95026

FY 95 Detailed Project Description

COVER PAGE

1. **Project Title:** Hydrocarbon Monitoring: Integration of Microbial and Chemical Sediment Data

2. **Project Number:** 95026

3. **Lead Trustee Agency:** Alaska Department of Environmental Conservation

4. **Cooperating Agencies:** University of Alaska Fairbanks

5. **Project Start-up/Completion Dates (month/year):** Start-up, January 1995; Completion, one year after project start.

6. **Expected Project Duration (number of years):** One year.

7. **Cost of Project:** $146,900

8. **Geographic Area :** There is no field work for this project. The project will use existing data sets and will be completed at the Institute of Arctic Biology, University of Alaska Fairbanks.

9. **Name/Signature of Project Leader:**

Mark Brodersen

for Joan Braddock date

Assistant Professor of Microbiology
University of Alaska Fairbanks
Institute of Arctic Biology
Fairbanks, Alaska 99775-7000
Tele: (907) 474-7991; Fax: (907) 474-6967

10. **Name/Signature of lead agency Project Manager:**

P.I.
DR. BRADDOCK

Mark Brodersen 12/23/94

Mark Brodersen, Restoration Chief date
Alaska Department of Environmental Conservation
Exxon Valdez Oil Spill Restoration Office
410 Willoughby Ave., Suite 105
Juneau, Alaska 99801
Tele: (907) 465-5323: Fax: (907) 465-5375

A. INTRODUCTION

Biodegradation of hydrocarbons by microorganisms is a major mechanism for removal of petroleum contaminants from marine systems. Since the *Exxon Valdez* oil spill in 1989 we have amassed a great deal of data on microbial numbers and activities in sediments. These studies are unique in the extent of information collected following a major spill and the results provide valuable information on marine sediment microbial responses to hydrocarbon pollutants. For example, numbers of hydrocarbon oxidizers appear to be a good indicator of exposure of sediments to hydrocarbons. Some of these results have been recently accepted for publication in the journal, *Marine Pollution Bulletin*.

We originally designed our assays, in particular the microbial activity measurements, to stand on their own as much as possible. In other words we wanted some measure that would allow useful site to site comparisons without being reliant directly on chemistry data. We feel that we were successful in this goal. However, a great deal of predictive power is lost by not combining our results with sediment chemistry data. An analysis of these combined data sets will allow estimates of removal rates of hydrocarbons from contaminated sediments by biological processes and will validate the usefulness of microbial indicators as monitoring tools.

The Trustee Council has previously funded sediment analyses to determine whether intertidal and subtidal sediments are contaminated with oil, and to assess the concentrations and rate of degradation of the oil in these sediments. Microbial activity data can be used in concert with the hydrocarbon chemistry data to estimate in situ rates of mineralization of the fractions assayed (hexadecane, phenanthrene and naphthalene) in these sediments. These rate data can then be used in turn to estimate persistence of these fractions in sediments in Prince William Sound. In fact the major criticism of our damage assessment final report by the Trustee-appointed peer reviewer was that the microbiology and chemistry data need to be combined so that field rate calculations can be estimated. We wholeheartedly agree with the peer reviewer that these data should be combined both to validate the mineralization assays and to allow predictions of persistence of these hydrocarbons in the environment.

The microbial and sediment chemistry field work have been coordinated (since 1989) with samples for both collected at the same time in a similar manner. The sampling scheme was designed so that the chemistry and microbiology data could eventually be integrated. The two data sets are quite large and the resources have not yet been available to combine them. Synthesis of the data is a large undertaking. The proposed project would fund a researcher to complete that synthesis.

Synthesis of the intertidal and subtidal data on the microbial response to oil pollution, with the sediment chemistry data would: (1) Allow the estimation of in situ rates of biodegradation for hydrocarbon fractions in areas previously monitored for sediment contamination and microbial activity. (2) Establish upper and lower estimates of the persistence of these hydrocarbons in the sediments of the spill area. (3) Refine the tool of using relatively inexpensive microbial analyses as predictors of oil residue in sediments for future use in *Exxon Valdez* hydrocarbon monitoring and for future spills. (4) Comply with the peer-reviewer's recommendation that microbiology and chemistry data be synthesized.

We have two tremendous resources with the chemistry and microbiology data sets. A great deal of critical information about the relationship between numbers of oil degraders and oil concentrations and about persistence of various fractions of oil in the environment will be lost if this analysis is not done.

This information would help the Council meet the restoration objectives in the following manner:

- The Council's recovery objective for residual oil contamination of sediments is,"...recovery has been achieved when remaining oil concentrations are reduced to a level comparable to pre-spill levels." Since biodegradation is one of the major natural mechanisms for removal of oil from contaminated sediments, this technique will help predict when that occurs.
- Information on the rates of decomposition and persistence of oil is important foundation information for research involving any injured resource or service that exists in the nearshore environment.
- It would bring previous Council-funded activities to the close recommended by Trustee Council peer reviewers.

B. PROJECT DESCRIPTION

1. **Resources and/or Associated Services:** This project is important for evaluation of the relative "health" of sediments, and intertidal and subtidal organisms in the spill area. This project also will contribute to the development of techniques for monitoring oil contamination in contaminated systems.

2. **Relation to Other Damage Assessment/Restoration Work:** This project will integrate two previously funded projects-- sediment chemistry and microbiology. To successfully complete the project, close coordination with the NOAA Auke Bay Lab will be required. The results of this study are likely to be valuable for other researchers studying subtidal and intertidal organisms.

3. **Objectives:** The objectives of this study are: (1) Allow the calculation of rates of biodegradation for hydrocarbon fractions in areas previously monitored for sediment contamination and microbial activity. (2) Establish upper and lower estimates of the persistence of these hydrocarbons in the sediments of the spill area. (3) Refine the tool of using microbial analyses as predictors of oil residue in sediments for future use in *Exxon Valdez* hydrocarbon monitoring and for future spills. (4) Comply with the peer-reviewer's recommendation that microbiology and chemistry data be synthesized. A further objective of this study will be to produce a manuscript from these results for publication in a peer reviewed journal. This publication is important in the transfer of lessons learned from the *Exxon Valdez* spill to the broader community of scientists, regulators and decision-makers. The information gained from this study will be very valuable to decision-makers in future oil spills.

4. **Methods:** Our method of approach to complete the stated objectives will be to obtain a complete matrix of data from critical sites, place these data in a workable spread sheet or data base, formulate testable hypotheses and conduct statistical analysis of the data to test the hypotheses. We will initially focus on data from Prince William Sound.

All of the post-spill sediment microbiology data available were collected by personnel associated with our laboratory. This extensive data set (from 6 cruises) has already been tabulated in LOTUS 1-2-3 spread sheets. Corresponding sediment chemistry data for some of the samples have already been analyzed are available in a spread sheet from the NOAA Auke Bay Laboratory. We have already obtained some of these chemistry data. Other sediment samples have not yet been analyzed but are available for analysis. We have requested funding in the budget to analyze 33 (in triplicate) sediment chemistry samples. This will allow us to have complete chemistry and microbiology data from a matrix of key locations in Prince William Sound.

Once the data is compiled and agreement is reached on the history of the data sets, a set of testable hypotheses will be established. A strategy for statistical analysis will then be drawn up followed by assembly of the relevant microbial and chemical data sets. These will be organized into a matrix of collection time and location and, based on concurrence, a subset of data will be identified for further analysis. Appropriate control data will be selected, based primarily on location and the extent of oil contamination, and a preliminary statistical analysis will be performed. A complete statistical analysis will be performed as chemical analyses permit. Finally, the results will be tabulated and the process and conclusions presented in a final report and in a journal manuscript.

5. **Location:** With the exception of one trip to Juneau to coordinate with the Auke Bay Laboratory for chemistry data, the project will be located at the Institute of Arctic Biology at the University of Alaska Fairbanks.

6. **Technical Support:** Access will be needed to the microbial and sediment chemistry data. Support will be needed by those most knowledgeable with the sediment chemistry and microbial data sets. These include ADEC and NOAA personnel (for the sediment chemistry), and Dr. Joan Braddock, for the microbial data.

