

## PROPOSAL SIGNATURE FORM

**THIS FORM MUST BE SIGNED BY THE PROPOSED PRINCIPAL INVESTIGATOR AND SUBMITTED ALONG WITH THE PROPOSAL.** If the proposal has more than one investigator, this form must be signed by at least one of the investigators, and that investigator will ensure that Trustee Council requirements are followed. Proposals will not be reviewed until this signed form is received by the Trustee Council Office.

By submission of this proposal, I agree to abide by the Trustee Council's data policy (Trustee Council Data Policy\*, adopted March 17, 2008) and reporting requirements (Procedures for the Preparation and Distribution of Reports\*\*, adopted June 27, 2007).

**PROJECT TITLE:** Monitoring for Evaluation of Recovery and Restoration of Injured Nearshore Resources

Printed Name of PI Bodkin, James, L.

Email: James\_Bodkin@usgs.gov

Mailing Address 4210 University Drive

City, State, Zip Anchorage, Alaska, 99508

Phone: 907.786.7164

Signature of PI: \_\_\_\_\_ Date: 20 April 2009

Printed Name of PI Dean, Thomas, A.

Email: tom@innerclam.net

Mailing Address 302-A Pier View Way

City, State, Zip Carlsbad, CA, 92504

Phone: 760.721.2798

Signature of PI: \_\_\_\_\_ Date: 20 April 2009

\* [www.evostc.state.ak.us/Policies/data.cfm](http://www.evostc.state.ak.us/Policies/data.cfm)

\*\* [www.evostc.state.ak.us/Policies/reporting.cfm](http://www.evostc.state.ak.us/Policies/reporting.cfm)

**FY10 INVITATION  
PROPOSAL SUMMARY PAGE****Project Title:** Monitoring for Evaluation of Recovery and Restoration of Injured Nearshore Resources**Project Period:** October 1, 2009 – September 30, 2013**Primary Investigator(s):**James L. Bodkin, US Geological Survey  
Thomas A. Dean, Coastal Resource Associates**Study Location:** Western Prince William Sound

**Abstract:** The proposed project is designed to assist in the evaluation of recovery and restoration of injured resources in Prince William Sound. The primary objective is to initiate or continue recovery and restoration monitoring in the nearshore in Prince William Sound following the plan developed in Restoration Project 050750 and tested in Restoration Project 070750. The goal of this program is to evaluate the current status of EVOS injured resources and services (recreational, subsistence, and passive use), to determine when populations may be considered recovered, and to foster recovery of those resources by identifying and recommending actions in response to factors limiting recovery. The National Park Service and USGS began implementation of a similar nearshore monitoring plan outside of Prince William Sound (i.e., along the Katmai, Kenai Fjords, and Lake Clark National Park coasts, including both oiled and unoiled sites) in 2006. This program is collecting information similar to the data sets that have been used to assess recovery of injured resources in Prince William Sound (e.g., population abundance and survival of sea otters, population abundance of harlequin ducks and other nearshore birds, abundance estimates for mussels, clams, and other intertidal organisms). Contrasts among trends in injured resources in and outside Prince William Sound, including both oiled and unoiled areas will provide the primary means of resource evaluation. Funds for conducting some of these studies in Prince William Sound (e.g., bird and mammal surveys, D. Irons USFWS) are being sought by other proposals submitted to the Trustee Council and are not addressed herein. Our purpose is to implement a nearshore monitoring program in Western Prince William Sound related to EVOS injured resources and to make it comparable to the program being carried out by the National Park Service in the Gulf of Alaska outside of Prince William Sound. This proposed nearshore sampling in Prince William Sound, in conjunction with nearshore sampling and data management supported by NPS and USGS will provide the foundation of a comprehensive restoration monitoring program for the entire oil spill area.

<b>Estimated Budget:</b>				
<b>EVOS Funding Requested</b> <i>(must include 9% GA)</i>				
<b>FY10</b>	<b>FY11</b>	<b>FY12</b>	<b>FY13</b>	<b>Total</b>
166.4	166.4	165.3	103.4	601.5
<b>Non-EVOS Funds to be used:</b>				
<b>FY10</b>	<b>FY11</b>	<b>FY12</b>	<b>FY13</b>	<b>Total</b>
52.0	52.0	52.0	5.0	161.0

## PROJECT PLAN

### I. NEED FOR THE PROJECT

A. Most of the resources injured as a result of the Exxon Valdez Oil Spill (EVOS) are associated with the nearshore environment. This is not surprising given that most of the spilled oil was deposited in the intertidal zone where a significant fraction still remains (Short et al. 2004). The evaluation of injured resources in the nearshore has relied, and will continue to rely, largely on long-term data sets of abundance and other demographic characteristics for nearshore populations. Many of these data sets, including population abundance (Figure 1) and survival of sea otters, population abundance of harlequin ducks and other nearshore birds, abundance estimates for mussels, clams, and other intertidal organisms are also a critical part of a comprehensive Gulf of Alaska nearshore monitoring plan (Dean and Bodkin 2006). Continued monitoring can play a critical role in restoration in two important ways. First, it is necessary to secure the long-term evaluation of injured species and resources to determine when populations in oiled and unoled areas can be declared “recovered” or until it is determined that further remediation or enhancement is required. Second, recovery can be facilitated by identifying human induced effects that are independent of EVOS, and may be amenable to management actions, thus facilitating unimpeded recovery. Trial implementation of the program developed by Coastal Resource Associates and the U.S. Geological Survey (Dean and Bodkin 2006) was conducted for the EVOS Trustee Council in 2007 (Dean et al. 2008).

We propose to resume implementation in 2010 of the nearshore restoration monitoring program described by Dean and Bodkin (2006), and reported in Dean et al. (2008). This program (in a slightly modified form) is currently operational in the National Park Service (NPS) as part of long-term monitoring along the Southwest Alaska Network of National Parks (SWAN; including Katmai, Kenai Fjords, and Lake Clark National Parks). Many of the key elements of the monitoring program developed by Dean and Bodkin (2006) and implemented in SWAN Parks are the same as those previously used to evaluate recovery of injured resources in Prince William Sound, and to a lesser extent on the Kenai coast. These include aerial surveys of sea otter abundance, estimates of sea otter survival based on ages at death of beach-cast carcasses, surveys of marine bird and mammal abundance, and shoreline video surveys. The purpose in this proposal is to implement the full complement of elements outlined in the Dean and Bodkin (2006) monitoring program. This will provide for the continued evaluation of those nearshore injured resources and services that have failed to demonstrate recovery, including intertidal and subtidal communities, black oystercatchers, sea otters, clams, mussels, Barrow’s goldeneye, harlequin ducks, pigeon guillemots, and passive use, recreational, tourism, and subsistence

services (EVOS 2006). All proposed sampling is to be conducted in western Prince William Sound (WPWS). Funds for conducting marine bird surveys in Prince William Sound are being sought by another proposal (Irons et al. USFWS) being submitted to the Trustee Council and are not addressed herein. This proposed nearshore sampling in PWS with similar sampling being conducted in SWAN Parks in the Gulf of Alaska (GOA), as areas of contrast, will provide the foundation of a comprehensive restoration monitoring program. The goal of this program is to detect and identify sources of change in the nearshore and to foster recovery of nearshore resources by identifying adverse human-induced impacts that may be limiting recovery. We will build on prior and ongoing efforts both in Prince William Sound and at sites elsewhere in the Gulf of Alaska to achieve program goals.

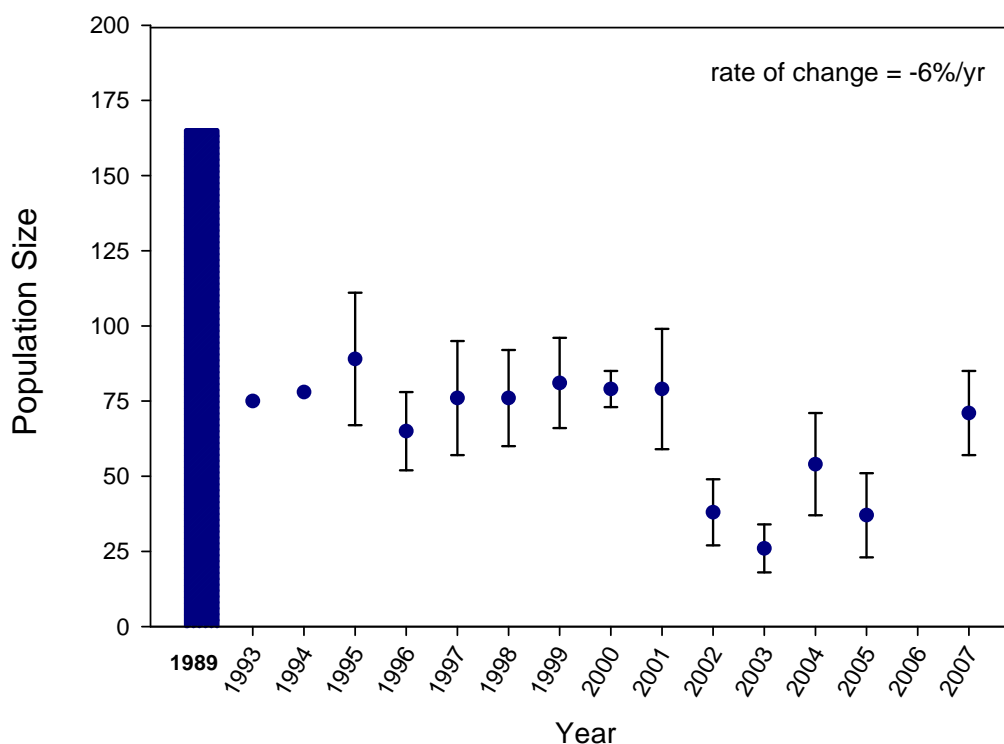


Figure 1. Sea otter population trend at northern Knight Island, Prince William Sound. The 1989 bar represents the number of live and dead sea otters that were captured or recovered during March and April of 1989 from the northern Knight Island area where aerial surveys were conducted from 1993-2007. This number of 164 does not include animals that survived, or that died and were not recovered from in this area. It may include animals that died elsewhere but were recovered here (From Bodkin et al. 2002).

