

***Partnering with NOAA to Quantify and Monitor Environmental Attributes of Kachemak Bay***

Project Number: 01385

Restoration Category: Ecosystem Synthesis, General Restoration (suggested)

Proposer: Kachemak Bay National Estuarine Research Reserve (ADFG/KBNER)

Lead Trustee ADFG

Duration: 2-year project

Cost FY 01: \$11.0

Cost FY02 +: Unknown, open for discussion

Geographic Area: Kachemak Bay, Lower Cook Inlet, and Gulf of Alaska

Injured Resource/Service: Kachemak Bay includes all resources injured by the oil spill (except cutthroat trout, Dolly Varden, and AB Killer Whale pod), intertidal communities, and all the lost or reduced services.

***ABSTRACT***

The increasing number of stresses on marine and estuarine ecosystems has challenged scientists and resource managers to find methods for determining temporal rates and spatial extents of ecological responses to changes in environmental conditions. This project will provide the necessary match for the Kachemak Bay Research Reserve to establish a monitoring program of oceanographic environmental attributes in Kachemak Bay. Results of on-going studies will then be able to link patterns of oceanographic changes to patterns of biodiversity in the marine and estuarine intertidal and subtidal habitats of Kachemak Bay.

## ***INTRODUCTION***

The marine ecology of the Pacific Northwest coast has been extensively studied, yet the scales of spatial and temporal variability of marine populations are poorly understood. The rich variety of seashore life along the coast is due partly to the many different habitats that are represented. Within the Kachemak Bay/Lower Cook Inlet area are rocky shores with reefs, tide pools and boulders, and sandy beaches exposed to heavy surf. These habitats are of utmost importance to society in terms of spawning and rearing habitats of commercial and sport fisheries, subsistence and commercial harvests of invertebrates, breeding and feeding grounds for shorebirds and seabirds, and for esthetic and recreational opportunities. However, the abundance of these populations is highly variable in space and time, and possibly linked to fluctuations in oceanic water properties and circulation patterns.

The Kachemak Bay Research Reserve acknowledges the importance of a long-term time series of environmental data and information dissemination through the support of the NOAA National Estuarine Research Reserve System (NERRS) System-Wide Monitoring Program (SWMP). The goal of the SWMP is to "identify and track short-term variability and long-term changes in the integrity and biodiversity of representative estuarine ecosystems and coastal watersheds for the purpose of contributing to effective national, regional and site specific coastal zone management". This comprehensive program consists of three phased components:

- (1) marine and estuarine water quality monitoring,
- (2) biodiversity monitoring, and
- (3) terrestrial and marine habitat change analysis.

## ***NEED FOR THE PROJECT***

### ***Statement of Problem***

Evidence from research in the Pacific Northwest suggests that patterns of marine community structure such as rocky intertidal communities, sediment communities, nearshore kelp bed communities (kelp, urchins, sea otters), and some seabird populations are trophically linked to oceanic processes and physical characteristics of the shoreline. For example, differences in primary productivity, salinity, and water temperature are often reflected in the composition of intertidal and nearshore flora and fauna communities. It is difficult to quantify boundaries of salinity or water temperature due to the large temporal and spatial changes caused by precipitation, surface runoff, groundwater flow, and evaporation. While nearshore regions have physical patterns that can be quantified, the difficulty lies in the trade off between temporally intensive vs. spatially extensive data collection. We need time series data to assess change over the relevant scales of temporal change, and spatially extensive data to assess the generality of the temporal changes.

### ***Rationale/Link to Restoration***

In addition to benefiting injured resources and services affected by the spill (see introduction), is a response to a request for new projects in Invitation to Bid under Ecosystem Synthesis: “Innovative Tools and Strategies to Improve Monitoring.” With the physical oceanographic studies we hope to begin with NOAA and other funds, this will be an important step to monitoring biological diversity and changes in intertidal communities and abundance of associated fish and wildlife resources over time.

Other links to the restoration effort are summarized below in relation to the policies of the Trustees Council.

*Ecosystem Approach, Policies 1 and 2* – A primary focus of this project is to develop and implement a strategy to promote an ecosystem approach towards restoration, management, and use of Kachemak Bay. The study area includes the Kachemak Bay Watershed, encompassing those lands purchased by the Trustee Council on the north and south side of the Bay.

*Injuries Addressed by Restoration, Policies 3, 4, and 6* – This project addresses restoration and monitoring environmental conditions related to injured species and services. Many of the injured species and services have substantial economic, cultural, and subsistence value to the state, regional, and local economies.

*Location of Restoration Actions, Policy 8* – Kachemak Bay is in the spill-affected area.

*Restoring a Service, Policy 9* – Most of the injured services occur within the Kachemak Bay area.

*Efficiency, Policies 11 and 14* – This project provides significant cost sharing. The EVOS restoration effort can gain significant benefits from this product with relatively little expense.

*Partnerships, Policy 15* – The project will both establish partnerships with NOAA and provide strong foundation for future collaborations.

