

Trustee Council Use Only
Project No: 040574
Date Received:

GEM PROPOSAL SUMMARY PAGE
(To be filled in by proposer)

Project Title: Assessment of Bivalve Recovery on Treated Mixed-Soft Beaches in Prince William Sound - Submitted Under the BAA

Project Period: April through September 2004 for this program cost extension

Proposer(s): Dennis C. Lees, Littoral Ecological & Environmental Services,
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Study Location: Prince William Sound

Abstract: Due to favorable weather, we were able to collect 25 percent more infaunal samples during the August 2002 field effort for Project No. 02574 than we had initially proposed for this work. This should improve the program's statistical power by about 15 percent. Current trends observed in samples analyzed to date suggest that treated sites have fewer bivalves than reference sites.

Unfortunately, sediment characteristics differed substantially between the new sampling sites and those sampled during previous work in the region. Consequently, sample volumes for these infaunal samples are four to five times larger than was anticipated. Therefore, the time required to sort the samples far exceeds the budget for sorting.

This proposal is directed at obtaining additional funds for sample sorting. Accelerating the sorting process will allow us to complete sample analysis and publication of our results and will allow the Trustee Council to draw inferences regarding lingering effects to intertidal bivalve assemblages from the oil spill in a timely manner.

Funding:	EVOS Funding Requested:	FY 04	\$	36,200	
	(must include 9%GA)	FY 05	\$	0	
		FY 06	\$	0	
					TOTAL: \$36,200
	Non-EVOS Funds to be Used:	FY 04	\$	0	
		FY 05	\$	0	
		FY 06	\$	0	
					TOTAL: \$ 0

Date: 3/30/2004

I. NEED FOR THE PROJECT - 040574

A. Statement of Problem

Studies from 1989 through 1997 suggest that bivalve assemblages on beaches in PWS treated with high-pressure hot-water washing remain severely damaged in terms of species composition and function. This project was funded to assess the generality of this apparent injury to these assemblages. A finding that our conclusions from these studies are accurate will indicate that a considerable proportion of mixed-soft beaches in treated areas of the sound remains disturbed and that these beaches are functionally impaired in terms of their ability to support foraging by damaged nearshore vertebrate predators such as sea otters and harlequin ducks. The study may also provide insight into the need for remediation of beaches to restore biodiversity and function in these assemblages.

To address these issues, infaunal samples were collected during the August 2002 field effort for Project No. 02574. Due to favorable weather, we were able to collect samples at 25 percent more sites (40 sites sampled vs 32 proposed) and samples (200 sampled vs 160 proposed) than we had proposed in the proposal for this work, thus improving the statistical power of the program by about 15 percent. Unfortunately we found that the sediment characteristics of the sampling sites differed substantially from the sites sampled during previous work in the region. Consequently, sample volumes for the infaunal samples are four to five times larger than was anticipated and budgeted for. Therefore, the time required to sort the samples far exceeds the budget for sorting.

This proposal is directed at obtaining additional funds to facilitate sample sorting. Accelerating sample the sorting process will allow us to complete sample analysis, report preparation, and publication of our results, and will allow the Trustee Council the ability to draw inferences regarding damage and lingering effects to intertidal bivalve assemblages from the oil spill and the ensuing cleanup in a timely manner.

B. Relevance to GEM Program Goals and Scientific Priorities

The primary reason we are proposing this study is that we became concerned about the implications of differences in condition of intertidal infaunal assemblages that we have observed between oiled and treated, oiled but untreated, and unoiled reference sites in western Prince William Sound since 1989. We observed that the assemblages at the treated sites were substantially impoverished relative to those at the reference sites and that they displayed fundamental differences in functional capabilities. Moreover, we postulated that these differences were due primarily to differences in inorganic and organic sediment characteristics resulting from cleanup efforts rather than hydrocarbons in the sediments.

As a consequence of these differences, the treated beaches that we observed from 1989 through 1996 were far less able to support foraging by organisms from higher trophic levels or to serve as subsistence harvest areas for the native or tourist populations in Prince William Sound. The impoverished condition of the bivalve assemblages may, in fact, be an important contributing factor in the failure of sea otters to demonstrate recovery in many oiled parts of the sound.

The geographic scope of our previous studies was, unfortunately, limited and cannot our findings cannot be extrapolated to the rest of the sound. Consequently, we proposed this study to assess if the conditions that we observed in the intertidal infaunal assemblages and sediments occur generally in sediments on beaches exposed to high-pressure hot-water wash in western Prince William Sound. Determining the answer to that question could also provide helpful information in understanding the dynamics of sea otters in areas of the sound that were oiled and treated in 1989-90.

