeling of herring life stages, and in the end improve our herring population predictive capability. No one model was seen as the solution to all of these desires. In looking for a potential modeling component there were two groups that rose to the top. The first were the several modeling programs of NOAA and the University of Washington that exist in the Seattle area. The second are the NPRB sponsored Bering Sea and Gulf of Alaska Integrated Ecosystem Research Programs. Based on conversations with the various modelers, we recommend an approach that takes advantage of the wide array of modeling efforts taking place in the Seattle area and therefore worked with Trevor Branch of the University of Washington to provide a proposal for a herring modeling project addition. Please see the attached proposal (modeling subdirectory) for a modeling component that would complement the observation efforts.

5. In light of strong concerns regarding the program's data component, the Council requires the proposers to work with Council staff to produce alternate options for Council to consider.

We worked with the Long-Term Monitoring Program and the EVOSTC staff to investigate how the National Center for Ecological Analysis and Synthesis (NCEAS) might contribute both oversight and delivery of the proposed data management component. NCEAS appeared to be capable of providing some of the proposed services, but not all of the services proposed as part of our data management component. Our interpretation is that they may best contribute to the existing data management structure that the Alaska Ocean Observing System has in place.

I want to provide more information about why we chose the approach we proposed. We proposed working with Axiom Consulting because they are the data managers for the Alaska Ocean Observing

System (AOOS). They are also included in the Long-Term Monitoring program. I also have experience working with Axiom through projects funded by the Oil Spill Recovery Institute and have been pleased with the products they deliver. This combination of factors is important for leverage, integration, and program management.

AOOS invests approximately $500K/year in data management and it has been identified by their governing board as the most critical component to maintain in the future. They have oversight through a data management committee and a backup plan for transferring the information if AOOS loses its funding. Their commitment to data management and plan for transferring the data if their funding ended provided the long-term stability that we were seeking in a data management and archiving system. The funding commitment by AOOS provided an opportunity to develop a data management approach at a much lower funding level than is typically recommended (20-30% of program costs, Mark Schildhauer, NCEAS teleconference May 11, 2011). The use of the AOOS data management system allows us to build upon their funding for data collection efforts and data management oversight.

Data collected for the Long-Term Monitoring (LTM) program is important for understanding the environmental conditions that affect herring survival. Integration of data from the Herring and LTM programs is necessary for both programs to succeed. We need access to the data they collect and recover in their efforts. Using the same data management structure eases the integration of data from the Herring and LTM programs. There is also a financial saving to the programs because we are able to build upon each other's efforts. The difference in the data management proposed in the two programs arises because of the difference in data quantity and availability. The herring program is building upon the EVOSTC funded herring portal that is available through the AOOS website, and the OSRI funded project to build a data management structure for data being collected at the PWSSC (primarily herring related). This allows us to have a limited data recovery aspect to the Herring program data management and a focus on developing tools to improve integration for synthesis efforts. The LTM program will be able to take advantage of these tools and the Herring program will be able to use their environmental data.

The third consideration in our selection is based on program management considerations. There is a very limited budget for coordination in the herring program because the team was selected based on their ability to produce and work together. Because it is an integrated program with a requirement for a single point-of-contact (W. Scott Pegau) for the program. I realize that I am responsible for the performance of all of the investigators included in the program. I therefore chose to work with investigators that I have been able to work with in the past. Since the data management, coordination, and outreach efforts are the only three aspects that touch on all aspects of the program it is imperative that the three be able to readily communicate, which is made much easier by having data management done in Alaska.

When the program was put together we looked at alternative approaches to each project, including data management. Given that we didn't want to spend over 10% of the budget (considerably below what most data managers recommend) on data management we needed to be able to leverage an existing program.

That eliminated approaches such as working with Resource Data, Inc. that would be more expensive and does not do all the types of work we were looking for. We were left with our back up plan being to post data sets from each investigator on the PWSSC website under the herring pages (http://www.pwssc.org/herringsurvey/). We have explored this option and have not tried to implement it as we do not think it is the proper direction to go. The approach would meet the required deliverables in the RFP and our budget, but we would have lost the connection to the LTM program, other data available through AOOS, and the ability to build tools for visualization and synthesis.

PWS Herring merged budget = 370 pages

Herring Program Projects = 223

FY12 INVITATION
PROPOSAL SUMMARY PAGE

Project Title: Modeling the population dynamics of Prince William Sound herring.

Project Period: October 1, 2011 – September 30, 2016

Primary Investigator(s): Trevor A. Branch

Study Location: School of Aquatic and Fishery Sciences, Box 355020, University of Washington, Seattle WA, 98195, USA.

Abstract:

Estimated Budget:
EVOSTC Funding Requested:
(breakdown by fiscal year and must include 9% GA)

Non-EVOSTC Funds to be used:
(breakdown by fiscal year)

Date: 1 June 2011

(NOT TO EXCEED ONE PAGE)

PROJECT PLAN

I. NEED FOR THE PROJECT

A. Statement of Problem

Robust Pacific herring (*Clupea pallasii*) populations, suitable for exploitation by commercial fisheries, are typically sustained by periodic recruitment of strong year classes into the adult spawning population. However, the Prince William Sound (PWS) herring population has not had a strong recruitment class since 1989, when the Exxon Valdez Oil Spill (EVOS) occurred. In the EVOS settlement herring were identified as an injured resource and they remain listed as an unrecovered species by the EVOS Trustee Council (EVOSTC). Understanding why herring have not recovered in Prince William Sound requires understanding potential bottlenecks in the herring life cycle. The identification of the limiting conditions to herring recovery requires a series of focused process studies combined with monitoring of the natural conditions that affect herring survival.

Described here is a single project that is a part of an integrative program that will enhance the current monitoring efforts of the Alaska Department of Fish and Game (ADF&G), and examine aspects of particular life stages to allow better modeling of herring populations. **The long-term goal of the program is to improve predictive models of herring stocks through observations and research.** While we do not anticipate that there will be a major change in our modeling ability in the next five years, we expect that the combination of monitoring and focused process studies will provide incremental changes over the next twenty years and result in a much better understanding of herring populations by the end of the program.

B. Relevance to 1994 Restoration Plan Goals and Scientific Priorities

The proposed program addresses the goals and priorities outlined in the 1994 Restoration Plan (http://www.evostc.state.ak.us/Universal/Documents/Publications/IHRP%20DRAFT%20-%20July%202010.pdf) and in the FY 2012 invitation for proposals. In particular our program addresses the need to "Conduct research to find out why Pacific herring are not recovering" and "Monitor recovery", listed on page 48 of the 1994 Restoration Plan. It will lead to the development of new tools to improve herring management. The latter will be accomplished by providing the information needed to develop or test biological and physical models of herring growth.

In November 2006, a Herring Steering Committee was formed and tasked with developing a focused Restoration Program that identifies strategies to address recovery and restoration of herring, recognizing that activities in the program must span an ecologically relevant time frame that accounts for herring population dynamics and life history attributes. A draft Integrated Herring Restoration Program (IHRP) was completed in the fall of 2008 and was further refined in July of 2010. The main goal of the program is to determine what, if anything, can be done to successfully recover the Pacific herring in PWS. In order to determine what steps can be taken, the program examines the factors limiting recovery of herring in PWS, identifies and evaluates potential recovery options, and recommends a course of action for achieving restoration.

Based on the recommendations of the IHRP the Trustee Council has stated in the FY12 request for proposals that they have chosen Restoration Option #2, Enhanced Monitoring, as the focus for their research interests. The program aims to meet the goals of this option by utilizing a combination of monitoring efforts to provide more information about the existing stock and process studies to elucidate aspects of the herring life cycle necessary to move us towards an improved modeling approach.

II. PROJECT DESIGN

A. Objectives

This project is designed to complement the "PWS Herring Research and Monitoring" proposal submitted by the Prince William Sound Science Center. The objectives of that program are:

1) *Provide information to improve input to the age-structure-analysis (ASA) model, or test assumptions within the ASA model.* The ASA model is currently used by ADF&G for estimating herring biomass (Hulson et al. 2008). The proposed monitoring efforts are designed to address this objective by either expanding the data available for the existing ASA model or by providing information about factors that determine the size of recruitment events.

2) *Inform the required synthesis effort.* Proper completion of a detailed synthesis means being able to access and manipulate different sources of data and information. We are proposing projects that make data available to all researchers.

3) *Address assumptions in the current measurements.* Many of the existing studies are based on historical or logistical constraints. We are proposing research necessary to put the existing measurements into context spatially and temporally. This effort will allow the design of the most accurate and efficient monitoring program.

4) *Develop new approaches to monitoring.* With technological advances we have the potential to improve our monitoring programs so they require less effort or reduce the need to collect fish.

This modeling program addresses objectives 1, 2 and 3 by examining which data sources provide the most informative inputs to the ASA assessment model, holistically modeling the PWS herring life cycle, identifying possible issues with the assumptions of the measurement program, and examining factors that could determine future herring recruitment.

The specific objectives of this project are to:

a) Determine which datasets provide the most informative information for the ASA model (objective 1).
b) Predict levels of future recruitment, and autocorrelation in recruitment, using information from other herring populations and other species of clupeids (objective 1).
c) Synthesize the data collected from the monitoring program into a holistic model of herring dynamics (objective 2), to determine which life stages the observational program should focus on (objective 3).

B. Procedural and Scientific Methods

Identify the most informative datasets: conduct a management strategy evaluation (e.g. Butterworth & Punt 1999, Sainsbury et al. 2000) to identify which types of data are most informative for the ASA model. This task will comprise developing an operating model (modeling the "truth") to generate data types used by the ASA model (hydroacoustic survey, surveys of milt production, age composition, etc.), particularly the new time series developed as part of this program. For each model run, one type of data will be omitted, a large number of data

sets will be generated (100-1000 depending on the time it takes to run the model), and the ASA model applied to the generated data to produce estimates of abundance. The estimates will then be compared to the underlying "truth" in the operating model to see how well the ASA model performs in the absence of that particular source of data. The end result will be an ordering of input data types from most to least informative, providing critical information to prioritize current and future monitoring efforts.

Predict future levels of recruitment: collate time series of herring abundance and recruitment in Pacific herring stocks, and for stocks of other clupeid species. Conduct a meta-analysis to estimate the average duration that a typical herring stock would be expected to remain at low abundance. Estimate the average level of autocorrelation in herring recruitment from other stocks, to understand how much recruitment covaries from one year to the next. Gather covariates (e.g. length, trophic level, price, latitude, sea surface temperature) to understand which factors influence recruitment in clupeid populations. Much of the data for this task has already been completed in the RAM Legacy stock assessment database (e.g. Branch et al. 2010, 2011, Ricard et al. submitted), but more stocks will be added for the analysis.