7. **Contracts:** The NOAA Auke Bay Lab will analyze 33 (in triplicate) sediment chemistry samples. We have tentatively discussed with the Auke Bay Lab which samples would need to be analyzed to complete this project. If the project goes forward, they have verbally agreed to provide us with the results from their analysis in May 1995. Completion of our data analysis will depend on the chemistry results being provided to us in a timely manner.

C. SCHEDULE

The project will begin as soon as funding is available. Assuming a start date of January 1995 we would complete a draft report by November 1995 and a final report in January 1996. If funding is not received by January 1995 these dates will need to be adjusted to reflect the actual start date. Within a one year time frame the objectives of this proposal will be accomplished on the following timeline: (1) Dec. 1994, selection of specific sites to be analyzed for chemistry by Auke Bay. (2) Jan.-May 1995, synthesize existing chemistry and microbiology data in data base or spread sheet and begin initial calculations and statistics. (3) May 1995, receive additional chemistry data from Auke Bay Lab. (4) May-Aug. 1995, finalize data calculations and statistics. (5) Aug.-Nov. 1995, complete a draft report for project for peer review and submit a manuscript for publication in peer reviewed literature. (6) Jan. 1996, revise report and submit final copy to Trustee Council.

D. EXISTING AGENCY PROGRAM

Not applicable to this project.

E. ENVIRONMENTAL COMPLIANCE, PERMITTING AND COORDINATION STATUS

Categorical exclusion on file.

F. PERFORMANCE MONITORING

Two extensive data sets are available to this project. It will be the responsibility of J. Braddock to oversee the selection of a critical sites matrix from the data sets

and from this information select sediment samples to be analyzed to complete the matrix. B. Luick will then be responsible for setting up the matrix in the computer in a useable format. The accuracy of the data set will be checked and both investigators will be responsible for quality control in this area. Both J. Braddock and B. Luick will also be responsible for determining specific hypotheses to be tested. These hypotheses will directly relate to the objectives of this proposal. B. Luick will be responsible for the statistical analysis of the data. Preparation of the final report and manuscript will be accomplished by both investigators. The participation of J. Braddock is critical to this project because of the accumulated knowledge of the microbial data set. B. Luick brings to the project a strong background in data analysis and statistical methods. Both investigators are committed to the successful completion of the project.

G. COORDINATION OF INTEGRATED RESEARCH EFFORT

We have coordinated our sample collection since 1989 with the NOAA Auke Bay Lab; sediment chemistry and microbiology samples were collected at the same time and manner. Coordination of the proposed work will be primarily with the Auke Bay Lab since they have the available chemistry data and the capabilities to do the additional required chemical analysis. While we do no anticipate direct coordination with other projects at this time, we expect that the results will be valuable for data interpretation to researchers studying intertidal and subtidal organisms.

H. PUBLIC PROCESS

This is a highly technical project with important, but technical results. Trustee agencies that help oversee the project will present the results in Trustee Council newsletters, etc. The personnel conducting the project will present results wherever needed. The general public will not, however, be otherwise integrated into the process.

I. PERSONNEL QUALIFICATIONS

Dr. Braddock has extensive experience in developing techniques for measuring microbial activity in the environment. In addition Dr. Braddock has been integrally involved with collection of sediment microbiology data since the spill. Dr. Luick brings to the project substantial training in chemistry and data reduction and analysis. See attached biographical sketches for Drs. Braddock and Luick.

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET
October 1, 1994 - September 30, 1995

Project Description: This project will integrate previously collected microbial and sediment chemistry data sets. It will calculate field rates of biodegradation for hydrocarbon fractions; establish upper and lower estimates of persistence of hydrocarbons in the environment; refine the tool of using inexpensive microbial analysis as predictors of oil residue for future monitoring; and comply with peer reviewer's recommendations to integrate the data sets.

Budget Category:	1994 Project No. . . . . Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment
Personnel	$0.0	$0.0	$48.9	$48.9	$3.4	
Travel	$0.0	$0.0	$0.0	$0.0	$0.0	
Contractual	$0.0	$0.0	$81.0	$81.0	$0.7	
Commodities	$0.0	$0.0	$4.0	$4.0	$0.0	
Equipment	$0.0	$0.0	$0.0	$0.0	$0.0	
Capital Outlay	$0.0	$0.0	$0.0	$0.0	$0.0	
Subtotal	$0.0	$0.0	$133.9	$133.9	$4.1	
General Administration	$0.0	$0.0	$13.0	$13.0	$0.6	
Project Total	$0.0	$0.0	$146.9	$146.9	$4.7	
Full-time Equivalents (FTE)	0.0	0.0	0.7	0.7	0.0	
	Dollar amounts are shown in thousands of dollars.					

Budget Year Proposed Personnel: Position Description	Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
See Individual 3A Forms for Personnel Details				
Personnel Total	0.0	$0.0	0.0	$0.0

NEPA Cost: $0.0

*Oct 1, 1994 - Dec 31, 1994

**Jan 1, 1995 - Sep 30, 1995

06/01/94

1995

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Project Number: 95026
Project Title: Integration of Microbial and Chemical Sediment Data
Sub-Project:
Agency: AK Dept. of Environmental Conservation

FORM 2A
PROJECT
DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET
October 1, 1994 - September 30, 1995

Project Description: This project will integrate previously collected microbial and sediment chemistry data sets. It will calculate field rates of biodegradation for hydrocarbon fractions; establish upper and lower estimates of persistence of hydrocarbons in the environment; refine the tool of using inexpensive microbial analysis as predictors of oil residue for future monitoring; and comply with peer reviewer's recommendations to integrate the data sets.

Budget Category:	1994 Project No. . . . . Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment
Personnel	$0.0	$0.0	$3.4	$3.4	$3.4	FFY 96 costs are to complete and reproduce the final report.
Travel	$0.0	$0.0	$0.0	$0.0	$0.0	
Contractual	$0.0	$0.0	$81.0	$81.0	$0.7	
Commodities	$0.0	$0.0	$0.0	$0.0	$0.0	
Equipment	$0.0	$0.0	$0.0	$0.0	$0.0	
Capital Outlay	$0.0	$0.0	$0.0	$0.0	$0.0	
Subtotal	$0.0	$0.0	$84.4	$84.4	$4.1	
General Administration	$0.0	$0.0	$6.2	$6.2	$0.6	
Project Total	$0.0	$0.0	$90.6	$90.6	$4.7	
Full-time Equivalents (FTE)	0.0	0.0	0.0	0.0	0.0	

Dollar amounts are shown in thousands of dollars.

Budget Year Proposed Personnel: Position Description	Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
Project Manager	0.0	$0.0	0.5	$3.4
Personnel Total	0.0	$0.0	0.5	$3.4

NEPA Cost: $0.0

*Oct 1, 1994 - Dec 31, 1994

**Jan 1, 1995 - Sep 30, 1995

Project Number: 95026
Project Title: Integration of Microbial and Chemical Sediment Data
Sub-Project:
Agency: AK Dept. of Environmental Conservation

FORM 3A SUB-PROJECT DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET
October 1, 1994 - September 30, 1995

		Reprt/Intrm	Remaining
Travel:			
	Travel Total	$0.0	$0.0
Contractual:			
Reimbursable Services Agreement with the University of Alaska to carry out the project		$0.0	$81.0
Personnel			
Principal Investigator	$6.7		
Co-PI	$45.3		
Tech Support	$5.6		
Travel			
Fairbanks-Juneau ($600/trip + 4 days per diem @ $150/day)	$1.2		
Fairbanks-Anchorage winter workshops ($300/trip + 3.5 days per diem @ $150/day -- 2 trips)	$1.7		
Contractual			
Long distance phone, fax, publication	$1.0		
Commodities			
Office supplies, data analysis supplies	$6.0		
Subtotal	$67.5		
Indirect @ 20%	$13.5		
Total	$81.0		
	Contractual Total	$0.0	$81.0

Project Number: 95026
Project Title: Integration of Microbial and Chemical Sediment Data
Sub-Project:
Agency: AK Dept. of Environmental Conservation

FORM 3B
SUB-PROJECT
DETAIL

Commodities:	Reprt/Intrm	Remaining
Commodities Total	$0.0	$0.0
Equipment:		
Equipment Total	$0.0	$0.0

Project Number: 95026
Project Title: Integration of Microbial and Chemical Sediment Data
Sub-Project:
Agency: AK Dept. of Environmental Conservation

FORM 3B
SUB-
PROJECT
DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET
October 1, 1994 - September 30, 1995

Project Description: This project will integrate previously collected microbial and sediment chemistry data sets. It will calculate field rates of biodegradation for hydrocarbon fractions; establish upper and lower estimates of persistence of hydrocarbons in the environment; refine the tool of using inexpensive microbial analysis as predictors of oil residue for future monitoring; and comply with peer reviewer's recommendations to integrate the data sets.

