FY12 INVITATION
PROPOSAL SUMMARY PAGE

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

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

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

Study Location: Prince William Sound

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

In response to a lack of recovery of wildlife populations following the *Exxon Valdez* Oil Spill (EVOS), and evidence of natural background changes in forage fish abundance, there was a significant effort to document forage fish distribution, abundance, and variability in Prince William Sound (PWS) 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.

Estimated Budget:
EVOSTC Funding Requested:
FY2012- $209.9K, FY2013-$202.5K, FY2014-202.5K, FY2015-$202.5K, FY2016-$150.3K

Non-EVOSTC Funds to be used: (USGS Matching Funds)
FY2012- $297.2K, FY2013-$297.2K, FY2014-297.2K, FY2015-$297.2K, FY2016-$72.2K

Date: May 22, 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.

Problem Statement: Fluctuations in forage fish abundance can have dramatic ecosystem effects because much of the energy transferred from lower to higher trophic levels passes through a small number of key forage species. Forage fish typically produce a large number of offspring and have short lifespans, and these traits predispose populations towards large fluctuations in abundance, with associated impacts on predators. 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. Since then, ongoing research has focused on commercially valuable Pacific herring, whereas less has been done to monitor other ecologically important forage species such as Pacific sand lance, capelin, eulachon and euphausiids (which we include under the generic term "forage species"). The lack of time series data on abundance and distribution of these forage species in PWS, and the spatial and temporal variability inherent to these populations makes it difficult to assess population status and trends of most forage species. We propose to initiate a program to monitor: 1) forage fish abundance and community composition; by conducting fishing and acoustic surveys of abundance and distribution that are cost effective and allow for long-term trend analyses; and, 2) indices of forage fish biology that are important in maintaining predator health, such as forage fish body size, condition, proximate composition and diet (inferred from stable isotope ratios).

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: We propose to gather new data on the distribution, relative abundance, and body condition of forage fish species in PWS, compare these data with some historical data from the 1990's and provide a baseline for future assessment of population trends. The specific objectives of this study are to:

1) Identify robust indices for monitoring forage fish populations over time and devise a sampling strategy for long term monitoring of those indices.
2) After completing Objective 1, and in addition to any other indices we might identify, assess the current distribution, abundance, species composition, and body condition of forage fishes (other than herring) in selected areas of PWS and at selected times of year.
3) Relate abundance and distribution of forage species to abiotic and biotic characteristics of the marine environment.

During the initial planning phase, we will consider how to replicate some of the APEX forage fish work (see below) previously supported (~650 K annually) in PWS by the EVOSTC in order to obtain useful trend information on fish abundance. We will determine the most appropriate sample design by examining historical data and consulting with other PI's (e.g., Rice, Brown, Thedinga, Haldorson, Coyle, Ostrand) on past and current projects. Options might include intensive sampling of one or two subareas within PWS every year, random sampling of the entire Sound each year, intensive sampling of different sites within PWS each year, or sampling different areas of the Gulf of Alaska in sequential years (e.g., PWS, Kenai Fjords, Kachemak Bay, Lower Cook Inlet). Because biomass may fluctuate considerably at small to large spatial and temporal scales, other useful indices of population change may be obtained from studies over time, such as: species composition within trawl and seine catches, proximate composition of fish, and other measures of body condition (length-weight relationship, age structure, etc.) or feeding conditions (stable isotope composition).

To achieve our second and third objectives, we will conduct hydroacoustic-trawl surveys using a random-stratified sample design that includes extensive environmental sampling at each station. The design will include elements of forage fish studies we conducted in lower Cook Inlet with EVOSTC funding in 1996-2000, forage fish studies in Glacier Bay and Kenai Fjords national parks in 1999-2008, and a survey we recently completed in Harriman and College fjords in July 2010 in collaboration with USFWS (D. Irons). We will simultaneously measure marine predators, forage fish assemblages and marine habitat by overlaying a 2.5 km^2 grid over navigable waters in PWS. Cells to be sampled will be selected at random after stratifying by habitat type (e.g., glacial, nearshore, offshore). At each station, we will sample a transect equal to the length of the cell by: 1) surveying for marine birds and mammals, 2) collecting hydroacoustic data, 3) sampling sea surface temperature and salinity, and, 4) sampling fish with a modified herring trawl. At a station on each transect we will conduct a vertical plankton tow, obtain an oceanographic profile of the water column, and collect water samples for nutrients and chlorophyll *a* analyses. Forage fish inhabiting shallow nearshore waters will also be sampled with a beach seine on appropriate nearshore sites (e.g., suitable beach substrate, historical sample site, proximity to benthic studies sample site). A suite of parameters will be measured at each station including: bird density, mammal density, hydroacoustic fish biomass, fish CPUE, fish species composition, zooplankton biomass and species composition, phytoplankton abundance, nutrient concentration, hydrographic properties of the water column (temperature, salinity, beam transmittance, fluorescence, dissolved oxygen, light), bathymetry (depth, slope), and geographic topography (distance to glaciers, marine sills, streams, etc).

