

Trustee Council Use Only

Project No: \_\_\_\_\_

Date Received: \_\_\_\_\_

**GEM PROPOSAL SUMMARY PAGE**

(To be filled in by proposer)

Project Title: Development of a strategy for monitoring *Exxon Valdez* oil and other contamination in PWS

Project Period: FY 04

Proposer(s): Jeffrey W. Short, National Marine Fisheries Service, NOAA  
Roger H Green, University of Western Ontario

Study Location: Prince William Sound

Abstract: This project will evaluate alternative sampling designs and strategies for monitoring oil from the T/V Exxon Valdez remaining on beaches in Prince William Sound, along with other hydrocarbon contaminants from anthropogenic and natural sources, and will make recommendations regarding overall sampling design, duration and frequency. The recommended strategy will be optimized for statistical power based on existing knowledge of the distributions of hydrocarbons from known sources, and will include a means of increasing power as more knowledge is gained through sampling as monitoring proceeds. The recommended strategy will incorporate results from the Prince William Sound Regional Citizens' Advisory Committee's Long Term Environmental Monitoring Program, and will explicitly recommend how the results from this program may be efficiently augmented. The project proposed here will directly address a core concern of the GEM program, by determining the persistence of Exxon Valdez oil placed in the context of other hydrocarbons in the region.

Funding:	EVOS Funding Requested:	FY 04	\$ 45.9K	
		FY 05	\$	
		FY 06	\$	TOTAL:45.9
	Non-EVOS Funds to be Used:	FY 04	\$ 18	
		FY 05	\$	
		FY 06	\$	TOTAL:18

Date: 12 June 2003      Date proposal prepared: 12 June 2003

# GEM RESEARCH PLAN

## I. NEED FOR THE PROJECT

### A. Statement of Problem

Although most of the oil spilled from the T/V Exxon Valdez in 1989 dispersed or was biodegraded by 1992, the remaining oil has proven surprisingly persistent. A study conducted during 2001 estimated on the order of 100 m<sup>3</sup> of Exxon Valdez oil remaining in Prince William Sound (Short et al., in prep.), with much of the oil buried in shallow intertidal sediments and only moderately weathered. These results imply loss rates on the order of 25% per year since 1992, suggesting that Exxon Valdez oil will remain readily encountered on the most heavily impacted beaches in the region on time spans of one to a few decades.

Other sources of hydrocarbons have been invoked as important in this region, including asphalt released from storage tanks during the 1964 Alaska earthquake (Kvenvolden et al., 1993), natural oil seeps (Page et al., 1997), native coal (Short et al., 1999), erosion of organic rich shales (Boehm et al., 2002), fallout from forest fires (Page et al., 1999), and other human industrial and habitation sites (Page et al., 1996). The extent of hydrocarbons oil from asphalt patches released during the 1964 earthquake is estimated as less than 5% of the beach area affected by Exxon Valdez oil by 2001 (Short et al., 2003), but the extent and intensity of hydrocarbons from the other sources is not clear.

Monitoring the persistence of remaining Exxon Valdez oil is necessary to evaluate the extent to which biota in the affected region are still exposed to toxic hydrocarbons from the oil. Monitoring hydrocarbons from other potentially confounding sources provides context necessary to evaluate the scale of likely impacts from exposure to Exxon Valdez oil. A relatively precise estimate of Exxon Valdez oil was provided by the 2001 survey (Short et al., 2003), but how this compares quantitatively to inputs from other sources, and especially other anthropogenic sources such as current and abandoned industrial and habitation sites is currently unknown.

#### References:

- Boehm, P. D., Burns, W. A., Page, D. S., Bence, A. E., Mankiewicz, P. J., Brown, J. S. and Douglas, G. S. 2002. Total organic carbon, an important tool in an holistic approach to hydrocarbon source fingerprinting. *Environmental Forensics* 3:243-250.
- Kvenvolden, K. A., Carlson, P. R., Threlkeld, C. N., and Warden, A. 1993. A possible connection between two Alaskan catastrophes occurring 25 yr apart (1964 and 1989). *Geology* 21:813-816
- Page, D. S., Boehm, P. D., Douglas, G. S., Bence, A. E., Burns, W. A. and Mankiewicz, P. J. 1999. Pyrogenic polycyclic aromatic hydrocarbons in sediments record past human activity: A case study in Prince William Sound, Alaska. *Mar. Pollut. Bull.* 38:247-260.