Budget Category:	1994 Project No. . . . . Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment
Personnel	$0.0	$0.0	$45.5	$45.5	$0.0	This subproject is to analyze and interpret
Travel	$0.0	$0.0	$0.0	$0.0	$0.0	33 hydrocarbon samples collected during the
Contractual	$0.0	$0.0	$0.0	$0.0	$0.0	shoreline assessment for origin and toxicity.
Commodities	$0.0	$0.0	$4.0	$4.0	$0.0	Three replicates must be run for each sample
Equipment	$0.0	$0.0	$0.0	$0.0	$0.0	to permit source identification.
Capital Outlay	$0.0	$0.0	$0.0	$0.0	$0.0	
Subtotal	$0.0	$0.0	$49.5	$49.5	$0.0	
General Administration	$0.0	$0.0	$6.8	$6.8	$0.0	Some of the FFY 95 money will need to be
Project Total	$0.0	$0.0	$56.3	$56.3	$0.0	rolled into FFY 96 to finish sample analysis.
						The amount to be rolled into FFY 96 will
Full-time Equivalents (FTE)	0.0	0.0	0.7	0.7	0.0	depend upon when the samples are collected
	Dollar amounts are shown in thousands of dollars.					and laboratory work load.

Budget Year Proposed Personnel: Position Description	Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
Senior Chemist (GS-13)	0.0	$0.0	1.5	$10.7
Chemist (GS-11)	0.0	$0.0	7.0	$34.8
Personnel Total	0.0	$0.0	8.5	$45.5

NEPA Cost: $0.0

*Oct 1, 1994 - Dec 31, 1994

**Jan 1, 1995 - Sep 30, 1995

06/01/94

1995

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Project Number: 95026
Project Title: Integration of Microbial and Chemical Sediment Data
Sub-Project:
Agency: National Oceanic & Atmospheric Admin.

FORM 3A SUB-PROJECT DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET
October 1, 1994 - September 30, 1995

	Reprt/Intrm	Remaining
Travel:		
Travel Total	$0.0	$0.0
Contractual:		
Contractual Total	$0.0	$0.0

06/01/94

1995

Printed: 12/5/94 11:43 AM

Project Number: 95026
Project Title: Integration of Microbial and Chemical Sediment Data
Sub-Project:
Agency: National Oceanic & Atmospheric Admin.

FORM 3B
SUB-
PROJECT
DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET
October 1, 1994 - September 30, 1995

	Reprt/Intrm	Remaining
Commodities:		
Chemistry laboratory supplies: reagents, solvents, glassware, consumables, etc.	$0.0	$4.0
Commodities Total	$0.0	$4.0
Equipment:		
Equipment Total	$0.0	$0.0

06/01/94

1995

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Project Number: 95026
Project Title: Integration of Microbial and Chemical Sediment Data
Sub-Project:
Agency: National Oceanic & Atmospheric Admin.

FORM 3B
SUB-
PROJECT
DETAIL

JOAN FORSHAUG BRADDOCK
Biographical Sketch

Institute of Arctic Biology, University of Alaska Fairbanks, Fairbanks, Alaska 99775-7000.

EDUCATION:

1989 Ph.D. Oceanography, University of Alaska; Dissertation Title: Competition between two aquatic microorganisms for oscillating concentrations of phosphorus.
1983 M.S. Microbial Physiology, University of Alaska/Michigan State University; Thesis Title: Iron-limited growth kinetics of *Thiobacillus ferrooxidans* isolated from arsenic mine drainage.
1977 B.S. Biological Sciences, University of Alaska, cum laude.

PROFESSIONAL EXPERIENCE:

1990-present	Assistant Professor of Microbiology, Institute of Arctic Biology, University of Alaska Fairbanks
1989-1990	Research Associate, Water Research Center, University of Alaska Fairbanks
1985-1989	Graduate Research Assistant, Water Research Center, University of Alaska Fairbanks
1984-1985	Research Associate, Water Research Center, University of Alaska Fairbanks
1983-1984	Agricultural Assistant, Agricultural Experiment Station, University of Alaska
1980-1983	Graduate Research Assistant, Institute of Water Resources, University of Alaska
1979-1980	Chemist, Syva Company, Cupertino, CA
1977-1978	Research Assistant, Inst. of Marine Science, University of Alaska
1976-1977	Microbiologist, U.S. Environmental Protection Agency, Fairbanks AK

RECENT FUNDING

Structure and Function of the Biosurfactant from *Pseudomonas aeruginosa*. U.S.G.S. through Water Research Center, P.I., $7,460, Sept. 1994 to Sept. 1995.

Microbial Degradation of Aromatic Hydrocarbons in Marine Sediments. Coastal Marine Institute, MMS, P.I., $25,412, July 1994 to June 1995.

Microbial Ecology of Subarctic Soils: the Key to Successful Land Reclamation for Alaska's Resource Industries. UA Natural Resources Fund, P.I., $22,387, May 1994 to Dec. 1995.

Biodegradation of Petroleum Contaminants in Soils at the Naval Arctic Research Laboratory, Barrow, Alaska. U.S.G.S., Water Resources Division, P.I., $28,500, May 1994 to September 1994.

Biodegradation of Hydrocarbon Contaminants. U.S.G.S. through Water Research Center, P.I., $9,500, Sept. 1993 to Sept. 1994.

Biodegradation of Petroleum Contaminants in Soils at the Naval Arctic Research Laboratory, Barrow, Alaska. U.S.G.S., Water Resources Division, P.I., $14,164, August 1993 to March 1994.

Evaluation of the Effectiveness and Impacts of PES-51: Remediation of a Contaminated Beach. Tesoro Alaska Petroleum co- P.I. with M. Tumeo, $32,400, June 1993 to June 1994.

Monitoring Microbial Populations in Marine Sediments as Indicators of Environmental Disturbance and Restoration. Oil Spill Restoration Planning Office, P.I., $62,400, April 1993 to Feb.1994.

Hydrogen Utilization by *Thiobacillus ferrooxidans* Isolated from Neutral pH Mine Drainage (year 2). U.S.G.S. through Water Research Center, P.I., $29,058, Sept. 1990 to Sept. 1992.

Oil Spill Microbiology, Alaska Department of Environmental Conservation, P.I. with E.J. Brown, $90,923, July 1991 to June 1992.

Damage Assessment Microbiology, Alaska Department of Environmental Conservation, P.I. with E.J. Brown, $81,018, June 1990 to June 1991.

Bioremediation Monitoring Program, Alaska Department of Environmental Conservation, co-P.I. with E.J. Brown, $81,600, July 1990 to June 1991.

Bioremediation Research Program, Alaska Department of Environmental Conservation, co-P.I. with E.J. Brown, $74,400, July 1990 to June 1991.

Bioremediation Monitoring Program, Exxon Corporation, co-P.I. with E.J. Brown, $32,000, July 1990 to Dec. 1990.

Damage Assessment-- *Exxon Valdez* Oil Spill, Alaska Department of Environmental Conservation, co-P.I. with E.J. Brown, $75,000, March 1990 to Sept. 1990.

