FY12 INVITATION
PROPOSAL SUMMARY PAGE

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

Project Period: FY12-FY16

Primary Investigator(s): Rob Bochenek, Alaska Ocean Observing System

Study Location: General Spill Affected Area

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.

Estimated Budget: $750K total over 5 years without 9%GA - $817.4K with the 9%GA
EVOSTC Funding Requested:
FY12-150K, FY13-149.9K, FY14-150.4K, FY15-150.4K, FY16-149.2K without the 9% GA
FY12-163.5K, FY13-163.4K, FY14-$164K, FY15-164K, FY16-162.6K with the 9% GA
Non-EVOSTC Funds to be used:
FY12-683K, FY13-640K, FY14-620K, FY15-500K, FY16-500K

Date: 5-25-2011

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 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.

Managing oceanographic data is particularly challenging due to the variety of data collection protocols and the vast range of oceanographic variables studied. Data may derive from automated real-time sensors, remote sensing satellite/observational platforms, field/cruise observations, model outputs, and various other sources. Variables can range from mesoscale ocean dynamics to microscale zooplankton counts. The resulting datasets are packaged and stored in advanced formats, and describe a wide spectrum of scientific observations and metrics. Due to the complexity of the data, developing data management strategies to securely organize and disseminate information is also technically challenging. Distilling the underlying information into usable products for various user groups requires a cohesive, end-to-end approach in addition to a fundamental understanding of the needs and requirements of the user groups and stakeholders.

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.

B. Relevance to 1994 Restoration Plan Goals and Scientific Priorities

Our proposed long-term monitoring program is: 1) directly relevant to the goals and priorities for "Monitoring and Research" outlined by the EVOS Trustee Council in the 1994 EVOS Restoration Plan; 2) responds to priorities in the FY 2012 Invitation for Proposals; and 3) follows additional Council guidance including the 2010 Injured Resources and Services Update. The 1994 Restoration Plan identifies the continuing need for a sustained and interdisciplinary monitoring system to inform restoration needs and activities for injured resources and services. Specific language in the 1994 Restoration Plan cites the need for monitoring to "understand the physical and biological interactions that affect an injured resource or service, and may be constraining its recovery" (p. 25), recommends an "ecosystem approach" (p. 12), and recognizes that "an ecosystem approach to restoring injured resources and services may require restoration activities that address a resource's prey or predators, or the other biota and physical surroundings on which it depends..."(p. 13). The scientific monitoring program described below is explicitly designed to meet these priorities.

The management strategy we propose to implement for the overall long-term monitoring program is also based on priorities in the 1994 Restoration Plan. First, in that document and in ongoing guidance, the Trustee Council recognizes that there are not sufficient funds to accomplish all necessary restoration and monitoring activities and that partnerships are necessary to meet Council goals. Specifically, the plan states that "Restoration will take advantage of cost-sharing opportunities where effective" (p. 15) and "Priority shall be given to strategies that involve multi-disciplinary, interagency, or collaborative partnerships" (p. 16). Our proposed monitoring program will expand the efforts previously funded by the Trustee Council through leveraging collaborations with multiple agency monitoring programs and other research programs (such as those of the North Pacific Research Board and the Alaska Ocean Observing System), and with the Herring Program under this funding opportunity.

The 1994 Restoration Plan also included a policy that "Restoration will include a synthesis of findings and results, and will also provide an indication of important remaining issues or gaps in knowledge" (p. 16). We address this priority in our proposed science synthesis component, which includes conceptual ecological modeling, described in Section C. Effective synthesis of science data requires coordinated data management from the beginning of the monitoring program. Data management activities for ecological and physical information have been scattered among different agencies and research groups, reducing the utilization of information for integrated understanding of the ecosystem.

We are also committed to the 1994 Restoration Plan policy that "Restoration must reflect public ownership of the process by timely release and reasonable access to information and data" (p. 17). We propose to adopt a data management policy for this project that responds to this policy in a transparent and timely fashion.

Community involvement in and public outreach of monitoring results is called for under the 1994 Restoration Plan policy that "Restoration must include meaningful public participation at all levels - planning, project design, implementation and review" (p. 17). We are committed to

involving local and native communities and to providing a diverse set of public outreach information and events, as outlined in Section G.

In summary, we propose a long-term monitoring program that will build on past monitoring and research efforts, leverage other initiatives and help ensure that the Trustee Council, agencies and spill-affected communities have the scientifically-based information they need to support the comprehensive, interdisciplinary recovery and rehabilitation program outlined in the 1994 EVOS Restoration Plan and subsequent EVOS Trustee Council guidance documents.

II. PROJECT DESIGN

A. Objectives

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

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

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

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

B. Procedural and Scientific Methods

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

AOOS data management staff will work with EVOS LTM investigators to assess the types of data which will be collected during sampling efforts, assess Standard Operating Procedures (SOPs) for data collection to create metadata templates in addition to gauging general data management needs of PIs. This assessment is critical to identify the data management needs and the types of tools needed by researchers to increase their abilities to manage their data in an automated, standard fashion. Table 1 (included at the end of this proposal) details an initial effort by the AOOS data management team to assess the characteristics of each individual LTM project's data collection activities. This initial assessment has provided key details which will assist and guide investigators in developing data management plans and strategizing for the overall data management approach to the program. This exercise further validates the fact that project level data is heterogeneous in nature and is composed of a wide array of observational types requiring novel data management approaches to facilitate integration. It is clear that PIs need both flexible and powerful tools to assist them in sharing, archiving and documenting their research products.

The AOOS data management group is currently developing a web base platform for PIs to manage project level data sets and author metadata. System development is currently funded through internal AOOS funds in additional to dedicated funding from the Prince William Sound Science Center. The AOOS Ocean Workspace will provide 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 limit access to LTM investigators, project managers and administrators. The system will also provide PIs with tools to generate metadata profiles which 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. The software development phase of this application was initiated in March 2011. An initial beta release/testing of this system will commence in August 2011 with a planned release date of October 1st, 2011. This platform will provide LTM investigators and project managers with a transparent view of data collection and metadata authoring progress in addition to providing a framework for data integration. It is envisioned that this platform will function as the primary vehicle to facilitate data transfer, metadata generation and archiving for the entire LTM project data management lifecycle. This proposed effort will provide a user base and focused environment for the expansion and refinement of this project level data management system.

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

This task will involve isolating and standardizing historic data sets deemed necessary for retrospective analysis by EVOS LTM synthesis efforts. Early in the effort the EVOS LTM researcher team 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 length of time series, scientific importance, and quality and precision of the data storage format. All data acquired through efforts of this project will be merged into the AOOS data system for long term archival and access.

Members of the LTM integrated team were surveyed to document historical data sources under their stewardship which could be of potential value to the LTM program and synthesis effort. These data resources are listed in Table 2 (included at the end of this proposal). This list will provide a starting point for consolidation/prioritization of data in preparation for synthesis efforts. Table 3 (included at the end of this proposal) provides a list which delineates the data sets researchers would be interested in getting access to but are currently unaware of any sources of data.

Many herring and PWS ecosystem data sets not easily accessible to restoration researchers and managers have been standardized and made available through the actions of the PWS Herring Portal (EVOS Project 070822, 080822 and 090822). Building upon results of the PWS Herring Portal Project, investigators will expand their efforts to additional project level data sets, long term time series produced from sensor platforms, remote sensing/satellite imagery data products, oceanographic/atmospheric/ecological model outputs and relevant GIS data layers. The AOOS data system currently has the capacity to manage all of these data types except for project level data. AOOS will be deploying a project level data management system in the fall of 2011 to address this need. This is the same system referenced in methods of objective 1. Data analysts

preparing and salvaging historic project level datasets will leverage this system to consolidate, centralize and document data resources so that LTM investigators can access these data as they are discovered, processed and made available for use.

Additionally, data management staff will leverage existing data management efforts and data sets currently under the stewardship of AOOS in this activity. These resources and efforts are detailed more fully in the "Coordination and Collaboration with Other Efforts" section of this proposal. These existing data resources include a wide array of physical and biological data sets in the general spill affected areas. These resources can be accessed at http://data.aoos.org.