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.

Major logistics: We will conduct this research from the USGS R/V *Alaskan Gyre*, a 16 m vessel equipped with a midwater trawl designed specifically for forage fish work (the same net used in APEX surveys of PWS and Cook Inlet in the 1990s). Twenty-day cruises will coincide with the peak in forage fish abundance and timing of previous work (July-August) for four years, and a funding for a fifth year will go towards analysis, reporting, and preparation of manuscripts. Based on experiences elsewhere, we expect that the total of 20 ship days will allow us to trawl and sample about 70 stations, conduct beach seines on ca. 15-20 beaches, collect ancillary environmental data and allow for vessel travel time to PWS, travel between sites, and occasional weather days.

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?

Based on our work in College and Harriman Fjord in 2010, and historical studies, we expect to obtain numerous samples of important forage species including capelin, eulachon, sand lance, herring, and euphausiids, etc., which can then be analyzed in the laboratory to assess body condition, proximate composition, and stable isotope composition using standard laboratory methods (contracted work). The simultaneous collection of a suite of some 25+ ecosystem variables during each trawl will allow us to model fish and predator community structure relative to important habitat features. Assessing body condition and habitat use is an important component of the monitoring program, because it allows us to lay the groundwork for understanding factors that may be responsible for future changes in abundance or health of various forage species.

We will employ a variety of statistical approaches to examine overall patterns in distribution of fish or apex predators and correlate these patterns with bio-physical features. For example, we will: 1) Use Principal Components Analysis (PCA) to identify important gradients in physical parameters within PWS; 2) Assess the relative contributions of different biophysical features in predicting the relative abundance of key forage fish and apex predators using General Linear

Models (GLM) or Classification and Regression Trees (CART); 3) Use Detrended Correspondence Analysis (DCA) or Non-metric multidimensional scaling (NMDS) to characterize community structure and patterns of community response to physical gradients; 4) Identify important hotspots in distribution of forage fish and use statistical indices (e.g., Moran's I, Getis-Ord Gi* and Ripley's K distance) to determine the spatial scale at which oceanographic features and biological communities are clustered; 5) Identify appropriate spatial scales and use these for all subsequent analyses of data. Spatial data will be analyzed using tools available in R (The R Foundation for Statistical Computing v. 2.7.2, Vienna, Austria) and ArcGIS (ESRI v. 9.2, Redlands, CA). l. 1997.

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

We will work primarily within Prince William Sound (bounding coordinates: 61.292, -148.74; 61.168, -146.057; 60.273, -145.677; 59.662, -148.238), although some work may be conducted in nearby Gulf of Alaska systems such as Kenai Fjords, Lower Cook Inlet, and Kachemak Bay (bounding coordinates: 59.653, -154.14; 60.168, -149.315; 59.78, -149.169; 58.585, -153.45).

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.

We will make use of current and previous forage fish work in PWS— including that of ongoing herring assessments, the Sound Ecosystem Assessment (SEA) program, and the forage fish component of the Alaska Predator Ecosystem Experiment in PWS (APEX)— to help design our sampling and monitoring plan, and to make meaningful comparisons with past and current findings. 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*.), and 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*.). We will coordinate our efforts with those of other PIs studying pelagic and nearshore components of the Sound, particularly those working on the current

Herring Assessment (project 10100132, PI: Scott Pegau, PWSSC) and provide them with data we collect that may be useful in their analyses. All oceanographic data will be archived with AOOS. Herring and other requested samples will be made available to PIs involved in dedicated herring studies, and samples of other forage species will be saved and could be distributed opportunistically to PIs engaged in trophic studies using stable isotopes, fatty acids, etc.