Oil Spill Microbiology, Alaska Department of Environmental Conservation, P.I. with E.J. Brown, $47,545, October 1989 to July 1990.

Microbial Hydrocarbon Degradation in Sediments Impacted by the *Exxon Valdez* Oil Spill, Science Applications International Corporation (contract to National Oceanic and Atmospheric Administration), co-P.I. with E.J. Brown and J. Lindstrom, $132,311, May 1989 to December 1989.

AWARDS AND FELLOWSHIPS

Druska Carr Schaible Memorial Award (for outstanding Biological Sciences major), 1977; Graduate Resource Fellowship, 1981 and 1982.

PROFESSIONAL ORGANIZATIONS

American Society for Microbiology, American Society of Limnology and Oceanography, American Association for the Advancement of Science, Association for Women in Science, Sigma XI, Phi Kappa Phi.

GRADUATE ADVISORY COMMITTEE CHAIR FOR:

Ph.D.: Jon Lindstrom, Biology; Richard Smith, Biochemistry and Molecular Biology; Dave Guinn, Environmental Quality Engineering (co-chair)
M.S.: Sharon Moore, Environmental Quality Science, graduated August 1994; Lee Nix, Environmental Quality Engineering, graduated Dec. 1993; Chris Kjellmark, Environmental Quality Science; Emy Plakke, Univ. of N. Iowa (co-chair); Zachary Richter, Univ. of N. Iowa (co-chair); Peter Catterall, Biology.
M.A.: Qiaofei Zheng, Chemistry, graduated May 1993.

PUBLICATIONS

Reviewed Papers

Tumeo, M.A., J.F. Braddock, T. Venator and S. Rog. 1994. Effectiveness of PES-51 in removing weathered crude oil from sub-surface beach material. Spill Sci. Technol. Bull. 1:53-59.

Braddock, J.F., J.E. Lindstrom and E.J. Brown. 1994. Distribution of hydrocarbon-degrading microorganisms in sediments from Prince William Sound, Alaska following the *Exxon Valdez* oil spill. Mar. Pollut. Bull. In Press.

Braddock, J.F. and E.J. Brown. 1994. Phosphate uptake by the yeast, *Rhodotorula rubra,* and the green alga, *Selenastrum capricornutum* Printz, after phosphate additions to steady-state continuous cultures. FEMS Microbiol. Ecol. 14:111-120.

Braddock, J.F., J.E Lindstrom, T.R. Yeager, B.T. Rasley and E.J. Brown. Patterns of microbial activity in oiled and unoiled sediments in Prince William Sound. Proceedings of the *Exxon Valdez* Oil Spill Symposium, Feb. 1993. In Press.

Wolfe, D.A., M.J. Hameedi, J.A. Galt, G. Watabayashi, J.W. Short, C.E. O'Clair, S. Rice, J. Michel, J.R. Payne, J.F. Braddock, S. Hanna and D.M. Sale. 1994. Fate of the oil spilled from the *T/V Exxon Valdez* in Prince William Sound. Environ. Sci. Technol. 28:561-568.

Prince, R.C., J.R. Clark, J.E. Lindstrom, E.L. Butler, E.J. Brown, G. Winter, M.J. Grossman, P.R. Parrish, R.E. Bare, J.F. Braddock, W.G. Steinhauer, G.S. Douglas, J.M. Kennedy and P. Barter. Bioremediation of the *Exxon Valdez* oil spill: monitoring safety and efficacy in 1990. 1993. Proceedings of the International Symposium on In Situ and On-Site Bioreclamation, April 1993.

Lindstrom, J.E., R.C. Prince, J.R. Clark, M. Grossman, J.F. Braddock, T. Yeager, G. Winter and E.J. Brown. 1991. Microbial hydrocarbon degradation potentials and populations in fertilized shoreline sediments impacted by the *Exxon Valdez* oil spill. Appl. Environ. Microbiol. 57:2514-2522.

Brown, E.J. and J.F. Braddock. 1990. Sheen Screen: a miniaturized Most Probable Number technique for oil-degrading microorganisms. Appl. Environ. Microbiol. 56:3895-3896.

Luong, H.V., J.F. Braddock and E.J. Brown. 1984. Microbial leaching of arsenic from low-sulfide gold mine material. Geomicrobiol. J. 4:85-90.

Braddock, J.F., H.V. Luong and E.J. Brown. 1984. Growth kinetics of *Thiobacillus ferrooxidans* isolated from arsenic mine drainage. Appl. Environ. Microbiol. 48:48-55.

Brown, E.J., H.V. Luong and J.M. Forshaug. 1983. Geomicrobiology of arsenic associated with gold deposits in Alaska. p.570-580 In G. Rossi and A.E. Torma (ed.), Recent progress in biohydrometallurgy. Associazione Mineralia Sarda, 09016, Iglesia, Italy.

Brown, E.J., H.V. Luong and J.M. Forshaug. 1982. The occurrence of *Thiobacillus ferrooxidans* and arsenic on subarctic streams affected by gold mine drainage. Arctic. 35:417-421.

Reports

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Recent publications

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DPD

Kodiak Archipelago Shoreline Assessment: Monitoring Surface and Subsurface Oil

Project Number: 95027

Lead Trustee Agency: ADEC

Cooperating Agency: NOAA

Cost FY 95: $447,800

Cost FY 96: $110,800

Total Cost: $558,600

Project Start-up/Completion: Begins December 1995; Final Report approximately April 1996.

Duration: 2 years. (Most of the field work will be completed in FY 95; some hydrocarbon analyses and the final report will be done in FY 96.)

Geographic Area: Kodiak Archipelago

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Bob Loeffler for — **Mark Brodersen**

A. INTRODUCTION

Abstract & Background. This project will determine the areal extent, toxicity and origin of surface and subsurface oil on selected Kodiak Archipelago shorelines. Most of these shorelines were last surveyed in 1989; some were resurveyed in 1990 and 1991. Information about the remaining oil is necessary to determine whether recovery is proceeding at an acceptable rate; to determine whether winter storms have brought subsurface oil to the surface; to help local people assess whether the presence of remaining oil is still affecting shoreline activities; to determine the origin and toxicity of any remaining oil; and to determine if any beaches need additional treatment.

Data from previous shoreline assessments indicates that this project may be the last comprehensive shoreline assessment that will be needed in the Kodiak area, though it may locate "hot spots" that need continued monitoring or treatment. Based upon information from the communities, previous surveys, and logistical considerations, approximately 50 beach segments will be chosen as representative of oiling conditions in the Kodiak area. If the survey finds more oil than anticipated, additional survey work at additional sites may be necessary in FY 96 and beyond.

Need for the Project. This project is important for subsistence, recreation, sediments, mussels, and intertidal and subtidal organisms. It is also relevant to harlequin ducks, sea otters, and other injured species that feed in the intertidal area. In addition, while oil itself is not an injured resource or service, it is the cause of the injuries. Monitoring the continued presence of oil in the environment including location, extent, origin, and toxicity provides current information about the remaining oil contamination in the ecosystem.

Subsistence. The objective for subsistence restoration adopted by the Trustee Council as part of the Restoration Plan reads in part, "Subsistence will have recovered when...people are confident that the resources are safe to eat."

In 1993, representatives of the Trustee Council held 22 public meetings throughout the spill area, including nine in the project area. At almost every meeting, residents indicated that they believe the oil remains and it is contaminating their subsistence foods. Based on previous assessments, agency scientists expected that oil would have mostly disappeared from Kodiak shorelines by now. Information from the public indicates that expectation may be optimistic. Since there has been no shoreline assessment since 1991 to confirm or contradict these beliefs, one is needed now to supply information necessary for restoration efforts. If oil is not found, a believable assessment of that fact in the Kodiak area will be an important step toward restoring confidence in subsistence resources. If oil is found, it will be important for allowing residents to make their own assessment of the safety and reliability of the resources and where to harvest resources, and it will be important for the Council to determine if additional beach treatment is warranted. Determining the absence of oil is at least as important as determining the presence of oil.