*Clear, Measurable, and Achievable Endpoint* – This project will be completed at the end of the fiscal year. All data will be available to managers, researchers, local governments, and the public.

*Access to Information and Data, Policy 20* – This project will make information available to the public, agencies, and managers through a CD and the Internet.

*Normal Agency Activities* – The NERR System requires minimal monitoring efforts, and Reserve’s are required to obtain non-federal match. We are establishing partnerships and combining resources with other agencies to bring this important long-term monitoring project to bear on the EVOS restoration effort.

### ***C. Location***

The location of this study is the Kachemak Bay/Lower Cook Inlet/Gulf of Alaska Area. The immediate benefits of this study will be realized in the greater Kachemak Bay area, but can be applied to other geographic areas. The most directly affected communities include the areas/communities of Homer, Seldovia, Halibut Cove, Port Graham, and Nanwalek.

### ***COMMUNITY INVOLVEMENT AND TRADITIONAL ECOLOGICAL KNOWLEDGE***

This project (as revised) will involve minimal community involvement.

### ***PROJECT DESIGN***

#### ***A. Objectives***

- (1) marine and estuarine water quality monitoring,
- (2) nearshore biodiversity monitoring, and
- (3) change detection analysis.

#### ***B. Methods Summary***

With funds provided by NOAA, the Kachemak Bay NERR will purchase equipment to begin to develop its monitoring program. EVOS funds will be used as match to partially support staff time necessary to install these instruments to get this program started.

This will likely include establishing an instrumented water quality monitoring site at the end of the Homer Spit to continuously measure salinity, temperature, DO, PAR, and chlorophyll fluorescence. Nearby meteorological instruments will measure wind speed and direction. These sensors will transmit data streams to a computer for storage and to allow access to the information in real time.

Standard time series analyses (Fourier and Wavelet) will be conducted on these data sets to determine the frequencies of dominant patterns.

We also propose to measure the chlorophyll fluorescence, salinity, temperature and transmissivity and/or PAR distributions by conducting periodic profiles over a 1 km grid over Kachemak Bay. We anticipate purchasing a Seabird SEALOGGER CTD *SBE 25* profiler with a WetStar Fluorometer (or similar) and a small field computer. Reserve staff will provide a boat and personnel for data collection and analysis. The data will be

downloaded and entered into a GIS and web accessible maps will be produced to show the spatial attribute fields for the inner and outer bay. These data will be used to locate sites for future additional instrument arrays with potential deployments near Halibut Cove and Seldovia.

### ***C. Cooperating Agencies, Contracts, and other Agency Assistance***

Cooperating Agencies/Contracts: ADFG is the only trustee agency requesting financial assistance under this award. There will be no contracts to other Trustee Agencies.

#### Other Agency Assistance:

*NOAA/Office of Ocean and Coastal Resource Management/Research Reserve Division (RRD)* – As part of its operations award from NOAA, RRD will provide limited funds to participate in the National Estuarine Reserve System’s (NERRS’s) System-wide Monitoring Program. This monitoring program currently includes the deployment and maintenance of data sondes (to measure salinity, temperature, dissolved oxygen, pH, and turbidity) and a weather station. As a new reserve, the KBNERR will be defining its participation in this program next fiscal year. Most of the operations funds for this program this year will go to staff time in designing the program. This program will provide the necessary non-federal match to NOAA’s \$25,000 for purchase of several data sondes in Kachemak Bay.

In addition, NOAA has agreed to provide an additional \$25,000 next year to the KBNERR – over and above operations funds – for purchase of several data sondes for deployment in Kachemak Bay. These funds are provided on a 70% federal/30% non-federal basis, although we could not have met this requirement without the EVOS funds. The proposed EVOS project (#01385) will allow us to satisfy this match requirement and begin deployment of this equipment in Federal FY01.

### ***SCHEDULE***

#### ***A. Measurable Project Tasks for FY01***

- December 2000 – complete draft plan for deployment of data sondes and a weather station in Kachemak Bay
- June 2001 – deploy data sondes.

#### ***B. Project Milestones and Endpoints (tasks funded in part by EVOS)***

Overall Products (from two-year effort, includes portion funded by EVOS)

1. Start Kachemak Bay NERR monitoring program.

### ***C. Completion Date***

For purposes of expediency, to keep costs down, and respond to Trustee Staff comments, this project has been drastically reduced. A large scale monitoring program should be considered to more fully assess and monitor natural and human changes to the ecosystem. The KBNERR will begin this process in FY01 through initial development of the KBNERR's participation in the NERRS's system-wide monitoring program.

### ***PUBLICATIONS AND REPORTS***

No publication are anticipated based on this small project.

### ***PROFESSIONAL CONFERENCES***

No professional conferences will be attended based on this small project.

### ***NORMAL AGENCY MANAGEMENT***

Neither ADFG nor NOAA requires the Kachemak Bay Research Reserve by statute, regulation, or policy to undertake habitat monitoring and modeling. The KBNERR does not receive adequate operation funds for this purpose, which are largely dedicated to Research Reserve Administration and system-wide research and education initiatives. Consequently, the Research Reserve must seek other sources of funding and create partnerships to complete these tasks.