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.

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

To be met by March 2012

Objective 2. After completing Objective 1, and in addition to any other indices we might identify, assess the current distribution, abundance, species composition, and body condition of forage fishes (other than herring) in selected areas of PWS and at selected times of year.

To be met by September 2016

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

To be met by September 2016

B. Measurable Project Tasks

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

September: *Project funding approved by Trustee Coucil*

FFY 12, 1st quarter (October 1, 2011-December 31, 2011)

Oct.- Dec *Coordinate with collaborators,*
Begin acquisition of current and historical data

FFY 12, 2nd quarter (January 1, 2012-March 31, 2012)

Jan. – Mar. *Continue planning, historical data aquisition*

FFY 12, 3rd quarter (April 1, 2012-June 30, 2012)

April 15 *Submit annual progress report.*

Apr. – Jun. *Prepare for cruise, hire seasonal staff, buy supplies,*

FFY 12, 4th quarter (July 1, 2011-September 30, 2012)
July: *Conduct cruise, collect fish and ancillary data*
August: *Post cruise data organization, specimen disposition*

FFY 13, 1st quarter (October 1, 2012-December 31, 2012)
Oct. – Dec. *Data organization, archival, analysis*
December 15: *Provide data to EVOSTC archive*

FFY 13, 2nd quarter (January 1, 2013-March 31, 2013)
January 18: *Annual Marine Science Symposium*
Jan. – Mar. *Data analysis and writing*

FFY 13, 3rd quarter (April 1, 2013-June 30, 2013)
April 15 *Submit annual progress report.*
Apr. – Jun. *Prepare for cruise, hire seasonal staff, buy supplies*

FFY 13, 4th quarter (July 1, 2013-September 30, 2013)
July: *Conduct cruise, collect fish and ancillary data*
August: *Post cruise data organization, specimen disposition*

FFY 14, 1st quarter (October 1, 2013-December 31, 2013)
Oct. – Dec. *Data organization, archival, analysis*
December 15: *Provide data to EVOSTC archive*

FFY 14, 2nd quarter (January 1, 2014-March 31, 2014)
January 18. *Annual Marine Science Symposium*
Jan. – Mar. *Data analysis and writing*

FFY 14, 3rd quarter (April 1, 2014-June 30, 2014)
April 15 *Submit annual progress report.*
Apr. – Jun. *Prepare for cruise, hire seasonal staff, buy supplies*

FFY 14, 4th quarter (July 1, 2014-September 30, 2014)
July: *Conduct cruise, collect fish and ancillary data*
August: *Post cruise data organization, specimen disposition*

FFY 15, 1st quarter (October 1, 2014-December 31, 2014)
Oct. – Dec. *Data organization, archival, analysis*
December 15: *Provide data to EVOSTC archive*

FFY 15, 2nd quarter (January 1, 2015-March 31, 2015)
January 18. *Annual Marine Science Symposium*
Jan. – Mar. *Data analysis and writing*

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

April 15	*Submit annual progress report.*
Apr. – Jun.	*Prepare for cruise, hire seasonal staff, buy supplies*

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

July:	*Conduct cruise, collect fish and ancillary data*
August:	*Post cruise data organization, specimen disposition*

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

Oct. – Dec.	*Data organization, archival, analysis*
December 15:	*Provide data to EVOSTC archive*

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

January 18.	*Annual Marine Science Symposium*
Jan. – Mar.	*Data analysis and writing*

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

April 15	*Submit final progress report.*
Apr. – Jun.	*Data analysis and writing*

FFY 16, 4th quarter (July 1, 2016-September 30, 2016)

Jul.-Sep.	*Data analysis and writing*
August 15	*Submit draft final report (in form of manuscript for publication)*
September 30	*Submit final report, end project.*

Budget: Funding required to complete this research is outlined in the accompanying excel file. USGS will make a substantial contribution of personnel time for PIs (0.5 FTE GS-11, 0.2 FTE GS-15), half of the vessel costs for annual cruises, and all the field equipment required including sampling nets (beach seine, modified herring trawl, zooplankton nets), oceanography equipment (CTD with rosette and external sensors, thermosalinograph), BIOSONICS DTX-4000 digital hydroacoustic equipment, and small boats. We request funding for 1FTE at the GS-9 level, 0.6 FTE at the GS-7 level, and 0.4 FTE at the GS-5 level. Travel funds will cover the field trips and meetings for the PI and other personnel. We will split the vessel costs equally between USGS and EVOS funding for cruises each year. Equipment and supplies will include an EchoView software license for acoustic data processing (year 1), and also calibration and maintenance for oceanographic equipment (all years). External contracts will include zooplankton processing, nutrients and chlorophyll a analyses, and stable isotope analyses. Indirect costs include 9% overhead.