Some examples from the 1993 Kodiak village meetings illustrate the concern.

> "There's many people in our community still afraid to eat subsistence foods. My uncle found a tar ball just the other day. That stuff is still around and it affects our kelp beds, clams beds, and our mussels." (Ouzinkie public meeting, April 1993)
>
> "...I know a lot of people in the room who are still injured. They won't eat the seafood because they don't trust it." (Larsen Bay public meeting, April 1993)
>
> "All these studies you've done are in Prince William Sound...you're going to tell us they apply here too? When they first did testing in 1989 and the first part of 1990, they sent out brochures but we haven't heard anything here since then..." (Larsen Bay public meeting, April 1993)

Recreation. Recreation, like subsistence, is affected by the visual recognition of oil. The objective for recreation restoration adopted by the Trustee Council reads in part, "Recreation and tourism will have recovered, in large part, when the fish and wildlife resources on which they depend have recovered, [and] *when recreation use of oiled beaches is no longer impaired..."* Monitoring the presence or absence of oil is an important part of monitoring the ability of the Kodiak shorelines to provide for recreational and tourism use.

Sediments, mussels, intertidal and subtidal organisms, and other natural resources. Shorelines treated in 1989 and 1990 and other potentially oiled sites need to be evaluated to determine if the shorelines responded to treatment, or if additional localized treatment is required to restore resources and services. Previous surveys in the spill area have shown that surface oil (usually in the form of tar mats) is quite stable, but responds well to treatment. Surveys in Prince William Sound indicate subsurface oil is disappearing at most sites, but some sites might benefit from additional treatment. We have only limited information on the subsurface oil in the Kodiak area, but it may be persisting in some locations. The oil around Kodiak is present primarily in the form of mousse which has been resistant to degradation in Prince William Sound. The resources most affected are sediments, mussels, and intertidal and subtidal organisms. Monitoring the shorelines provides current information that helps scientists understand the recovery of these and other resources and services in the Kodiak area.

B. PROJECT DESCRIPTION

1. **Resources and Services.** Subsistence, recreation, sediments, mussels, intertidal and subtidal organisms, and other natural resources. See discussion above.

2. Relation to Other Damage Assessment/Restoration Work. Assessing the amount and location of *Exxon Valdez* oil has been an important activity since the moment of the spill. From 1989 through 1992 extensive shoreline assessment surveys were funded as part of response activities in various parts of the spill area. In 1993 and 1994, the Trustee Council funded four projects:

Project Number	Project Title	Amount Budgeted	Amount Spent
93036	Recovery Monitoring of Oiled Mussel Beds	$404,800	Unknown
93038	Shoreline Assessment	$539,200	$353,000
94090	Mussel Bed Restoration & Monitoring	$676,100	Unknown
94266	Shoreline Assessment & Oil Removal	$365,000	Unknown

- *Prince William Sound.* Limited shoreline surveys and clean-up work occurred in 1991, 1992, and 1993. In 1994, treatment of surface oil and mussel beds was authorized.

- *Kodiak Archipelago, Alaska Peninsula, Cook Inlet, and Outer Kenai Coast.* Since the 1991 May Shoreline Assessment Program, (MAYSAP), no sites have been surveyed by the Department of Environmental Conservation on Kodiak, and only limited general assessment work has been completed in Cook Inlet and the Kenai Coast. Six study sites were established by the National Park Service in 1992 along national park coast lines. Those sites will be revisited in 1994 by the National Biological Survey.

3. Objectives

a. Provide current information about the presence or absence of oil that is useful for all injured resources and services; that is, the project will update the 1991 information base necessary for other research and restoration in the Kodiak area.

b. Create a common understanding that does not now exist among the Trustees, local residents, subsistence and recreation user groups, scientists, and the general public about the presence or absence of *Exxon Valdez* oil in the Kodiak area.

c. Where (and if) surface and subsurface oil is found, the project will locate "hot spots" where continued monitoring, and possibly treatment, is necessary. Where oil is found, analysis will be done to determine toxicity and origin of the oil. Where oil is *not* found or found only in trace amounts, the project will end the need for continued shoreline assessments. Thus, this project may be the last comprehensive shoreline assessment project for this area.

d. Maintain (and possibly end) the record of the extent, concentration, and degradation of surface and subsurface oil from the 1989 *Exxon Valdez* oil spill in these areas.

4. Methods

a. Identify Shorelines to be Surveyed.

AGENCY COMPONENT. The Trustee Agencies will review previous oiling information to produce a draft list of previously oiled shorelines to be surveyed in 1995. The number of beach segments surveyed in 1989 was 168. By 1991 the number of individual sites surveyed within segments decreased to 43. For planning purposes, we have assumed that about 50 subdivisions will be surveyed.

There are two general options for selecting sites: 1) we can try to document *all* of the residual oiling from the Exxon Valdez spill in the Kodiak region is the goal, or 2) we can document the oiling conditions at sites that have the longest and most extensive history of being "hot spots" during the response phase. Trying to document all of the remaining oil may be possible, but is impractical because of budget and time constraints. Accordingly, we propose to initially focus on known "hot spots" and then modify that list with community input. We expect this approach to result in a useful, achievable, and cost-effective product that will meet the objectives outlined previously. We are somewhat constrained in our site selection because the information for previous years was gathered primarily to guide response activities and was not intended to document all oiled shorelines.

In this survey, as in previous surveys, sites will initially be selected based on the following criteria:

1) Surface or subsurface oiling over a significant portion of the subdivision;

2) Areas of moderate to serious oiling, based on the ad hoc classification system used during the survey (definitions ranged from SOR -- surface oil residue - to OP and HOR -- oil-saturated sediments and high oil residue, see Table 1);

3) Areas of emerging concern, such as the heavily oiled mussel beds which had received little or no cleanup over time;

4) Areas of specific and consistent concern on the part of an agency, landowner, or nearby community.

Table 1. Field Oiling Classifications

Surface Oil Types	Abbreviation	Definition
asphalt pavement	AP	Heavily oiled beach sediments held cohesively to together.
mousse/pooled oil	MS	Any oil/water emulsion with a thickness of more than 1 cm.
tar balls/tar patties	TB	Small, distinct oil deposits lying on top of the beach surface; possibly binding debris but typically not sediments.
surface oil residue	SOR	Significantly oil coated beach sediments in the top 5 cm; sediments do not form a cohesive layer; may be described as heavy or light.
cover	CV	Oil more than 1 mm to 1 cm thick.
coat	CT	Oil more than 0.1 mm to less than or equal to 1 mm thick; can be easily scratched off with fingernail.
stain	ST	Oil less than or equal to 0.1 mm thick; cannot be easily scratched off with fingernail.
film or sheen	FL	Transparent or translucent film or sheen.
oiled debris	DB	Any oiled debris or cleanup material stranded on a shore.

Surface Oil Distribution Classes	Abbreviation	Definition
continuous	C	Area or band with 91% to 100% oil coverage.
broken	B	Area or band with 51% to 90% coverage.
patchy	P	Area or band with 11% to 50% coverage.
sporadic	S	Area or band with 1% to 10% coverage.
trace	T	Area or band with less than 1% coverage.

Subsurface Oil Types	Abbreviation	Definition
oil pore	OP	Pore space are completely filled with oil resulting in oil oozing out of sediments-water cannot penetrate OP zone.
heavy oil residue	HOR	Pore spaces partially filled with oil residue but not generally flowing out of sediments.
medium oil residue	MOR	Heavily coated sediments; pore spaces are not filled with oil - pore spaces may be filled with water.
light oil residue	LOR	Sediments lightly coated with oil.
oil film	OF	Continuous layer of sheen or film on sediments - water may bead on sediments.
trace	TR	Discontinuous film; spots of oil on sediments; an odor or tackiness with no visible evidence of oil.

As in previous years, sites will be included on the 1995 survey list to respond to areas of public concern.