Create holistic model of herring dynamics: develop a life stage model to synthesize data from each aspect of the monitoring program, to understand which age groups and sources of mortality are most likely to explain the decline in the abundance of PWS herring. The model will be age-based and include separate terms for each component of mortality. The model will be fitted to time series of abundance at each life history stage and time series of disease prevalence.

These tasks will be conducted on computers by University of Washington students and faculty, who have access to a wide range of in-house fisheries modeling expertise (e.g. faculty members Ray Hilborn, André Punt, Tim Essington). This will allow us to examine statistical modeling, process based modeling, and ecosystem modeling approaches in choosing the best approach for each objective.

C. Data Analysis and Statistical Methods

By working with a well-established measurement program we foresee being able to learn about previous work and have access to historical data more rapidly than if this was a stand-alone project. Thus there will be no need to collect data or analyze data separately from the ongoing efforts of the monitoring program. The only data collection will involve gathering time series of abundance and recruitment for clupeid stocks as described above.

Computer models will be written in a combination of R, a high level language such as C++ or Fortran, and AD Model Builder (ADMB Project 2010) software which can rapidly and efficiently fit models to data.

D. Description of Study Area

The study area includes all of Prince William Sound (N, E, S, and W boundaries of respectively, ~ 61, -145.5. 60, and -149°). However, most of the projects will focus on the four bays (Zaikof, Whale, Eaglek, and Simpson) that were extensively studied during the Sound Ecosystem Assessment study and PWS Herring Survey program (Figure 2). This allows the work to build upon the historical research completed in those bays. These bays also cover four different quadrants of the Sound. We anticipate a potential build out to include other bays or contraction based on the results from the synthesis. As part of the

synthesis effort we will be reviewing the question "What is the appropriate sampling distribution?" as applied to the questions of juvenile herring condition and providing an index of juvenile abundance.

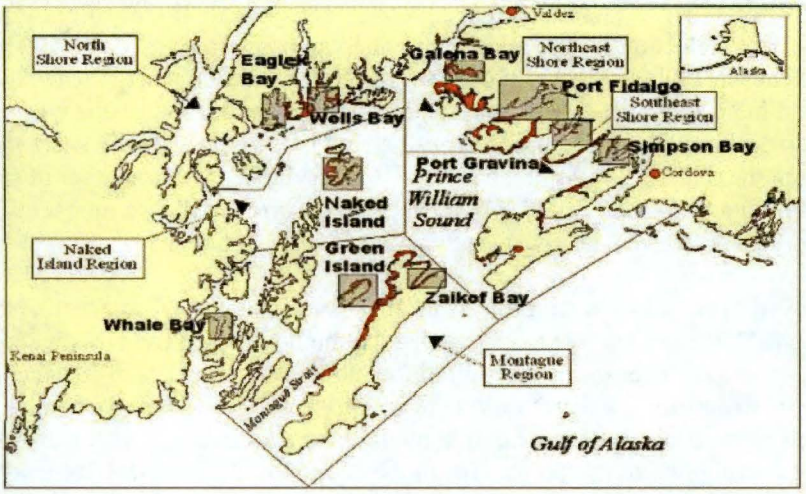

Figure 2. PWS study area, including the four SEA bays (Whale, Zaikof, Eaglek, and Simpson, as well as other bays historically important for juvenile herring.

E. Coordination and Collaboration with Other Efforts

This proposal is structured to be part of a collaborative programmatic effort being led by the Prince William Sound Science Center. Program coordination will primarily be through e-mail and phone communications. Annual meetings are planned in Cordova, tentatively in May, for all investigators to share information between themselves and with the community. These in-person meetings are vital to ensure proper communication among programs.

Dr. Pegau will act as the program team leader and be responsible for ensuring a coordinated and focused research program that leverages other assets whenever possible. He will be responsible for ensuring proper scientific oversight of individual projects and reporting to the EVOSTC. He will lead the development of annual work plans and the synthesis of findings from these programs. He will be responsible for coordinating the efforts of the herring research program with those of the Long-term Monitoring program.

There will be annual Principal Investigator meetings in Cordova each year to provide updates to the oversight panel, improve coordination between projects, and provide outreach and public input opportunities. This meeting will be in the spring so that there is opportunity to provide input on the development of the next year's work plan. In an effort to be proactive in the scientific oversight we sought input on the development of this proposal from ADF&G, NOAA, Cordova District Fishermens United (CDFU), and others. Team development and input on research direction was also sought at the 2011 Alaska Marine Science Symposium.

The wide array of projects that make up this program required careful integration to ensure the maximum collaboration between projects. Not all observation projects are directly connected to each other, but are connected through the objectives of the program. The full benefits of the linkages will be seen at the points where synthesis efforts occur. As the modeling component to this program the proposed project is one of the main tools for synthesizing the different observation program. It is designed to utilize data from the observation programs and help guide future sampling efforts to maximize the likelihood of achieving the program objectives.

Direct overlap between observation projects occurs in the area of logistics. We intend to have the acoustic surveys, direct capture, and non-lethal collection components sharing a vessel. The direct capture and non-lethal collection are intended to provide validation to the acoustics. The direct capture component will be responsible for providing fish to the RNA condition, energetic condition, disease research, fatty acid indicators, and genetic stock indicator projects. Another direct project overlap occurs between the herring scale analysis and primiparous herring projects, which will share growth information as determined from the scales. The combined efforts will lead to a greater number of scales becoming digitized and improving the statistics for both projects. All projects will also interact with the data management efforts to ensure the data is properly archived and maintained.

Indirect project overlap occurs between projects through the scheduling. Projects like the genetic stock indicators are pushed back in the cycle to ensure that the methodologies used by the direct capture program are mature enough to ensure collection of the required samples. Non-lethal collection is also later in the program to ensure new direct capture techniques are fully tested. Fish collected from the RNA and energetics intensive studies will also be used by the fatty acid indicator project. The acoustic tagging project is early in the program to take advantage of the acoustic receiver array that is in place and has a limited life span. Some projects like the disease research component also start later in the program because of coordination with the existing herring monitoring program. We worked hard to ensure that there isn't duplication between the proposed program and the existing program. One apparent exception is the RNA and energetic condition intensives. By moving these projects early in the program we intend to fill what is seen as a major gap in the existing program and hopefully more quickly resolve the information value that each project provides.

Coordination with the EVOSTC Long-term Monitoring program is critical to the success of the herring program. The ability to develop a predictive tool using the juvenile condition component requires an understanding of when feeding may occur and hence the need to coordinate with the oceanographic monitoring component. Predation by whales, fish, and birds are also considered potential factors inhibiting the recovery of herring. In that regard we will be looking to the monitoring program for information on the changes in the predator population base. That information will be critical if the herring program chooses to focus on predation during future efforts. The forage fish component and our efforts to develop an index of juvenile herring populations must inform each other. We expect that our hydroacoustic surveys and direct capture efforts will help provide measures of total fish biomass as well as forage fish populations. We will also work together to identify historical data that both programs would benefit from as part of the data management efforts. Throughout the proposal writing effort, the herring and long-term monitoring efforts led by Kris Holderied have been working together to identify how the two programs can inform and complement each other.

Other important programs for coordinating with are the existing PWS herring survey program and existing ADF&G herring research. This program has been developed with input from both of these programs and the focus of this proposal is extending the interpretation of the data from those two programs. The Herring Survey program will still be operating in FY12 and FY13. There are field observations scheduled in FY12 and in FY13 funds are strictly for analysis and report writing. Included in the report writing is a synthesis of previous and current research. This report will be finished in FY13 and be the basis for the synthesis required under this request for proposals.

III. SCHEDULE

A. Project Milestones

All projects will be conducted simultaneously and are interlinked. The dates given are the expected dates of submission of scientific papers, but preliminary results will be used to improve the monitoring efforts as they are generated.

Objective 1. Create life history model of herring dynamics.
To be met by September 2014

Objective 2. Identify the most informative datasets using management strategy evaluation.
To be met by September 2015

Objective 3. Predict future levels of recruitment from other herring and clupeid stocks.
To be met by September 2016

B. Measurable Project Tasks

Specify, by each quarter of each fiscal year, when critical project tasks (for example, sample collection, data analysis, manuscript submittal, etc.) will be completed. This information will be the basis for the quarterly project progress reports that are submitted to the Trustee Council Office. Please format your schedule like the following example.

FY12, 1st quarter (October 1, 2013-December 31, 2013)

December 31:	Advertise position to potential graduate students
FY12, 2nd quarter	
March 31:	Offer graduate student place in SAFS program
FY12, 3rd quarter	
May:	Annual Cordova meeting with broader project PIs
FY12, 4th quarter	
August	Annual report: summary of data available for modeling, preliminary model development
FY13, 1st quarter	
October	Student registers, begins quantitative training and coursework
FY13, 2nd quarter	
January	Annual Marine Science Symposium, Anchorage
FY13, 3rd quarter	
May	Annual Cordova meeting with broader project PIs
FY13, 4th quarter	
August	Annual report: preliminary life-history model
December	Student completes required modeling and quantitative courses

FY14, 1st quarter (October 1, 2013-December 31, 2013)

September	Preliminary examination of most informative datasets
FY14, 2nd quarter	
January	Annual Marine Science Symposium, Anchorage
March	Draft manuscript: life history model of herring dynamics
FY14, 3rd quarter	
May	Annual Cordova meeting with broader project PIs
June	Student completes all required coursework and milestones
FY14, 4th quarter	
August	Annual report
September	Manuscript submission: life history model of herring dynamics
FY15, 1st quarter (October 1, 2014-December 31, 2014)	
December	Finalize gathering of time series of abundance and recruitment for herring stocks and other clupeids
FY15, 2nd quarter	
January	Annual Marine Science Symposium, Anchorage
March	Draft manuscript: identification of most informative datasets using management strategy evaluation
FY15, 3rd quarter	
May	Annual Cordova meeting with broader project PIs
FY15, 4th quarter	
September	Manuscript submission: identification of most informative datasets using management strategy evaluation
FY16, 1st quarter (October 1, 2015-December 31, 2015)	
FY16, 2nd quarter	
January	Annual Marine Science Symposium, Anchorage
March	Draft manuscript: predictions of herring recruitment and autocorrelation in herring recruitment
FY16, 3rd quarter	
May	Annual Cordova meeting with broader project PIs
FY16, 4th quarter	
August	Final project report
September	Manuscript submission: predictions of herring recruitment and autocorrelation in herring recruitment

References

Branch, T. A., R. Watson, E. A. Fulton, S. Jennings, C. R. McGilliard, G. T. Pablico, D. Ricard, and S. R. Tracey. 2010. The trophic fingerprint of marine fisheries. Nature 468:431-435.