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

Working with regional agency and outreach staff develop products and management tools that are based upon data produced or acquired from EVOS LTM project activities. Effective data 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. Providing these types of high level data products allows members of all user groups to rapidly discover assess and comprehend complex data sets. These tools could include emergency response and management applications that provide users with rapid detailed access to threatened habitat, species distribution and real time ocean conditions or outreach and education products that provide users visualizations of relevant data at informational kiosks.

Investigators propose to develop web based data driven tools based upon prioritization and direction from user groups. The process will initiate in year two with the development of a user access tool work plan which will be distributed for review and feedback in May of 2013. The work plan will be finalized in October of 2013 at which time platform development will commence with a target release date of June 2014 for the first version of user data access tools. Addition release versions are planned annually in June alongside annual access tool work plan publishing for review at the Alaska Marine Science Symposium in January.

Figure 1 below provides screen captures of existing AOOS data portals which provide access to data systems that manage sensors, models/remote sensing and GIS data sets. These portals can be accessed off the AOOS website at http://data.aoos.org/.

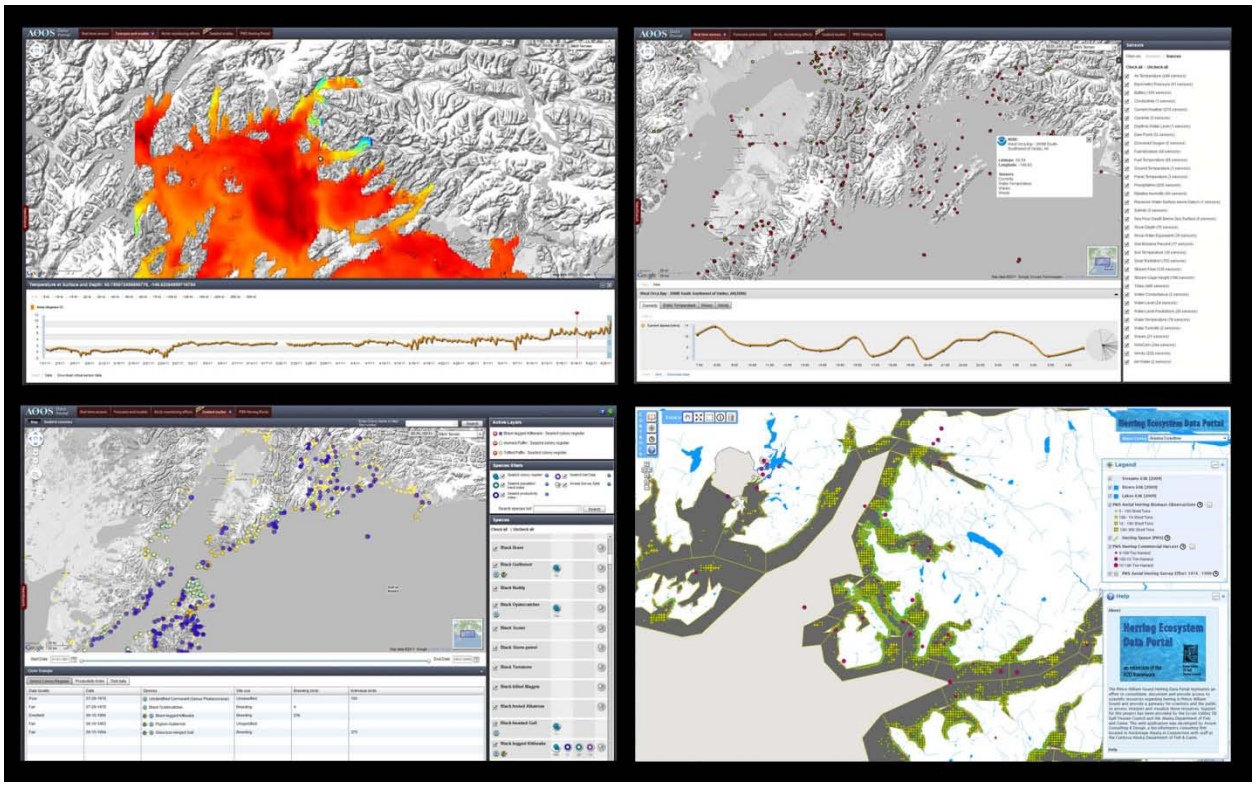

Figure 1. Screenshots of existing AOOS data management and visualization systems which are available at http://data.aoos.org. At the top left is a screenshot of the AOOS model explorer displaying a ROMS circulation model of Prince William Sound and an ocean temperature point source time series extraction near Port Fidalgo. On the top right of the figure is a screen capture of the AOOS real time sensor portal. On the bottom of the figure from the left to right are screenshots of the North Pacific Seabird Portal and the PWS Herring Portal.

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.

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 IHRP 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 cyber infrastructure, 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.

C. Data Analysis and Statistical Methods

The overarching strategic plan for the AOOS data system 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. The following diagram (Figure 2) details the

four logical technical tiers of the approach. At the base (Tier 1) of the pyramid lie the source data produced by researchers, instruments, models, and remote sensing platforms which are stored as files or loaded within geospatial databases. Interoperability systems (Tier 2), such as Web Map Services (WMS) and Web Coverage Services (WCS), are then implemented and connected to these underlying data sources. The asset catalogue (Tier 3) connects to internal interoperability systems in addition to known external sources of interoperable data and populates a database describing the dimensional characteristics (space, time, measured parameter, and taxonomy) of each data resource. Also in this third tier are web services which provide access to the descriptive information contained in the asset catalogue database so that applications can more easily utilize data from multiple sources, formats, and types. The final technical level (Tier 4) is composed of the web based applications and tools which provide users access to data and products. Users sit at the top of the pyramid with all underlying systems working together to create a powerful and intuitive user experience. 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.

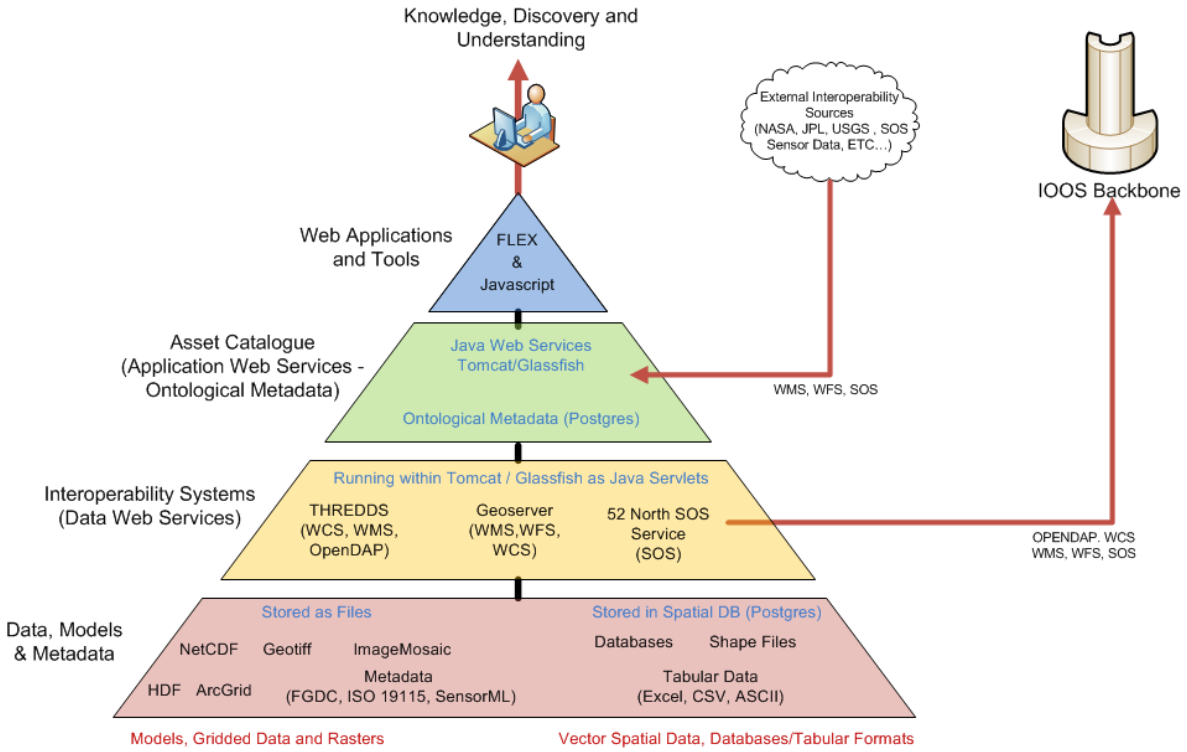

Figure 2. Data knowledge pyramid detailing the flow of data through logical technology tiers so that it can be consumed by users to enable discovery and understanding about the ocean environment.