COMMUNITY COMPONENT. Once a draft list of survey sites has been developed, the Kodiak communities will be consulted to help finalize the list. It is our intent to have a high degree of community involvement in both the site selection process and the actual shoreline surveys. Representatives of the Trustee Agencies will work with community organizations to identify sites where community residents believe that oil is present, and to identify important subsistence or recreation shorelines where it is important to know whether or not oil is present. To avoid deluging communities with independent visits from representatives of various projects, community interactions will be coordinated with other restoration projects. It is anticipated that at least one visit to the communities will be required to identify areas to be surveyed.

b. Survey Identified Shorelines.

Agency technical experts, upland owners, and representatives of local communities will together assess the shoreline segments and document oiling conditions. Three to four person teams will carry out the actual survey work. At least one person on each team will be recruited from the local communities.

To ensure comparability of data from previous years, the surveyors will use the same techniques as those used during the 1990, 1991, 1992 and 1993 surveys as best explained in the 1991 MAYSAP survey manual (Exxon Corporation, 1991). The surveyors will dig random pits in the beaches and turn over cobbles and boulders to reveal hidden oil. After the pits are dug and a general reconnaissance made, the surveyors will document the oil distribution on field sketch maps. Areas of distinct

oiling will be paced or measured with a tape and visual estimates made of the percentage of cover of oiling within the area.

Field oiling classifications (see Table 1) regarding types of surface and subsurface oil and percent coverage will be consistent with previous surveys (Exxon Corporation, 1991). These categories are broad and reflect the limitations of qualitative observations in areas of complicated geology and oiling conditions (Gibeaut, 1993). These general classifications are now in wide use (Owens and Taylor, 1993).

Field oiling forms will include all of the same oil classifications and distributions that have been used in past surveys. To continue maintaining consistency with past surveys and treatment, the shoreline outlines and features from the most recent survey conducted will be traced and used as templates for documenting oiling distribution. Photographs documenting typical oiling conditions and overall setting of each site will also be taken.

As a guide, we will use oiling data going back to initial field observations made by state, federal, and/or Exxon survey teams in the spring of 1989, and subsequent survey data at those sites. We have found the most useful information to be the detailed field sketch maps made by the Exxon geomorphologists who accompanied each survey team over time. These "OG maps" are, in most cases, excellent guides to locating most residual oiling at most of the sites. (Note: The "OG map" relates to the title of the people making the sketches - the Oil Geomorphologists.) We will update each of these maps, marking both 1995 oiling conditions and any significant changes in beach profile, general physical setting, or other notable aspects of the area.

Therefore, at most of the sites, we will allow experience, the physical setting of the site, and significant obstacles to determine the boundaries of the 1995 assessment. This will be a change from previous "joint" surveys that were strictly limited to the discrete work sites from the season before. This was partly a function of procedural policy, partly because of the number of sites on most surveys (the 1991 survey included nearly 600 sites across the spill area), and partly because the response assessments had to take place within a short period in the spring so that the summer could be devoted to actual treatment. We will not have these kinds of pressures driving the 1995 project, and can therefore take more time to explore the sites and map them more precisely. However, most of the time we will limit our ground surveys to the specific areas mapped in 1991 and use the so-called "OG maps" of 1990 and 1991, where they are available (some community-selected sites may not have OG maps) as our primary guides.

Specifically, the survey team will: 1) observe and record oiling conditions at selected sites; 2) observe and record geomorphological observations that will allow comparison with data gathered in previous seasons; 3) observe and record selected biological information; 4) observe and record oiling conditions, surface and subsurface, at oiled mussel beds; 5) collect appropriate samples of flora, fauna, and weathered oil and oiled sediment for further analysis; and 6) gather any other data that will allow the trustees to decide if more substantial remediation is necessary for the purposes of restoration.

At each survey site, survey crew members will walk each shoreline and:

1) Make observations at specific sites or in subdivisions with a history of persistent oiling, according to existing data;

2) Examine areas having the physical characteristics of places where oiling has been persistent, such as "wave shadows," boulder fields, and other areas protected from significant wave energy or weather;

3) Examine areas in which state monitors previously reported oiling, but the response survey crews did not completely survey or "follow" the oiling to determine its true extent;

4) Dig discovery and delineation pits in areas where subsurface oiling was previously reported. A series of penetration pits will be dug to determine the extent of oil penetration. Depth to the top of the "oiled lens", depth to the furthest penetration of the oil, and oil character will be recorded on a subsurface oil data entry form. Subsurface oil character will be described using terms from previous oiling surveys. Pit locations will be marked on 1:10,000 scale computer-generated or similar maps of the shoreline;

5) Collect sediment samples as appropriate to determine origin and toxicity of remaining oil. Representative hydrocarbon samples will be collected in triplicate. Methods of collection will conform to the standard methods developed by NOAA for sediment samples. All collection implements that will contact the sample will be hydrocarbon-free. The samples will be placed in hydrocarbon-free glass jars with teflon lid liners. Samples will be chilled immediately and frozen as soon as possible;

6) Record the absence or presence of oiling, describing it according to established terms. The nature of surface oil will be described in terms of it's thickness. Oil thickness will be approximated as follows: Thick tar able to be scratched off = 1 mm, light tar or coat = 0.5 mm, stain = 0.25 mm, and discontinuous stain or film = 0.1 mm. Oiled mats of tar, tar balls, or pooled oil will be noted on data entry forms if the oil will remain after the survey team has left. Oiling extent will be described as either heavy, moderate, light, very-light, or none remaining. Locations of the oil will be marked on 1:10,000 scale computer-generated or similar maps of the shoreline;

7) Describe the extent of the oiling, as much as possible, on and below the surface;

8) Record the absence, presence, and/or relative abundance of common shoreline plants and animals;

9) Record beach profiles and the general gemorphological setting by drawing simple sketch maps and listing any striking or unusual features;

10) Record the general subsurface profile of the beach based on pits dug to the point where fine sediments prevail;

11) Make a photographic and/or video record of each site survey; and

12) Record basic wind, weather, and tidal conditions at the time of the survey.

c. Additional Transects

The project's consulting geologist will include sites at which NOAA and/or DEC have previously laid out transects. These will be selected primarily for consistency and quality of data over time, and will add a level of quantitative analysis to the project. For planning purposes, we have estimated that about 10 transect surveys will be conducted.

At these sites, crew members will measure the elevation along a line oriented perpendicular to the shoreline trend and visually estimate sedimentological and oiling conditions along that line (transect). Two metal datum stakes established in the supratidal from past transect work will serve to orient the direction of the beach profile (transect) and provide a consistent horizontal and vertical starting point. At some sites, instead of two stakes, one stake or a stable natural feature, such as a bedrock promontory, may be used as the datum, and the surveyors will orient the transect using a compass direction. The Emery method (Emery, 1961) will be used to measure the profiles for this study.

At these sites, crew members will dig pits and record surface and subsurface data along the transect only. (In some cases, the pits will be dug two meters to the left or right of the transect line because it is thought that repeated pit-digging along a transect over the years could have actually been the same thing as treatment, and the data would not reflect natural changes in oiling over the period). The data from transect sites are more tightly tied to the geomorphology of the site. In addition to oiling descriptions, crew members will measure the beach profile as described above and record the sediment types both on the surface and in the distinct strata shown in the pits.

d. Hydrocarbon Analysis

Sediment samples will be prepared and analyzed following procedures presented in detail by Larsen, et al. (1992). After three successive extractions at room temperature with dichloromethane that contained a suite of internal and deuterated surrogate standards, the combined dichloromethane extract will be concentrated by evaporation and exchanged with hexane (Brown, et al. 1980). Aromatic and alkane hydrocarbons will be separated by alumina/silica gel column chromatography, and the alkane fraction

will be concentrated and analyzed using a gas chromatograph with a flame ionization detector. The aromatic fraction will be further purified by high-performance liquid chromatography, then concentrated and analyzed using a gas chromatograph with a mass-selective detector.

Samples will be analyzed for 23 alkane and 44 aromatic hydrocarbons. The alkanes included normal alkanes from decane through triacontane, plus pristane and phytane. The aromatics included un-substituted and methyl-substituted homologues of PAH's containing from two to five rings, and dibenzothiophene homologues.