Branch, T. A., O. P. Jensen, D. Ricard, Y. Ye, and R. Hilborn. 2011. Contrasting global trends in marine fishery status obtained from catches and from stock assessments. Conservation Biology doi: 10.1111/j.1523-1739.2011.01687.x.

Butterworth, D. S. and A. E. Punt. 1999. Experiences in the evaluation and implementation of management procedures. ICES Journal of Marine Science 56:985-998.

Ricard, D., C. Minto, J. K. Baum, and O. P. Jensen. Submitted. RAM Legacy: a new global stock assessment database for exploited marine species. Fish and Fisheries.

Sainsbury, K. J., A. E. Punt, and A. D. M. Smith. 2000. Design of operational management strategies for achieving fishery ecosystem objectives. ICES Journal of Marine Science 57:731-741.

III. BUDGET NARRATIVE

Funds are requested for FY12-FY16, but most of the costs are in FY13-FY16 when the graduate student is hired. Indirect costs are 54.5%.

Budget Category:	Proposed FY 12	Proposed FY 13	Proposed FY 14	Proposed FY 15	Proposed FY 16	TOTAL PROPOSED
Personnel	$20,734.0	$34,445.7	$35,823.5	$37,256.4	$38,746.7	$167,006.3
Travel	$982.0	$3,636.0	$8,194.0	$7,812.0	$8,508.0	$29,132.0
Contractual	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Commodities	$200.0	$16,884.0	$20,552.4	$21,286.5	$22,050.0	$80,972.9
Equipment	$0.0	$4,000.0	$0.0	$0.0	$0.0	$4,000.0
Indirect Costs (*will vary by proposer*)	$11,944.2	$20,863.5	$25,188.5	$25,761.3	$26,952.8	$110,710.4
SUBTOTAL	$33,860.2	$79,829.2	$89,758.4	$92,116.2	$96,257.5	$391,821.6
General Administration (9% of subtotal)	$3,047.4	$7,184.6	$8,078.3	$8,290.5	$8,663.2	$35,263.9
PROJECT TOTAL	$36,907.6	$87,013.8	$97,836.7	$100,406.7	$104,920.6	$427,085.5
Other Resources (Cost Share Funds)	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0

FY12 Justification:

Personnel ($20,734):

Two months for Branch to review literature, compile data, conduct preliminary data analysis, and develop preliminary models of Prince William Sound herring. Since it is too late to identify and admit a graduate student in September 2011, Branch will conduct analyses in FY12 and then train the graduate student to complete and extend the analyses in subsequent years. Tow months at monthly salary of $8150 per month, plus 27.2% benefits, assuming no cost-of-living increase from FY11 salary ($20,734).

Travel ($982):

Travel funds for Branch to attend annual PI meeting in Cordova in May 2012.

Commodities ($200):
Long distance phone calls, photocopying, printer cartridges etc. ($200).

FY13 Justification:
Personnel ($34,446):
One month for Branch to supervise graduate student and for modeling (monthly salary $8,476, plus 27.2% benefits, includes 4% cost-of-living increase from FY12).
Twelve months of PhD student research assistant support to conduct research (monthly salary $1972, plus 16.2% benefits, includes 4% cost-of-living increase from FY12).

Travel ($3636):
Travel funds for Branch and graduate student to attend annual PI meeting in Cordova in May 2012 ($1964).
Travel funds for graduate student to attend Annual Marine Science Symposium in Anchorage ($1672).

Commodities ($16,884):
Long distance phone calls, photocopying, printer cartridges etc. ($200).
Tuition for graduate student, assuming 16% increase in tuition over FY12 ($16,684). Increase assumed to be the same as increase from FY11 to FY12 (due to budget cuts in Washington State).

New Equipment ($4000):
Laptop computer, monitor, associated software for graduate student ($2000).
High speed desktop computer for running lengthy simulations, monitor, to be shared between student and Branch ($2000).
Equipment costing more than $2000 is not subject to University of Washington indirect costs of 54.5%.

FY14 Justification:
Personnel ($35,824):
One month for Branch, 12 months of PhD student, justification as in FY13 except including 4% cost-of-living increase.

Travel ($8194):
Travel funds for Branch and graduate student to attend annual PI meeting in Cordova in May 2012 ($1964).
Travel funds for Branch and graduate student to attend Annual Marine Science Symposium in Anchorage ($3344).
Travel funds for Branch and graduate student to attend American Fisheries Society conference in Little Rock Arkansas ($2886).

Commodities ($20,552):
Publication charges for papers (page charges, color page charges, open access charges). ($2000).
Long distance phone calls, photocopying, printer cartridges etc. ($200).
Tuition for graduate student, assuming 10% increase in tuition over FY13 ($18,352).

FY15 Justification:
Personnel ($37,256):
One month for Branch, 12 months of PhD student, justification as in FY14 except including 4% cost-of-living increase.

Travel ($7812):
Travel funds for Branch and graduate student to attend annual PI meeting in Cordova in May 2012 ($1964).
Travel funds for Branch and graduate student to attend Annual Marine Science Symposium in Anchorage ($3344).
Travel funds for Branch and graduate student to attend Mote Marine Symposium in Sarasota Florida to present results ($2504).

Commodities ($21,287):
Publication charges for papers (page charges, color page charges, open access charges). ($2000).
Long distance phone calls, photocopying, printer cartridges etc. ($200).
Tuition for graduate student, assuming 5% increase in tuition over FY14 ($19,086).

FY16 Justification:
Personnel ($38,747):
One month for Branch, 12 months of PhD student, justification as in FY15 except including 4% cost-of-living increase.

Travel ($8508):
Travel funds for Branch and graduate student to attend annual PI meeting in Cordova in May 2012 ($1964).
Travel funds for Branch and graduate student to attend Annual Marine Science Symposium in Anchorage ($3344).
Travel funds for Branch and graduate student to attend American Fisheries Society annual meeting, venue to be arranged ($3200).

Commodities ($22,050):
Publication charges for papers (page charges, color page charges, open access charges). ($2000).
Long distance phone calls, photocopying, printer cartridges etc. ($200).
Tuition for graduate student, assuming 5% increase in tuition over FY15 ($19,850).

Indirect costs (54.5%)
Federal cost recovery at the University of Washington has been set at 54.5%, and is assumed to remain at this level throughout the grant. Indirect is not applied to tuition or to capital equipment expenses.

Trevor A. Branch

(Principal Investigator)
Address: School of Aquatic and Fishery Sciences, Box 355020, University of Washington, Seattle, WA, 98195
Telephone: 206-221-0776, Fax: 206-685-7471
Email address: tbranch@uw.edu

Education

University of Cape Town	Zoology and Computer Science	B.Sc.	1994
University of Cape Town	Zoology	B.Sc.(Hons)	1995
University of Cape Town	Conservation Biology	M.Sc.	1998
University of Washington	Aquatic and Fishery Sciences	Ph.D.	2004

Employment (Position, institution, start and end year):

2010–present	Assistant Professor, School of Aquatic and Fishery Sciences, Univ. of Washington
2006–2010	Research Scientist, School of Aquatic and Fishery Sciences, Univ. of Washington
2005–2006	Research Officer, Marine Resource Assessment and Management Group, Department of Mathematics and Applied Mathematics, University of Cape Town

Professional Recognition (Societies, honors and awards):

Associate Editor for Animal Conservation, 2011-present.

Invited participant to Scientific Committee meetings of the International Whaling Commission, 2000–2008, advising on abundance, current status, and trends of Antarctic minke whales, Antarctic blue whales and other large cetaceans.

Consultant to Independent Scientific Advisory Panel for Commission for Conservation of Southern Bluefin Tuna, 2004–present.

Young Investigator award for best oral presentation at the Mote Symposium, November 2004.

Faculty merit award for best PhD student, School of Aquatic and Fishery Sciences, University of Washington, 2004.

Reviewer for 22 journals including Science, Canadian Journal of Fisheries and Aquatic Sciences, Proceedings of the Royal Society B, Fisheries Research, ICES Journal of Marine Science, Fish and Fisheries, Ecology, and Marine Ecology Progress Series.

Graduate students and post-doctorates supervised:

M.S. Advisor, Cole Monnahan (2011-present), Quantitative Ecology and Resource Management (QERM) interdisciplinary program.

Ph.D. committee member: Kotaro Ono (2011-present), School of Aquatic and Fishery Sciences, University of Washington.

M.S. Committee member: Curry Cunningham (2011-present), School of Aquatic and Fishery Sciences, University of Washington.

Selected publications since 2009 (total = 34):

Branch, T.A., Watson, R., Fulton, E.A., Jennings, S., McGilliard, C.R., Pablico, G.T., Ricard, D., & Tracey, S.R. 2010. The trophic fingerprint of marine fisheries. Nature. 468:431-435.

Worm, B., Hilborn R., Baum, J.K., **Branch**, T.A., Collie, J.S., Costello, C., Fogarty, M.J., Fulton, E.A., Hutchings, J.A., Jennings, S., Jensen, O.P., Lotze, H.K., Mace, P.M., McClanahan, T.R., Minto, C., Palumbi, S.R., Parma, A.M., Ricard, D., Rosenberg, A.A., Watson, R. & Zeller, D. 2009. Rebuilding global fisheries. Science. 325:578-585.

Sethi, S. A., **Branch**, T.A. & Watson, R. 2010. Fishery development patterns are driven by profit but not trophic level. Proceedings of the National Academy of Sciences U.S.A. 107:12163-12167.

Branch, T.A., Jensen, O.P., Ricard, D., Ye, Y. & Hilborn, R. 2011 Contrasting global trends in marine fishery status obtained from catches and from stock assessments. Conservation Biology. doi: 10.1111/j.1523-1739.2011.01687.x

Froese, R., **Branch, T.A.**, Proelβ, A., Quaas, M., Sainsbury, K. & Zimmermann, C. 2011. Generic harvest control rules for European fisheries. Fish and Fisheries. doi: 10.1111/j.1467-2979.2010.00387.x

Branch, T.A. & Hilborn, R. 2010. A general model for reconstructing salmon runs. Canadian Journal of Fisheries and Aquatic Sciences. 67:886-904. doi: 10.1139/F10-032

Branch, T.A. 2009a. How do individual transferable quotas affect marine ecosystems? Fish and Fisheries. 10:39-57.