Tiers are discussed in technical detail below.

- **Tier 1 (Data, Models and Metadata)** – At the base of the proposed data management framework are the datasets, metadata, and model outputs that provide the foundation for applications and user tools. These resources can be stored either in native formats or spatially enabled databases. The decision to choose one method over the other is dictated

by the requirements of the interoperability system which will be serving the data. Data which has a tabular or vector form (Shapefiles, databases, Excel spreadsheets, comma separated values (CSV) text files, etc.) will be loaded into a PostgreSQL database and spatially indexed. GeoServer, an open source geospatial data server, will then connect to the PostgreSQL database and serve the data via WFS and WMS protocols. Imagery, raster, and model data will be stored in a file server in their native file formats. THREDDS and/or ncWMS will be used to serve NetCDF and HDF files which may contain two, three, four or higher dimensional gridded datasets. GeoServer or other OGC compliant mapping servers will be utilized to serve GeoTIFF, ArcGrid, ImageMosaic and other two dimensional imagery/raster data.

- **Tier 2 (Interoperability Systems)** – Various interoperability servers (GeoServer, THREDDS, ncWMS, 52 North SOS, etc.) will be implemented on top of source data. By design, these servers will expose a powerful set of interfaces for other computing systems and humans to extract, query, and visualize the underlying source data. These systems will facilitate all aspects of data delivery to users in addition to providing the muscle for the machine-to-machine data transfer to national data assembly systems as required. Because these systems have been developed using the Java programming language, they will run within a servlet container such as Tomcat or Glassfish.

- **Tier 3 (Asset Catalogue, Ontological Metadata and Services)** – The asset catalogue provides a description of known internal and external available data resources, access protocols for these resources (interoperability services, raw file download, etc.), and directives on how to ultimately utilize these data resources in applications. Because documentation and access methods vary widely between data sources, a system which catalogs data sources and reconciles these inconsistencies must be implemented if the data are to be used in an efficient manner.

  In addition to managing information about data availability and access methods, the asset catalogue will also contain an ontology that maps 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. The following dimensions are to be stored in the database for mapping the heterogeneous characteristics of source data to common metrics:

  - **Source** – Service URLs and methods of interaction for these services.
  - **Data formats and return types** – Data format returned by the service and how data can be equated between various formats.
  - **Space (x, y, z)** – Spatial dimensions of dataset (1D, 2D, 3D). Upper and lower spatial bounds (bounding box or cube) stored in common projection (EPSG 4326).

- **Time (t)** – For data resources with a time component: document time span, whether time corresponds to a single moment or if it is representative of a time period. If data is in discrete periods, document individual available periods.
- **Taxonomy** – Taxonomic data mapped to International Taxonomic Information System (ITIS) codes.
- **Parameter** – Parameter(s) and units in the data resource and how they map to internally defined universal terms. For example: Datasets SST, AVHRR, and Sea_Surface all contain parameters that map to internal universal term Sea Surface Temperature.

Web services written in the Java programming language will be developed to connect to the asset catalogue and provide applications with access to the underlying descriptions of all known data sources. Because the asset catalogue contains a structured ontological 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. The following is a list of example functionality that is possible utilizing this methodology:

- Users can load multiple data layers (potentially existing in different physical locations and being served by different systems) onto a single web based map. Users can also filter all layers simultaneously by time or request spatial and temporal subsamples of data that can be pulled from multiple sources and automatically packaged into a single download.
- All real time sensor feeds can be accessed and visualized on a single uniform user interface by parameter even though the sources of the sensor feeds may exist in a wide array of formats and service protocols.
- Users can query the asset catalogue to discover which data is available for an area, time period, parameter, and species.

- **Tier 4 (User Applications)** – Users interface with web based applications that bring together combinations of underlying data and allow users to make discoveries, improve understanding, and develop knowledge through visualization and data access. These types of applications would most likely be interactive map based data portals. Applications will also be developed which provide specific targeted functionality. These focused applications could include marine spatial planning tools, emergency response applications, and educational/outreach portals. Developed tools are designed to meet user needs and thus require user input into their initial design and periodic feedback to direct functional improvements for future design iterations.

D. Description of Study Area

The majority of this project will involve consolidating existing data, metadata, and other electronic resources related to herring in Spill Affected Area. Specific areas of focus include those areas in PWS, Lower Cook Inlet, and Kodiak where herring fisheries currently do, or

historically did occur. The north, east, south, and west bounding coordinates of this area are 59.767, -145.837, 61.834, and -154.334

E. Coordination and Collaboration with Other Efforts

This proposal is part of the integrated "Long-Term Monitoring of Marine Conditions and Injured Resources and Services" proposal submitted by the Prince William Sound Science Center to the Exxon Valdez Oil Spill Trustee Council. It includes the collaboration and coordination described there for work within the herring research group and with the Long-Term Monitoring PWS Herring Research and Monitoring proposal submitted by the Alaska Ocean Observing System. This project is also highly coupled with the proposed data management component of the EVOS Herring Research and Monitoring program.

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

1. AOOS – (500k to AOOS DM) Alaska oceanographic data management effort. Supports open source, standards based data system that serves up and archives real-time sensor feeds, models & remote sensing data, GIS data layers, and historical datasets. Data system developed on interoperability concepts and meets NOAA Integrated Ocean Observing System standards and protocols for streaming data feeds to national data assimilation centers. Data Management Committee chaired by Dr. Phil Mundy provides ongoing advice, prioritization and direction to the team at Axiom Consulting & Design. AOOS board is made up of federal and state agencies, and major marine research institutions in the state that have committed to data sharing. The AOOS board has committed to supporting a statewide data system for as long as AOOS exists. Federal funding is stable, although we would like to see it increase. In the event AOOS was to end, all data and data products would be transferred to the University of Alaska.
2. PWSSC – PWSSC Data Management Project ($50K to AOOS DM).– Project involves the creation of a prototype data management system for use by PWSSC staff to manage, track, document via metadata and visualize oceanographic and biological data being collected at the center. Project will utilize a stack of open source technologies and protocols with the overall goal of creating a packaged solution for research organizations to better manage and document their data resources. This project is to function as the pilot application for the AOOS project level data management system (Ocean Workbench).
3. Northern Forum/USFWS Seabird Data System – ($50K)Project involves the creation and population of a series of new seabird metric databases (diet and productivity) and integrating these new databases with legacy seabird databases (species distribution and abundance at seabird colonies, pelagic species distribution and abundance, USGS seabird monitoring databases and NPRB's North Pacific Seabird Diet Database). Modern spatially explicit, web based data entry interfaces have and continue to be developed to assist researchers existing in distributed agencies to contribute their historic and current seabird metric data into standard data structures. Project will result in vastly increasing

the amount and quality of seabird species distribution, diet and other seabird data available for use in retrospective analysis and management. Though data includes areas around all of Alaska, most available data is located in GOA and PWS.

4. AOOS – 3-year funded partnership (~$200K to ADF&G) with ADF&G Division of Commercial Fisheries to develop data sharing and transfer to make commercial fisheries data more accessible, and to allow ADF&G researchers greater access to oceanographic data. Project builds upon an effort funded by the Moore foundation to develop improved data management capacity and salmon fishery management tools for the PWS fisheries.
5. AOOS – collaborator with Alaska Data Integration Working Group – an initiative with the Alaska Climate Change Executive Roundtable – to develop protocols for serving up project data to increase data sharing among federal and state agencies.
6. AOOS and NOAA – initiatives to develop data sharing agreements with private sector, including oil & gas companies.
7. Cook Inlet Regional Citizens Advisory Council (27K) – contract with Axiom to develop a data management system for their oceanographic and contaminants data in Cook Inlet.