## **B. Relevance to 1994 Restoration Plan Goals and Scientific Priorities**

The injured resource monitoring program we are proposing provides important information to help guide restoration activities. The information we will provide includes the status and condition of many of those resources and services that were injured as a result of the EVOS and remain less than fully recovered (e.g., Figure 1, sea otters). These resources include intertidal and subtidal communities, clams, mussels, Barrows goldeneye, harlequin ducks, pigeon guillemots, black oystercatchers and sea otters. The data we will collect will aid managers to determine whether each injured resource is recovering, whether further restoration activities are required, and what factors may be constraining recovery. Defining recovery of EVOS induced injuries has proven difficult for many resources for various reasons, including 1) a lack of pre-spill data that could provide a recovery target and 2) cause and patterns of change in populations independent, or concurrent with EVOS effects, that confound the ability to separate causal factors and thus limit confidence in spill related assessments. The information we propose to accumulate will be useful in overcoming some of these difficulties by providing multiple contrasts over both time and space within the domain of potential EVOS effects, ranging from a maximum (i.e., northern Knight Island, in WPWS) to a minimum (i.e., unoiled areas on the Kenai and Katmai coasts).

The three years of work we are proposing are the minimum required to determine current trends in population abundance or other parameters, such as age or size class distributions, that will be useful for evaluating the status of resources. Contrasts among sites within WPWS and among sites in the Gulf of Alaska (Kenai and Katmai SWAN sites) will allow comparisons across areas that vary in relation to initial levels of oiling and potential long-term exposure to lingering oil. Such contrasts may prove useful in determining the likelihood of lingering oil as a factor limiting resource recovery. Alternatively, a similarity in trends observed across sites may indicate a larger scale phenomenon driving observed patterns. The final report in year four of this project, in addition to evaluating injured resource recovery status, will provide recommendations as to the need and value of continued monitoring.

## **II. PROJECT DESIGN**

### **A. Objectives**

The objectives of the proposed work are:

1. Continue restoration monitoring in the nearshore in order to evaluate the current status of injured resources in oiled areas.
2. Identify if those injured resources being monitored may be considered recovered from EVOS effects.
3. Identify potential factors that could inhibit recovery of injured resources, and recommend potential restoration actions.

## **B. Procedural and Scientific Methods**

### **Initiate Implementation of Nearshore Restoration Monitoring**

Following several years of planning and testing, Dean and Bodkin (2006) drafted a restoration and ecosystem monitoring plan for the nearshore marine ecosystems in the Gulf of Alaska and presented this to the Trustee Council. Within this plan it is recognized that 1) restoration of resources injured by the *Exxon Valdez* Oil Spill will benefit from contemporary information on the status and trends of those injured resources on a variety of spatial scales within the Gulf, and 2) changes independent of the oil spill are likely to occur, and these are likely to result from a number of different agents (e.g., global climate change, shoreline development and associated inputs of pollutants). Further, in order to affect restoration of injured resources it is essential to separate EVOS- related effects from other sources of change. The goal of the plan is to identify changes that may be occurring within the system, identify causes for change, and suggest actions to facilitate recovery of resources injured by the EVOS.

In 2006, the 2006 Bodkin and Dean plan for the EVOS area was jump-started when the National Park Service implemented a modified version along the Katmai coast, with subsequent implementation in Kenai Fjords in 2007 and Lake Clark in 2009. This effort is part of the NPS Vital Signs monitoring project and scheduled to continue into the foreseeable future. In 2007 the EVOS Trustee Council supported the trial implementation of the nearshore monitoring program described by Dean and Bodkin (2006). Metrics sampled in both the SWAN and EVOS projects (Table 1) that we are proposing to continue sampling in PWS in 2010-2012 include:

- 1) Sampling marine mammal and seabird marine mammal abundance - Seabird and marine mammal abundance are estimated via boat surveys in summer and winter. Counts are made along shoreline transects using the methods of Irons et al. (2000). The focus is on estimating the abundance of birds closely linked to the nearshore (especially black oystercatchers, harlequin ducks, and Barrow's goldeneye) and therefore are restricted to areas within 200 meters of shorelines. Surveys will be conducted in summer and winter so that abundance estimates can be obtained for birds with different seasonal patterns (e.g., harlequin ducks and goldeneye that are more abundant in winter and black oystercatchers that are more abundant in summer).
- 2) Sampling of sea otter diets - The species composition and relative abundance of sea otter prey are sampled using direct observation of sea otter feeding (Calkins 1978, Estes et al. 1981, Dean et al. 2002). These observations provide an assessment of prey being consumed by sea otters as well as an indirect measure of the composition and relative abundance of representative subtidal invertebrates that are otherwise difficult to sample.
- 3) Sampling of marine mammal and seabirds, marine mammal and bird carcasses, herring spawn, debris, changes in beach geomorphology, and patterns of human use - Specified beach segments are surveyed. Sea otter skulls are collected from beaches and a tooth extracted from each skull and sectioned to determine the age of the sea otter (Bodkin et al. 1997). The data on the age distribution of dead sea otters will be used to develop age-

specific survival estimates based on models (Monson et al. 2000, Bodkin et al. 2002). The number and location of selected nearshore birds and mammals, bird and mammal carcasses, herring spawn, large debris items, oil or chemical spills, areas of intense human usage, and items spilled from cargo ships are recorded. In addition, changes in shoreline geomorphology and the presence of any unusual species (especially potentially invasive ones) are noted. These data will primarily be used to document unusual events or trends (large scale die offs of birds, or change in beach geomorphology) and changing patterns of human use.

- 4) Sampling of oystercatcher breeding territory abundance and oystercatcher chick provisioning - The number of black oystercatcher breeding territories are identified and nest sites are surveyed along shoreline transects. The species composition and relative abundance of oystercatcher prey provided to chicks will be evaluated by sampling prey remains at oystercatcher nesting sites (Webster 1941, Andres 1998).
- 5) Sampling of intertidal plants and invertebrates on sheltered rocky shores - Five sites on sheltered rocky shores are selected and sampled to determine the abundance and distribution of intertidal invertebrates and algae. Metrics include algal diversity, invertebrate diversity, abundances of selected dominant taxa, size distributions of mussels, and limpets, and the concentration of contaminants in mussels.
- 6) Sampling of infaunal invertebrates in gravel / mixed-sand gravel shores - Sampling of infaunal invertebrates will be conducted at five gravel / mixed sand-gravel sites. Sampling will focus on clams as representative infaunal species. Metrics obtained will include abundances of selected clam species, size distributions of littleneck clams, and growth rates of littleneck clams. Sediment samples will be obtained from gravel / sand-gravel sites for determination of grain size distribution.

Metrics to be sampled in 2010-2012 in PWS will also include:

1) Sampling of sea otter abundance - Sea otter abundance will be estimated using aerial survey methods described by Bodkin and Udevitz (1994). These methods have been used to conduct annual surveys to estimate the abundance of sea otters in Prince William Sound since 1993 (Bodkin et al. 2002, Figure 1), and on a less frequent basis elsewhere in the GOA. The metric obtained will be numbers of sea otters per block (see below for sampling design).

Table 1. Elements of long-term monitoring of the nearshore and the status of these in sampling conducted in Katmai National Park (implemented in 2006), Kenai National Park, and Western Prince William Sound in 2007. PWS projects that address elements not covered in this proposal are indicated. X indicates completion of data collection at Katmai and Kenai National Parks.

	Katmai	Kenai	PWS -2007
Marine Intertidal			
Shore-zone mapping	X	X	EVOS 070805 – Lindeberg, NOAA
Sheltered rocky	X	X (2008)	Dean et al. 2008
Gravel / sand	X	X	Dean et al. 2008
Marine Birds			
Density	X	X	EVOS 08075 - Irons USFWS
Black oystercatcher			
Nest density	X	X	Dean et al. 2008
Chick& eggs / nest	X	X	Dean et al. 2008
Prey composition	X	X	Dean et al. 2008
Sea otter			
Abundance	X (2008)	X	EVOS 080808– Bodkin
Survival	X		EVOS 080808 – Bodkin
Forage success	X	X	Dean et al. 2008
Kelp and eelgrass			
Shorezone mapping	X	X	EVOS 070805 – Lindeberg, NOAA
Eel Grass	X	X	None <sup>1</sup>
Mussel bed size	X (Methods development)	X (2008)	None <sup>2</sup>
Marine Water Quality			
Temperature	X	X	None <sup>3</sup>
PAH contaminants	X	X	None <sup>3</sup> (but historical data available)
Other contaminants	X	X	None <sup>2</sup>

<sup>1</sup> Eelgrass mapping was not conducted in PWS because methods were still in the development phase

<sup>2</sup> Mussel bed sampling data in pws available from prior EVOS work, 1996-1998, O’Clair

<sup>3</sup> Marine water quality monitoring in PWS was not conducted because of uncertainty with respect to prospects for longer-term funding.