***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	$123.1	$123.1	$123.1	$123.1	$119.8	$612.2
Travel	$11.4	$10.5	$10.5	$10.5	$3.3	$46.2
Contractual	$14.6	$28.9	$28.9	$28.9	$14.8	$115.9
Commodities	$20.0	$20.0	$20.0	$20.0	$0.0	$80.0
Equipment	$23.5	$3.3	$3.3	$3.3	$0.0	$33.4
Indirect Costs (*will vary by proposer*)						
SUBTOTAL	$192.6	$185.7	$185.7	$185.7	$137.9	$887.7
General Administration (9% of subtotal)	$17.3	$16.7	$16.7	$16.7	$12.4	$79.9
PROJECT TOTAL	$209.9	$202.5	$202.5	$202.5	$150.3	$967.6
Other Resources (Cost Share Funds)	$297.2	$297.2	$297.2	$297.2	$72.2	$1,260.8

Over life of the project, USGS will make a substantial contribution of salary (360.8K) for PIs (0.5 FTE GS-11, 0.2 FTE GS-15), half of the vessel costs for annual cruises (80K), and in each year all the field equipment required including sampling nets (5K; beach seine, modified herring trawl, zooplankton nets), oceanography equipment (90K; CTD with rosette and external sensors, thermosalinograph), BIOSONICS DTX-4000 digital hydroacoustic equipment (104K), and small boats (10.5K).

FY12-16

Program Title: LTM Pelagic Monitoring
Team Leader: John Piatt
Agency: USGS

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	$123.1	$123.1	$123.1	$123.1	$119.8	$612.2
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Contractual	$14.6	$28.9	$28.9	$28.9	$14.8	$115.9
Commodities	$20.0	$20.0	$20.0	$20.0	$0.0	$80.0
Equipment	$23.5	$3.3	$3.3	$3.3	$0.0	$33.4
SUBTOTAL	$192.6	$185.7	$185.7	$185.7	$137.9	$887.7
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Over life of the project, USGS will make a substantial contribution of salary (360.8K) for PIs (0.5 FTE GS-11, 0.2 FTE GS-15), half of the vessel costs for annual cruises (80K), and in each year all the field equipment required including sampling nets (5K; beach seine, modified herring trawl, zooplankton nets), oceanography equipment (90K; CTD with rosette and external sensors, thermosalinograph), BIOSONICS DTX-4000 digital hydroacoustic equipment (104K), and small boats (10.5K).

FY12-16

Program Title: LTM Pelagic Monitoring
Team Leader: John Piatt
Agency: USGS

FORM 4A
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
Piatt GS-15 (in kind)	LTM Forage Fish Project/Team Leader	2.0	0.0		0.0
Arimitsu GS-12 (in kind)	LTM Forage Fish Project/Project Leader	6.0	0.0		0.0
GS-9	LTM Forage Fish Project/ Fisheries Biologist	12.0	6057.0		72.7
GS-7	LTM Forage Fish Project/ Fisheries Biologist	8.0	4286.0		34.3
GS-5	LTM Forage Fish Project/ Seasonal Tech	5.0	3225.0		16.1
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
			Subtotal	13568.0	0.0	
				Personnel Total	$123.1

Travel Costs:		Ticket	Round	Total	Daily	Travel
Description		Price	Trips	Days	Per Diem	Sum
PI-Field Site	Airfare, M&IE	1,184	1	40	20.0	2.0
PI-Meeting	Airfare, hotel, M$IE	1,077	1	5	175.0	2.0
CO-PI Field Site	Airfare, M&IE	1,158	1	40	20.0	2.0
CO-PI Meeting	Airfare, hotel, M$IE	477	1	5	175.0	1.4
GS 9 Field Site	Airfare, M&IE	450	2	25	20.0	1.4
GS 7 Field Site	Airfare, M&IE	450	2	25	20.0	1.4
Volunteer Field Site	Airfare, M&IE	850	1	25	20.0	1.4
						0.0
						0.0
						0.0
						0.0
					Travel Total	$11.4