III. SCHEDULE

A. Project Milestones

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

This objective will be addressed throughout the entire span of the project and will follow the annual cycle of field data collection and analysis by principal investigators. Investigators will be engaged before each field season to ensure that preparations have been made to stage data collected by the project so that other members of the LTM project can access the data produced by project participants.

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 met by the fourth quarter of year two of the effort (September 2013).

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

Initial release of version 1 of the user access tool platform will take place in Quarter three of year three (June 2014). Version 2 and 3 of the user tool platform will be released June 2015 and June 2016 respectively.

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.

B. Measurable Project Tasks

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

October	Project authorized by trustee council
October	Release AOOS Ocean Workbench (Project DM System)
November	Set up user profiles for PIs in Ocean Workbench
November	Initialize historic data aggregation effort
December	Draft historic data set manifest

FY12 2nd Quarter

January	Annual Marine Science Symposium
January	Prioritize historic datasets for inclusion into synthesis effort
February	Adjust historic data aggregation effort and AOOS integration

FY12 3rd Quarter

April	Prepare for FY12 field season
May	Participate in annual PI meeting
June	Submit FY13 work plan for review

FY12 4th Quarter

August	Submit annual report

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

October	Assess/Validate year 1 datasets and metadata submitted through Ocean Workbench

FY13 2nd Quarter

January	Annual Marine Science Symposium
January	Release updated Ocean Workbench tool

FY13 3rd Quarter

May	Draft user access tool work plan version 1
May	Participate annual PI meeting
June	Submit FY14 work plan for review
June	Complete integration of data salvaged into AOOS DM System

FY13 4th Quarter

August	Submit annual report

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

October	Assess year 2 datasets and metadata submitted through Ocean Workbench
October	Finalize user access tool work plan version 1 and initiate development

FY14 2nd Quarter

January	Annual Marine Science Symposium
January	Release updated Ocean Workbench tool
Winter	EVOS workshop with Herring and Long-term monitoring programs

FY14 3rd Quarter

May	Participate in annual PI meeting
June	Submit FY15 work plan for review
June	Release version 1 of user tool platform

FY14 4th Quarter

August	Submit annual report

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

October	Assess year 3 datasets and metadata submitted through Ocean Workbench
October	Compile feedback from user access tool platform version 1.

FY15 2nd Quarter

January	Annual Marine Science Symposium
January	Finalize user access tool work plan version 2, initiate development
January	Release updated Ocean Workbench tool

FY15 3rd Quarter

May	Participate in annual PI meeting
May	Submit five-year plan for FY17-22 and work plan for FY16
June	Release version 2 of user tool platform

FY15 4th Quarter

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

October	Assess year 4 datasets and metadata submitted through Ocean Workbench
October	Compile feedback from user access tool platform version 2.

FY16 2nd Quarter

January	Annual Marine Science Symposium
January	Release updated Ocean Workbench tool
January	Finalize user access tool work plan version 3, initiate development

FY16 3rd Quarter

June	Submit work plan for FY17
June	Release version 3 of user tool platform

FY16 4th Quarter

August	Submit annual report

Table 1. LTM project level data manifest for planned research/sampling efforts.

Team Member	LTM or IHRP	Data Set Name	Description/Parameters Collected	Collection Location	Frequency/Collection Period	Storage Formats	Size (KB, MB, GB)?
Sonia Batten	LTM	Continuous Plankton Recorder data	Mesozooplankton and larger phytoplankton near surface abundances with taxonomic resolution	transect from Cook Inlet to open ocean	6 times per year, monthly between about March and September. Collected over 1-2 days	Samples stored in an archive. Data stored in spreadshe	less than 1 MB per year

						ets	
Mary Anne Bishop	LTM	Seabird Monitoring	species, number, activity, gis location, time, date, weather	throughout Prince William Sound	~1x month, Oct - March, beginning 2011	text files, excel, access database	access database ~1gb when complete
Rob Campbell	LTM and IHRP	PWS plankton	Plankton taxonomy (surface sample)	12 stations throughout PWS (SEA bays, Entrances, central PWS)	6 times/year, focus on spring and autumn blooms	flat file	KB
Rob Campbell	LTM and IHRP	PWS nutrients	Nitrate, Phosphate, Silicate (six near surface depths)	12 stations throughout PWS (SEA bays, Entrances, central PWS)	6 times/year, focus on spring and autumn blooms	flat file	KB
Rob Campbell	LTM and IHRP	PWS Hydrography	Pressure, Temperature, Salinity	12 stations throughout PWS (SEA bays, Entrances, central PWS)	6 times/year, focus on spring and autumn blooms	flat file	KB
Rob Campbell	LTM and IHRP	PWS biogeochemistry	Submisible Ultraviolet Nitrate Analyser (SUNA) nitrate concentration, In situ fluorescence, In situ backscatter turbidity	12 stations throughout PWS (SEA bays, Entrances, central PWS)	6 times/year, focus on spring and autumn blooms	flat file	KB
Rob Campbell	LTM	PWS high frequency mooring	Pressure, Temperature, Salinity, Submisible Ultraviolet Nitrate Analyser (SUNA) nitrate concentration, In situ fluorescence, In situ backscatter turbidity	Central PWS (approximate site of CFOS buoy deployed in the 1990's)	Daily	Electronic, near real-time, direct to Data Management Group database)	MB
Brenda Ballachey	LTM	Sea otter aerial survey	aerial surveys used to calculate sea otter abundance	PWS, Katmai, Kenai Fjords, Kachemak Bay	every 3 years in Katmai, Kenai Fjords, and Kachemak Bay, annual for WPWS	GIS files, .pdf reports generated from ArcPad	MB
Brenda Ballachey	LTM	Sea otter forage	forage data collected to calculate energy recovery rates, species size and composition	PWS, Katmai, Kenai Fjords, Kachemak Bay	annual	excel	MB
Brenda Ballachey	LTM	Sea otter carcass	collected to determine age-at-death; includes carcass location, condition, sex if it can be detemined, age at death; skulls are collected, cleaned and stored	PWS, Katmai, Kenai Fjords, Kachemak Bay	annual	excel	MB

Brenda Ballachey	LTM	Soft sediment inverts	clam density, size distribution and species composition	PWS, Katmai, Kenai Fjords, Kachemak Bay	every 2 years	excel	MB
Brenda Ballachey	LTM	percent cover for various algae and invertebrates - rocky sediment	random point counts collected to calculate percent cover of dominant algae and large sessile invertebrates	PWS, Katmai, Kenai Fjords, Kachemak Bay	annual	excel / Access	MB
Brenda Ballachey	LTM	sea star density - rocky sediments	sea star density and species distribution	PWS, Katmai, Kenai Fjords, Kachemak Bay	annual	excel	MB
Brenda Ballachey	LTM	Nucella/Katharina density - rocky sediments	Nucella and Katherina density along rocky sediment substrates	PWS, Katmai, Kenai Fjords, Kachemak Bay	annual	excel	MB
Brenda Ballachey	LTM	limpet size distribution - rocky sediments	L. persona size distribution along rocky sediment substrates	PWS, Katmai, Kenai Fjords, Kachemak Bay	annual	excel	MB
Brenda Ballachey	LTM	Temperature	temperature collected every 30min. - 1 hour at the 0 MLLW tidal elevation at various rocky sediment sites	PWS, Katmai, Kenai Fjords, Kachemak Bay	annual	HOBO Onset proprietary software,	MB
Brenda Ballachey	LTM	Salinity	salinity collected every hour at the 0 MLLW tidal elevation at various rocky sediment sites	PWS, Katmai, Kenai Fjords	annual	StarOdi proprietary software,	MB
Brenda Ballachey	LTM	Mussel density	Mussel density of all size classes as well as density of mussels > 19mm collected at mussel bed sites	PWS, Katmai, Kenai Fjords, Kachemak Bay	annual	excel	MB
Brenda Ballachey	LTM	Mussel size distribution	Mussel size distribution of mussels > 19mm collected at mussel bed sites	PWS, Katmai, Kenai Fjords, Kachemak Bay	annual	excel	MB
Brenda Ballachey	LTM	Eelgrass percent cover	Presence/absence of eelgrass bed data collected using sonar for a set of random transects within a bed	PWS, Katmai, Kenai Fjords	annual	excel	MB
Brenda Ballachey	LTM	marine bird and mammal nearshore surveys	density and distribution collected along nearshore transects	Katmai, Kenai Fjords	annual	Can be excel if that is what fits best for import into larger data structure	MB
Brenda Ballachey	LTM	black oystercatcher nest density	active nest density along 20 km transects	PWS, Katmai, Kenai Fjords	annual	excel	MB