In summary, we propose to initiate a sampling effort in Western Prince William Sound in 2010 similar to that underway at other locations in the GOA. With the exception of the marine bird and mammal surveys (being proposed by Irons et al. USFWS) all elements of the Dean and Bodkin (2006) plan are included as part of this proposal and are expressly designed to examine



the status of recovery of injured resources. Efforts proposed herein include sampling of sea otter abundance, diet, and mortality; black oystercatcher abundance, productivity and diet; sampling of intertidal invertebrates and algae on sheltered rocky shores, and sampling of infaunal invertebrates on sheltered soft-sediment shores. Sampling will be restricted to Western Prince William Sound in the intensive block identified in Dean and Bodkin 2006) and at 5 sites within the WPWS block for invertebrates on sheltered rocky and on gravel/sand beaches (Figure 2). All procedures (including site selection and specific sampling and analytical methods) are described in Dean and Bodkin (2006).

### **C. Data Analysis and Statistical Methods**

Data analyses and statistical methods used to evaluate changes in the nearshore environment are detailed in Dean and Bodkin (2006) and Dean et al., (2008). In general we will examine trends in each metric over time within each location (Western PWS and at SWAN, GOA locations, Figure 3), differences between locations over time, and interactions between time and locations (i.e., the extent to which changes within each location track changes across locations over time), through regression and information-theoretic (IT) criterion (Burnham and Anderson 2002, 2004). Competing hypotheses (models) will be selected a priori and those models will be ranked based on their relative support (AIC values). These analyses will help to sort out effects of small scale sources of change (e.g., effects of oil in PWS or other location specific impacts such as logging activities) from larger scale sources of change (e.g., those due to climate change that are occurring over the entire GOA).

### **D. Description of Study Area**

The proposal specifically aims to implement sampling within western Prince William Sound. Comparable monitoring is being conducted in the SWAN National Parks (Katmai, Kenai Fjords, and Lake Clark (limited sampling)) and is funded entirely by the National Park Service. Contrasts between WPWS and other locations in the Gulf of Alaska where oiling in 1989 was less pervasive, or non-existent will provide useful contrasts in the evaluation of the status of injured resources in WPWS.

### **E. Coordination and Collaboration with Other Efforts**

The portion of the proposal regarding implementation of long-term monitoring requires coordination with other researchers conducting surveys related to recovery of nearshore resources. We have coordinated efforts to the extent possible by not including efforts proposed elsewhere (e.g., surveys of marine birds) in this proposal. However, in order to achieve maximum efficiency, additional coordination will be required once the Trustee Council determines which of these tasks are to be funded and provides a comprehensive vision of future monitoring efforts.

Community involvement- We will use vessels, equipment and supplies, chartered or obtained in communities in PWS. Information gathered in this course of study will be made available to local, regional and national audiences through USGS and NPS web sites. Visits to communities in PWS to share findings will be made upon request.

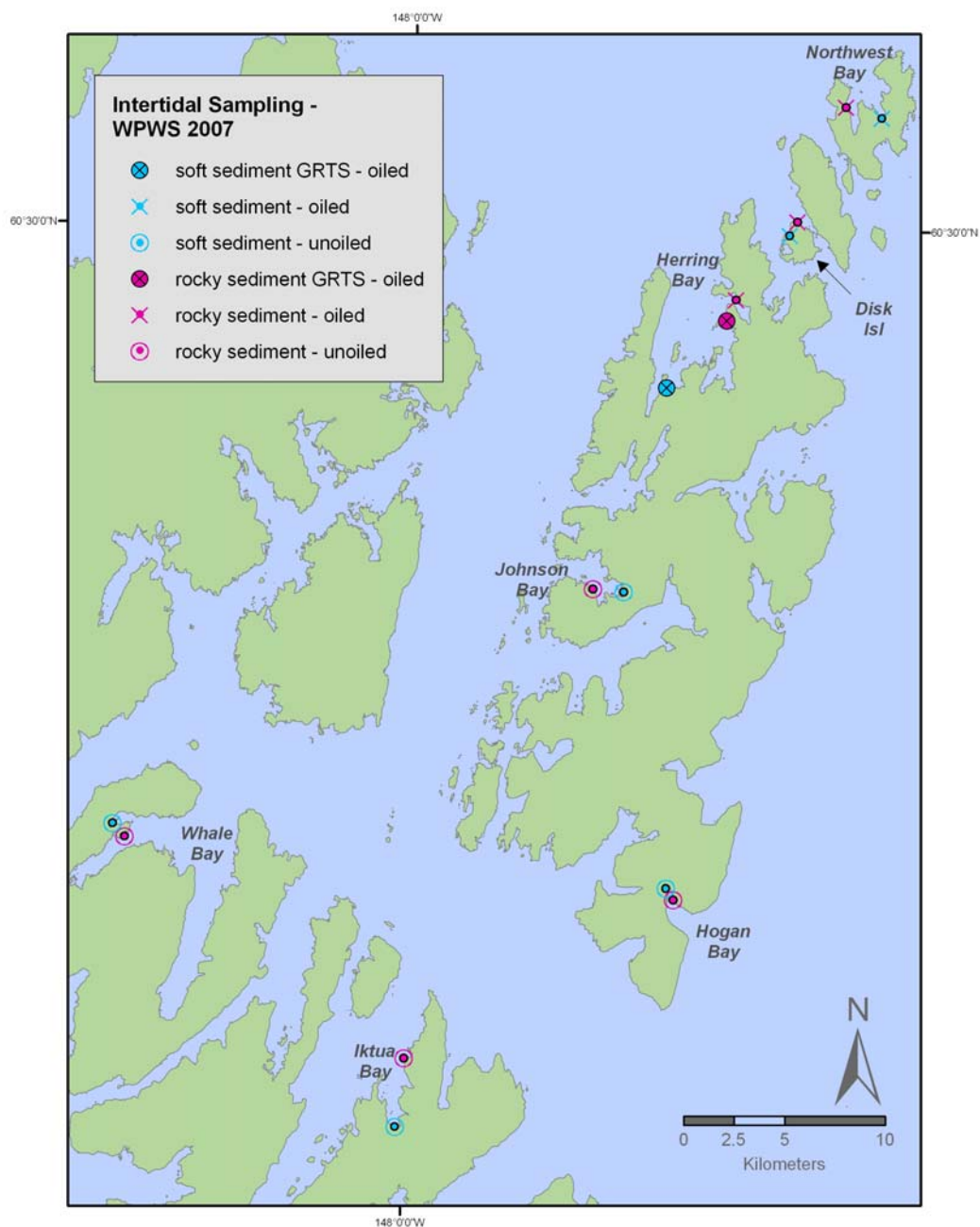


Figure 2. Locations of sheltered rocky and sand/gravel intertidal sites sampled in Western Prince William Sound in 2007. Sites were selected using a generalized random tessellation stratified sample selection procedure (GRTS) and are indicated with a circle with a dot or an X in the center. An X in the center indicates that it was oiled. Previously established (selected) sites are indicated by X's. Soft sediment sites are in blue and rocky sediment sites are in red.



Figure 3. Location of nearshore sampling conducted in Western Prince William Sound, Katmai National Park and Preserve, Kenai Fjords National Park in 2007, and Lake Clark National Park and Preserve in 2009 (outlined in red). Park boundaries are outlined in blue. Intensive sampling block designations are from the Dean and Bodkin (2006) sampling design.

### **III. SCHEDULE**

#### **A. Project Milestones**

- Objective 1. Initiate long-term monitoring and report initial results:  
To be met initially by October 2010, and annually through 2012
  
- Objective 2. Identify if those injured resources being monitored may be considered recovered from EVOS effects:  
Provide recommendations in final report related to the status of injured resources
  
- Objective 3. Identify potential factors that could inhibit recovery of injured resources, and recommend potential restoration actions:  
As human or other manageable impacts affecting recovery are identified

#### **B. Measurable Project Tasks**

##### **FY 2010**

FY 2010, 1st quarter (October 1, 2009-December 31, 2009)

October: Project funding approved by Trustee Council

December: Complete initial development sampling plan

FY 2010, 2nd quarter (January 1, 2010-March 31, 2010)

Annual Alaska Marine Science Symposium

FY 2010, 3<sup>rd</sup> quarter (April 1 2010- June 30 2010)

Sea otter, marine bird, and debris beach collections

FY 2010, 4th quarter (July 1, 2010-September 30, 2010)

August: Complete 2010 field sampling (sea otter abundance and diet, black oystercatcher density, productivity and diet, sheltered rocky and soft sediment intertidal sampling)

##### **FY 2011**

FY 2011, 1st quarter (October 1, 2010-December 31, 2010)

October: Complete 2010 trip report

December: Complete 2010 data analysis

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

January: Annual Alaska Marine Science Symposium

FY 2011, 3<sup>rd</sup> quarter (April 1 2011- June 30 2011)

April 15: 2010 Interim annual field report

April: Sea otter, marine bird, and debris beach collections

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

August: Complete 2011 field sampling (sea otter abundance and diet, black oystercatcher density, productivity and diet, sheltered rocky and soft sediment intertidal sampling)

**FY 2012**

FY 2012 1st quarter (October 1, 2011-December 31, 2011)

October: Complete 2011 trip report

December Complete 2011 data analysis

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

January Annual Alaska Marine Science Symposium

FY 2012, 3<sup>rd</sup> quarter (April 1 2013- June 30 2013)

April 15: 2011 Interim annual field report

April: Sea otter, marine bird, and debris beach collections

FY 2012, 4th quarter (July 1, 2012-September 30, 2012)

August: Complete 2012 field sampling (sea otter abundance and diet, black oystercatcher density, productivity and diet, sheltered rocky and soft sediment intertidal sampling)

**2013**

FY 2013 1<sup>st</sup> quarter (October 1 2012-December 31, 2012)

October: Complete 2012 trip report

December: Continue 2010-2012 data analysis

FY 2013, 2nd quarter (January 1, 2013-March 31, 2013)