- Page, D. S., Boehm, P. D., Douglas, G. S., Bence, A. E., Burns, W. A. and Mankiewicz, P. J. 1996. The natural petroleum hydrocarbon background in subtidal sediments of Prince William Sound, Alaska, USA. *Environ. Toxicol. Chem.* 15(8):1266-1281.
- Page, D. S., Boehm, P. D., Douglas, G. S., Bence, A. E., Burns, W. A. and Mankiewicz, P. J. 1997. An estimate of the annual input of natural petroleum hydrocarbons to seafloor sediments in Prince William Sound, Alaska. *Mar. Pollut. Bull.* 34(9):744-749.
- Short, J.W., K.A. Kvenvolden, P.R. Carlson, F.D. Hostettler, R.J. Rosenbauer, and B.A. Wright. 2000. Response to comment re: The natural hydrocarbon background in benthic sediments of Prince William Sound, Alaska: oil vs. coal. *Environ. Sci. Technol.* 34:2066-2067.
- Short, J. W., Lindeberg, M. R., Harris, P. M., Maselko, J. M., Pella, J. J., and Rice, S. D. 2003. A quantitative estimate of oil persisting on beaches of Prince William Sound, Alaska, USA, 12 years after the Exxon Valdez oil spill. In prep.

## **B. Relevance to GEM Program Goals and Scientific Priorities**

The project proposed here will recommend a long-term sampling strategy to efficiently monitor the persistence of the remaining Exxon Valdez oil, as well as changes in hydrocarbons from the 1964 earthquake, from other anthropogenic sources, and from natural sources on the beaches of western Prince William Sound. Implementation of the recommended sampling strategy will permit a quantitative comparison of hydrocarbon contributions from each of these classes of sources to the region within Prince William Sound impacted by the Exxon Valdez oil spill and an assessment of temporal changes of these contributions. The significance of likely effects of exposure to hydrocarbons from these sources may then be more rigorously compared with other factors affecting biota using the intertidal zone, including harlequin ducks and sea otters, two species that show evidence of continuing exposure to hydrocarbons.

Ultimately, monitoring results using the recommended strategy will indicate the time when the amount of Exxon Valdez oil remaining on beaches of Prince William Sound is no longer a significant factor for the biota there and will signal the end of the spill's direct impacts. Results from monitoring hydrocarbons from other sources will directly address two GEM goals: detection of changes of hydrocarbon insults to the intertidal of the region and understanding the quantitative relationships among sources inputs of these hydrocarbons. The specific results we expect from this project include a set of recommendations for monitoring hydrocarbon inputs from categorically distinct sources efficiently with explicit recognition and incorporation of the hydrocarbon monitoring currently conducted by the Prince William Sound Regional Citizens' Advisory Committee's Long Term Environmental Monitoring Program. We anticipate these results will allow core objectives of the GEM plan regarding lingering oil effects to be rigorously and efficiently addressed.

## **II. PROJECT DESIGN**

### **A. Objectives**

The main objective is to develop and “ground-truth” a strategy for monitoring persistence of residual oil from the Exxon Valdez oil spill in the context of hydrocarbon contamination from other sources and any natural sources.

Subsidiary objectives are:

- to maximize efficiency in routine sampling (“monitoring”), i.e. sensitivity and discrimination in relation to time and cost.
- to ensure unbiased estimation of hydrocarbon contaminants on the shores of Prince William Sound (PWS), as to (a) amount and (b) source.
- building on work already done by one of us (JS), sample the oiled (western) part of PWS to verify the present distribution of contaminants by source (e.g. the *Exxon Valdez* spill), and modify the sampling design accordingly (e.g. weighting the sampling effort by strata: shoreline by region, tidal height, substrate type, etc.).
- to plan the temporal dimension of the monitoring design e.g. frequency, duration, consistency.