Brenda Ballachey	LTM	black oystercatcher diet	size distribution and species composition of prey brought back to the nest to provision chicks	PWS, Katmai, Kenai Fjords	annual	excel	MB
Brenda Ballachey	LTM	contaminants	trace metals, organics (PAH, PCB, OC) in mussels; includes grain size of sediments collected concurrently with mussels	PWS	one time, scheduled for 2012	excel	MB
Brenda Ballachey	LTM	Mussels - stable isotopes	stable isotopes in mussel tissue; n of isotopes to be determined	PWS	annual	excel	MB
John Moran	LTM	Humpback Whale Fluke ID	Fluke photographs, counts of whales, Location, behavior, prey type	PWS	3 - 6 day surveys/winter	Access database	GB
David Irons					Every two years/ summer, every three years/winter	access database, North Pacific Pelagic Seabird Database	< 10 GB per survey
Mark Carls					Annual, probably < 100 samples + lingering oil time series every 5 years	Excel, Access	mb to gb
John Piatt	LTM	sample station log	randomly selected grid locations, time, date, transect distance, geographic and topographic parameters (distance to shore, distance to pour points, distance to tidewater glacier, bottom depth, etc,)	PWS (possibly also Katmai, Cook Inlet, Kachemak Bay)	Annual, July	Access	< 100 KB
John Piatt	LTM	hydroacoustics (sample = transect)	depth-integrated biomass (1 x 100 m cell resolution), nearshore fine-scale bathymetric features, GIS	PWS (possibly also Katmai, Cook Inlet, Kachemak Bay)	Annual, July	Access	2-5 GB
John Piatt	LTM	trawl catch and morphometrics (sample = station)	fish CPUE by species (number of fish/km towed, gelatinous zooplankton and euphausiid biomass/km towed); fish length-weight by species; euphausiid weights, counts per volume by species;	PWS (possibly also Katmai, Cook Inlet, Kachemak Bay)	Annual, July	Access	< 5 MB
John Piatt	LTM	seabird and marine mammal survey (sample = transect)	observation conditions, predator GIS locations and group size by transect	PWS (possibly also Katmai, Cook Inlet, Kachemak Bay)	Annual, July	Access	< 5 MB

John Piatt	LTM	zooplankton (sample = station)	zooplankton abundance and biomass by species	PWS (possibly also Katmai, Cook Inlet, Kachemak Bay)	Annual, July	Access	< 1 MB
John Piatt	LTM	CTD (sample = station)	temperature, conductivity, depth, fluorescence, beam transmission, photosynthetically active radiation, oxygen concentration	PWS (possibly also Katmai, Cook Inlet, Kachemak Bay)	Annual, July	Access	< 5 MB
John Piatt	LTM	Chlorophyll a (sample = station)	acetone extracted chlorophyll a concentration, pheopigment ratio	PWS (possibly also Katmai, Cook Inlet, Kachemak Bay)	Annual, July	Access	< 100 KB
John Piatt	LTM	nutrients (sample = station)	NO_2, NO_3, NH_4, $Si(OH)_4$, PO_4 concentration (µM)	PWS (possibly also Katmai, Cook Inlet, Kachemak Bay)	Annual, July	Access	< 100 KB
Tom Weingartner	LTM	GAK 1 moored time series	Temperature, salinity, pressure	59° 50.7' N, 149° 28.0' W, Waater depth = 263 m	15 minutes - year-round	ASCII	1-2MB
Tom Weingartner	LTM	GAk 1 monthly CTD vertical profiles	Temperature, salinity, pressure	59° 50.7' N, 149° 28.0' W, Waater depth = 263 m	10 times per year	ASCII	0.5 MB
Russ Hopcroft	LTM	Seward Line Chlorophyll	total extarcted chlorophyll	Northern Gulf fo Alaska, Prince William Sound	Surveys twice annually	File by year as Excel and CSV	KBs per year
Russ Hopcroft	LTM	Seward Line Nutrients	Nitrate, ammonia, phosphate, silicate	Northern Gulf fo Alaska, Prince William Sound	Surveys twice annually	File by year as Excel and CSV	KBs per year
Russ Hopcroft	LTM	Seward Line CTD	temperature, salinity, fluorescence profiles	Northern Gulf fo Alaska, Prince William Sound	Surveys twice annually	File by year as Excel and CSV	MBs per year
Russ Hopcroft	LTM	Seward Line meszooplankton	species composition, abundance and biomass	Northern Gulf fo Alaska, Prince William Sound	Surveys twice annually	File by year as Excel and CSV	MBs per year
Russ Hopcroft	LTM	Seawrd Line Carbonate chemistry	Ocean pH and satuation states	Northern Gulf fo Alaska, Prince William Sound	Surveys twice annually	File by year as Excel and CSV	KBs per year
Craig Matkin	LTM	Annual photographic census of killer whales	Photographs of individual killer whales/pods/groups	Prince William Sound/Kenai Fjords	Annual	Individual digital photos	10GB

Craig Matkin	LTM	Annually updated catalogue of individuals	ID number/Date of birth/geneology of individual KWs	Prince William Sound/Kenai Fjords	Annual	Digital catalogue	50MB
Craig Matkin	LTM	Annual photographic census summary by pod/group	Individuals/pods in each encounter	Prince William Sound/Kenai Fjords	Annual	Digital spread sheets	2MB
Craig Matkin	LTM	Annual summary of biopsy results	Animals biopsied/date/time/location/haplotype	Prince William Sound/Kenai Fjords	Annual	Digital spread sheet	1MB
Craig Matkin	LTM	Annual summary of tag attachments	Animals tagged/date/time/location/other data	Prince William Sound/Kenai Fjords	Annual	Digital spread sheet	1MB
Craig Matkin	LTM	Annual Survey/Encounter summaries	Details of each survey day and each encounter	Prince William Sound/Kenai Fjords	Annual	Access database	15MB
Angela Doroff	LTM	Zooplankton	Plankton (surface sample)	Multiple stations throughout LCI and KB	4 times/year, focus on spring and autumn blooms; monthly for inner KB	Access	GB
Angela Doroff	LTM	KB Nutrients	ammonium, nitrate + nitrite, orthophosphate, and chlorophyll-a	2 stations in KB; surface and deep sampling at Homer and Seldovia harbors	Nutrient monitoring will occur at the SWMP datalogger stations for monthly baseline grab samples (consisting of two replicates) and monthly diel samples will be collected at the Homer Harbor station	Access	GB
Angela Doroff	LTM	KB Hydrography	Pressure/depth, Temperature, Salinity, DO, turbitity, pH	2 stations in KB; surface and deep sampling at Homer and Seldovia harbors	Standard SWMP water quality data will be collected at four stations every 15 minutes. Sondes will be regularly deployed, retrieved, calibrated, and maintained	Access	GB
Angela Doroff	LTM	KB Meteorological Station	air temp, relative humitity, barometric pressure, wind (speed & direction), PAR, total solar radiation, precipitation	2 stations in KB (Homer Spit and Anchor Point)	Weather data will be collected every 15 minutes according to the standard SWMP protocols	Access	GB
Angela Doroff	LTM	CTD (sample = station)	temperature, conductivity, depth, fluorescence, beam transmission, photosynthetically active radiation, oxygen	LCI and KB	Quarterly	Access	< 5 MB

			concentration				

Table 2. Known and available historic data sets voiced by LTM PIs to be of potential value to LTM project.