Branch, T.A. 2009b. Differences in predicted catch composition between two widely used catch equation formulations. Canadian Journal of Fisheries and Aquatic Sciences. 66: 126-132. doi:10.1139/F08-196

Collaborators and co-editors in the last 48 months

Abbott, J. (Arizona State University), Abubaker, E.M.N. (Sudan), Allison, C. (IWC, U.K.), A'Mar, Z.T. (UW), Anderson, R.C. (Maldives), Ashe, E., (U.K.), Baker, A.N. (New Zealand), Baker, M.R. (UW), Bannister, J.L. (W. Australian Museum) , Baum, J.K. (Scripps Inst. Oceanography), Best, P.B. (South African Museum), Borsa, P. (New Caledonia), Bravington, M. (CSIRO, Australia), Brownell Jr, R.L. (NOAA), Burton, C.L.K. (private, Australia), Butterworth, D.S. (Univ. Cape Town, South Africa), Cabrera, E. (Centro de Conservacion Cetacea, Chile), Carlson, C.A. (College of the Atlantic), Childerhouse, S. (Department of Conservation, New Zealand), Clarke, E. (NOAA), Clark, S. (Sea World), Collie, J.S. (Univ. Rhode Island), Costello, C. (UC Santa Barbara), Essington, T.E. (UW), Findlay, K.P. (Univ. Cape Town, South Africa), Fogarty, M.J. (NOAA), Froese, R. (Leibniz Inst. Mar. Sci., Germany), Fulton, E.A. (CSIRO, Australia), Galletti Vernazzani, B. (Centro de Conservacion Cetacea, Chile), Gerrodette, T. (NOAA), Gill, P.C. (Blue Whale Study, Australia), Haynie, A.C. (NOAA), Hammond, P. (U.K.), Hedley, S. (U.K.), Hilborn R. (UW), Hollowed, A. (NOAA), Holland, D.S. (NOAA), Holtgrieve, G.W. (UW) , Hucke-Gaete, R. (Universidad Austral de Chile), Hoyt, E. (Whale & Dolphin Cons. Soc.), Hutchings, J.A. (Dalhousie Univ., Canada), Ianelli, J. (NOAA), Ilangakoon, A.D. (Sri Lanka), Jannot, J. (NOAA), Jenner, K.C.S. (Centre for Whale Research, Australia), Jenner, M.-N.M. (Ctr. Whale Res, Australia), Jennings, S. (Ctr. Env. Fish. Aqu. Res., U.K.), Jensen, O.P. (Univ. Rutgers), Joergensen, M. (Denmark), Kahn, B. (Indonesia), Kato, H. (Tokyo Univ. Mar. Sci. Tech., Japan), Kendall, N.W. (UW), Krkošek, M. (New Zealand), Ljungblad, D.K. (private), Lotze, H.K. (Dalhousie Univ., Canada), Mace, P.M. (Min. Fisheries, New Zealand), Matsuoka, K. (Inst. Cet. Res., Japan), Maughan, B. (U.K.), McCauley, R.D. (Curtin Univ., Australia), McClanahan, T.R. (Wildlife Cons. Soc., Kenya), McGilliard, C.R. (UW), McKay, S. (Deakin Univ., Australia), Melvin, E. (UW), Mikhalev, Y.A. (South-Ukrainian Pedagogical Univ.), Minto, C. (Dalhousie Univ., Canada), Miyashita, T. (Natl Res. Inst. Far Seas Fish., Japan), Mkango, S. (Univ. Cape Town, South Africa), Morrice, M.G. (Deakin Univ., Australia), Nishiwaki, S. (Inst. Cet. Res., Japan), Noren, D. (NOAA), Norris, T.F. (private), Pablico, G. (WorldFish Cntr., Philippines), Palacios, D.M. (NOAA), Palumbi, S.R. (Stanford Univ.), Parma, A.M. (Centro Nacional Patagónico, Argentina), Proelβ, A. (Germany), Quaas, M. (Germany), Quinn, T.P. (UW), Ranjan, R. (UW), Rankin, S. (NOAA), Ricard, D. (Dalhousie Univ., Canada), Rosen, D. (UBC, Canada), Rosenberg, A.A. (Univ. New Hampshire), Sainsbury, K. (Australia), Samaran, F. (Cntr. d'Etudes Biol. Chize, France), Schindler, D.E. (UW), Sethi, S.A. (UW), Stafford, K.M. (UW), Sturrock, V.J. (Australia), Thiele, D. (Deakin Univ. Australia), Tormosov, D. (Russia), Tracey, S.R. (Univ. Tasmania), Van Waerebeek, K. (Peruvian Cntr. Cet. Res.), Warneke, R.M. (Australia), Watson, R. (Univ. British Columbia), Williams, R. (Canada), Worm, B. (Dalhousie Univ., Canada), Ye, Y. (FAO, Italy), Zeller, D. (Univ. British Columbia), Zerbini, A.N. (NOAA), Zimmermann, C. (Germany).

***EXXON VALDEZ* OIL SPILL TRUSTEE COUNCIL**
DETAILED BUDGET FORM FY 12-FY16

Budget Category:	Proposed FY 12	Proposed FY 13	Proposed FY 14	Proposed FY 15	Proposed FY 16	TOTAL PROPOSED
Personnel	$20,734.0	$34,445.7	$35,824	$37,256.4	$38,746.7	$167,006.3
Travel	$982.0	$3,636.0	$8,194.0	$7,812.0	$8,508.0	$29,132.0
Contractual	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Commodities	$200.0	$16,884.0	$20,552.4	$21,286.5	$22,050.0	$80,972.9
Equipment	$0.0	$4,000.0	$0.0	$0.0	$0.0	$4,000.0
Indirect Costs (*will vary by proposer*)	$11,944.2	$20,863.5	$25,188.5	$25,761.3	$26,952.8	$110,710.4
SUBTOTAL	$33,860.2	$79,829.2	$89,758.4	$92,116.2	$96,257.5	$391,821.6
General Administration (9% of subtotal)	$3,047.4	$7,184.6	$8,078.3	$8,290.5	$8,663.2	$35,263.9
PROJECT TOTAL	$36,907.6	$87,013.8	$97,836.7	$100,406.7	$104,920.6	$427,085.5
Other Resources (Cost Share Funds)	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0

COMMENTS: 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

FY12-16

Program Title: Modeling the population dynamics of Prince William Sound herring
Team Leader: Trevor A. Branch

FORM 3A
NON-TRUSTEE AGENCY SUMMARY

***EXXON VALDEZ* OIL SPILL TRUSTEE COUNCIL**
DETAILED BUDGET FORM FY 12-FY16

Personnel Costs:		Months	Monthly		Personnel
Name	Project Title	Budgeted	Costs	Overtime	Sum
Trevor A. Branch	Assistant Professor	2.0	10367.0		20,734.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
		Subtotal	10367.0	0.0	
				Personnel Total	$20,734.0

Travel Costs:	Ticket	Round	Total	Daily	Travel
Description	Price	Trips	Days	Per Diem	Sum
Travel Seattle to Cordova, annual PI meeting	307.0	1	3	225.0	982.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
				Travel Total	$982.0

FY12

Program Title:
Team Leader:

FORM 3B
PERSONNEL & TRAVEL DETAIL

EXXON VALDEZ OIL SPILL TRUSTEE COUNCIL
DETAILED BUDGET FORM FY 12-FY16

Contractual Costs: Description		Contract 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: Description	Commodities Sum
Long distance telephone, photocopying, printer cartridges etc.	200.0
Commodities Total	$200.0

FY12

Program Title:
Team Leader:

FORM 3B
CONTRACTUAL &
COMMODITIES DETAIL

EXXON VALDEZ OIL SPILL TRUSTEE COUNCIL
DETAILED BUDGET FORM FY 12-FY16

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

FY13

Program Title:
Team Leader:

FORM 3B
EQUIPMENT DETAIL

EXXON VALDEZ OIL SPILL TRUSTEE COUNCIL
DETAILED BUDGET FORM FY 12-FY16

Personnel Costs:		Months	Monthly		Personnel
Name	Project Title	Budgeted	Costs	Overtime	Sum
Trevor A. Branch	Assistant Professor	1.0	10781.7		10,781.7
To be arranged	Research Assistant	12.0	1972.0		23,664.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
			Subtotal	12753.7	0.0	
					Personnel Total	$34,445.7

Travel Costs:	Ticket	Round	Total	Daily	Travel
Description	Price	Trips	Days	Per Diem	Sum
Travel Seattle to Cordova, annual PI meeting	307.0	2	6	225.0	1,964.0
Marine Science Symposium	307.0	1	7	195.0	1,672.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
				Travel Total	$3,636.0

FY13

Program Title:
Team Leader:

FORM 3B
PERSONNEL & TRAVEL DETAIL

EXXON VALDEZ OIL SPILL TRUSTEE COUNCIL
DETAILED BUDGET FORM FY 12-FY16

Contractual Costs: Description		Contract 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: Description	Commodities Sum
Tuition for graduate student	16,684.0
Long distance telephone, photocopying, printer cartridges etc.	200.0
Commodities Total	$16,884.0

FY13

Program Title:
Team Leader:

FORM 3B
CONTRACTUAL & COMMODITIES DETAIL

EXXON VALDEZ OIL SPILL TRUSTEE COUNCIL
DETAILED BUDGET FORM FY 12-FY16

New Equipment Purchases: Description	Number of Units	Unit Price	Equipment Sum
Laptop computer, monitor, associated software	1.0	2,000.0	2,000.0
High speed desktop computer, monitor, for simulations	1.0	2,000.0	2,000.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
		New Equipment Total	$4,000.0

Existing Equipment Usage: Description	Number of Units	Inventory Agency

FY14

Program Title:
Team Leader:

FORM 3B
EQUIPMENT DETAIL

***EXXON VALDEZ* OIL SPILL TRUSTEE COUNCIL**
DETAILED BUDGET FORM FY 12-FY16

Personnel Costs:		Months	Monthly		Personnel
Name	Project Title	Budgeted	Costs	Overtime	Sum
Trevor A. Branch	Assistant Professor	1.0	11212.9		11,212.9
To be arranged	Research Assistant	12.0	2050.9		24,610.6
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
		Subtotal	13263.8	0.0	
				Personnel Total	$35,823.5