FY12

Program Title: LTM Pelagic Monitoring
Team Leader: John Piatt
Agency: USGS

FORM 4B
PERSONNEL & TRAVEL DETAIL

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

Contractual Costs: Description		Contract Sum
Zooplankton (60*$185/sample)		11.1
Nutrients, chla (120*$25/sample)		3.0
Outreach		0.5
If a component of the project will be performed under contract, the 4A and 4B forms are required.	**Contractual Total**	$14.6

Commodities Costs:	Commodities Sum
Description	
Research Vessel Operations (including fuel, food, supplies)	20
Commodities Total	$20.0

FY12

Program Title: LTM Pelagic Monitoring
Team Leader: John Piatt
Agency: USGS

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
EchoView Data Processing Software			16.8
Manifold for POM/phyto filters			0.8
2 computers			3.6
Calibration of CTD/sensors			1.8
Other Sampling equipment			0.5
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
		New Equipment Total	$23.5

Existing Equipment Usage: Descriptior	Number of Units	Inventory Agency
Research Vessel M/V Gyre (with mid-water trawl capability)	1	USGS
Nets (beach seine, trawl, zooplankton)	5	USGS
Oceanographic equipment (CTD, Rossette, Thermosalinograph)	1	USGS
BIOSONICS DT-4000 Hydroacoustic system	2	USGS
Small boats (Naiad RIB, Zodiac)	2	USGS

FY12

Program Title: LTM Pelagic Monitoring
Team Leader: John Piatt
Agency: USGS

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
Piatt GS-15 (in kind)	LTM Forage Fish Project/Team Leader	2.0	0.0		0.0
Arimitsu GS-12 (in kind)	LTM Forage Fish Project/Project Leader	6.0	0.0		0.0
GS-9	LTM Forage Fish Project/ Fisheries Biologist	12.0	6057.0		72.7
GS-7	LTM Forage Fish Project/ Fisheries Biologist	8.0	4286.0		34.3
GS-5	LTM Forage Fish Project/ Seasonal Tech	5.0	3225.0		16.1
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
		Subtotal	13568.0	0.0	
				Personnel Total	$123.1

Travel Costs:		Ticket	Round	Total	Daily	Travel
Description		Price	Trips	Days	Per Diem	Sum
PI-Field Site	Airfare, M&IE	1,184	1	40	20.0	2.0
PI-Meeting	Airfare, hotel, M$IE	1,077	1	5	175.0	2.0
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GS 9 Field Site	Airfare, M&IE	450	1	25	20.0	1.0
GS 7 Field Site	Airfare, M&IE	450	1	25	20.0	1.0
Volunteer Field Site	Airfare, M&IE	850	1	25	20.0	1.4
						0.0
						0.0
						0.0
						0.0
					Travel Total	$10.5

FY13

Program Title: LTM Pelagic Monitoring
Team Leader: John Piatt
Agency: USGS

FORM 4B
PERSONNEL & TRAVEL DETAIL

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

Contractual Costs: Description		Contract Sum
Zooplankton (60*$185/sample)		11.1
Nutrients, chla (120*$25/sample)		3.0
Stable isotope analyses		14.3
Outreach		0.5
If a component of the project will be performed under contract, the 4A and 4B forms are required.	**Contractual Total**	$28.9

Commodities Costs: Description		Commodities Sum
Research Vessel Operations (including fuel, food, supplies)		20
	Commodities Total	$20.0

FY13

Program Title: LTM Pelagic Monitoring
Team Leader: John Piatt
Agency: USGS

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
Calibration of CTD/sensors			1.80
EchoView Data license renewal (x2)			1.00
Other Sampling equipment			0.50
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
		New Equipment Total	$3.3

Existing Equipment Usage: Descriptior	Number of Units	Inventory Agency
Research Vessel M/V Gyre (with mid-water trawl capability)	1	USGS
Nets (beach seine, trawl, zooplankton)	5	USGS
Oceanographic equipment (CTD, Rossette, Thermosalinograph)	1	USGS
BIOSONICS DT-4000 Hydroacoustic system	2	USGS
Small boats (Naiad RIB, Zodiac)	2	USGS