There has been much dispute about the amount and source of oil and other hydrocarbon contamination in PWS. At one extreme there is a belief that little *Exxon Valdez* oil remains, that what does remain is mostly refractory (without biological impact), and that it is a small portion of the hydrocarbon contaminants (i.e. from anthropogenic sources) on or in the shores of PWS. At the other extreme there is a belief that substantial amounts of *Exxon Valdez* oil remain on PWS shorelines (especially subsurface in gravel at mid to low tide levels in the most heavily impacted western Sound), that it remains toxic (having mostly sublethal effects e.g. developmental, genetic, growth), and that biologically important contaminants from other sources are not in such large amounts as to make residual *Exxon Valdez* oil unimportant by comparison. Thus it is important to make a rigorous and fair assessment of this question and to set in place an ongoing scheme for future monitoring of persistent residual *Exxon Valdez* oil and other hydrocarbon contaminants in PWS. As it is applied year to year, the baseline established by previous and ongoing monitoring efforts (e.g. the Prince William Sound Regional Citizens' Advisory Committee's Long Term Environmental Monitoring Program) will be broadened, with an ongoing protocol for detection of changes in distribution of oil from various sources over time.

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

The main objective - - See subsidiary objectives following:

Maximize efficiency - - This requires an optimum allocation of sampling effort to various levels in the design e.g. shoreline by region, shoreline segments, transects within shoreline segments, samples along transects, - - Time and cost for any particular allocation can be evaluated, and power analysis re. given hypotheses (e.g. how much oil from each source) will assess sensitivity and discrimination.

Ensure unbiased estimation - - It must be ensured that the allocation of sampling effort

gives a fair and equal (proportional) chance to the detection of oil from different sources. In other words, sampling effort must not be disproportionately allocated to beaches, tide levels, etc., which tend to have oil from a particular source, or which tend *not* to have oil from a particular source. This would be based on the following:

Sample to verify present distribution of contaminants by source - - Sampling programs sponsored by the Exxon Valdez Trustee Council provide assessments of the present distribution of oil, by source, on beaches of western PWS. These programs are based on stratified random samples at two spatial scales. Beaches were selected for intensive field sampling from categories of beaches that were oiled by the Exxon Valdez spill. The selected beaches were evaluated for oil contamination examining randomly placed 0.25 m<sup>2</sup> quadrats for evidence of oil. Results from these studies provide a good basis for estimating statistical sampling power of related sampling designs. Based on this information we can sample with good efficiency and minimal bias, and then use the results to fine-tune (re-weight) the sampling design for optimal efficiency and unbiased estimation.

Plan temporal dimension of monitoring design - - Up to this point the emphasis has been on an optimal strategy for assessment of distribution of EV (and other) oil at any given time (e.g. in a given year). However we want a strategy for monitoring persistence of oil which implies sampling in some fashion over time. This gets into other issues:

- Should units be re-sampled each time (e.g. beaches) or randomly selected each time?
- If the former then a repeated measures design and statistical analysis is implied. The specifics of this have to be worked out, including power analysis re. testing hypotheses about changes of distribution of oil from various sources over time.
- Frequency of sampling has to be determined. Every year? Less frequently? Simulation of power (changes detected or missed) in different frequency of sampling scenarios has been done by one of us (RG, for *Ontario Ministry of Environment* re. monitoring discharges) and the procedure is applicable here.
- All of this would be put into a context of benefit/cost i.e. sensitivity (power) in relation to costs in time & effort.

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

Since this proposal is to create and describe a strategy for monitoring persistence of EV oil and its relationship to other sources of contamination in PWS, this is mostly not applicable. Assessment of power for different amounts and allocation of sampling effort in space and time is key to what we propose to do. Initial values will be based on previous marine intertidal studies in general (of which there are many including quite a few by RG and JS), and PWS intertidal studies in particular. Since the EV oil spill there have been many, done by various companies and agencies, and much of the data are in the public domain. In addition, JS was involved in some of these, and RG was chair of the Design and Statistics Working Group for EVOS, which dealt with many of the (non-*Exxon*) projects. The methods are in standard references (including RG's book and his

new one in prep), and appropriate statistical software is widely available or can be written. In effect, JS will provide the first-hand PWS shoreline sampling experience and the chemistry expertise, and RG will provide the study design and statistical analysis expertise, and the experience in determining optimal design re. power, robustness and efficiency for monitoring studies similar to the one proposed here.

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

The study area includes the spill-affected portion of western PWS, in particular the islands from the Naked Island complex to the islands forming the southwestern passages (i.e. Evans, LaTouche, Bainbridge, etc.).