Travel Costs:	Ticket	Round	Total	Daily	Travel
Description	Price	Trips	Days	Per Diem	Sum
Travel Seattle to Cordova, annual PI meeting	307.0	2	6	225.0	1,964.0
Marine Science Symposium	307.0	2	14	195.0	3,344.0
AFS symposium, Little Rock Arkansas	400.0	2	14	149.0	2,886.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
				Travel Total	$8,194.0

FY14

Program Title:
Team Leader:

FORM 3B
PERSONNEL & TRAVEL DETAIL

EXXON VALDEZ OIL SPILL TRUSTEE COUNCIL
DETAILED BUDGET FORM FY 12-FY16

Contractual Costs: Description		Contract 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: Description	Commodities Sum
Publication charges for scientific papers, page charges and color page charges	2,000.0
Tuition for graduate student	18,352.4
Long distance telephone, photocopying, printer cartridges etc.	200.0
Commodities Total	$20,552.4

FY14

Program Title:
Team Leader:

FORM 3B
CONTRACTUAL & COMMODITIES DETAIL

EXXON VALDEZ OIL SPILL TRUSTEE COUNCIL
DETAILED BUDGET FORM FY 12-FY16

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:
Team Leader:

FORM 3B
EQUIPMENT DETAIL

EXXON VALDEZ OIL SPILL TRUSTEE COUNCIL
DETAILED BUDGET FORM FY 12-FY16

Personnel Costs:		Months	Monthly		Personnel
Name	Project Title	Budgeted	Costs	Overtime	Sum
Trevor A. Branch	Assistant Professor	1.0	11661.5		11,661.5
To be arranged	Research Assistant	12.0	2132.9		25,595.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
		Subtotal	13794.4	0.0	
				Personnel Total	$37,256.4

Travel Costs:	Ticket	Round	Total	Daily	Travel
Description	Price	Trips	Days	Per Diem	Sum
Travel Seattle to Cordova, annual PI meeting	307.0	2	6	225.0	1,964.0
Marine Science Symposium, Anchorage	307.0	2	14	195.0	3,344.0
Mote Marine Symposium, Sarasota	400.0	2	12	142.0	2,504.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
				Travel Total	$7,812.0

FY15

Program Title:
Team Leader:

FORM 3B
PERSONNEL & TRAVEL DETAIL

EXXON VALDEZ OIL SPILL TRUSTEE COUNCIL
DETAILED BUDGET FORM FY 12-FY16

Contractual Costs: Description		Contract 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: Description	Commodities Sum
Publication charges for scientific papers, page charges and color page charges	2,000.0
Tuition for graduate student	19,086
Long distance telephone, photocopying, printer cartridges etc.	200.0
Commodities Total	$21,286.5

FY15

Program Title:
Team Leader:

FORM 3B
CONTRACTUAL & COMMODITIES DETAIL

EXXON VALDEZ OIL SPILL TRUSTEE COUNCIL
DETAILED BUDGET FORM FY 12-FY16

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

FY16

Program Title:
Team Leader:

FORM 3B
EQUIPMENT DETAIL

***EXXON VALDEZ* OIL SPILL TRUSTEE COUNCIL**
DETAILED BUDGET FORM FY 12-FY16

Personnel Costs:		Months	Monthly		Personnel
Name	Project Title	Budgeted	Costs	Overtime	Sum
Trevor A. Branch	Assistant Professor	1.0	12127.9		12,127.9
To be arranged	Research Assistant	12.0	2218.2		26,618.8
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
		Subtotal	14346.2	0.0	
				Personnel Total	$38,746.7

Travel Costs:	Ticket	Round	Total	Daily	Travel
Description	Price	Trips	Days	Per Diem	Sum
Travel Seattle to Cordova, annual PI meeting	307.0	2	6	225.0	1,964.0
Marine Science Symposium	307.0	2	14	195.0	3,344.0
AFS meeting, venue to be arranged	400.0	2	12	200.0	3,200.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
				Travel Total	$8,508.0

FY16

Program Title:
Team Leader:

FORM 3B
PERSONNEL & TRAVEL DETAIL

EXXON VALDEZ OIL SPILL TRUSTEE COUNCIL
DETAILED BUDGET FORM FY 12-FY16

Contractual Costs: Description		Contract 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: Description	Commodities Sum
Publication charges for scientific papers, page charges and color page charges	2,000.0
Tuition for graduate student	19,850.0
Long distance telephone, photocopying, printer cartridges etc.	200.0
Commodities Total	$22,050.0

FY16

Program Title:
Team Leader:

FORM 3B
CONTRACTUAL & COMMODITIES DETAIL

EXXON VALDEZ OIL SPILL TRUSTEE COUNCIL
DETAILED BUDGET FORM FY 12-FY16

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

FY16

Program Title:
Team Leader:

FORM 3B
EQUIPMENT DETAIL

LTM *McCammon*
AOOS - PJ 12120114

AOOS
Alaska Ocean Observing System
1007 W. Third Avenue, Suite 100
Anchorage, AK 99501
907.644.6703 – phone
907.644.6780 – fax
www.aoos.org

PRINCE WILLIAM SOUND SCIENCE CENTER
CORDOVA, ALASKA
P.O. Box 705 - Cordova, AK 99574
www.pwssc.org

June 1, 2011

Elise Hsieh, Executive Director
Exxon Valdez Oil Spill Trustee Council
441 W. 5th Ave., Suite 500
Anchorage, AK 99501

Dear Elise:

This letter, as well as a package of detailed project descriptions (DPDs) and budgets constitute our response to your April 27, 2011 and April 4, 2011 letters asking for additional information relating to our proposal for Long-Term Monitoring of Marine Conditions and injured Resources and Services Program.

1. *Seabird monitoring program – why do costs double in Year 3?* In our original proposal, we had hoped to include a winter survey in year 3, which is why costs were double. However, due to salary increases and the need to replace aging equipment, the principal investigators (PIs) say they are not able to include this additional survey in the current project without additional funding in the amount of $125k.

2. *Please provide a detailed breakdown of the items listed under "Coordination, Data Management, Outreach, and Administration" in the proposed budget.* This information is included in four separate components:

- Administration and Outreach budget and DPD submitted by PWSSC (Bird) for a total of $1,301k over five years. Funds are included for Science Center staff to provide these administrative functions and fiscal management at a cost of approximately $200k per year and includes contract management for six, non-Trustee agency sub-awards, meeting coordination and logistics, and administrative assistance in the formation and operation of the Scientific Review Panel and the Outreach Steering Committee. In addition, about $60k per year is included for outreach and community involvement activities that will be performed by our outreach partners as described in the DPD through small contracts or professional service agreements.
- Data Management budget and DPD submitted by AOOS (McCammon/Bochenek) for a total of $750k over five years. About $150k per year is included for the AOOS data team at Axiom Consulting to 1) provide basic data management services for the LTM project team; 2) provide access

to relevant historical data sets; 3) develop analytical and visualization tools for users; and 4) integrate all data, metadata and information products into the AOOS data management system for long term storage and public use.

- Science Coordination and Synthesis budget and DPD submitted by Kris Holderied, NOAA Kasitsna Bay Lab for $650k over five years to: 1) facilitate overall long-term monitoring program planning and information sharing among PIs, the herring program, EVOS TC staff, and other monitoring and research efforts in the region; 2) improve integration of monitoring information across scientific disciplines and regions; and 3) enhance communication of monitoring information to resource managers and the public through data synthesis reports and visualization tools.
- Conceptual Ecological Modeling budget and DPD submitted by Tuula Hollmen, Alaska SeaLife Center for $395k total over five years to develop conceptual models that summarize key components, processes, and functions of ecosystems in the EVOS-affected region and which support science synthesis, interactive data exploration and program planning.

3. *Please provide an explanation of how these proposals are integrated both within themselves and within the team.*

The long term monitoring (LTM) project is organized by four large components: environmental drivers, nearshore benthic ecosystems, pelagic monitoring, and lingering oil. These are all described in detail in Appendix 1 of the original proposal and in the Detailed Project Descriptions for each component. Our approach is to sustain key existing time series and to improve connections between and integration with existing monitoring programs. Integration will be achieved through these efforts:

- Use of an interdisciplinary framework that fosters collaboration among the LTM components and PIs;
- Required sharing of data among all PIs in a timely fashion in the LTM database;
- Annual PI meetings held in conjunction with the Herring Research Program PI meeting;
- Geographic scale (PWS, GOA shelf, Lower Cook Inlet) that improves linkages between monitoring in different regions of spill-affected region to better discern impacts of environmental change on restoration and continued recovery of injured resources;
- Close coordination with existing agency monitoring (e.g., National Park Service Vital Signs Monitoring Program, Kachemak Bay Research Reserve System-wide Monitoring Program, USFWS sea otter and bird surveys, NPRB GOAIERP, AOOS PWS and Cook Inlet observations;
- Use of program-wide science synthesis and conceptual ecological modeling efforts; and
- Support for publication of results.

The Environmental Drivers component examines physical oceanographic and lower trophic variability in the marine ecosystems of the northwest Gulf of Alaska,

provides the environmental context under which the other components are conducted, and provides information essential for synthesizing the results from the other components into a conceptual ecosystem model. The Nearshore Benthic component is designed to include monitoring at four locations across the Gulf of Alaska and uses a combination of intensive sampling to detect larger spatial scale changes and extensive sampling to evaluate potential impacts from more localized sources. This component will be closely linked with the Lingering Oil component, as well as the Environmental Drivers component since the nearshore is strongly influenced by physical oceanographic processes. The Pelagic Monitoring component is a mixed species group that is critical to understanding long term effects of the spill on injured species, as well as the status and energy flow through the ecosystem by looking at top down apex predators and bottom up prey species. The Lingering Oil component examines 12 of the most heavily oiled shoreline sites to continue to track oil quantity and weathering, and resamples harlequin ducks and sea otters in western PWS to evaluate continuing exposure to lingering oil and the status of their recovery. Study results will be shared among all the LTM PIs.