January Annual Alaska Marine Science Symposium

FY 2013, 3<sup>rd</sup> quarter (April 1 2013- June 30 2013)

April: Final report draft

FY 2013, 4th quarter (July 1, 2013-September 30, 2013)

August: Receive and incorporate final report reviews when available

September: As possible, secure approval, publish and submit final report to EVOS office and ARLIS

#### IV. REFERENCES

- Andres, B.A. 1996. Consequences of the Exxon Valdez oil spill on black oystercatchers inhabiting Prince William Sound. Ph. D. Thesis. Ohio State University. Columbus. 98 pp.
- Bodkin, J.L., and M.S. Udevitz. 1994. An intersection model for estimating sea otter mortality along the Kenai Peninsula. In: Loughlin T (ed) Marine mammals and the *Exxon Valdez*. Academic Press, San Diego, p 81-95
- Bodkin J.L., J.A. Ames, R.J. Jameson, A.M. Johnson, and G.M. Matson. 1997. Estimating age of sea otters with cementum layers in the first premolar. *J Wildl Manag* 61:967-
- Bodkin, J.L., B.E. Ballachey, T.A. Dean, A.K. Fukuyama, S.C. Jewett, L.L. McDonald, D.H. Monson, C.E. O'Clair, and G.R. VanBlaricom. 2002. Sea otter population status and the process of recovery following the 1989 *Exxon Valdez* oil spill. *Mar Ecol Prog Ser*. 241:237-253.
- Burnham, K.P. and D.R. Anderson. 2002. *Model selection and multimodel inference*. 2nd Ed. Springer-Verlag, New York.
- Burnham, K.P. and D.R. Anderson. 2004. Multimodel inference: understanding AIC and BIC in model selection. *Sociological Methods in Research* 33:261-304.
- Calkins, D.G. 1978. Feeding behavior and major prey species of the sea otter, *Enhydra lutris*, in Montague Strait, Prince William Sound, Alaska. *US Fish Bull* 76:125-131
- Dean, T. and J.L. Bodkin. 2006. Sampling Protocol for the Nearshore Restoration and Ecosystem Monitoring (N-REM) Program (Nearshore Restoration and Ecosystem Monitoring Research Project G-050750), US Geological Survey, Alaska Science Center, Anchorage, Alaska. Report submitted to the EVOS Trustee Council. 99 pg. plus appendices.
- Dean, T.A., J.L. Bodkin, A. Fukuyama, S.C. Jewett, D.H. Monson, C.E. O'Clair, G.R. VanBlaricom. 2002. Food limitation and the recovery of sea otters following the *Exxon Valdez* oil spill. *Marine Ecology Progress Series* 241:255-270
- Dean, T.A., J.L. Bodkin, H.A. Coletti and K.A. Kloecker. 2008. Nearshore Data Management and Monitoring Project. Draft final report, Exxon Valdez Trustee Council Restoration Project 070750, Anchorage, Alaska, 99501, 56pp. April 2008.
- Estes, J. A., R. J. Jameson, and A. M. Johnson. 1981. Food selection and some foraging tactics of sea otters. *in* The worldwide furbearer conference proceedings J. A. P. D. Chapman, editors. The worldwide furbearer conference proceedings. University of Maryland Press, Bethesda, MD.
- Exxon Valdez* Oil Spill Trustee Council. 2006. *Exxon Valdez* Oil Spill Restoration Plan: Update on Injured Resources and Services 2006. 41p.
- Harper, J.R., M. Morris. 2003. Shore-zone mapping system for the Gulf of Alaska. EVOS project 030641. Draft Report of December 2003.

Irons, D.B., S.J. Kendall, W.P. Erickson, and L.L. McDonald. 2000. Nine years after the Exxon Valdez oil spill: effects on marine bird populations in Prince William sound, Alaska. *Condor* 102:723-737.

Monson, D. H., D. F. Doak, B. E. Ballachey, A. Johnson, and J. L. Bodkin. 2000. Long-term impacts of the Exxon Valdez oil spill on sea otters, assessed through age-dependent mortality patterns. *Proc. Natl. Acad. Sci. USA* 97(12): 6562-6567.

Short, J.W., M. R. Lindeberg, P. M. Harris, J. M. Maselko, J. J. Pela, and S. D. Rice. 2004. Estimate of oil persisting on the beaches of Prince William Sound 12 years after the *Exxon Valdez* oil spill. *Environmental Science and Technology*. 38(1):19-25.

Webster, J. D. 1941. Feeding habitats of the black oyster-catcher. *The Condor* 43: 175-180.

## V. RESUMES

**James L. Bodkin**

March 2009

Research Wildlife Biologist, Alaska Science Center, USGS, 4210 University Dr, Anchorage, Alaska, 99508. phone 907-786-7164, fax 907-786-7150 email, james\_bodkin@usgs.gov.

Education: 1985 -MS, California Polytechnic State University, San Luis Obispo, CA. (Wildlife Biology)  
1976- BS, Long Beach State University (Biology), Long Beach, CA  
1972 - AS, Cypress College (Biology), Cypress, CA

Memberships: Society for Marine Mammalogy  
American Society of Mammalogists  
Society for Conservation Biology  
Wildlife Society

Responsibilities:

I lead Alaska sea otter research and a related marine science program focused on nearshore ecosystems for the Alaska Science Center. The mission of the Center is to provide biological information and research findings to resource managers, policymakers, and the public to support sound management of biological resources and ecosystems in Alaska and throughout the North Pacific Ocean. The Alaska sea otter project is one of two USGS sea otter research programs, the other led by Tim Tinker, located in Santa Cruz, CA.

Responsible for designing, developing and directing multi-disciplinary research programs for studying North Pacific coastal marine ecosystems, focusing on sea otter populations and their role in structuring coastal marine communities in Alaska. Current research programs encompass three broad objectives, including, 1) designing, developing and testing methods to assess the status of sea otter populations, 2) describing processes responsible for structuring coastal marine communities, and 3) determining the status of recovery of sea otter populations affected by the 1989 Exxon Valdez oil spill in Prince William Sound, Alaska.

Scope of each of the three research programs:

**Designing, developing and testing methods to assess the status of sea otter populations.** Appropriate conservation and management of sea otter populations requires accurate knowledge on the status of populations relative to available resources, primarily food and space. Current projects to evaluate population status include measures of abundance (density), age and sex specific fecundity and survival, individual condition and bio-markers, and activity-time budgets. Remote sensing devices (time-depth recorders) are currently being tested as a new method to estimate time budgets.



**Describing processes responsible for structuring coastal marine communities.** Processes responsible for driving the structure and function of north Pacific coastal communities are complex and not well understood, yet managers of coastal resources need to understand causes of variation and change in coastal communities. Current projects include a) defining coastal marine community structure in terms of physical character, biological productivity, and species composition and abundance of algae, macro-invertebrates, fishes, birds and mammals, and b) employing comparative and experimental methods to allow inference regarding cause of change in the coastal system.

**Determine the status of recovery of sea otter populations affected by the 1989 Exxon Valdez oil spill in Prince William Sound, Alaska.** Natural resources are subjected to increasing levels of anthropogenic disturbance, as exemplified by this nation's largest oil spill, the Exxon Valdez spill of 1989. Previous methods to understand the acute and chronic effects of disturbances at both species and ecosystem levels are poorly developed, often leading to uncertainty. Project objectives include developing new tools and approaches to improve our understanding of catastrophic perturbations and methods to describe the processes of how systems recover and to identify factors that can constrain system recovery.

#### Selected Publications:

- Bodkin, J. L. and M.S. Udevitz. 1999. An aerial survey method to estimate sea otter abundance. in: Garner, G.W., S.C. Amstrup, J.L. Laake, B.F.J. Manly, L.L. McDonald, and D.G. Robertson, (eds.) Marine mammal survey and assessment methods. Balkema Press, Netherlands pg. 13-26
- Bodkin, J.L., A.M. Burdin and D.A. Ryzanov. 2000. Age and sex specific mortality and population structure in sea otters. *Marine Mammal Science* 16(1):201-219.
- Bodkin, J.L. 2001. Marine Mammals: Sea otters. Pages 2614-2621. in Steele, J. S. Thorpe and K. Turekian (eds.) *Encyclopedia of Ocean Sciences*. Academic Press, London UK.
- Bodkin, J.L., B.E. Ballachey, T.A. Dean, A.K. Fukuyama, S.C. Jewett, L.M. McDonald, D.H. Monson, C.E. O'Clair and G.R. VanBlaricom. 2002. Sea otter population status and the process of recovery from the Exxon Valdez oil spill. *Marine Ecology Progress Series*. 241:237-253.
- Peterson, C.H., S.D. Rice, J.W. Short, D. Esler, J.L. Bodkin, B.E. Ballachey, D.B. Irons. 2003. Long-term ecosystem response to the Exxon Valdez oil spill. *Science* 302:2082-2086.