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

This project will affect all other Trustee funded projects relating to lingering oil, and it will complement the Prince William Sound Regional Citizens' Advisory Committee's Long Term Environmental Monitoring Program (LTEMP). The project proposed here will furnish the basis for deciding how the oil remaining in PWS should be monitored, with respect to location, frequency and duration. It will also provide a basis for evaluating the impacts of other hydrocarbon pollution sources relative to the Exxon Valdez, and will complement the LTEMP by showing how the trend information from repeated sampling at fixed stations under the LTEMP can be integrated with random sampling methods that permit inferences regarding the sampled region as a whole.

### **III. SCHEDULE**

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

This project will begin with a field examination of the study region in spring 2004 by RG guided by JS. Following examination of the range of field situations where lingering Exxon and "earthquake" oil is still found, we will develop alternative sampling designs and test their statistical power to detect change. This development will occur from May 2004 through August 2004, and a report of our findings will be prepared and submitted by September 30, 2004.

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

FY 04, 1st quarter (October 1, 2003-December 31, 2003)

October: Project funding approved by Trustee Council

FY 04, 2nd quarter (January 1, 2004-March 31, 2004)

Perform a literature and data review to establish a set of resources for performing statistical power calculations

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

April 15 - April 30: Overfly PWS to examine the range of beach types, followed by 5-day cruise to examine locations where lingering oil persists.

May 1 - June 30: Construct feasible sampling design alternatives and begin power assessments.

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

July 1 - August 31: Continue power assessments

September 1 - September 30: Prepare and submit final report

FY 05, 2nd quarter (January 1, 2005-March 31, 2005)

January 12-16: Present results at the annual workshop

#### **IV. RESPONSIVENESS TO KEY TRUSTEE COUNCIL STRATEGIES**

##### **A. Community Involvement and Traditional Ecological Knowledge (TEK)**

There is little opportunity for this project to interact directly with communities in the region. The primary product will be a set of sampling design alternatives, and an assessment of the advantages of each. These results will be presented to the public at the annual workshop.

##### **B. Resource Management Applications**

This project will generate efficient sampling strategies that facilitate monitoring the oil remaining from the Exxon Valdez, as well as hydrocarbons from other major prospective sources. These strategies will allow resource managers to assess the long-term impacts of the lingering oil, and of hydrocarbons from other sources, on the valued marine resources of the region. This will directly address public concerns regarding the long-term impacts of the lingering oil.

#### **V. PUBLICATIONS AND REPORTS**

In addition to the required final report, we anticipate presentation of our findings in a refereed scientific journal, to be identified at a later date.

#### **VI. PROFESSIONAL CONFERENCES**

None

## RESUMES

Jeffrey Short:

- Education            Bachelor of Science, Biochemistry and Philosophy, University of California at Riverside, 1973
- Master of Science, Physical Chemistry, University of California at Santa Cruz, 1982
- Ph.D. Candidate, Fisheries Biology, University of Alaska. Thesis Title: "Seasonal Variability of Pristane in Mussels (*Mytilus trossulus*) in Prince William Sound, Alaska". Defense scheduled summer 2003.
- Current Position    Research Chemist (since 1983), Auke Bay Laboratory, National Marine Fisheries Service, NOAA, 11305 Glacier Highway, Juneau, Alaska 99801-8626 Tel: 907.789.6065 Fax: 907.789.6094 email: Jeff.Short@noaa.gov

### Relevant Publications:

- Short, J. W., Lindeberg, M. R., Harris, P. M., Maselko, J. M., Pella, J. J., and Rice, S. D. 2003. A quantitative estimate of oil persisting on beaches of Prince William Sound, Alaska, USA, 12 years after the Exxon Valdez oil spill. In prep.
- Short, J. W. 2002. Oil identification based on a goodness-of-fit metric applied to hydrocarbon analysis results. *Environmental Forensics* 3:349-356.
- Van Kooten, G. W., Short, J. W., and Kolak, J. J. 2002. Low maturity Kulthieth Formation coal: A possible source of polycyclic aromatic hydrocarbons in benthic sediment of the northern Gulf of Alaska. *Environmental Forensics* 3:227-242.
- Short, J. W., Lindeberg, M. R., Harris, P. M., Maselko, J. M., and Rice, S. D., 2002. Vertical oil distribution within the intertidal zone 12 years after the Exxon Valdez oil spill in Prince William Sound Alaska. *Proceedings of the Twentyfifth Arctic and Marine Oilspill Program (AMOP) Technical Seminar*, Environment Canada, Ottawa, Ont. pp. 57-72.