4. *In light of strong concerns regarding the program's data component, the Council requires the proposers to work with Council staff to produce alternate options for Council to consider.*

We believe we have addressed this issue in several letters to the Trustee Council explaining our reasons for leveraging the investment of the Alaska Ocean Observing System in management of ocean and coastal biological, physical and chemical data. These bear repeating here:

- AOOS brings a significant level of leveraged resources, infrastructure, regional data management projects and partnerships to this proposed effort including the AOOS $500k a year commitment to a statewide system, a joint project with the AK Department of Fish and Game to make their data more easily available, a collaboration with the Prince William Sound Science Center/Oil Spill Recovery Institute for a data system to manage their projects, development of a Cook Inlet "ERMA-lite" project, and the USFWS Seabird Data System. The data management effort for the LTM and Herring programs could not be accomplished for the budgeted amount by a team without these leveraged resources. We believe it makes the most economic sense to take advantage of the AOOS data system in development and to leverage the proposed funding to help develop a robust, sustainable data management and delivery system for Gulf of Alaska coastal science and management needs, including the restoration and monitoring of EVOS-injured resources. Developing a parallel system, whether in or out of state, would not make effective use of the limited funds available. The AOOS data system is anticipated to be a long-term (essentially, permanent) commitment and funding for it is the top priority of the AOOS Board. National funding for the program is surviving in spite of budget cuts and changes in Congressional leadership. As data management is a core function

of AOOS, it makes it an effective partner for the North Pacific Research Board efforts in the Gulf and proposed EVOS TC efforts.

- There are two immediate advantages of using an in-state entity for data management and delivery services for the LTM and Herring programs. First, since the majority of the PIs and program managers are in Alaska, it will facilitate coordination and communication, including in person meetings. The project PIs have significant expertise in data management and will be major contributors to the developing system. Second, the need for data management extends beyond development of a good database to include ongoing services. Ideally, both the datasets and an effective data service to provide ongoing information to managers, researchers and the general public, will be long-term legacies of these programs.

There appear to be three issues relating to the LTM data management capabilities:

1. The ability to manage a system that provides for data quality/accuracy (procedures to identify and minimize errors at each stage of the data lifecycle); security (data maintained to protect against loss); longevity (data documentation, proper storage conditions, backups, migration to current platforms, archiving); and availability/usability (making data available for decision-making, research, outreach and education). These are basic core functions of any data system.

AOOS has procedures in place for providing these core functions, guided by an external advisory committee (chaired by Dr. Phil Mundy, NOAA Auke Bay Lab director) consisting of 12 data experts from a variety of agencies and organizations, including NOAA, USGS, NSF, ADF&G, and GINA. The AOOS data system is designed to follow national interoperability standards. The current AOOS data team of Axiom was selected following a highly competitive and rigorous review process conducted by an external peer review team and led by Jeffrey Rosen, a nationally recognized data management expert now designing the data system for the Papahānaumokuākea Marine National Monument, the largest marine sanctuary in the world. The panel also included Jim Moore (National Center for Atmospheric Research) and Florence Fetterer (National Snow and Ice Data Center), Principal Investigator and co-PI for CADIS, the data information service for the National Science Foundation's Arctic Observing Network, as well as Jeff de LaBeaujardiere, who was just appointed as NOAA's chief data architect. Axiom was clearly superior to all other proposers. We would be happy to make the review team's report available to you.

The LTM management team, and AOOS, is confident that Axiom is capable of providing these core data management functions. If the Trustee Council or Council staff would like to make additions to the AOOS Data Management Advisory Committee, we would be happy to consider them. There are not many – if any - other entities that would be able to provide similar services (possibly the Geographic Information Network of Alaska at UAF or Resource Data, Inc., a private, for-profit company with an office in Alaska), and certainly none for the costs included in the LTM and Herring Projects. In fact, the funding provided in this

proposal, even with the significant amount of leveraging made possible with the AOOS and other partnerships, is still minimally sufficient to provide core data management services given the desire to make accessible and use large amounts of historical data, most of which have no metadata and are currently not publicly accessible.

2. The ability to add value to the data through a system that allows for data integration, display, visualization, incorporation of a variety of biological, physical and chemical data into decision support tools and ecosystem models, etc.

The kinds of data products described here are challenging, but essential if we are to have a program that provides useful information to the research team, the EVOS Trustee Council, resource managers and the public. Again, the AOOS data team, as part of the national Integrated Ocean Observing System, is on the forefront in developing these kinds of applications. However, because they are "cutting edge", we would welcome any additional support and collaborations from external entities such as the National Center for Ecological Analysis and Synthesis (NCEAS), Woods Hole Oceanographic Institution (WHOI) or any other organization that has experience in developing similar products. We should note, that because AOOS is part of IOOS, we have access to similar programs and expertise at the University of Washington, Scripps, Rutgers, University of Rhode Island, Boeing, SAIC, Applied Science Applications (ASA), and a host of other entities. Any participation by an external group would require additional funding, but, we believe, would ultimately add significant value to the overall LTM program.

3. Past performance of Axiom prior to its current contract with AOOS.

The herring portal final report has been submitted and the herring portal is now publicly available on the AOOS website. Axiom has successfully completed projects and currently supports data management systems for a variety of regional science programs including the Cook Inlet Regional Citizens Advisory Council, the Alaska Department of Fish and Game's PWS herring monitoring program, the US Fish and Wildlife Service seabird monitoring group, LGL Alaska, the Alaska Native Heritage Program, and the PWSSC/OSRI. We can provide letters of reference from these entities if requested. AOOS administrative staff has complete confidence in their data management team. If the Trustee Council does not wish the AOOS data team to be part of this proposal, we need to know this immediately. It is not a simple matter of AOOS or the team subcontracting the data management component to another data contractor. The result of removing the AOOS data management team would be complete removal of AOOS from the entire project, including McCammon as the project lead, with significant impacts on the Herring Research Program proposal. The remainder of the team would then have to decide separately on a new team lead and data management structure.

We would also like to respond to additional recommendations made to the Team:

1. *Routine inclusion of the NOAA small mesh trawl survey data done off of Kodiak into the LTM database so that the information can be used for possible future analyses that may be used to infer climate change impacts to the GOA ecosystem.*

Our response: We concur, and intend to collaborate with ongoing efforts by the NOAA National Marine Fisheries Service (NMFS) and the Alaska Department of Fish and Game (ADF&G) to integrate their multiple databases for time series of small-mesh trawl surveys in the Gulf of Alaska. We will include linkages to any integrated databases that are developed as a part of that effort in the LTM database and investigate whether a direct integration of database efforts would be cost-effective for all organizations.

2. *Use of an open source data system, which plans for inclusion of structurally diverse data and is compliant with currently acceptable metadata standards for biological data. Development of a plan for incorporating this data into NPRB's GOAIERP program at the end of the first five-year contract cycle.*

Our response: We concur. AOOS has in place an open source data system with capacity for including structurally diverse data and use of currently acceptable metadata standards for biological data. We envision NPRB GOAIERP incorporating their data into the AOOS system since that project will conclude before the EVOS project does. We intend to closely coordinate these two major initiatives.

3. *Incorporate current forage fish aerial surveys from NOAA, ADF&G and USFWS into the project design. The forage fish component is vague in terms of measurement.*

Our response: We concur. Information from previous EVOSTC-funded forage fish projects, such as the aerial survey work by Evelyn Brown, and vessel based surveys by Lew Haldorson, Ken Coyle, John Thedinga, Jeep Rice and others will be incorporated into the forage fish monitoring project design. We will also seek out and incorporate unpublished information for non-target species (e.g., eulachon, capelin) in bycatch data from NOAA RACE surveys, and work conducted at the Prince William Sound Science Center (e.g., Thorne *et al.*, Bishop *et al.*), University of Alaska (e.g. Iverson *et al.*, Brown *et al.* currently Flying Fish Ltd., Norcross *et al.*), and ADF&G (Moffitt *et al.*, Byerly *et al.*). Please see the Piatt and Arimitsu DPD for additional information on how this will be done, as well as for more detail on how the forage fish surveys will be conducted.

4. *Include a conceptual model that will be a critical part of the three-year science review.*

Our response: We concur. The conceptual ecological modeling component is a significant part of our LTM program and one goal of this effort is to support ongoing evaluation of the effectiveness of the monitoring program, including at the three-year science review. As described further in the modeling component DPD, we

anticipate that multiple conceptual models may be developed through coordination with the project PIs.

5. *Encourage Dan Esler to make sure Dan Rosenberg's ADF&G HADU survey data is incorporated into the LTM database and project design.*

Our response: Dr. Esler is aware of the ADF&G survey data and used that information to designate sampling sites for the original CYP1A monitoring work, which the proposed studies will replicate. Also, a proposal to formally and spatially integrate those datasets (along with estimates of residual oil) has been submitted as part of separate Lingering Oil proposals to the EVOSTC (led by Zach Nixon and Jacqui Michel).

6. *Incorporate acoustic tracking monitoring lines in real time, using boats already in the area to increase the frequency of data collection. Use Hinchinbrook entrance as a demonstration site for real time data recovery.*

Our response: We request additional clarification on this comment. If this references the humpback whale monitoring work proposed by Moran and Straley, they propose to identify prey using sonar, rather than track whales via use of acoustic tags. If this references the POST acoustic arrays planned for Hinchinbrook and Montague entrances, we plan to coordinate this project conducted by the PWSSC with the LTM project.

We hope this adequately answers the questions posted to the LTM team. We'd be happy to provide any additional information as requested.

Sincerely,

Molly McCammon, Executive Director
Alaska Ocean Observing System

Nancy Bird, President and C.E.O.
Prince William Sound Science Center

Kris Holderied, Science Lead, Long Term Monitoring Proposal
NOAA Kasitsna Bay Laboratory

Cc: Dr. Scott PegauScience Lead, PWS Herring Monitoring Proposal
Research Program Manager, Oil Spill Recovery Institute

Catherine Boerner, EVOS Trustee Council Science Coordinator

LTM budget = 39 pages

LTM Program Projects = 603

FY12 INVITATION
PROPOSAL SUMMARY PAGE

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

Project Period: October 1, 2011 – September 30, 2016

Primary Investigator(s): Mark Carls, principal investigator; Mandy Lindeberg and Jeep Rice, cooperating investigators

Study Location:

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.

Estimated Budget:
EVOSTC Funding Requested:
(breakdown by fiscal year and must include 9% GA)

Non-EVOSTC Funds to be used:
(breakdown by fiscal year)

Date: May 18, 2011

(NOT TO EXCEED ONE PAGE)

PROJECT PLAN

I. NEED FOR THE PROJECT

A. Statement of Problem

Identify the problem the project is designed to address. Describe the background and history of the problem. Include a scientific literature review that covers the most significant previous work history related to the project.