Team member	Data Set Name	Description/Parameters Collected	Frequency/Collection Period	Storage Formats	Size (KB, MB, GB)?	Location
Sonia Batten	Continuous Plankton Recorder data	Mesozooplankton and larger phytoplankton near surface abundances with taxonomic resolution	monthly between about March and September, 2000-2011	spreadsheets	<2 MB	Gulf of Alaska, Cook Inlet
Mary Anne Bishop	Seabird Predation on Herring	species, number, activity, gis location, time, date, weather	Nov and March; 2007-2011; Jan 08 & 09, Sept 08, Oct 08,	text files, excel, access database	DB= 525 mb; other files = ~100mb	Prince William Sound Science Center
Mary Anne Bishop	ShoreZone	various		raster files		NOAA web site & PWS Science Ctr has copy
Brenda Ballachey	Master site location for rocky / soft / mussel	locations (lat/lons) for all rocky and soft sediment sites as well as mussel beds	measurements taken once during initial site set-up	excel . GIS files	MB	WPWS, Kenai Fjords, Katmai
Brenda Ballachey	Rocky site slope	slope measurements taken at initial site visit	measurements taken once during initial site set-up	excel	MB	WPWS, Kenai Fjords, Katmai
Brenda Ballachey	Eelgrass sonar track (d-log)	locations (lat/lons) for all eelgrass bed sampling including track logs	measurements taken annually during eelgrass sampling	excel . GIS files	MB	WPWS, Kenai Fjords, Katmai
Brenda Ballachey	Sea otter aerial survey	aerial surveys used to calculate sea otter abundance	every 3 years in Katmai and Kenai Fjords, annually in WPWS	GIS files, .pdf reports generated from Arc Pad	MB	WPWS, Kenai Fjords, Katmai, some data for Kachemak Bay
Brenda Ballachey	Sea otter forage	forage data collected to calculate energy recovery rates, species size and composition	annually	excel	MB	WPWS, Kenai Fjords, Katmai, some data for Kachemak Bay
Brenda Ballachey	Sea otter carcass	collected to determine age-at-death; includes carcass location, condition, sex if it can be detemined, age at death; skulls are collected, cleaned and stored	annually	excel	MB	WPWS, Kenai Fjords, Katmai, some data for

						Kachemak Bay
Brenda Ballachey	Soft sediment inverts	clam density, size distribution and species composition	every 2 years	excel	MB	WPWS, Kenai Fjords, Katmai, some data for Kachemak Bay
Brenda Ballachey	percent cover for various algae and invertebrates - rocky sediment	random point counts collected to calculate percent cover of dominant algae and large sessile invertebrates	annually	excel / Access	MB	WPWS, Kenai Fjords, Katmai, Kachemak Bay
Brenda Ballachey	sea star density - rocky sediments	sea star density and species distribution	annually	excel	MB	WPWS, Kenai Fjords, Katmai, Kachemak Bay
Brenda Ballachey	Nucella/Katharina density - rocky sediments	Nucella and Katherina density along rocky sediment substrates	annually	excel	MB	WPWS, Kenai Fjords, Katmai, Kachemak Bay
Brenda Ballachey	limpet size distribution - rocky sediments	L. persona size distribution along rocky sediment substrates	annually	excel	MB	WPWS, Kenai Fjords, Katmai
Brenda Ballachey	Temperature	temperature collected every 30min. - 1 hour at the 0 MLLW tidal elevation at various rocky sediment sites	annually	HOBO Onset proprietary software	MB	WPWS, Kenai Fjords, Katmai, some data for Kachemak Bay
Brenda Ballachey	Salinity	salinity collected every hour at the 0 MLLW tidal elevation at various rocky sediment sites	annually	StarOdi proprietary software	MB	WPWS, Kenai Fjords, Katmai, some data for Kachemak Bay
Brenda Ballachey	Mussel density	Mussel density of all size classes as well as density of mussels > 19mm collected at mussel bed sites	annually	excel	MB	WPWS, Kenai Fjords, Katmai, some data for Kachemak Bay

Brenda Ballachey	Mussel size distribution	Mussel size distribution of mussels > 19mm collected at mussel bed sites	annually	excel	MB	WPWS, Kenai Fjords, Katmai
Brenda Ballachey	Eelgrass percent cover	Presence/absence of eelgrass bed data collected using sonar for a set of random transects within a bed	annually	excel	MB	WPWS, Kenai Fjords, Katmai, some data for Kachemak Bay
Brenda Ballachey	marine bird and mammal nearshore surveys	density and distribution collected along nearshore transects	annually	Can be excel if that is what fits best for import into larger data structure	MB	Kenai Fjords, Katmai, some data for Kachemak Bay
Brenda Ballachey	black oystercatcher nest density	active nest density along 20 km transects	annually	excel	MB	WPWS, Kenai Fjords, Katmai
Brenda Ballachey	black oystercatcher diet	size distribution and species composition of prey brought back to the nest to provision chicks	annually	excel	MB	WPWS, Kenai Fjords, Katmai
Brenda Ballachey	contaminants	trace metals, organics (PAH, PCB, OC) in mussels; includes grain size of sediment samples collected concurrently with mussels	one time	excel	MB	Katmai, Kenai Fjords
John Moran	Humpback Whale Fluke ID from EVOSTC Project 100804	Fluke photographs, counts of whales, Location, behavior, prey type	Fall/Winter 2007-2009	Access	GB	PWS
David Irons	North Pacific Pelagic Seabird Database	birds/km2, sea surface variables, weather	every 2 to 3 years from 1989 to 2010	access database	< 50GB	USGS Anchorage, Gary Drew contact
Mark Carls	ABLHCD	naphthalene through benzo(ghi)perylene (currently 44 PAH compounds) + C9 through C36 alkanes (n=30), including pristane and phytane. Some analyses also include biomarkers (triterpanes, hopanes, and steranes; n = 51)	1989 through present	Access database.	about 10 gb	ABL, Carls, Larsen
John Piatt	Herring Assessment data (ADFG, PWSCC, NOAA)	forage fish bycatch data, hydroacoustic data, energetics, stable isotope, zooplankton	1994-2011 (ongoing, annual)	Excel		PWS
John Piatt	Areial forage fish surveys	schools, species, locations	1995-1999 (SEA, APEX), 2010-13 (PWS Herring Survey)	excel		PWS

John Piatt	Forage fish biomass data	hydroacoustic survey data	1997-1999 (APEX)	Excel		PWS
John Piatt	Forage fish size data	fish morphometrics (length weight by species)	1997-1999 (APEX)	Excel		PWS
John Piatt	Proximate composition of forage fish	lipid, protein, energy density	Oct-Nov 1995	Excel		PWS
John Piatt	ADFG large mesh trawl surveys	forage fish bycatch data	1999-2009 (ongoing, biennial)	Excel		PWS
Russ Hopcroft	Seward Line Chlorophyll	total extarcted chlorophyll	1998-2004 frequency was 4-7 times per year, twice per year 2005-2011	File by year as Excel and CSV	KBs per year	UAF, NPRB, WHOI, NODC
Russ Hopcroft	Seward Line Nutrients	Nitrate, ammonia, phosphate, silicate	1998-2004 frequency was 4-7 times per year, twice per year 2005-2011	File by year as Excel and CSV	KBs per year	UAF, NPRB, WHOI, NODC
Russ Hopcroft	Seward Line CTD	temperature, salinity, fluorescence profiles	1998-2004 frequency was 4-7 times per year, twice per year 2005-2011	File by year as Excel and CSV	MBs per year	UAF, NPRB, WHOI, NODC
Russ Hopcroft	Seward Line meszooplankton	species composition, abundance and biomass	1998-2004 frequency was 4-7 times per year, twice per year 2005-2011	File by year as Excel and CSV	MBs per year	UAF, NPRB, WHOI, NODC
Russ Hopcroft	Seward Line Carbonate chemistry	Ocean pH and satuation states	twice annually 2009-2011	File by year as Excel and CSV	MBs per year	UAF
Craig Matkin	Annual photographic census of killer whales	Photographs of individual killer whales/pods/groups	Annually since 1984 (film negative format until 2010)	Digital since 2010	20GB plus negatives	Pacific Biological Station, Nanaimo BC and NGOS, Homer, Alaska
Craig Matkin	Annually updated catalogue of individuals	ID number/Date of birth/geneology of individual KWs	Annually since 1984	Digital since 2000	Current 50MB	NGOS, Homer, AK
Craig Matkin	Annual photographic census summary by pod/group	Individuals/pods in each encounter	Annually since 1984	Digital spread sheets	10MB	NGOS, Homer, AK
Craig Matkin	Annual summary of biopsy results	Animals biopsied/date/time/location/haplotype	Annually since 1994	Digital spread sheets	1MB	NGOS, Homer, AK