### Recent Collaborators:

- Dr. Mace Barron, P.E.A.K. Research, Boulder, Colorado
- Dr. Peter Hodson, Queen's University, Ontario, Canada
- Dr. Gail Irvine, US Geological Survey, Anchorage, Alaska

Dr. Jon Kolak, US Geological Survey, Reston, Virginia

Dr. Lena Latkovskaya, Sakhalin Research Institute of Fisheries and Oceanography, 196  
Komsomolskaya Street, Yuzhno-Sakhalinsk, Russia

Dr. Kenneth Lee, Department of Fisheries and Oceans, Halifax, Canada

Dr. James R. Payne, Payne Environmental Consultants, Inc., Encinitas, California

Dr. Arnfinn Skadsheim, Rogaland Research Institute, Stavanger, Norway

Dr. Gerald VanKooten, Calvin College, Grand Rapids, Michigan

**Dr. Roger Green:**

6212 Spruce Meadows Drive,

Anchorage AK 99507

phone/fax 907-743-0626

(Temporary until August 15, 2003: 613-475-5543)

E-mail: rgreen@uwo.ca

Academic qualifications:

- Bachelor of Science in Biology, College of William & Mary, 1961
- Ph.D. in Zoology, Cornell University, 1965
- Fulbright Postdoctoral Fellowship, University of Queensland, 1965-66
- Resident Ecologist, Marine Biological Lab, Woods Hole, 1966-68
- Asst. and Assoc. Professor, Department of Zoology, University of Manitoba, 1968-76
- Assoc. Professor and Professor, Department of Zoology, University of Western Ontario, 1977-99
- Professor Emeritus, Department of Zoology, University of Western Ontario, 1999-

Publications:

- 56 papers in refereed journals
- 23 papers in refereed conference or workshop proceedings
- 1 book: Sampling Design and Statistical Methods for Environmental Biologists. 1979. Wiley, New York.
- 1 book in prep: Environmental Study Design and Analysis: Principles and Examples. Wiley, New York.
- 8 contributions to a book or document
- 4 invited book reviews

Relevant References:

Peterson, C. H., L. L. McDonald, R. H. Green, and W. P. Erickson. 2001. Sampling design begets conclusions: the statistical basis for detection of injury to and recovery of shoreline communities after the 'Exxon Valdez' oil spill. *Mar. Ecol. Prog. Ser.* 210: 255-283.

Green, R. H. and S. R. Smith. 1997. Sample program design and environmental impact assessment on coral reefs. In "*Proceedings of Internat. Coral Reefs Symp.* ", J.B.C. Jackson, ed, Panama.

Walters, C. J. and R. H. Green. 1997. Valuation of experimental management options for ecological systems. *J. Wildl. Man.* 61: 987-1006.

Green, R. H. and P. A. Montagna. 1996. Implications for monitoring: study designs and interpretation of results. *Can. J. Fish. Aquat. Sci.* 53: 2629-2636.

Green, R. H. 1994. Aspects of power analysis in environmental monitoring. In "*Statistics in Ecology and Environmental Monitoring*", D.J. Fletcher and B.F.J. Manly, eds., p.173-182, Otago Conference Series, Otago, New Zealand.

#### Recent Collaborators:

1999-2000 Alberta Environment (various people) re. design of monitoring for the tar sands project

2001-2002 Zubir Din (Director), W.K. Gong and various science officers and graduate students, at Centre for Marine and Coastal Studies at University Science Malaysia in Penang, while I was a Visiting Professor there.

2000-01 James Gan (NParks Singapore) re. an intertidal sampling study on the mangrove shoreline of Sungei Buloh Wetland Reserve (SBWR)

1999-2000 H.W. Khoo (same place) re. use of bivalve mollusks (enzyme response of mussels to metals in this case) for monitoring

Up through March 1999 Tom Lam (National Univ. of Singapore, then head of Biological Sciences Dept.) re. presenting an environmental study design & analysis short workshop

1999-2000 Fred Longstaffe (Univ. of Western Ont.) re. use of stable isotopes (an M.Sc. student of mine) to trace HCs and nutrients from natural oil seeps in a freshwater (stream) benthic community. Fred is also UWO Dean of Science.

Up through April 2002 C.H. (Pete) Peterson (Univ. of NC) re. various things but especially the "EVOS studies review" papers in MEPS in 2001 and 2002.