### ***COORDINATION AND INTEGRATION WITH THE RESTORATION EFFORT***

#### Coordination with the EVOS Restoration Effort:

*USGS/Biological Research Division (BRD)* – The KBNERR will be using the oceanographic information developed by John Piatt, BRD, in Kachemak Bay. With Dr. Piatt winding down his studies in the region, we anticipate utilizing his phytoplankton and related oceanographic data as part of the proposed project and related NERR efforts. While the details are still being developed, this coordination will save BRD and EVOS Trustees money and help continue and expand important data sets funded by these programs.

*FWS (potential)* – The KBNERR has submitted a proposal under the FWS Coastal Management Program to continue and expand Dr. John Piatt's work to measure the chlorophyll fluorescence. Since primary production drives all other trophic levels, a partial list of resources enhanced by the proposed work include: fisheries with

commercial stocks of salmon, rockfish, crabs, and shellfish, kelp bed communities (kelp, urchins, sea otters), seabirds and shorebirds.

Other Funds/Major Contributors:

Please see “C. Cooperating Agencies, Contracts, and Other Agency Assistance” for contributions from NOAA and FWS (potential contributor). A summary of other funds and in-kind contributions are also summarized in the budget.

***PRINCIPAL INVESTIGATOR***

Carl Schoch, Ph.D.  
Research Coordinator  
Kachemak Bay Research Reserve  
202 W. Pioneer Ave.  
Homer, Alaska 99603

Phone: 235-4799  
Fax: 235-4794  
E-mail: carl\_schoch@fishgame.state.ak.us

***Qualifications:***

Dr. Schoch has extensive experience on oceanographic cruises and developed the SCALE methods of shoreline habitat modeling (see attached resume). Dr. Schoch will be responsible for designing the instrument deployment and the collection, processing and delivery of all oceanographic data.

***OTHER KEY PERSONNEL***

Not applicable.

**2001 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET**

October 1, 2000 - September 30, 2001

<b>Budget Category:</b>	Authorized FY 2000	Proposed FY 2001						
Personnel		\$9.0						
Travel		\$0.0						
Contractual		\$0.0						
Commodities		\$0.6						
Equipment		\$0.0	LONG RANGE FUNDING REQUIREMENTS					
Subtotal	\$0.0	\$9.6	Estimated FY2002	Estimated FY2003				
General Administration		\$1.4						
Project Total	\$0.0	\$11.0						
Full-time Equivalentents (FTE)		0.2						
Dollar amounts are shown in thousands of dollars.								
Other Resources								
Comments:								

**FY01**

Prepared:

Project Number: 01385  
 Project Title: Modeling Biodiversity in Kachemak Bay: A  
 Proposal to Map Marine Nearshore Habitats at Nested  
 Spatial Scales  
 Agency: Alaska Department of Fish and Game



**2001 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET**

October 1, 2000 - September 30, 2001

<b>Personnel Costs:</b>		GS/Range/ Step	Months Budgeted	Monthly Costs	Overtime	
Name	Position Description					
G. Carl Schoch, Ph.D.	Research Coordinator	18A	1.8	5.0		
Subtotal			1.8	5.0	0.0	
<b>Personnel Total</b>						
<b>Travel Costs:</b>		Ticket Price	Round Trips	Total Days	Daily Per Diem	
Description						
<b>Travel Total</b>						

**FY01**

Prepared:

Project Number: 01385  
 Project Title: Modeling Biodiversity in Kachemak Bay: A  
 Proposal to Map Marine Nearshore Habitats at Nested  
 Spatial Scales  
 Agency: Alaska Department of Fish and Game

**2001 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET**

October 1, 2000 - September 30, 2001

<b>Contractual Costs:</b>		
Description		
When a non-trustee organization is used, the form 4A is required.		<b>Contractual Total</b>
<b>Commodities Costs:</b>		
Description		
Boat Gas and Related Supplies		
		<b>Commodities Total</b>

**FY01**

Prepared:

Project Number: 01385  
 Project Title: Modeling Biodiversity in Kachemak Bay: A  
 Proposal to Map Marine Nearshore Habitats at Nested  
 Spatial Scales  
 Agency: Alaska Department of Fish and Game

**2001 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET**

October 1, 2000 - September 30, 2001

<b>New Equipment Purchases:</b>		Number of Units	Unit Price	
Description				
Those purchases associated with replacement equipment should be indicated by placement of an R.		<b>New Equipment Total</b>		
<b>Existing Equipment Usage:</b>		Number of Units		
Description				
Personal Computers or Workstations		2		
22 Foot Boat for Field Surveys		1		

**FY01**

Prepared:

Project Number: 01385  
 Project Title: Modeling Biodiversity in Kachemak Bay: A  
 Proposal to Map Marine Nearshore Habitats at Nested  
 Spatial Scales  
 Agency: Alaska Department of Fish and Game