Craig Matkin	Annual summary of tag attachments	Animals tagged/date/time/location/other data	Annually since 2006	Digital spread sheets	1MB	NGOS, Homer, AK
Craig Matkin	Annual Survey/Encounter summaries	Details of each survey day and each encounter	Annually since 2002 (prior years in non digital formats	Acess data base, data sheets prior to 2002	50MB and data sheets	NGOS, Homer, AK
Angela Doroff	KB Nutrients	ammonium, nitrate + nitrite, orthophosphate, and chlorophyll-a	2 stations in KB; surface and deep sampling at Homer and Seldovia harbors	monthly baseline grab samples	Access	KB
Angela Doroff	KB Hydrography	Pressure/depth, Temperature, Salinity, DO, turbitity, pH	2 stations in KB; surface and deep sampling at Homer and Seldovia harbors	collected at four stations every 15 minutes.	Access	KB
Angela Doroff	KB Meteorological Station	air temp, relative humitity, barometric pressure, wind (speed & direction), PAR, total solar radiation, precipitation	2 stations in KB (Homer Spit and Anchor Point)	collected every 15 minutes	Access	KB
Angela Doroff	CTD (multiple transects)	temperature, conductivity, depth, fluorescence, beam transmission, photosynthetically active radiation, oxygen concentration	LCI and KB			

Table 3. LTM project data requests/needs as voiced by PIs.

Team Member	Data Type	Ideal Time Period	Ideal Location
Mary Anne Bishop	hydroacoustic fish surveys	in conjunction w Humpback Whale Cruises	Prince William Sound
Mary Anne Bishop	zooplankton sampling	in conjunction w Humpback Whale Cruises	Prince William Sound
Mary Anne Bishop	CTD sampling	in conjunction w Humpback Whale Cruises	Prince William Sound
Mary Anne Bishop	Seabird Diet Sampling (lethal collections)	Oct - March	Prince William Sound
Brenda Ballachey	aerial photos of eelgrass and kelp bed	summer low tides	WPWS, Katmai and Kenai Fjords, Kachemak Bay
Brenda Ballachey	GOA oceanographic data: environmental, chlor a, nutrients, plankton	annual/seasonal	WPWS, Katmai and Kenai Fjords, Kachemak Bay
Brenda Ballachey	forage fish	annual/seasonal	WPWS, Katmai and Kenai Fjords, Kachemak Bay

John Moran	Forage fish euphausiid distributions	Sesonally form fall 2011- spring 2015	Thoughout PWS
John Moran	Opportunistic Whale observations	Year-round	PWS
David Irons	Forage fish abundance and distribution	overlap with our surveys, summer	PWS -s ound-wide
David Irons	water column characteristics	overlap with our surveys, summer	PWS -s ound-wide
David Irons	SST and SSS	overlap with our surveys, summer	PWS -s ound-wide
Russ Hopcroft	CTD casts - SEA program	1990 onward	PWS
Russ Hopcroft	Mooring records	1990 onward	PWS entances
Angela Doroff	GOA oceanographic data: environmental, chlor a, nutrients, plankton	annual/seasonal	WPWS, Katmai and Kenai Fjords, Kachemak Bay
Angela Doroff	PWS, GOA, plankton	Plankton taxonomy (surface sample)	All PWS, GOA, LCI, & KB
Angela Doroff	Sea otter aerial survey	aerial surveys used to calculate sea otter abundance	PWS, Katmai, Kenai Fjords, Kachemak Bay
Angela Doroff	Sea otter forage	forage data collected to calculate energy recovery rates, species size and composition	PWS, Katmai, Kenai Fjords, Kachemak Bay
Angela Doroff	Soft sediment inverts	clam density, size distribution and species composition	PWS, Katmai, Kenai Fjords, Kachemak Bay
Angela Doroff	percent cover for various algae and invertebrates - rocky sediment	random point counts collected to calculate percent cover of dominant algae and large sessile invertebrates	PWS, Katmai, Kenai Fjords, Kachemak Bay
Angela Doroff	sea star density - rocky sediments	sea star density and species distribution	PWS, Katmai, Kenai Fjords, Kachemak Bay
Angela Doroff	Nucella/Katharina density - rocky sediments	Nucella and Katherina density along rocky sediment substrates	PWS, Katmai, Kenai Fjords, Kachemak Bay
Angela Doroff	limpet size distribution - rocky sediments	L. persona size distribution along rocky sediment substrates	PWS, Katmai, Kenai Fjords, Kachemak Bay
Angela Doroff	Mussel density	Mussel density of all size classes as well as density of mussels > 19mm collected at mussel bed sites	PWS, Katmai, Kenai Fjords, Kachemak Bay
Angela Doroff	Mussel size distribution	Mussel size distribution of mussels > 19mm collected at mussel bed sites	PWS, Katmai, Kenai Fjords, Kachemak Bay

BUDGET JUSTIFICATION: Fiscal Year: 2012

Personnel:
Funds are requested ($117.8K) to support a Senior Software Engineer (2 months), Software Engineer (3.0 months), Information Architect (1 month), and two Data Analysts (9 months total) in the AOOS data management unit. The software Engineers and Information Architect will supervise and direct data processing activities of the data analysts. These lead staff members will also assists in developing data management plans for projects and support the AOOS Ocean Workbench project level data management system. The data analysts will focus their activities on acquiring, accessing, documenting and loading data sets produced by or deemed important to the LTM effort into the AOOS data system for use in synthesis efforts.

Equipment:
A disk array will be procured (5.1K) in FY12 to increase storage capacity of the AOOS data system.

Indirect:
AOOS's indirect Rate is 23% (27.1 K) and has been figured into the AOOS budget. This covers expenses for software, telecommunications and other operating expenses.

BUDGET JUSTIFICATION: Fiscal Year: 2013

Personnel:
Funds are requested ($118.0K) to support a Senior Software Engineer (1.5 months), Information Architect (1 month), software engineer (3 months) and two data analysts (9 months total) in the AOOS data management unit. The Senior Software Engineer and Information Architect will supervise and direct data processing activities of the data analysts and data system development of the software engineer. These lead staff members will also assists in developing data management plans for projects. The data analyst will focus activities on acquiring, accessing, documenting and loading data sets deemed important to the LTM effort into the AOOS data system for use in synthesis. The software engineer will work developing web based pathways (extend the AOOS Ocean Workspace) for data sharing, discovery and visualization by researchers and others.

Equipment:
Compute capacity will be procured ($4.8K) in FY13 to increase storage capacity of the AOOS data system.

Indirect:
AOOS's indirect Rate is 23% ($27.1 K) and has been figured into the AOOS budget. This covers expenses for software, telecommunications and other operating expenses.

BUDGET JUSTIFICATION: Fiscal Year: 2014

Personnel:
Funds are requested ($122.3K) to support a Senior Software Engineer (1.5 months), Information Architect (1 month), two Software Engineers (5 months total) and a data analyst for (7 months total) in the AOOS data management unit. The Senior Software Engineer and Information Architect will supervise and direct data processing activities of the data analyst and data system development of the software engineers. These lead staff members will also assists in developing

data management plans for projects. The data analyst will focus activities on acquiring, accessing, documenting and loading data sets deemed important to the LTM effort into the AOOS data system for use in synthesis. The software engineers will work developing web based pathways (extend the AOOS Ocean Workspace) for data sharing, discovery and visualization by researchers and others.

Indirect:
AOOS's indirect Rate is 23% ($28.1 K) and has been figured into the AOOS budget. This covers expenses for software, telecommunications and other operating expenses.

BUDGET JUSTIFICATION: Fiscal Year: 2015

Personnel:
Funds are requested ($122.3K) to support a Senior Software Engineer (1.5 months), Information Architect (1 month), two Software Engineers (4.5 months total) and a data analyst for (7 months total) in the AOOS data management unit. The Senior Software Engineer and Information Architect will supervise and direct data processing activities of the data analyst and data system development of the software engineers. These lead staff members will also assists in developing data management plans for projects. The data analyst will focus activities on acquiring, accessing, documenting and loading data sets deemed important to the LTM effort into the AOOS data system for use in synthesis. The software engineers will work developing web based pathways (extend the AOOS Ocean Workspace) for data sharing, discovery and visualization by researchers and others.