Four quality control samples will be analyzed with each batch of twelve sediment samples. The quality control samples will include two references derived from National Institute of Standards and Technology (NIST) standards, a method blank, and a method blank spiked with NIST-derived alkane and aromatic hydrocarbons. Analysis of these samples provided estimates of analytical precision and accuracy, and demonstrated absence of laboratory artifacts.

e. Draft Final Report

As usual, a final report and database will provide the scientific record of the project. The results will be used to plan future activities as appropriate. In addition, each community will be made aware of the results pertaining to their use areas, as well as to the entire shoreline assessment. Final methods of conveying the information have not been determined but they may include community visits, meetings, or special community-specific publications. Information dissemination will be coordinated with the Executive Director's Office and other projects to ensure maximum benefit.

5. Location

Work will be conducted within the Kodiak Archipelago and will initially involve the following communities: Akhiok, Karluk, Kodiak, Larsen Bay, Old Harbor, Ouzinkie, and Port Lions. Some communities may drop out if oiling records do not indicate oil near the community, or a community is uninterested, or has few remaining concerns for residual oil.

6. Technical Support

The project will require technical support for the following tasks: data processing support to update existing files detailing the conditions of the specific beach segments surveyed; mapping and GIS information concerning the beach segments; database manipulation to identify beach segments and categorize results; geomorphological support to gather and interpret beach geomorphology; lab work for analyzing oil samples; and chemistry support to interpret the results.

7. Contracts

Consulting Geomorphologist. A professional services contract will be sought for geomorphological expertise to help the survey crews identify and assess beach segments. The project manager and beach survey crew leaders will be ADEC or other trustee agency employees. At least one member of each survey team will be a short-term DEC employee hired from the local communities near the survey sites.

Transportation. The survey team will use various methods of transport depending on the location of the survey sites: A Fish and Game vessel will be used for August, charter vessels may be used in some cases, and personnel may stay in communities and use daily boat, plane or helicopter access. Previous *Exxon Valdez* surveys have used all of these methods in the past and found them to be both cost effective and time efficient support structures.

C. SCHEDULE

The results of this study are important to subsistence and recreation users and other community members. Therefore this study is not concluded until the results have been delivered to all parties in a manner that can be easily understood. Two questions influence the release of the information from this study. They are: How to provide a good understanding of the actual oiling conditions? and When can that information be distributed?.

To avoid deluging communities with information, the distribution of information from this study should be coordinated with whatever else is being distributed by the restoration program at that time. To ensure that people have easy access to the information, the study may use, in addition to the scientific final report, one or more of public sessions, meeting with community members, or public-oriented publications. The final method of distribution will not be determined until we know what other activities are being conducted by the restoration program at that time.

The second question involves when to distribute the information. It should be distributed as soon as possible after the information is peer-reviewed. This requires that two components of the study be expedited: analysis of the hydrocarbon samples by Auke Bay Lab, and peer review by the Chief Scientist. If this is accomplished, the information can be distributed in spring 1996 — before the summer season. If not, it can be distributed in some form during summer or fall 1996.

Dec 94 --	Initial identification of shoreline segments to be surveyed utilizing ADEC response files.
Jan - Feb 95 --	Submit requests for additional vessel contract and float plane and helicopter charters. Submit RFP for professional geomorphologist to accompany shoreline assessment team.

Mar 95 -- Circulate and solicit comments from other Trustee Agencies regarding shoreline segments to be surveyed.

Apr 95 -- Submit site list to agencies, landowners, and the public for review and comment. Identify village personnel that will be utilized for surveys.

May 95 -- Have Hazwoper training for staff. Purchase materials for surveys. Finalize sites to be surveyed. Obtain additional permits and authorizations, notify Alaska Regional Response Team of areas to be assessed.

June 95 -- First round of surveys.

July 95 -- Second round of surveys.

August 95 -- Finish surveys using AK Department of Fish and Game vessel. Send HC samples to Auke Bay Laboratory for analysis.

September 95 -- Assemble beach condition data.

February 96 -- Hydrocarbon sample results returned from Auke Bay Laboratory.

Late February or Early March 96 -- Draft report for review.

Spring, Summer, or Fall 1996 -- Distribution of results to the communities. This will occur as soon as possible after peer review is completed. If possible during April 1996. If not, soon thereafter. The method of distribution will be coordinated with whatever else is being distributed by the restoration program at that time.

D. EXISTING AGENCY PROGRAM

Not applicable, there is no existing agency program to search shorelines for residual oil, and the work would not be accomplished if there had not been an oil spill.

E. ENVIRONMENTAL COMPLIANCE, PERMITTING, AND COORDINATION STATUS.

With respect to NEPA compliance activities, a categorical exclusion has been prepared and is under review by National Oceanic and Atmospheric Administration (NOAA) rules governing research activity. NOAA issued a finding of no significant impact and granted a categorical exclusion.

The project manager has requested guidance based on this project plan from the Alaska Department of Natural Resources, the Alaska Department of Fish and Game, the Alaska Regional Response Team (ARRT), and the U.S. Army Corps of Engineers. Depending on agency interpretations, the project may require a general land use permit (ADNR), a Title 16 permit (ADF&G), a Section 404, Clean Water Act permit (U.S. Army Corps of Engineers), and approval of the Alaska Regional Response Team (ARRT).

F. PERFORMANCE MONITORING

This project will be supervised by Mark Brodersen, Restoration Chief for ADEC, who for four years has coordinated ADEC's efforts as the representative from the agency on the Restoration Work Force. He is the main liaison to the Commissioner of ADEC regarding Exxon Valdez activities. The Project Manager will be Ron Bruyere, Restoration Specialist for ADEC who was Project Manager on Projects 94266, the 1994 Shoreline Assessment and Oil Removal Project for Prince William Sound, done in 1994 and 94090, the Oiled Mussel Bed Restoration Project, that was coordinated with 94266. The third ADEC person in the effort is Restoration Specialist, Dianne Munson, who has five years of extensive field experience in examining the conditions of residual oil in the field as a result of the Exxon Valdez spill. At least one member of each survey team will be a short-term ADEC employee hired from the local communities near the survey sites. A PhD level geomorphologist will be contracted with who knows the coastal topology and the conditions of the oiling that resulted from the Exxon Valdez Spill.

The project manager will produce at the close of the project:

(1) A data report on a site-by-site basis;

(2) A segment summary report, describing the conditions and activities at each site in 1995, comparing, if possible, with data from previous years;

(3) A narrative report, with appropriate maps and photographs, intended for distribution to the general public, describing the general condition of the shorelines surveyed, including any additional information deemed important by the respective trustee agencies and participants in the survey;

(4) Additional reports, summaries, data sets, photographs, video records, etc. that have been reviewed and properly organized.

G. COORDINATION OF INTEGRATED RESEARCH EFFORT

This project will maintain and update a database and knowledge of oiling that provides fundamental baseline data for investigations of the problems with injured resources and services in the Kodiak area. In the 1995 Work Plan, only the Subsistence Planning Project, 95279, includes work that needs detailed coordination. However, the project is similar to previous shoreline surveys conducted by the state and federal agencies in Kodiak and other areas. The 1995 assessment is designed to provide another series of data points regarding conditions on the shorelines affected by the spill. They survey team will observe and record oiling and other conditions so that they can be compared with similar types of information collected during the response, especially during the last survey of the Kodiak area in 1990. Methods section describes how the project's methods and locations will be coordinated with the needs of resource agencies, landowners, and local communities. Some sharing of information and logistics may be possible with Project 95090, Oiled Mussel Bed Monitoring.

H. PUBLIC PROCESS

The only other project operating in Kodiak communities is the Subsistence Planning Project, 95279. Both projects will be going to some or most of the Kodiak Communities this winter, most likely in February or March, and ADEC and ADF&G personnel have already be in contact in order to coordinate their visits. The two agencies will go together to avoid confusion, minimize travel costs, and to avoid inundating the communities.