Justification

Intertidal areas in western Prince William Sound were extensively coated with Exxon Valdez oil; oil still remains in many beaches, presumably with declining impacts on intertidal invertebrates such as mussels, and also predators such as sea otters and harlequin ducks. This project would revisit approximately 12 of the worst case sites to continue the long term data set that tracks oil quantity and weathering composition in the contaminated sediments, and establish long term oil monitoring sites that would be re-sampled every 5 years over the next 20 years.

This project fills two needs: understanding the "dose" levels (past and present) for species such as mussels, intertidal invertebrates, sea otters, and harlequin ducks; and (2) understanding the natural degradation of quantity and composition of PAH over a long time course. Understanding exposure doses is important to injured species, and this would complement the biomarker analyses of lingering exposure on sea otters and harlequin ducks (Ballachey; Esler). Understanding oil loss over time is important for understanding full recovery of the habitat; in Alaska, this time course is apparently longer than in lower latitude environments. This study would complement and extend previous work, and would complement the remediation studies by Boufadel in 2011-12 as well as the Irvine study outside of PWS in 2011-12.

B. Relevance to 1994 Restoration Plan Goals and Scientific Priorities

Please see pages 2-4 of the integrated proposal titled "Long-Term Monitoring of Marine Conditions and Injured Resources and Services," and submited by McCammon et. al

II. PROJECT DESIGN

A. Objectives

List the objectives of the proposed research, the hypotheses being tested during the project, and briefly state why the intended research is important.

Project Concept

Continue monitoring a subset of beaches in Prince William Sound where sequestered oil is predicted to linger for long periods of time (decades). At least three predictive data sets will be considered in determining which beaches are monitored: (1) mussel bed time series started in the early 1990s[1], (2) beach surveys that were continued up to 2004[2], and spatial modeling analysis that was initiated in 2008[3]. Sampling techniques will allow extension of time series data (where they exist), detailed examination of hydrocarbons present (including PAHs, alkanes, and chemical 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). A limited number of passive samplers may be deployed in pits dug for sampling purposes to demonstrate the potential for biological exposure if (or when) sediment is disturbed.

Chemical analyses will be upgraded to include chemical biomarker data (terpanes, hopanes, and steranes); these compounds are the most recalcitrant compounds to biodegradation and weathering, and will yield a more complete picture of the biodegradation/weathering that has occurred over the last 25 plus years and the future 20 years. Biomarker data have not been collected in the past but are being incorporated in the remediation studies of 2011. We will analyze new samples, but also re-analyze samples collected in the past that are still stored and compliment the future sampling, plus Exxon Valdez source oil. In addition, biomarkers will be measured in a limited number of other known (stored) sources (Constantine Harbor, coal, and Monterey oil) for comparison and contrast with Exxon Valdez oil.

Lastly, to ensure integration between projects and with past monitoring, we will analyze a limited number of sediment samples collected from the intertidal monitoring project (e.g. from sea otter pits) and maintain the hydrocarbon database including new entries of all new sampling.

Future intentions: The periodic sampling (every 5 years) should be extended for three more cycles, ending on year 40 of the post spill era.

Objectives:

Objective 1. Determine quantity and weathering state at 12 beaches in PWS, in 2014, 25 years post spill.

a. Year 1 (2012). Retrospective analysis of biomarkers in Exxon Valdez oil, weathered Exxon Valdez oil, and other potential source oils in Prince William Sound (Constantine Harbor, coal, and Monterey oil). (year 2: Draft a biomarker report (and paper).

b. Year 2 (2013), determine specific subset of beaches to be sampled.

c. Year 3 (2014). Major field effort, 25 years after the spill.

i. Visit 10-12 beaches, collect sediment samples for PAH concentration and weathering profiles

ii. using random quadrats, measure the quantity of oil on specific beaches to estimate the quantity present.

iii. Collect mussels near oil patches to determine bioavailability in tissues.

iv. Place a limited number of passive samplers in disturbed areas to model oil bioavailability resultant from foraging activity. Pair these with samplers deployed without disturbance.

v. year 3,4. Begin and end the chemical analyses of samples collected in primary field effort, using state of the art GCMS, with chemical biomarkers included.

Objective 2- supplemental support analyses: Support on-going intertidal projects with chemical analyses, such as determine PAH levels in sea otter pits or prey items. This will integrate with the sea otter and harlequin duck biomarker measurements in those studies. 10-20 samples per year

Objective 3- Database: Maintain and add new data to the hydrocarbon database.

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 package (100% of the chemical analyses have been FOIAed in the past, and these data will likely also be FOIAed.

Objective 4- Products: prepare annual and final reports as needed; supply collaborators with appropriate data (e.g. sea otter pit data to sea otter PI. Prepare synthesis manuscript summarizing environmental progress after 25 years.

B. Procedural and Scientific Methods

For each objective listed in A. above, identify the specific methods that will be used to meet the objective. In describing the methodologies for collection and analysis, identify measurements to be made and the anticipated precision and accuracy of each measurement and describe the sampling equipment in a manner that permits an assessment of the anticipated raw-data quality.

If applicable, discuss alternative methodologies considered, and explain why the proposed methods were chosen. In addition, projects that will involve the lethal collection of birds or mammals must comply with the Trustee Council's policy on collections, available at www.evostc.state.ak.us/Proposals/policies.htm.

Methods

1. Chemical analyses: Standard operating procedures developed at the Auke Bay Laboratories for hydrocarbon analysis will be used for all sample analyses. These have resulted in numerous peer-reviewed publications.
2. Beaches will be randomly drawn from the identified group of oiled beaches (n = 12).
3. Beach segments will be up to 100 m long. Sampling by quadrat will be random across beaches, divided by upper, middle, and lower tide intervals; all based on past studies.

4. Beaches will be accessed by charter boat during spring or summer months during one cruise. Passive samplers will be deployed at the front end of the cruise and picked up at the back end.

Project integration

1. This project continues hydrocarbon analyses started prior to 1989 in Prince William Sound and recorded in a hydrocarbon database that encompasses multiple agencies, collection sites, and matrices. This database has been maintained by Auke Bay Laboratory (ABL) personnel since the time of the Exxon Valdez oil spill.
2. The major field sampling of 2014 will use methods developed in earlier studies and will conform to those methods for intercomparison over time.
3. This project will complement "effects" studies by including some sampling/analyses specifically targeted to those projects, and will complement the remediation studies of Boufadel (same analyses with chemical biomarkers included), and will complement the tracking study by Irvine outside of PWS.

Project Logistics:

Major field effort in PWS in 2014 will be on a local charter, consisting of a field crew of up to 6 people. Federal personnel will lead the cruise effort, although some contract labor will likely be used for the labor intensive beach surveys. Laboratory logistics (chem labs, GCMS) will be at the Auke Bay Laboratories in Juneau Alaska. Senior staff will conduct the instrumental analyses, but processing effort will be by contractors.

C. Data Analysis and Statistical Methods

Describe the process for analyzing data. Discuss the means by which the measurements to be taken could be compared with historical observations or with regions that are thought to have similar ecosystems. Describe the statistical power of the proposed sampling program for detecting a significant change in numbers. To the extent that the variation to be expected in the response variable(s) is known or can be approximated, proposals should demonstrate that the sample sizes and sampling times (for dynamic processes) are of sufficient power or robustness to adequately test the hypotheses. For environmental measurements, what is the measurement error associated with the devices and approaches to be used?

D. Description of Study Area

Where will the project be undertaken? Describe the study area, including if applicable decimally-coded latitude and longitude readings of sampling locations or the bounding coordinates of the sampling region (e.g., 60.8233, -147.1029, 60.4739, -147.7309 for the north, east, south and west bounding coordinates). The formula for converting from degree minute seconds to decimal degrees is: degrees + (minutes/60) + (seconds/3600) so 121°8'6" = 121. + (8/60) + (6/3600) = 121.135

E. Coordination and Collaboration with Other Efforts

Indicate how your proposed project relates to, complements or includes collaborative efforts with other proposed or existing projects funded by the Trustee Council. Describe any coordination that has taken or will take place (with other Council funded projects, ongoing agency operations, activities funded by other marine research entities, etc.) and what form the coordination will take (shared field sites, research platforms, sample collection, data management, equipment purchases, etc.). 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. SCHEDULE

A. Project Milestones

For each project objective listed above (II.A.), specify when critical project tasks will be completed. Project reviewers will use this information in conjunction with annual project reports to assess whether projects are meeting their objectives and are suitable for continued funding. Please format your information like the following example.

Objective 1. Develop sediment-core chronologies in lake-productivity indicators.
To be met by September 2011

Objective 2. Compare sediment data corresponding to the past few decades to salmon population statistics.
To be met by December 2011

Objective 3. Reconstruct time-series of lake productivity, input of marine-derived nutrients, and salmon escapement.
To be met by April 2012

B. Measurable Project Tasks

Specify, by each quarter of each fiscal year, when critical project tasks (for example, sample collection, data analysis, manuscript submittal, etc.) will be completed. This information will be the basis for the quarterly project progress reports that are submitted to the Trustee Council Office. Please format your schedule like the following example.

FFY 11, 2nd quarter (January 1, 2011-March 31, 2011)

February:	*Project funding approved by Trustee Council*

FFY 11, 3rd quarter (April 1, 2011-June 30, 2011)

April 30:	*Core Upper Russian Lake*
May 30:	*Core Delight Lake*

FFY 11, 4th quarter (July 1, 2011-September 30, 2011)

September 1:	*Core Hidden Lake*

FFY 12, 1st quarter (October 1, 2011-December 31, 2011)
December 15: *Begin analysis and report writing*

FFY 12, 2nd quarter (January 1, 2012-March 31, 2012)
January 18: *Annual Marine Science Symposium*

FFY 12, 3rd quarter (April 1, 2012-June 30, 2012)
April 15 *Submit final report. This will consist of a draft manuscript for publication to the Trustee Council Office.*

Budget: total $ 199.2 K from 2012-2016

Note: No federal salaries are included; soft funded labor is, 9% agency overhead is not included. Federal contribution in FTP salaries will exceed 300K.

2012	2013	2014	2015	2016
$18K	12K	$155.2K	$8K	$6K

2012. Main activity is retrospective sample analysis
25 EVO (previously analyzed) samples including source oil & sediment for weathering series for chemical biomarkers. $200/sample = $5K
15 Constantine, coal, and Monterey samples * $200/sample = 3K
Supplies, contract labor, 1 Anc trip. 10K
0-20 samples from other projects: no charge. $500 per sample above 20.

2013. Main activity is completion of sample design and draft biomarker report
Supplies, contract labor, 1 Anc trip 12K
0-20 samples from other projects: no charge.