1999-2000 Carl Schwartz (Simon Fraser Univ.) re. statistical consequences of compositing field samples re. the tar sands project

2000-02 S.M. Rashid re. statistical analysis of doctoral research data on population of giant monitor lizards at SBWR



## **DETAILED PROJECT BUDGET FORM**

### **BUDGET JUSTIFICATION**

Sampling costs include a trip to Prince William Sound to examine the range of beach types that the model would include. This trip involves examining the different types of beaches (topography) where lingering oil persists.

Dr. Green's salary covers his time and effort to develop a model for long-term oil monitoring.

### **DATA MANAGEMENT QA/QC STATEMENT INCLUDING MetaLite file.**

This project involves developing a model and the specific parameters have not been established yet. A MetaLife file is attached in electronic form. The file is named: lingering oil.mdb.

## GEM 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/GEM Data Policy\**, adopted July 9, 2002) and reporting requirements (*Procedures for the Preparation and Distribution of Reports\*\**, adopted July 9, 2002).

**PROJECT TITLE:**                    Development of a Strategy for Monitoring Exxon Valdez Oil and other Contamination in PWS.

Printed Name of PI:                Jeffrey W. Short

Signature of PI:                    \_\_\_\_\_ Date \_\_\_\_\_

Printed Name of co-PI:            Roger H. Green

Signature of co-PI:                \_\_\_\_\_ Date \_\_\_\_\_

Printed Name of co-PI:            \_\_\_\_\_

Signature of co-PI:                \_\_\_\_\_ Date \_\_\_\_\_

\* Available at <http://www.oilspill.state.ak.us/pdf/admin/datapolicy.pdf>

\*\* Available at <http://www.oilspill.state.ak.us/pdf/admin/reportguidelines.pdf>

**GEM CLASSIFICATION FORM**

**POSSIBLE PEER REVIEWERS FORM**

**EXXON VALDEZ OIL SPILL TRUSTEE COUNCIL  
DETAILED BUDGET FORM FY 04 - FY 06**

<b>Budget Category:</b>	Proposed FY 04	Proposed FY 05	Proposed FY 06		TOTAL PROPOSED	
Personnel	\$0.0	\$0.0	\$0.0		\$0.0	
Travel	\$7.6	\$0.0	\$0.0		\$7.6	
Contractual	\$29.5	\$0.0	\$0.0		\$29.5	
Commodities	\$5.0	\$0.0	\$0.0		\$5.0	
Equipment	\$0.0	\$0.0	\$0.0		\$0.0	
Subtotal	\$42.1	\$0.0	\$0.0		\$42.1	
General Administration (9% of Subtotal)	\$3.8	\$0.0	\$0.0		\$3.8	
Project Total	\$45.9	\$0.0	\$0.0		\$45.9	

**Cost-share Funds:**

This project is designed to evaluate alternative sampling designs and strategies for oil monitoring in PWS. NOAA will contribute all of Jeff Short's labor for project management and field planning 1.5 mo for a total of 18K.

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**FY 04-  
06**

Project Number:  
Project Title: Development of a strategy for monitoring  
Exxon Valdez oil & contamination in PWS  
Agency: NOAA - Auke Bay Laboratory

FORM 3A  
TRUSTEE  
AGENCY  
SUMMARY

Date Prepared:

6/11/2003



**EXXON VALDEZ OIL SPILL TRUSTEE COUNCIL  
 DETAILED BUDGET FORM FY 04 - FY 06**

<b>Contractual Costs:</b>		Contract
Description		Sum
Temporary labor (NOAA) - Data entry and verification		3.0
Vessel Charter to collect samples	5 days      1.3k/day	6.5
David Green Model Development		20.0
If a component of the project will be performed under contract, the 4A and 4B forms are required.		<b>Contractual Total</b>
		\$29.5
<b>Commodities Costs:</b>		Commodity
Description		Sum
Software		5.0
		<b>Commodities Total</b>
		\$5.0

**FY 04**

Project Number:  
 Project Title: Development of a strategy for monitoring  
 Exxon Valdez oil & contamination in PWS  
 Agency: NOAA - Auke Bay Laboratory Project

FORM 3B  
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**EXXON VALDEZ OIL SPILL TRUSTEE COUNCIL  
 DETAILED BUDGET FORM FY 04 - FY 06**

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

**FY 06**

Project Number:  
 Project Title:  
 Agency:

FORM 3B  
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