#### Collaborators:

Dr B.E. Ballachey, USGS, Dr. T.A. Dean, Coastal Resource Associates, Mr D. Burn, USFWS, Dr. D. Esler, Simon Fraser Univ., Dr. J.A. Estes, USGS (retired), Dr. D.B. Irons USFWS, Dr. C.H. Peterson, Univ. North Carolina, Dr. John Piatt, Alaska Science Center, Dr S.D. Rice NOAA, Dr P. Snyder, Purdue University, Dr M. Murray, Monterey Bay Aquarium

**Thomas A. Dean**

Coastal Resources Associates Inc.  
5674 El Camino Real, Suite M  
Carlsbad, CA 92008

Phone: (760) 603-0612  
Email: coastal\_resources@sbcglobal.net

Education:

University of Delaware, Ph.D., Biology	1977
East Carolina University, M.A., Biology	1973
Gettysburg College, B.A., Biology	1970

Professional Experience:

President Coastal Resources Associates, Inc.	1988 to Present
Associate Research Biologist University of California, Santa Barbara	1978 to 1987
Senior Staff Ecologist E.H. Richardson Associates	1976 to 1978

Biographic Summary:

Dr. Dean is a marine ecologist with over 25 years of experience. He specializes in nearshore communities and in assessment of impacts on nearshore resources. He has served as a principal investigator as part of two of the largest marine impact assessment projects ever conducted: the assessment of the impacts from the discharge of heated cooling water from the San Onofre Nuclear Generating Station and the effects of the *Exxon Valdez* oil spill. In addition, Dr. Dean has directed a number of smaller scale projects evaluating impacts of harbor development, characterizing the toxicity of sediments and waste water, evaluating the impacts of sewage spills, and developing techniques for the mitigation of impacts and restoration of nearshore biological resources. His work has led to the publication of over 35 manuscripts in the peer reviewed literature and numerous technical reports.

Dr. Dean founded and became President of Coastal Resources Associates, Inc. (CRA) in 1988. CRA specializes in environmental studies in coastal areas of the northeastern Pacific. Projects have included siting and design of the San Clemente artificial reef. This is the largest artificial reef system in California and was designed to mitigate for losses of kelp resources. Dr. Dean also directed laboratory investigations of waste water and sediment toxicity specializing in the development of sensitive life-stage tests and the evaluation of special toxicity problems. Dr. Dean has served as an advisor to the State of California Water Resources Board on marine

toxicity testing since 1986 and was instrumental in the development and implementation of sensitive life-stage tests for marine organisms native to California and in the selection of test protocols now widely used in routine testing throughout the Pacific.

Since 1989, Dr. Dean has been funded by the *Exxon Valdez* Oil Spill Trustee Council to evaluate impacts and assess recovery of nearshore resources following the *Exxon Valdez* oil spill. Earlier works examined the impact of the spill on nearshore plants and invertebrates as part of the natural resource damage assessment (NRDA). More recent studies focused on factors responsible for the lack of recovery of representative nearshore vertebrate predator species (e.g., sea otters and river otters) and especially on the role of invertebrate food resources as a pathway of exposure to residual oil. Current projects are focusing a long-term nearshore monitoring effort for the Gulf of Alaska. The plan is being developed to detect change, determine causes for change, and advise the public and regulatory agencies with respect to mitigation of man-induced impacts over the next century.

#### Recent Publications:

Bowyer, R.T., G.M. Blundell, M. Ben-David, S.C. Jewett, T.A. Dean, L.A. Duffy. 2003. Effects of the *Exxon Valdez* oil spill on river otters: injury and recovery of a sentinel species. *Wildlife Monographs* 67:1-53.

Dean, T.A., J.L. Bodkin, A. Fukuyama, S.C. Jewett, D.H. Monson, C.E. O'Clair, G.R. VanBlaricom. 2002. Food limitation and the recovery of sea otters following the *Exxon Valdez* oil spill. *Marine Ecology Progress Series* 241:255-270

Bodkin, J.L., B. Ballachey, T.A. Dean, F.K. Fukuyama, S.C. Jewett, L.L. McDonald, D.H. Monson, C.E. O'Clair, and G.R. Van Blaricom. 2002. Sea otter population status and the process of recovery following the 1989 *Exxon Valdez* oil spill. *Marine Ecology Progress Series* 241:237-253

Golet, H.G., P.E. Seizer, A.D. McGuire, D.D. Roby, J.B. Fischer, K.J. Kuletz, D.B. Irons, T. A. Dean, S.C. Jewett, and S.H. Newman. 2002. Long-term direct and indirect effects of the the *Exxon Valdez* oil spill on pigeon guillemots in Prince William Sound, Alaska. *Marine Ecology Progress Series* 241:287-304

Esler, D., T.D. Bowman, K.A. Trust, B.E. Ballachey, T.A. Dean, S.C. Jewett, C.E. O'Clair. 2002. Harlequin duck population recovery following the *Exxon Valdez* oil spill: Progress, process, and constraints. *Marine Ecology Progress Series* 241: 271-286

#### Collaborators:

B.E. Ballachey, USGS; M. Ben-David, UAF; G. Blundell, UAF; J. Bodkin, USGS; T. Bowman, USFWS; T. Bowyer, UAF; L. Deysher, Coastal Resources; L. Duffy, UAF; D. Esler, Simon Fraser Univ.; J. Fischer, USFWS; A. Fukuyama, Univ. Washington; G. Golet, USFWS; B. Grove, Southern California Edison Co.; D. Irons USFWS; A. Jahn, MEC Analytical, S. Jewett, UAF; K. Kuletz, USFWS; L. McDonald, West Inc.; D. Monson, USGS; S. Newman, UC Davis; C. O'Clair, NOAA; D. Roby, USGS; P. Seizer, UAF; K. Trust, USFWS; G. VanBlaricom, USGS

## **VI. BUDGET JUSTIFICATION - \$465.467**

Justification for each item in the attached budget is as follows:

### **FY10, FY11, FY12**

#### **Personnel - \$59,840 years 1-3**

Responsibilities of each person are as follows:

James Bodkin (PI) - Project oversight, direct field sampling.

biologist - Assist in field sampling, coordinate preparation for field sampling, enter, edit, and analyze data.

biologist - Assist in field sampling.

biologist - Assist in field sampling.

#### **Travel – \$2,599 years 1-3**

Travel is required for a qualified Department of Interior, Aviation Management Directorate AMD pilot based in Idaho to Alaska, and to transport survey crew to PWS from Anchorage.

#### **Contractual – \$62,000 years 1-3 plus \$17,700.50 years 1-3**

Contracts include two vessel charters required to conduct work in April and July, and contract costs for an aircraft suitable to conduct aerial survey in July. Contractor costs for Coastal Resources for years 1-3 are projected at \$17,700.50 for each year and include salary, travel and indirect costs.

#### **Commodities – \$2,000 years 1-3**

Commodities include necessary fuel and purchase of temperature data loggers in 2010 and 2011

#### **Equipment – \$0.0K years 1-3**

All equipment costs are provided by lead Agency.

#### **Agency G&A = \$11,379 years 1-3**

Agency G&A is 9% of the project total direct costs.

### **FY13 Closeout year**

**Personnel – \$72,400 year 4**

Cost includes salary of PI and one assistant for analysis, writing, and preparation of final report.

**Travel – \$2,473**

Cost includes one trip to San Diego for PI to collaborate with contractor in preparation of final report

**Contractual – \$10,000**

Cost includes contract for comprehensive analysis of combined EVOS and SWAN nearshore data sets.

**Contractor**

Contract is for Coastal Resources Associates (CRA, Dr. Thomas Dean). Dr. Dean will be responsible for assisting in project oversight, conducting field surveys, development of the database management system, and report writing. Travel for Dr. Dean includes 1 trip from San Diego to for field sampling.

**VII. DATA MANAGEMENT****1. Study Design**

The monitoring component will employ sampling described in Dean and Bodkin (2006). This design combines elements of systematic sampling with the intent of distributing the sampling effort somewhat evenly throughout the sampling region. To this end, we divided the coastline to be sampled into three regions (Katmai, and Kenai Peninsula, and western Prince William Sound, with three approximately equal size sampling blocks (in terms of the extent of shoreline) per region. Sampling will be conducted under this proposal in WPWS and conducted in Katmai and Kenai under the NPS SWAN program using the following standard operating procedures as described in Dean and Bodkin (2006): 1) for “Coastline surveys of birds, mammals, animal carcasses, debris and other resources” 2) “Sampling of intertidal invertebrates and algae on sheltered rocky shores” 3) “Sampling of intertidal invertebrates on sheltered soft-sediment shores”, 4) “Collection of marine bird and mammal abundance data”, 5) “Black oystercatcher breeding territory occupancy and chick diet”, and 6) “Collection of sea otter foraging data.

**2. Criteria/Acceptable Data Quality**

The data management development component of this project will be establishing the criteria for acceptable data quality for each component of the monitoring program.

**3. Metadata****a. Metalite Metadata information:**

Identification\_Information:

Citation:

Citation\_Information:

Originator: USGS, James L Bodkin and Thomas A Dean

Publication\_Date: 20060804

Title: Database Development and Implementation of Long-Term Monitoring for Evaluation of Recovery and Restoration of Nearshore Resources

Geospatial\_Data\_Presentation\_Form: maps and database to be developed as part of this task

Publication\_Information:

Publication\_Place: Anchorage, Alaska, United States

Publisher: USGS

Description:

Abstract: The proposed project is designed to assist in the evaluation of recovery and restoration of injured resources in Prince William Sound. The primary objective is to initiate or continue recovery and restoration monitoring in the nearshore in Prince William Sound following the plan we developed in Restoration Project 050750 and tested in Restoration Project 070750. The NPS has already begun implementation of a portion of our nearshore monitoring plan along the Katmai, Kenai Fjords, and Lake Clark National Park coasts, collecting information similar to the data sets we have been using to assess recovery of injured resources in Prince William Sound (e.g., population abundance and survival of sea otters, population abundance of harlequin ducks and other nearshore birds, abundance estimates for mussels, clams, and other intertidal organisms). Funds for conducting some of these studies in Prince William Sound (e.g., bird and mammal surveys, D. Irons USFWS) are being sought by other proposals submitted to the Trustee Council and are not addressed herein. Our purpose is to implement a nearshore monitoring program in Prince William Sound related to injured resources and to make it comparable to the program being carried out by the National Park Service (NPS). This proposed nearshore sampling in PWS in conjunction with nearshore sampling and data management supported by NPS will provide the foundation of a comprehensive restoration monitoring program for the oil spill area. The goal of this program is to detect change and identify potential causes of change in the nearshore, focusing on EVOS injured resources and services, to determine when populations may be considered recovered, and to foster recovery of those resources by identifying and recommending actions in response to factors limiting recovery.