FY13

Program Title: LTM Pelagic Monitoring
Team Leader: John Piatt
Agency: USGS

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
Piatt GS-15 (in kind)	LTM Forage Fish Project/Team Leader	2.0	0.0		0.0
Arimitsu GS-12 (in kind)	LTM Forage Fish Project/Project Leader	6.0	0.0		0.0
GS-9	LTM Forage Fish Project/ Fisheries Biologist	12.0	6057.0		72.7
GS-7	LTM Forage Fish Project/ Fisheries Biologist	8.0	4286.0		34.3
GS-5	LTM Forage Fish Project/ Seasonal Tech	5.0	3225.0		16.1
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
		Subtotal	13568.0	0.0	
				Personnel Total	$123.1

Travel Costs:		Ticket	Round	Total	Daily	Travel
Description		Price	Trips	Days	Per Diem	Sum
PI-Field Site	Airfare, M&IE	1,184	1	40	20.0	2.0
PI-Meeting	Airfare, hotel, M$IE	1,077	1	5	175.0	2.0
CO-PI Field Site	Airfare, M&IE	1,158	1	40	20.0	2.0
CO-PI Meeting	Airfare, hotel, M$IE	477	1	5	175.0	1.4
GS 9 Field Site	Airfare, M&IE	450	1	25	20.0	1.0
GS 7 Field Site	Airfare, M&IE	450	1	25	20.0	1.0
Volunteer Field Site	Airfare, M&IE	850	1	25	20.0	1.4
						0.0
						0.0
						0.0
						0.0
					Travel Total	$10.5

FY14

Program Title: LTM Pelagic Monitoring
Team Leader: John Piatt
Agency: USGS

FORM 4B
PERSONNEL & TRAVEL DETAIL

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

Contractual Costs: Description	Contract Sum
Zooplankton (60*$185/sample)	11.1
Nutrients, chla (120*$25/sample)	3.0
Stable isotope analyses	14.3
Outreach	0.5
If a component of the project will be performed under contract, the 4A and 4B forms are required. **Contractual Total**	$28.9

Commodities Costs: Description	Commodities Sum
Research Vessel Operations (including fuel, food, supplies)	20
Commodities Total	$20.0

FY14

Program Title: LTM Pelagic Monitoring
Team Leader: John Piatt
Agency: USGS

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
Calibration of CTD/sensors			1.80
EchoView Data license renewal (x2)			1.00
Other Sampling equipment			0.50
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
		New Equipment Total	$3.3

Existing Equipment Usage: Descriptior	Number of Units	Inventory Agency
Research Vessel M/V Gyre (with mid-water trawl capability)	1	USGS
Nets (beach seine, trawl, zooplankton)	5	USGS
Oceanographic equipment (CTD, Rossette, Thermosalinograph)	1	USGS
BIOSONICS DT-4000 Hydroacoustic system	2	USGS
Small boats (Naiad RIB, Zodiac)	2	USGS

FY14

Program Title: LTM Pelagic Monitoring
Team Leader: John Piatt
Agency: USGS

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
Piatt GS-15 (in kind)	LTM Forage Fish Project/Team Leader	2.0	0.0		0.0
Arimitsu GS-12 (in kind)	LTM Forage Fish Project/Project Leader	6.0	0.0		0.0
GS-9	LTM Forage Fish Project/ Fisheries Biologist	12.0	6057.0		72.7
GS-7	LTM Forage Fish Project/ Fisheries Biologist	8.0	4286.0		34.3
GS-5	LTM Forage Fish Project/ Seasonal Tech	5.0	3225.0		16.1
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
		Subtotal	13568.0	0.0	
				Personnel Total	$123.1