Preliminary analysis of samples analyzed to date for this program indicates a trend for greater abundance of bivalves at reference sites than at treated sites. However, sediment variables appear similar between the two categories of stations. In contrast, sediment grain size characteristics for both categories of sites selected for this study differ substantially from those at the NOAA sites at which we sampled from 1990 through 1996 and used as the basis for our calculations for these analyses.

II. PROJECT DESIGN

A. Objectives

The objective of this proposal is to obtain additional funding to deal with the increased sample analysis time created by the increased number of samples (25 percent more samples) and higher than expected volume of the samples (4-5 times the volume observed in the NOAA samples) obtained during the field phase of this program.

The purposes of this program are to determine if the impoverished condition of intertidal bivalve assemblages observed in oiled and treated areas during the NOAA 1990-97 studies is general to treated sites throughout the western sound and to examine the sediment characteristics that may be causing it. The program is addressing two major objectives. The first is to evaluate whether the depressed condition of bivalve assemblages at treated sites observed in our earlier work is general to treated sites throughout western Prince William Sound. The second objective is to evaluate the role that three sediment characteristics may play in the apparent depression of bivalve assemblages in treated sediments. The four major hypotheses that are being tested to compare patterns in bivalve assemblages between oiled and treated and reference sites in western Prince William Sound are listed below:

Bivalve Assemblages

1. H_0 = Numerical characteristics of the bivalve assemblage (numbers of taxa and individuals) are similar at treated and reference sites.

H_a = Numerical characteristics of the bivalve assemblage exhibit lower values at treated sites than at reference sites.

2. H_0 = Species composition of the bivalve fauna is similar at treated and reference sites.

H_a = Species composition of the bivalve fauna is more complex and productive at reference sites than at treated sites.

3. H_0 = Functional characteristics of the bivalve assemblage (dominance by deposit feeders, tubicolous or burrowing forms) are statistically similar at treated and reference sites. Deposit feeders and tubicolous or burrowing forms are equally abundant at treated and reference sites.

H_a = Functional characteristics of the bivalve assemblage are dissimilar at treated and reference sites. Deposit feeders and tubicolous or burrowing forms are more abundant at reference sites than at treated sites.

Sediment Characteristics

4. H_0 = Sediment characteristics are statistically similar at treated and reference sites. Percent silt/clay, Total Organic Carbon, Total Kjeldahl Nitrogen, and C:N ratios are similar at treated and reference sites.

H_a = Sediment characteristics are dissimilar at treated and reference sites. Total Percent silt/clay, Organic Carbon, and Total Kjeldahl Nitrogen are lower at treated than at reference sites, and C:N ratios are higher at treated than at reference sites.

B. Procedural and Scientific Methods

General procedures are described in the original proposal for this project (Project No. 02574).

To address the sample sorting associated with this proposal, the methods initially proposed have been modified to accommodate the nature of the samples collected. The samples are being screened in a nested series of sieves with mesh sizes of 1.0, 2.0, and 6.3 mm. Organisms are being sorted from these fractions and preserved in isopropyl alcohol. Subsequently, bivalves are identified to the lowest appropriate taxon, enumerated, and shell length is measured and recorded for the larger clam species (e.g., *Protothaca staminea*, *Saxidomus gigantea*, *Macoma* spp., and *Hiatella arctica*). The other organisms are being archived to permit further analysis if that is deemed appropriate. The sediments from each sample are being discarded.

C. Data Analysis and Statistical Methods

General procedures are described in the original proposal for this project (Project No. 02574).

D. Description of Study Area

The study area is described in the original proposal for this project (Project No. 02574). Geographic coordinates for sampling locations occupied during the August 2002 survey are

indicated in Table 1. They range from Northwest Bay on Eleanor Island south the Sleepy Bay on Latouche Island.

Table 1. Station locations occupied during intertidal bivalve assemblage survey in August 2002.

Location	Latitude (degrees)	Latitude (seconds)	Longitude (degrees)	Longitude (seconds)
KN007 - NOAA Bay of Isles	60	23.061	147	44.983
CH001	60	19.636	148	0.558
CH008A	60	21.9303	147	59.3388
CH008B	60	21.989	147	59.357
CH009	60	22.7273	147	59.682
DI066	60	29.7791	147	40.0506
DI067	60	29.9177	147	39.8308
DI067B	60	29.9381	147	39.5867
EV008	60	6.09439	148	0.72383
EV016	60	7.64269	147	55.0897
EV070	60	5.974	148	2.842
FL003A	60	9.071	148	2.709
FL003B	60	9.072	148	2.718
FL003C	60	9.54365	148	2.75391
FL004A	60	10.0587	148	2.56407
FL004B	60	10.444	148	1.87527
IN031	60	30.055	147	38.333
IN032	60	29.7447	147	37.6016
KN004	60	22.9729	147	42.789
KN0103A	60	29.655	147	41.845
KN0103B	60	29.6876	147	41.8408
KN0104	60	29.695	147	41.231
KN0106A	60	28.236	147	41.138
KN0106B	60	28.424	147	40.979
KN0118	60	28.324	147	42.7119
KN0130	60	25.5042	147	47.2891
KN0131A	60	25.906	147	47.02
KN0131B	60	25.901	147	46.999