Purpose: The proposed project is designed to assist in the evaluation of recovery and restoration of injured nearshore resources in Prince William Sound. The primary task is to continue long-term recovery and restoration monitoring in the nearshore in Western Prince William Sound. Its purpose is to detect and identify sources of change in the nearshore and to foster recovery of nearshore resources by identifying and recommending actions in response to factors limiting recovery.

Time\_Period\_of\_Content:

Time\_Period\_Information:

Range\_of\_Dates/Times:

Beginning\_Date: 20060804

Ending\_Date: 20070415

Currentness\_Reference: ground condition

Status:

Progress: Planned

Maintenance\_and\_Update\_Frequency: As needed

Spatial\_Domain:

Bounding\_Coordinates:

West\_Bounding\_Coordinate: -156.375  
East\_Bounding\_Coordinate: -144.6428  
North\_Bounding\_Coordinate: 61.38361  
South\_Bounding\_Coordinate: 56.79611

Keywords:

Theme:

Theme\_Keyword\_Thesaurus:  
Theme\_Keyword: nearshore monitoring

Place:

Place\_Keyword\_Thesaurus:  
Place\_Keyword: Prince William Sound

Temporal:

Temporal\_Keyword\_Thesaurus:  
Temporal\_Keyword: not required

Access\_Constraints: None

Use\_Constraints: None

Spatial\_Data\_Organization\_Information:

Direct\_Spatial\_Reference\_Method: Point

Distribution\_Information:

Distributor:

Contact\_Information:

Contact\_Person\_Primary:  
Contact\_Person: James L. Bodkin  
Contact\_Organization: USGS Alaska Science Center

Contact\_Address:

Address\_Type: Mailing and Physical Address

Address:

Alaska Science Center  
1011 East Tudor Road

City: Anchorage

State\_or\_Province: Alaska

Postal\_Code: 99503

Country: United States

Contact\_Voice\_Telephone: 907.786.7164

Contact\_Facsimile\_Telephone: 907.786.3636

Contact\_Electronic\_Mail\_Address: james\_bodkin@usgs.gov

Distribution\_Liability:

Metadata\_Reference\_Information:

Metadata\_Date: 20060804

Metadata\_Contact:

Contact\_Information:

Contact\_Person\_Primary:  
Contact\_Person: James L. Bodkin  
Contact\_Organization: USGS Alaska Science Center

Contact\_Address:

Address\_Type: Mailing and Physical Address

Address:

Alaska Science Center

1011 East Tudor Road

City: Anchorage

State\_or\_Province: Alaska

Postal\_Code: 99503

Country: United States

Contact\_Voice\_Telephone: 907.786.3550

Contact\_Facsimile\_Telephone: 907.786.3636

Contact\_Electronic\_Mail\_Address: james\_bodkin@usgs.gov

Metadata\_Standard\_Name: FGDC Content Standards for Digital Geospatial Metadata

Metadata\_Standard\_Version: FGDC-STD-001-1998

b. Dataset category:

Physical measurements:

Sampling of intertidal invertebrates and algae on sheltered rocky shores SOP:

Field: Water temperature

Species specific measurements:

Quantitative species specific measurement fields are identified in each of the SOP's identified in #1 above and defined in the corresponding data dictionary within each SOP. In summary, we will collect species specific measurements on presence, abundance and for some species size, under the following SOP's:

- 1) Coastline surveys of birds, mammals, animal carcasses, debris and other resources:
  - Marine bird and mammal carcasses, presence, number and location
  - Breach wrack species composition and categorical abundance
  - Beach cast debris, by category and abundance
  - Herring spawn, presence and categorical abundance
- 2) Sampling of intertidal invertebrates and algae on sheltered rocky shores:
  - Presence and abundance of intertidal marine algae, sea grasses and invertebrates
  - Sizes of mussels and limpets.
- 3) Sampling of intertidal invertebrates on sheltered soft-sediment shores:
  - Presence and abundance of intertidal invertebrates
  - Sizes of mussels and clams
- 4) Collection of marine bird and mammal abundance data:
  - Presence and density of nearshore marine bird and mammal species
- 5) Black oystercatcher breeding territory occupancy and chick diet:
  - Presence and density of Black oystercatcher breeding pairs
  - Estimated reproductive output and success
  - Estimated species composition and size distribution of prey brought to nest site.
- 6) Collection of sea otter foraging data:
  - Species, number, and sizes of prey recovered by foraging sea otters
  - Dive time, surface time and success rate of foraging dives



#### **4. Algorithms**

Algorithms to be used in this project are to be described and documented in the database management portion of this proposed project.

#### **5. Sample Collection, Handling, Custody, Storage**

Procedures to be used in sample collection, data handling, custody, and storage are given in standard operating procedures (Dean and Bodkin 2006).

#### **6. Analytical Instrumentation**

Analytical instruments to be used include temperature recording devices. The use of these is described in Standard Operating Procedures for “Sampling of Intertidal Invertebrates and Algae on Sheltered Rocky Shores” (Dean and Bodkin 2006).

#### **7. Data Reduction and Reporting**

Statistical analysis and computer modeling are described in standard operating procedures (Dean and Bodkin 2006).

**EXXON VALDEZ OIL SPILL TRUSTEE COUNCIL  
DETAILED BUDGET FORM FY 10- FY 12**

<b>Budget Category:</b>	<b>Proposed FY 10</b>	<b>Proposed FY 11</b>	<b>Proposed FY 12</b>	<b>Proposed FY 13</b>	<b>TOTAL PROPOSED</b>
Personnel	\$84,840.0	\$84,840.0	\$84,840.0	\$82,400.0	\$336,920.0
Travel	\$3,838.0	\$3,838.0	\$3,838.0	\$2,473.0	\$13,987.0
Contractual	\$62,000.0	\$62,000.0	\$62,000.0	\$10,000.0	\$196,000.0
Commodities	\$2,000.0	\$2,000.0	\$1,000.0	\$0.0	\$5,000.0
Equipment	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0
Indirect ( <i>Contractor</i> )	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0
<b>SUBTOTAL</b>	<b>\$152,678.0</b>	<b>\$152,678.0</b>	<b>\$151,678.0</b>	<b>\$94,873.0</b>	<b>\$551,907.0</b>
General Administration (9% of subtotal)	\$13,741.0	\$13,741.0	\$13,651.0	\$8,538.6	\$49,671.6
<b>PROJECT TOTAL</b>	<b>\$166,419.0</b>	<b>\$166,419.0</b>	<b>\$165,329.0</b>	<b>\$103,411.6</b>	<b>\$601,578.6</b>
Other Resources (Cost Share Funds)	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0

Annual USGS contributions include 2 months of GS 14 salary (24,000) use of existing sampling equipment, including computers (2 @ 2,000 ea), telescopes (2 @ 2,500 ea), binoculars (2 @ 2,000 ea), motors and skiffs (2 @ 5,000 ea) necessary for conducting sampling. Also included is office space, computing software and services and the use of a USGS vehicle (5,000). Total annual in-kind contributions are 52,000 with a total project in kind contribution of \$161,000.

**FY10 - 13**

**Project Title: Nearshore Monitoring**  
**Lead PI: Bodkin and Dean**  
**Agency: USGS**

**FORM 3A  
TRUSTEE &  
CONTRACTOR  
SUMMARY**

Prepared April 13, 2009

***EXXON VALDEZ* OIL SPILL TRUSTEE COUNCIL  
DETAILED BUDGET FORM FY 10- FY 12**

**EXXON VALDEZ OIL SPILL TRUSTEE COUNCIL  
DETAILED BUDGET FORM FY 10- FY 12**

<b>Budget Category:</b>	<b>Proposed FY 10</b>	<b>Proposed FY 11</b>	<b>Proposed FY 12</b>	<b>Proposed FY 13</b>	<b>TOTAL PROPOSED</b>
Personnel	\$59,840.0	\$59,840.0	\$59,840.0	\$72,400.0	\$251,920.0
Travel	\$2,599.0	\$2,599.0	\$2,599.0	\$2,473.0	\$10,270.0
Contractual	\$62,000.0	\$62,000.0	\$62,000.0	\$10,000.0	\$196,000.0
Commodities	\$2,000.0	\$2,000.0	\$1,000.0	\$0.0	\$5,000.0
Equipment	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0
<b>SUBTOTAL</b>	<b>\$126,439.0</b>	<b>\$126,439.0</b>	<b>\$125,439.0</b>	<b>\$84,873.0</b>	<b>\$463,190.0</b>
General Administration (9% of subtotal)	\$11,379.5	\$11,379.5	\$11,289.5	\$7,638.6	\$41,687.1
<b>PROJECT TOTAL</b>	<b>\$137,818.5</b>	<b>\$137,818.5</b>	<b>\$136,728.5</b>	<b>\$92,511.6</b>	<b>\$504,877.1</b>
Other Resources (Cost Share Funds)	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0

Annual USGS contributions include 2 months of GS 14 salary (24,000) use of existing sampling equipment, including computers (2 @ 2,000 ea), telescopes (2 @ 2,500 ea), binoculars (2 @ 2,000 ea), motors and skiffs (2 @ 5,000 ea) necessary for conducting sampling. Also included is office space, computing software and services and the use of a USGS vehicle (5,000). Total annual in-kind contributions are 52,000 with a total project in kind contribution of \$161,000.