2014. Main activity is field sampling, hydrocarbon measurement
Charter cost $3000 per day * 14 d = $42K
Supplies, shipping, FTP trav for field trip 8K
0-20 samples from other projects: no charge
Contract labor (5 diggers for field effort, 30K includes travel to CDV)
Chemical analyses : (assumes 12 beaches) total of 74K
9 sediment samples per beach (3 from each zone) = 108 samples * 500 $/sample = $54K
3 mussel samples per beach = 30 samples * 500 $/sample = $15K
4 PEMDs per beach at 3 beaches = 12 samples * 400 $/sample = $5K
Travel: 1 Anc trip 1.2K;

2015. Main activity: continue hydrocarbon measurement
Supplies, contract labor, 1 Anc trip $8K
0-20 samples from other projects: no charge

2016. Main activity: complete data analysis, FOIA package, and draft report
Supplies, contract labor, 1 Anc trip: 8K
0-20 samples from other projects: no charge

1. Carls, M.G., Harris, P.M. *Monitoring of oiled mussel beds in Prince William Sound and the Gulf of Alaska*; NOAA / NMFS, Auke Bay Laboratory: Juneau, AK, 2005.
2. Short, J.W., Irvine, G.V., Mann, D.H., Maselko, J.M., Pella, J.J., Payne, J.R., Driskell, W.B., Rice, S.D., Slightly weathered *Exxon Valdez* oil persists in Gulf of Alaska beach sediments after 16 years. *Environmental Science & Technology* 2007, 41, 1245-1250.
3. Michel, J. *Report on recent lingering oil studies*; EVOSTC project 070801?: date unknown, 2010?

EXXON VALDEZ OIL SPILL TRUSTEE COUNCIL
DETAILED BUDGET FORM FY 12-FY16

Budget Category:	Proposed FY 12	Proposed FY 13	Proposed FY 14	Proposed FY 15	Proposed FY 16	TOTAL PROPOSED
Personnel	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Travel	$1.5	$1.5	$4.2	$1.5	$1.5	$10.2
Contractual	$14.0	$9.0	$130.0	$5.5	$4.0	$162.5
Commodities	$2.5	$1.5	$21.0	$1.0	$0.5	$26.5
Equipment	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
SUBTOTAL	$18.0	$12.0	$155.2	$8.0	$6.0	$199.2
General Administration (9% of subtotal)	$1.6	$1.1	$14.0	$0.7	$0.5	$17.9
PROJECT TOTAL	$19.6	$13.1	$169.2	$8.7	$6.5	$217.1
Other Resources (Cost Share Funds)	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0

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: Lingering Oil Monitoring
Team Leader: Mark Carls
Agency: NOAA / NMFS / Auke Bay Laboratories

FORM 4A
TRUSTEE AGENCY
SUMMARY

EXXON VALDEZ OIL SPILL TRUSTEE COUNCIL
DETAILED BUDGET FORM FY 12-FY16

Personnel Costs: Name	Project Title	Months Budgeted	Monthly Costs	Overtime	Personnel 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: Description	Ticket Price	Round Trips	Total Days	Daily Per Diem	Travel 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
					0.0
				Travel Total	$1.5

FY12

Program Title: Lingering Oil Monitoring
Team Leader: Mark Carls
Agency: NOAA / NMFS / Auke Bay Laboratories

FORM 4B
PERSONNEL & TRAVEL DETAIL

EXXON VALDEZ OIL SPILL TRUSTEE COUNCIL
DETAILED BUDGET FORM FY 12-FY16

Contractual Costs: Description		Contract Sum
technician, hydrocarbon processing		14.0
If a component of the project will be performed under contract, the 4A and 4B forms are required.	**Contractual Total**	$14.0

Commodities Costs: Description		Commodities Sum
solvents and supplies for hydrocarbon processing		2.5
	Commodities Total	$2.5

FY12

Program Title: Lingering Oil Monitoring
Team Leader: Mark Carls
Agency: NOAA / NMFS / Auke Bay Laboratories

FORM 4B
CONTRACTUAL & COMMODITIES DETAIL

EXXON VALDEZ OIL SPILL TRUSTEE COUNCIL
DETAILED BUDGET FORM FY 12-FY16

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
muffle furnace		
HPLC		
GC/FID		
GC/MS		
ACE - accelerated solvent extractor		
steam tables		
glassware		
freezers		
balances		
computers		

FY12

Program Title: Lingering Oil Monitoring
Team Leader: Mark Carls
Agency: NOAA / NMFS / Auke Bay Laboratories

FORM 4B
EQUIPMENT DETAIL

EXXON VALDEZ OIL SPILL TRUSTEE COUNCIL
DETAILED BUDGET FORM FY 12-FY16

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: Description	Ticket Price	Round Trips	Total Days	Daily Per Diem	Travel 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

FY13

Program Title: Lingering Oil Monitoring
Team Leader: Mark Carls
Agency: NOAA / NMFS / Auke Bay Laboratories

FORM 4B
PERSONNEL & TRAVEL
DETAIL

EXXON VALDEZ OIL SPILL TRUSTEE COUNCIL
DETAILED BUDGET FORM FY 12-FY16

Contractual Costs: Description		Contract Sum
technician, hydrocarbon processing		9.0
If a component of the project will be performed under contract, the 4A and 4B forms are required.	**Contractual Total**	$9.0

Commodities Costs: Description		Commodities Sum
solvents and supplies for hydrocarbon processing		1.5
	Commodities Total	$1.5

FY13

Program Title: Lingering Oil Monitoring
Team Leader: Mark Carls
Agency: NOAA / NMFS / Auke Bay Laboratories

FORM 4B
CONTRACTUAL & COMMODITIES DETAIL

EXXON VALDEZ OIL SPILL TRUSTEE COUNCIL
DETAILED BUDGET FORM FY 12-FY16

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
muffle furnace		
HPLC		
GC/FID		
GC/MS		
ACE - accelerated solvent extractor		
steam tables		
glassware		
freezers		
balances		
computers		

FY13

Program Title: Lingering Oil Monitoring
Team Leader: Mark Carls
Agency: NOAA / NMFS / Auke Bay Laboratories

FORM 4B
EQUIPMENT DETAIL

EXXON VALDEZ OIL SPILL TRUSTEE COUNCIL
DETAILED BUDGET FORM FY 12-FY16

Personnel Costs: Name	Project Title	Months Budgeted	Monthly Costs	Overtime	Personnel 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: Description	Ticket Price	Round Trips	Total Days	Daily Per Diem	Travel Sum
					0.0
Alaska Marine Science Symposium	0.5	1	5	0.2	1.5
Cordova	0.4	2	30	0.01	1.1
field workers air travel to Cordova	0.4	4	0	0.0	1.6
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
				Travel Total	$4.2

FY14

Program Title: Lingering Oil Monitoring
Team Leader: Mark Carls
Agency: NOAA / NMFS / Auke Bay Laboratories

FORM 4B
PERSONNEL & TRAVEL DETAIL

EXXON VALDEZ OIL SPILL TRUSTEE COUNCIL
DETAILED BUDGET FORM FY 12-FY16

Contractual Costs: Description		Contract Sum
boat charter, $3000 per day * 14 days		42.0
technicians, hydrocarbon processing		68.0
field worker contracts (4)		20.0
If a component of the project will be performed under contract, the 4A and 4B forms are required.	**Contractual Total**	$130.0

Commodities Costs: Description		Commodities Sum
field supplies		9.0
solvents and supplies for hydrocarbon processing		12.0
	Commodities Total	$21.0

FY14

Program Title: Lingering Oil Monitoring
Team Leader: Mark Carls
Agency: NOAA / NMFS / Auke Bay Laboratories

FORM 4B
CONTRACTUAL & COMMODITIES DETAIL

EXXON VALDEZ OIL SPILL TRUSTEE COUNCIL
DETAILED BUDGET FORM FY 12-FY16

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
muffle furnace		
HPLC		
GC/FID		
GC/MS		
ACE - accelerated solvent extractor		
steam tables		
glassware		
freezers		
balances		
computers		

FY14

Program Title: Lingering Oil Monitoring
Team Leader: Mark Carls
Agency: NOAA / NMFS / Auke Bay Laboratories

FORM 4B
EQUIPMENT DETAIL

EXXON VALDEZ OIL SPILL TRUSTEE COUNCIL
DETAILED BUDGET FORM FY 12-FY16

Personnel Costs: Name	Project Title	Months Budgeted	Monthly Costs	Overtime	Personnel 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: Description	Ticket Price	Round Trips	Total Days	Daily Per Diem	Travel 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
					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

EXXON VALDEZ OIL SPILL TRUSTEE COUNCIL
DETAILED BUDGET FORM FY 12-FY16

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

EXXON VALDEZ OIL SPILL TRUSTEE COUNCIL
DETAILED BUDGET FORM FY 12-FY16

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

EXXON VALDEZ OIL SPILL TRUSTEE COUNCIL
DETAILED BUDGET FORM FY 12-FY16

Personnel Costs: Name	Project Title	Months Budgeted	Monthly Costs	Overtime	Personnel Sum
					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: Description	Ticket Price	Round Trips	Total Days	Daily Per Diem	Travel 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
					0.0
				Travel Total	$1.5

FY16

Program Title: Lingering Oil Monitoring
Team Leader: Mark Carls
Agency: NOAA / NMFS / Auke Bay Laboratories

FORM 4B
PERSONNEL & TRAVEL
DETAIL

EXXON VALDEZ OIL SPILL TRUSTEE COUNCIL
DETAILED BUDGET FORM FY 12-FY16

Contractual Costs: Description		Contract Sum
technician, hydrocarbon processing		4.0
If a component of the project will be performed under contract, the 4A and 4B forms are required.	**Contractual Total**	$4.0

Commodities Costs: Description	Commodities Sum
solvents and supplies for hydrocarbon processing	0.5
Commodities Total	$0.5

FY16

Program Title: Lingering Oil Monitoring
Team Leader: Mark Carls
Agency: NOAA / NMFS / Auke Bay Laboratories

FORM 4B
CONTRACTUAL & COMMODITIES DETAIL

EXXON VALDEZ OIL SPILL TRUSTEE COUNCIL
DETAILED BUDGET FORM FY 12-FY16

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		

FY16

Program Title: Lingering Oil Monitoring
Team Leader: Mark Carls
Agency: NOAA / NMFS / Auke Bay Laboratories

FORM 4B
EQUIPMENT DETAIL