KN0133	60	26.0342	147	46.4811
KN0502	60	27.24	147	47.956
KN0507	60	25.741	147	49.032
KN0553	60	21.87	147	51.943
KN0554A	60	21.211	147	50.8116
KN0554B	60	20.0444	147	49.3506
KN0575	60	17.0634	147	51.334
LA016	60	4.014	147	50.01
NW Bay West Arm - NOAA	60	32.609	147	36.24
Shelter Bay - NOAA	60	7.07813	147	57.3963
SL001	60	19.898	147	53.75
Sleepy Bay - NOAA	60	3.91824	147	50.2765

E. Coordination and Collaboration with Other Efforts

Not Applicable

III. SCHEDULE

A. Project Milestones

Project milestones have been discussed in the original proposal for this project (Project No. 02574). An additional milestone is provided for the sample analysis component addressed in this proposal.

Objective 1. Complete infaunal sample sorting and data entry.
To be met by June 2004

B. Measurable Project Tasks

FY 04, 3rd quarter (April 1, 2004-June 30, 2004)

June 15: Complete sample analysis and data entry

June 30: Initiate data analysis

FY 04, 4th quarter (July 1, 2004-September 30, 2004)

July 15: Commence preparation of final report and peer-reviewed paper

August 31: Complete preparation of final report

FY 05, 1st quarter (October 1, 2004-December 31, 2004)

December 15: Complete preparation of peer-reviewed paper and submit draft manuscript to Trustee Council Office and selected journal

FY 05, 2nd quarter (January 1, 2005-March 31, 2005)
(Dates not yet known) Present results at Annual GEM Workshop

IV. RESPONSIVENESS TO KEY TRUSTEE COUNCIL STRATEGIES

A. Community Involvement and Traditional Ecological Knowledge (TEK)

Not Applicable

B. Resource Management Applications

Not Applicable

V. PUBLICATIONS AND REPORTS

Not Applicable; provided in original proposal for project.

VI. PROFESSIONAL CONFERENCES

Not Applicable; provided in original proposal for project.

**EXXON VALDEZ OILSPILL TRUSTEE COUNCIL
DETAILED BUDGET FORM FY 05 - FY 07**

Budget Category:	Proposed FY 04	Proposed FY 05	Proposed FY 06	TOTAL PROPOSED
Personnel	\$1.9	\$0.0	\$0.0	\$1.9
Travel	\$0.0	\$0.0	\$0.0	\$0.0
Contractual	\$31.3	\$0.0	\$0.0	\$31.3
Commodities	\$0.0	\$0.0	\$0.0	\$0.0
Equipment	\$0.0	\$0.0	\$0.0	\$0.0
Subtotal	\$33.2	\$0.0	\$0.0	\$33.2
Indirect (rate will vary by proposer)				
Project Total	\$33.2	\$0.0	\$0.0	\$33.2
Trustee Agency GA (9% of Project Total)	\$3.0	\$0.0	\$0.0	\$3.0
Total Cost	\$36.2	\$0.0	\$0.0	\$36.2

Cost-share Funds:

In this box, identify non-EVOS funds or in-kind contributions used as cost-share for the work in this proposal. List the amount of funds, the source of funds, and the purpose for which the funds will be used. Do not include funds that are not directly and specifically related to the work being proposed in this proposal.

Coastal Marine Institute relict Arctic fauna
CIRCAC Reconnaissance survey - 2002
National Park Service

FY 04-06

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**EXXON VALDEZ OILSPILL TRUSTEE COUNCIL
 DETAILED BUDGET FORM FY 05 - FY 07**

Contractual Costs:		Contract
Description		Sum
Sorting of infaunal samples - 125 samples @ \$250 per sample		31.3
If a component of the project will be performed under contract, the 4A and 4B forms are required.		
Contractual Total		\$31.3
Commodities Costs:		Commodity
Description		Sum
N/A		
Commodities Total		\$0.0

FY 04

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**EXXON VALDEZ OILSPILL TRUSTEE COUNCIL
DETAILED BUDGET FORM FY 05 - FY 07**

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

FY 05

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**EXXON VALDEZ OILSPILL TRUSTEE COUNCIL
DETAILED BUDGET FORM FY 05 - FY 07**

Contractual Costs:	Contract
Description	Sum
N/A	
Contractual Total	\$0.0
Commodities Costs:	Commodity
Description	Sum
N/A	
Commodities Total	\$0.0

FY 06

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