**FY10 - 13**

**Project Title: Nearshore monitoring  
Lead PI: Bodkin and Dean  
Agency:USGS**

**FORM 3A  
TRUSTEE AGENCY  
SUMMARY**

**EXXON VALDEZ OIL SPILL TRUSTEE COUNCIL  
DETAILED BUDGET FORM FY 10- FY 12**

<b>Personnel Costs:</b>		GS/Range/ Step	Months Budgeted	Monthly Costs	Overtime	Personnel Sum
Name	Project Title					
James L Bodkin	Research Wildlife Biologist	GS/14/4	3.0	12080.0		36,240.0
to be determined	biologist	GS/9/5	2.0	6000.0		12,000.0
to be determined	biologist	GS/9/5	1.0	6000.0		6,000.0
to be determined	biologist	GS/9/1	1.0	5600.0		5,600.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
		<b>Subtotal</b>	7.0	29680.0	0.0	
					<b>Personnel Total</b>	\$59,840.0

<b>Travel Costs:</b>	Ticket Price	Round Trips	Total Days	Daily Per Diem	Travel Sum	
Description						
Travel to whittier for 5 persons 2 times/yr for 100 days			100	15.0	1,500.0	
Tavel for AMD pilot Idaho to Anchorage	1099.0	1			1,099.0	
					0.0	
					0.0	
					0.0	
					0.0	
					0.0	
					0.0	
					0.0	
					0.0	
					0.0	
					0.0	
					0.0	
					<b>Travel Total</b>	\$2,599.0

**FY10**

**Project Title:**  
**Lead PI:**

**FORM 3B  
PERSONNEL &  
TRAVEL DETAIL**

**EXXON VALDEZ OIL SPILL TRUSTEE COUNCIL  
DETAILED BUDGET FORM FY 10- FY 12**

<b>Contractual Costs:</b>	Contract
Description	Sum
5 days vessel charter for 4 persons for carcass and debris surveys April @ 2K/d	10,000.0
Sea otter aerial surveys 80 hr @ 200/hr	16,000.0
12 days vessel charter for 6 persons for intertidal, oystercatcher, and sea otter diet sampling July @ 3K/d	36,000.0
If a component of the project will be performed under contract, the 4A and 4B forms are required.	<b>Contractual Total</b> \$62,000.0

<b>Commodities Costs:</b>	Commodities
Description	Sum
fuel for small vessels in support of sampling 250g @ 4.00/gal	1,000.0
HOBO water temperature loggers 5 @ 200 ea	1,000.0
	<b>Commodities Total</b> \$2,000.0

**FY10**

**Project Title:**  
**Lead PI:**

**FORM 3B  
CONTRACTUAL &  
COMMODITIES  
DETAIL**

**EXXON VALDEZ OIL SPILL TRUSTEE COUNCIL  
DETAILED BUDGET FORM FY 10- FY 12**

<b>New Equipment Purchases:</b> 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
			0.0
			0.0
<b>New Equipment Total</b>			<b>\$0.0</b>

<b>Existing Equipment Usage:</b> Description	Number of Units	Inventory Agency

**FY10**

**Project Title:**  
**Lead PI:**

**FORM 3B  
EQUIPMENT DETAIL**

**EXXON VALDEZ OIL SPILL TRUSTEE COUNCIL  
DETAILED BUDGET FORM FY 10- FY 12**

<b>Personnel Costs:</b>		GS/Range/ Step	Months Budgeted	Monthly Costs	Overtime	Personnel Sum
Name	Project Title					
James L Bodkin	Research Wildlife Biologist	GS/14/4	3.0	12080.0		36,240.0
to be determined	biologist	GS/9/5	2.0	6000.0		12,000.0
to be determined	biologist	GS/9/5	1.0	6000.0		6,000.0
to be determined	biologist	GS/9/1	1.0	5600.0		5,600.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
Subtotal			7.0	29680.0	0.0	
					<b>Personnel Total</b>	<b>\$59,840.0</b>

<b>Travel Costs:</b>	Ticket Price	Round Trips	Total Days	Daily Per Diem	Travel Sum
Description					
Travel to whittier for 5 persons 2 times/yr for 100 days			100	15.0	1,500.0
Tavel for AMD pilot Idaho to Anchorage	1099.0	1			1,099.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
<b>Travel Total</b>					<b>\$2,599.0</b>

**FY11**

**Project Title:**  
**Lead PI:**

**FORM 3B  
PERSONNEL &  
TRAVEL DETAIL**



**EXXON VALDEZ OIL SPILL TRUSTEE COUNCIL  
DETAILED BUDGET FORM FY 10- FY 12**

<b>Contractual Costs:</b> Description	Contract Sum
5 days vessel charter for 4 persons for carcass and debris surveys April @ 2K/d	10,000.0
Sea otter aerial surveys 80 hr @ 200/hr	16,000.0
12 days vessel charter for 6 persons for intertidal, oystercatcher, and sea otter diet sampling July @ 3K/d	36,000.0
If a component of the project will be performed under contract, the 4A and 4B forms are required.	<b>Contractual Total</b> \$62,000.0

<b>Commodities Costs:</b> Description	Commodities Sum
fuel for small vessels in support of sampling 250g @ 4.00/gal	1,000.0
HOBO water temperature loggers 5@ 200 ea	1,000.0
<b>Commodities Total</b>	\$2,000.0

**FY11**

**Project Title:**  
**Lead PI:**

**FORM 3B  
CONTRACTUAL &  
COMMODITIES  
DETAIL**

**EXXON VALDEZ OIL SPILL TRUSTEE COUNCIL  
 DETAILED BUDGET FORM FY 10- FY 12**

<b>New Equipment Purchases:</b> 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
			0.0
			0.0
			0.0
<b>New Equipment Total</b>			<b>\$0.0</b>

<b>Existing Equipment Usage:</b> Description	Number of Units	Inventory Agency

**FY11**

**Project Title:**  
**Lead PI:**

**FORM 3B  
 EQUIPMENT DETAIL**

**EXXON VALDEZ OIL SPILL TRUSTEE COUNCIL  
DETAILED BUDGET FORM FY 10- FY 12**

<b>Personnel Costs:</b>		GS/Range/ Step	Months Budgeted	Monthly Costs	Overtime	Personnel Sum
Name	Project Title					
James L Bodkin	Research Wildlife Biologist	GS/14/4	3.0	12080.0		36,240.0
to be determined	biologist	GS/9/5	2.0	6000.0		12,000.0
to be determined	biologist	GS/9/5	1.0	6000.0		6,000.0
to be determined	biologist	GS/9/1	1.0	5600.0		5,600.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
Subtotal			7.0	29680.0	0.0	
<b>Personnel Total</b>						<b>\$59,840.0</b>

<b>Travel Costs:</b>	Ticket Price	Round Trips	Total Days	Daily Per Diem	Travel Sum
Description					
Travel to whittier for 5 persons 2 times/yr for 100 days			100	15.0	1,500.0
Tavel for AMD pilot Idaho to Anchorage	1099.0	1			1,099.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
<b>Travel Total</b>					<b>\$2,599.0</b>

**FY12**

**Project Title:**  
**Lead PI:**

**FORM 3B  
PERSONNEL &  
TRAVEL DETAIL**

**EXXON VALDEZ OIL SPILL TRUSTEE COUNCIL  
DETAILED BUDGET FORM FY 10- FY 12**

<b>Contractual Costs:</b> Description	Contract Sum
5 days vessel charter for 4 persons for carcass and debris surveys April @ 2K/d	10,000.0
Sea otter aerial surveys 80 hr @ 200/hr	16,000.0
12 days vessel charter for 6 persons for intertidal, oystercatcher, and sea otter diet sampling July @ 3K/d	36,000.0
If a component of the project will be performed under contract, the 4A and 4B forms are required.	<b>Contractual Total</b> \$62,000.0

<b>Commodities Costs:</b> Description	Commodities Sum
fuel for small vessels in support of sampling 250g @ 4.00/gal	1,000.0
<b>Commodities Total</b>	\$1,000.0

<p><b>FY12</b></p>
--------------------

<p><b>Project Title:</b> <b>Lead PI:</b></p>
--------------------------------------------------

<p><b>FORM 3B CONTRACTUAL &amp; COMMODITIES DETAIL</b></p>
------------------------------------------------------------------------

**EXXON VALDEZ OIL SPILL TRUSTEE COUNCIL  
DETAILED BUDGET FORM FY 10- FY 12**

<b>New Equipment Purchases:</b> 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
			0.0
			0.0
<b>New Equipment Total</b>			<b>\$0.0</b>

<b>Existing Equipment Usage:</b> Description	Number of Units	Inventory Agency

**FY12**

**Project Title:**  
**Lead PI:**

**FORM 3B  
EQUIPMENT DETAIL**

**EXXON VALDEZ OIL SPILL TRUSTEE COUNCIL  
DETAILED BUDGET FORM FY 10- FY 12**

<b>Personnel Costs:</b>		GS/Range/ Step	Months Budgeted	Monthly Costs	Overtime	Personnel Sum
Name	Project Title					
James L Bodkin	Research Wildlife Biologist	GS/14/4	5.0	12080.0		60,400.0
to be determined	biologist	GS/9/5	2.0	6000.0		12,000.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
Subtotal			7.0	18080.0	0.0	
					<b>Personnel Total</b>	<b>\$72,400.0</b>

<b>Travel Costs:</b>	Ticket Price	Round Trips	Total Days	Daily Per Diem	Travel Sum
Description					
Anchorage to San Diego	1099.0	2	5	55.0	2,473.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
Travel Total					\$2,473.0