Travel Costs:		Ticket	Round	Total	Daily	Travel
Description		Price	Trips	Days	Per Diem	Sum
PI-Field Site	Airfare, M&IE	1,184	1	40	20.0	2.0
PI-Meeting	Airfare, hotel, M$IE	1,077	1	5	175.0	2.0
CO-PI Field Site	Airfare, M&IE	1,158	1	40	20.0	2.0
CO-PI Meeting	Airfare, hotel, M$IE	477	1	5	175.0	1.4
GS 9 Field Site	Airfare, M&IE	450	1	25	20.0	1.0
GS 7 Field Site	Airfare, M&IE	450	1	25	20.0	1.0
Volunteer Field Site	Airfare, M&IE	850	1	25	20.0	1.4
						0.0
						0.0
						0.0
						0.0
					Travel Total	$10.5

FY15

Program Title: LTM Pelagic Monitoring
Team Leader: John Piatt
Agency: USGS

FORM 4B
PERSONNEL & TRAVEL
DETAIL

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

Contractual Costs: Description	Contract Sum
Zooplankton (60*$185/sample)	11.1
Nutrients, chla (120*$25/sample)	3.0
Stable isotope analyses	14.3
Outreach	0.5
If a component of the project will be performed under contract, the 4A and 4B forms are required. **Contractual Total**	$28.9

Commodities Costs: Description	Commodities Sum
Research Vessel Operations (including fuel, food, supplies)	20

Commodities Total	$20.0

FY15

Program Title: LTM Pelagic Monitoring
Team Leader: John Piatt
Agency: USGS

FORM 4B
CONTRACTUAL & COMMODITIES DETAIL

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

New Equipment Purchases: Description	Number of Units	Unit Price	Equipment Sum
Calibration of CTD/sensors			1.80
EchoView Data license renewal (x2)			1.00
Other Sampling equipment			0.50
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
		New Equipment Total	$3.3

Existing Equipment Usage: Descriptior	Number of Units	Inventory Agency
Research Vessel M/V Gyre (with mid-water trawl capability)	1	USGS
Nets (beach seine, trawl, zooplankton)	5	USGS
Oceanographic equipment (CTD, Rossette, Thermosalinograph)	1	USGS
BIOSONICS DT-4000 Hydroacoustic system	2	USGS
Small boats (Naiad RIB, Zodiac)	2	USGS

FY15

Program Title: LTM Pelagic Monitoring
Team Leader: John Piatt
Agency: USGS

FORM 4B
EQUIPMENT DETAIL

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

Personnel Costs:		Months	Monthly		Personnel
Name	Project Title	Budgeted	Costs	Overtime	Sum
Piatt GS-15 (in kind)	LTM Forage Fish Project/Team Leader	2.0	0.0		0.0
Arimitsu GS-12 (in kind)	LTM Forage Fish Project/Project Leader	6.0	0.0		0.0
GS-9	LTM Forage Fish Project/ Fisheries Biologist	12.0	6057.0		72.7
GS-7	LTM Forage Fish Project/ Fisheries Biologist	10.2	4645.0		47.1
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
		Subtotal	10702.0	0.0	
				Personnel Total	$119.8

Travel Costs:		Ticket	Round	Total	Daily	Travel
Description		Price	Trips	Days	Per Diem	Sum
PI-Meeting	Airfare, hotel, M$IE	1,077	1	5	175.0	2.0
CO-PI Meeting	Airfare, hotel, M$IE	477	1	5	175.0	1.4
						0.0
						0.0
						0.0
						0.0
					Travel Total	$3.3

FY16

Program Title: LTM Pelagic Monitoring
Team Leader: John Piatt
Agency: USGS

FORM 4B
PERSONNEL & TRAVEL
DETAIL

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

Contractual Costs: Description	Contract Sum
Stable Isotope Analyses	14.3
Outreach	0.5
If a component of the project will be performed under contract, the 4A and 4B forms are required. **Contractual Total**	$14.8

Commodities Costs: Description	Commodities Sum
Commodities Total	$0.0

FY16

Program Title: LTM Pelagic Monitoring
Team Leader: John Piatt
Agency: USGS

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
Research Vessel M/V Gyre (with mid-water trawl capability)	1	USGS
Nets (beach seine, trawl, zooplankton)	5	USGS
Oceanographic equipment (CTD, Rossette, Thermosalinograph)	1	USGS
BIOSONICS DT-4000 Hydroacoustic system	2	USGS
Small boats (Naiad RIB, Zodiac)	2	USGS

FY16

Program Title: LTM Pelagic Monitoring
Team Leader: John Piatt
Agency: USGS

FORM 4B
EQUIPMENT DETAIL

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