Indirect:
AOOS's indirect Rate is 23% ($28.1 K) and has been figured into the AOOS budget. This covers expenses for software, telecommunications and other operating expenses.

BUDGET JUSTIFICATION: Fiscal Year: 2016

Personnel:
Funds are requested ($121.3K) to support a Senior Software Engineer (1.5 months), Information Architect (0.5 month), two Software Engineers (4.5 months total) and a data analyst for (7 months total) in the AOOS data management unit. The Senior Software Engineer and Information Architect will supervise and direct data processing activities of the data analyst and data system development of the software engineers. These lead staff members will also assists in developing data management plans for projects. The data analyst will focus activities on acquiring, accessing, documenting and loading data sets deemed important to the LTM effort into the AOOS data system for use in synthesis. The software engineers will work developing web based pathways (extend the AOOS Ocean Workspace) for data sharing, discovery and visualization by researchers and others.

Indirect:
AOOS's indirect Rate is 23% (27.9 K) and has been figured into the AOOS budget. This covers expenses for software, telecommunications and other operating expenses.

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	$117.8	$118.0	$122.3	$122.3	$121.3	$601.7
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	$5.1	$4.8	$0.0	$0.0	$0.0	$9.9
Indirect Costs (*will vary by proposer*)	$27.1	$27.1	$28.1	$28.1	$27.9	$138.4
SUBTOTAL	$150.0	$149.9	$150.4	$150.4	$149.2	$749.9
General Administration (9% of subtotal)	$13.5	$13.5	$13.5	$13.5	$13.4	$67.5
PROJECT TOTAL	$163.5	$163.4	$164.0	$164.0	$162.6	$817.4
Other Resources (Cost Share Funds)	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0

Levraged Funding Sources
AOOS - Data management Activities (FY12 - 500K, FY13 - 500K, FY14 - 500K, FY15 - 500K, FY16 - 500k)
PWSSC -Project level data management system (FY12 - 48K)
Northern Forum/USFWS - North Pacific Seabird Data System (FY12 - 50K, FY13 - 50K, FY14 -50K)
ADF&G/AOOS - Data integration partnership/sharing (FY12 - 60K, FY13 - 90K, FY14 -70K)
CIRCAC - Regional Data Management Support for CI (FY12 - 25K)

FY12-16

Program Title: LTM Data Maanagement
Team Leader: Rob Bochenek, AOOS

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	$117.8	$118.0	$122.3	$122.3	$121.3	$601.7
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	$5.1	$4.8	$0.0	$0.0	$0.0	$9.9
Indirect Costs (*will vary by proposer*)	$27.1	$27.1	$28.1	$28.1	$27.9	$138.4
SUBTOTAL	$150.0	$149.9	$150.4	$150.4	$149.2	$749.9
General Administration (9% of subtotal)	$13.5	$13.5	$13.5	$13.5	$13.4	$67.5
PROJECT TOTAL	$163.5	$163.4	$164.0	$164.0	$162.6	$817.4
Other Resources (Cost Share Funds)	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0

Levraged Funding Sources
AOOS - Data management Activities (FY12 - 500K, FY13 - 500K, FY14 - 500K, FY15 - 500K, FY16 - 500k)
PWSSC -Project level data management system (FY12 - 48K)
Northern Forum/USFWS - North Pacific Seabird Data System (FY12 - 50K, FY13 - 50K, FY14 -50K)
ADF&G/AOOS - Data integration partnership/sharing (FY12 - 60K, FY13 - 90K, FY14 -70K)
CIRCAC - Regional Data Management Support for CI (FY12 - 25K)

FY12-16

Program Title: LTM Data Maanagement
Team Leader: Rob Bochenek, AOOS

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
Shane StClair	Senior Software Engineer		2.0	8.4		16.8
Rob Bochenek	Infortmation Architect		1.0	9.2		9.2
Vacant	Data Analyst		7.0	7.6		53.2
Vacant	Software Engineer/		2.0	7.6		15.2
Ross Martin	Software Engineer/		3.0	7.8		23.4
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
			Subtotal	40.6	0.0	
					Personnel Total	$117.8

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

FY12

Program Title: LTM Data Maanagement
Team Leader: Rob Bochenek, AOOS

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
Commodities Total	$0.0

FY12

Program Title: LTM Data Maanagement
Team Leader: Rob Bochenek, AOOS

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
Stoarge Expansion for AOOS Disk Array	1.0	5.1	5.1
			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	$5.1

Existing Equipment Usage: Descriptior	Number of Units	Inventory Agency

FY12

Program Title: LTM Data Maanagement
Team Leader: Rob Bochenek, AOOS

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
Shane StClair	Senior Software Engineer		1.5	8.7		13.1
Rob Bochenek	Infortmation Architect		1.0	9.5		9.5
Vacant	Data Analyst		7.0	7.9		55.3
Vacant	Data Analyst		2.0	7.9		15.8
Ross Martin	Software Engineer/		3.0	8.1		24.3
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
			Subtotal	42.1	0.0	
					Personnel Total	$118.0

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: LTM Data Maanagement
Team Leader: Rob Bochenek, AOOS

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
Commodities Total	$0.0

FY13

Program Title: LTM Data Maanagement
Team Leader: Rob Bochenek, AOOS

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
Server for hosting LTM data and products	1.0	4.8	4.8
			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	$4.8

Existing Equipment Usage: Descriptior	Number of Units	Inventory Agency

FY13

Program Title: LTM Data Maanagement
Team Leader: Rob Bochenek, AOOS

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
Shane StClair	Senior Software Engineer		1.5	9.0		13.5
Rob Bochenek	Infortmation Architect		1.0	9.8		9.8
Vacant	Data Analyst		7.0	8.2		57.4
Vacant	Software Engineer		2.0	8.2		16.4
Ross Martin	Software Engineer		3.0	8.4		25.2
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
			Subtotal	43.6	0.0	
					Personnel Total	$122.3

Travel Costs:	Ticket	Round	Total	Daily	Travel
Description	Price	Trips	Days	Per Diem	Sum
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
				Travel Total	$0.0

FY14

Program Title: LTM Data Maanagement
Team Leader: Rob Bochenek, AOOS

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
Commodities Total	$0.0

FY14

Program Title: LTM Data Maanagement
Team Leader: Rob Bochenek, AOOS

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

FY14

Program Title: LTM Data Maanagement
Team Leader: Rob Bochenek, AOOS

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
Shane StClair	Senior Software Engineer		1.5	9.3		14.0
Rob Bochenek	Infortmation Architect		1.0	10.1		10.1
Vacant	Data Analyst		7.0	8.5		59.5
Vacant	Software Engineer/		2.0	8.5		17.0
Ross Martin	Software Engineer/		2.5	8.7		21.8
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
			Subtotal	45.1	0.0	
					Personnel Total	$122.3

Travel Costs:	Ticket	Round	Total	Daily	Travel
Description	Price	Trips	Days	Per Diem	Sum
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
				Travel Total	$0.0

FY15

Program Title: LTM Data Maanagement
Team Leader: Rob Bochenek, AOOS

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
Commodities Total	$0.0

FY15

Program Title: LTM Data Maanagement
Team Leader: Rob Bochenek, AOOS

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: LTM Data Maanagement
Team Leader: Rob Bochenek, AOOS

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
Shane StClair	Senior Software Engineer		1.5	9.6		14.4
Rob Bochenek	Infortmation Architect		0.5	10.4		5.2
Vacant	Data Analyst		7.0	8.8		61.6
Vacant	Software Engineer/		2.0	8.8		17.6
Ross Martin	Software Engineer/		2.5	9.0		22.5
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
			Subtotal	46.6	0.0	
					Personnel Total	$121.3

Travel Costs:	Ticket	Round	Total	Daily	Travel
Description	Price	Trips	Days	Per Diem	Sum
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
				Travel Total	$0.0

FY16

Program Title: LTM Data Maanagement
Team Leader: Rob Bochenek, AOOS

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
Commodities Total	$0.0

FY16

Program Title: LTM Data Maanagement
Team Leader: Rob Bochenek, AOOS

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: LTM Data Maanagement
Team Leader: Rob Bochenek, AOOS

FORM 3B
EQUIPMENT DETAIL