**FY13**

**Project Title:**  
**Lead PI:**

**FORM 3B  
PERSONNEL &  
TRAVEL DETAIL**

**EXXON VALDEZ OIL SPILL TRUSTEE COUNCIL  
DETAILED BUDGET FORM FY 10- FY 12**

<b>Contractual Costs:</b> Description	Contract Sum
Data analysis cooperative contract with NPS for comprehensive spatial analysis	10,000.0
If a component of the project will be performed under contract, the 4A and 4B forms are required.	<b>Contractual Total</b> \$10,000.0

<b>Commodities Costs:</b> Description	Commodities Sum
<b>Commodities Total</b>	\$0.0

**FY13**

**Project Title:**  
**Lead PI:**

**FORM 3B  
CONTRACTUAL &  
COMMODITIES  
DETAIL**

**EXXON VALDEZ OIL SPILL TRUSTEE COUNCIL  
 DETAILED BUDGET FORM FY 10- FY 12**

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
			0.0
<b>New Equipment Total</b>			<b>\$0.0</b>

Existing Equipment Usage: Description	Number of Units	Inventory Agency

FY13

**Project Title:**  
**Lead PI:**

**FORM 3B  
 EQUIPMENT DETAIL**



**EXXON VALDEZ OIL SPILL TRUSTEE COUNCIL  
DETAILED BUDGET FORM FY 10- FY 12**

<b>Budget Category:</b>	<b>Proposed FY 10</b>	<b>Proposed FY 11</b>	<b>Proposed FY 12</b>	<b>Proposed FY 13</b>	<b>TOTAL PROPOSED</b>
Personnel	\$25,000.0	\$25,000.0	\$25,000.0	\$10,000.0	\$85,000.0
Travel	\$1,239.0	\$1,239.0	\$1,239.0	\$0.0	\$3,717.0
Contractual	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0
Commodities	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0
Equipment	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0
Indirect ( <i>will vary by proposer</i> )					\$0.0
<b>SUBTOTAL</b>	\$26,239.0	\$26,239.0	\$26,239.0	\$10,000.0	\$88,717.0
General Administration (9% of subtotal)	\$2,361.5	\$2,361.5	\$2,361.5	\$900.0	\$7,984.5
<b>PROJECT TOTAL</b>	\$28,600.5	\$28,600.5	\$28,600.5	\$10,900.0	\$96,701.5
Other Resources (Cost Share Funds)	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0

Contractor is Coastal Resources Associates, Inc.

**FY10 - 13**

**Project Title: Nearshore Monitoring  
Lead PI: Bodkin and Dean**

**FORM 4A  
NON-TRUSTEE  
AGENCY SUMMARY**

**EXXON VALDEZ OIL SPILL TRUSTEE COUNCIL  
DETAILED BUDGET FORM FY 10- FY 12**

<b>Personnel Costs:</b>		GS/Range/ Step	Months Budgeted	Monthly Costs	Overtime	Personnel Sum
Name	Project Title					
to be determined	Nearshore		2.5	10000.0		25,000.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
Subtotal			2.5	10000.0	0.0	
					<b>Personnel Total</b>	<b>\$25,000.0</b>

<b>Travel Costs:</b>	Ticket Price	Round Trips	Total Days	Daily Per Diem	Travel Sum
Description					
Seattle to Anchorage	999.0	1	12	20.0	1,239.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
Travel Total					\$1,239.0

**FY10**

**Project Title:**  
**Lead PI:**

**FORM 4B  
PERSONNEL &  
TRAVEL DETAIL**

**EXXON VALDEZ OIL SPILL TRUSTEE COUNCIL  
DETAILED BUDGET FORM FY 10- FY 12**

<b>Contractual Costs:</b> Description	Contract Sum
If a component of the project will be performed under contract, the 4A and 4B forms are required.	<b>Contractual Total</b>
	\$0.0

<b>Commodities Costs:</b> Description	Commodities Sum
	<b>Commodities Total</b>
	\$0.0

**FY10**

**Project Title:**  
**Lead PI:**

**FORM 4B  
CONTRACTUAL &  
COMMODITIES  
DETAIL**

**EXXON VALDEZ OIL SPILL TRUSTEE COUNCIL  
DETAILED BUDGET FORM FY 10- FY 12**

<b>New Equipment Purchases:</b> 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
			0.0
			0.0
<b>New Equipment Total</b>			<b>\$0.0</b>

<b>Existing Equipment Usage:</b> Description	Number of Units	Inventory Agency

**FY10**

**Project Title:**  
**Lead PI:**

**FORM 4B  
EQUIPMENT DETAIL**

**EXXON VALDEZ OIL SPILL TRUSTEE COUNCIL  
DETAILED BUDGET FORM FY 10- FY 12**

<b>Personnel Costs:</b>		GS/Range/ Step	Months Budgeted	Monthly Costs	Overtime	Personnel Sum
Name	Project Title					
to be determined	Nearshore		2.5	10000.0		25,000.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
Subtotal			2.5	10000.0	0.0	
					<b>Personnel Total</b>	<b>\$25,000.0</b>

<b>Travel Costs:</b>	Ticket Price	Round Trips	Total Days	Daily Per Diem	Travel Sum
Description					
Seattle to Anchorage	999.0	1	12	20.0	1,239.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
Travel Total					\$1,239.0

**FY11**

**Project Title:**  
**Lead PI:**

**FORM 4B  
PERSONNEL &  
TRAVEL DETAIL**

**EXXON VALDEZ OIL SPILL TRUSTEE COUNCIL  
DETAILED BUDGET FORM FY 10- FY 12**

<b>Contractual Costs:</b>	Contract
Description	Sum
If a component of the project will be performed under contract, the 4A and 4B forms are required.	<b>Contractual Total</b> \$0.0

<b>Commodities Costs:</b>	Commodities
Description	Sum
<b>Commodities Total</b>	\$0.0

**FY11**

**Project Title:**  
**Lead PI:**

**FORM 4B  
CONTRACTUAL &  
COMMODITIES  
DETAIL**



**EXXON VALDEZ OIL SPILL TRUSTEE COUNCIL  
DETAILED BUDGET FORM FY 10- FY 12**

<b>Personnel Costs:</b>		GS/Range/ Step	Months Budgeted	Monthly Costs	Overtime	Personnel Sum
Name	Project Title					
to be determined	Nearshore		2.5	10000.0		25,000.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
Subtotal			2.5	10000.0	0.0	
					<b>Personnel Total</b>	<b>\$25,000.0</b>

<b>Travel Costs:</b>	Ticket Price	Round Trips	Total Days	Daily Per Diem	Travel Sum
Description					
Seattle to Anchorage	999.0	1	12	20.0	1,239.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
Travel Total					\$1,239.0

**FY12**

**Project Title:**  
**Lead PI:**

**FORM 4B  
PERSONNEL &  
TRAVEL DETAIL**



**EXXON VALDEZ OIL SPILL TRUSTEE COUNCIL  
 DETAILED BUDGET FORM FY 10- FY 12**

<b>Contractual Costs:</b>	<b>Contract</b>
Description	Sum
If a component of the project will be performed under contract, the 4A and 4B forms are required.	<b>Contractual Total</b>
	\$0.0

<b>Commodities Costs:</b>	<b>Commodities</b>
Description	Sum
	<b>Commodities Total</b>
	\$0.0

<b>FY12</b>
-------------

<b>Project Title:</b> <b>Lead PI:</b>
------------------------------------------

<b>FORM 4B                  CONTRACTUAL &amp;                  COMMODITIES                  DETAIL</b>
--------------------------------------------------------------------------------------------------------------------

**EXXON VALDEZ OIL SPILL TRUSTEE COUNCIL  
 DETAILED BUDGET FORM FY 10- FY 12**

<b>New Equipment Purchases:</b> 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
			0.0
<b>New Equipment Total</b>			\$0.0

<b>Existing Equipment Usage:</b> Description	Number of Units	Inventory Agency

**FY12**

**Project Title:**  
**Lead PI:**

**FORM 4B  
 EQUIPMENT DETAIL**

**EXXON VALDEZ OIL SPILL TRUSTEE COUNCIL  
DETAILED BUDGET FORM FY 10- FY 12**

<b>Personnel Costs:</b>		GS/Range/ Step	Months Budgeted	Monthly Costs	Overtime	Personnel Sum
Name	Project Title					
to be determined	Nearshore		1.0	10000.0		10,000.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
Subtotal			1.0	10000.0	0.0	
					<b>Personnel Total</b>	<b>\$10,000.0</b>

<b>Travel Costs:</b>	Ticket Price	Round Trips	Total Days	Daily Per Diem	Travel Sum
Description					
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
<b>Travel Total</b>					<b>\$0.0</b>

**FY13**

**Project Title:**  
**Lead PI:**

**FORM 4B  
PERSONNEL &  
TRAVEL DETAIL**

**EXXON VALDEZ OIL SPILL TRUSTEE COUNCIL  
 DETAILED BUDGET FORM FY 10- FY 12**

<b>Contractual Costs:</b> Description	Contract Sum
If a component of the project will be performed under contract, the 4A and 4B forms are required. <span style="float: right;"><b>Contractual Total</b></span>	\$0.0

<b>Commodities Costs:</b> Description	Commodities Sum
<span style="float: right;"><b>Commodities Total</b></span>	\$0.0

FY13

Project Title:  
Lead PI:

FORM 4B  
CONTRACTUAL &  
COMMODITIES  
DETAIL

**EXXON VALDEZ OIL SPILL TRUSTEE COUNCIL  
 DETAILED BUDGET FORM FY 10- FY 12**

<b>New Equipment Purchases:</b> 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
			0.0
<b>New Equipment Total</b>			<b>\$0.0</b>

<b>Existing Equipment Usage:</b> Description	Number of Units	Inventory Agency

**FY13**

**Project Title:**  
**Lead PI:**

**FORM 4B  
 EQUIPMENT DETAIL**