One of the fundamental objectives of this project is to create a common understanding among scientists, local residents, subsistence and recreation user groups, and the general public about the presence or absence of *Exxon Valdez* oil on the Kodiak Archipelago. For that reason, the project has been designed to integrate community concerns and personnel into project planning, the actual beach surveys, and into understanding the results. (See description under Introduction, Objectives, and Methods.)

The community involvement portion of this project includes initial contact, community visits including either a general meeting or individual meetings with knowledgeable and concerned citizens (a community meeting may be conducted as part of the Subsistence Planning Project with which this project's visits will be coordinated). Finally, final results will be communicated to the community through site visits, summaries, copies in the library, and other similar means.

I. PERSONNEL QUALIFICATIONS

Agency Personnel. See statements of qualifications at the end of this section.

PROFESSIONAL EXPERIENCE

Ronald J. Bruyere

Education

Graduate Studies, Department of Education, State University of New York at Potsdam, Potsdam, NY 1982, 3.8 GPA

B.S. Mathematics, Physics, State University of New York at Potsdam, Potsdam NY 1975, 3.3 GPA

Experience

2/94 - Present — Alaska Department of Environmental Conservation (ADEC), Anchorage, Alaska

Project Manager

Act as the principal liaison between the Restoration Chief of ADEC and manage the projects that were part of the 1994 and 1995 *Exxon Valdez* Oil Spill Work Plan. Responsible for labor contract negotiations for vessels and labor and purchasing for the projects at the Anchorage facility. Draft Final Report for the 1994 Shoreline Assessment and Restoration Project.

5/90 - 2/94 — CACI, Inc. Commercial, Anchorage, Alaska

Project Manager

Responsible for the hiring, training and directing a support staff of 11 personnel for a large restoration support contract with the federal Departments of Agriculture and Justice. Coordinated all legal research required by the Department of Justice. The facility housed the Restoration Planning Work Force and the complex support required by the *Exxon Valdez* Restoration Team and the Trustee Council, which is the collaboration of federal and state of Alaska agencies coordinating restoration efforts mandated to them by the courts in the settlement agreement to disburse the funds. The building on two floors housed seven different Federal and State agencies, and a public repository for oil spill research. Interfaced daily agency representatives, scientific experts and attorneys. Delegated task assignments, monitored personnel and closely coordinated all project movement with the main corporate office as well as Department of Justice in Washington, DC. Was ultimately responsible for all

aspects of quality control at the site.

Data Processing Proficiencies

IBM 9370 Series Model 2, VAX 8050, 8250, 8550, IBM microcomputers, and compatibles, Optical Character Recognition (OCR) Equipment, and imaging. VM/CMS, VM/MVS, VMS, Word Perfect 4.2, 5.0, 5.1, 6.0, Paradox, DBase III, Plus IV, Basis, DM, Revelation, Nutshell Plus, Inmagic, Peachtree, Lotus, Excel, Bluefish, AMICUS, LEXIS/NEXIS, DW4, Procom, Procom Plus.

PROFESSIONAL EXPERIENCE

Dianne R. Munson

Education

Bachelor of Arts, Biology - **University Alaska at Fairbanks**, 1989, 3.1 GPA

Experience

Alaska Department of Environmental Conservation
Anchorage, Alaska May 1989 to Present

Environmental / Restoration Specialist

As an Environmental Specialist with the *Exxon Valdez* Oil Spill Response Center and as a Restoration Specialist for the *Exxon Valdez* Trustee Council (approximately 5 years) have gained intensive experience surveying, monitoring, evaluating conducting and recommending treatment to impacted shoreline. Developed working relationships with federal, public and native representatives. Implemented and supervised restoration field projects proposed by the *Exxon Valdez* Trustee Council. As a representative of the Trustee Council, communicated concerns of other trustee agencies and native corporations and villages. Consulted with native land owners and made recommendations for future restoration projects. Conducted surveys which located, documented and mapped areas of contamination. These surveys provided information regarding persistent oiling at or near critical habitats being considered for protection, and a basis for agreement between principle parties on the scope of additional work required and work methods to be used. Compiled data and wrote reports on sites impacted by the *Exxon Valdez* oil spill. Coordinated work team monitoring activities providing state oversight. Trained Environmental Technicians to act as shoreline monitors for the treatment of the *Exxon Valdez* oil spill. Provided technical support for the *Exxon Valdez* oil spill habitat protection work group. Utilized Autocad to digitized and processed necessary incremental resource themes to be integrated geographically to support restoration. This work provided maps, statistical analysis products and data repository services. Complex restoration alternatives can be evaluated very rapidly

using GIS (geographical information system) approaches.

Accomplishments

- Field supervisor charged with implementing and supervising two restoration projects proposed by the *Exxon Valdez* Restoration Trustee Council. These projects were Shoreline Assessment and Oil Removal and Mussel Bed Restoration.
- Draft Final Report for the 1994 Shoreline Assessment and Restoration Project.
- Principal surveyor and project field supervisor for the 1993 Restoration Shoreline Survey Project and Report.
- Primary author of the 1992 Shoreline Evaluations Contaminated Sites Report.
- Principal author of the 1989-1991 Prince William Sound Treatment Report.

Data Processing Proficiencies

IBM compatible Microcomputers, DOS, Windows, Excel, Word Perfect 4.2, 5.0, 5.1, 6.0 and RBase software systems.

Community Personnel. Community personnel need to be chosen in part on their ability to complete the work required of the project — locating areas of community concern, digging pits, etc. — and on their ability to represent community needs to the agency, and agency methods and conclusions to the community. They will be chosen by representative community groups such as native corporations, village councils, or municipal governments in cooperation with the ADEC project manager.

Professional Service Qualifications. A professional service contract will be sought to provide ADEC with geomorphological expertise to help locate and asses likely areas of residual oil The contractor should have a high degree of knowledge of beach processes likely to concentrate, degrade, and retain oil. Also, it is important that the contractor have previous experience with the *Exxon Valdez* Oil Spill.

References

BROWN, D. C., L. S. RAMOSE, M. Y. UYEDA, A. J. FRIEDMAN, and W.S. MACLEOD, 1980. Ambient temperature extraction of hydrocarbons from marine sediment - comparison with boiling-solvent extractions. In L. Petrakis and F. T. Weiss (editors), Petroleum in the marine environment, p. 313-326. ACS Symp. Ser. 185, American Chemical Society, Washington, D.C.

EMERY, K.O., 1961, A simple method of measuring beach profiles: Limnology and Oceanography, v. 6, p. 90-93.

EXXON CORPORATION, 1991, MAYSAP Survey Manual, May Shoreline Assessment Program: Exxon Corporation *Exxon Valdez* Oil Spill Response, Anchorage Alaska.

GIBEAUT, J., 1993, Shoreline Assessment Data Report, Alaska Department of Environmental Conservation (ADEC), *Exxon Valdez* Oil Spill Restoration, Anchorage Alaska.

LARSEN, M., HOLLAND, L., FREMGEN F., LUNASIN J., WELLS M., and SHORT J, 1992. Standard operating procedures for the analysis of petroleum hydrocarbons in seawater, marine sediments, and marine faunal tissues at the Auke Bay Laboratory. Auke Bay Laboratory, Alaska Science Center, National Marine Fisheries Service, NOAA, 11305 Glacier Highway, Juneau, Alaska, 99801-8626.

OWENS, E.H. and TAYLOR, E., 1993, A proposed standardization of terms and definitions for shoreline oiling assessment: Proceedings of the 1993 Arctic and Marine Oil Spill Program (AMOP), Technical Seminar, Calgary, Alberta.

PIPER, E.W., 1993 Shoreline Assessment Report, Alaska Department of Environmental Conservation (ADEC), *Exxon Valdez* Oil Spill Restoration, Anchorage Alaska.

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

Project Description: This project will determine the presence, areal extent, origin, and toxicity of *Exxon Valdez* oil on the shorelines of the Kodiak Archipelago and will look at the contribution of geomorphological factors to the presence or absence of oil. Most of these shorelines were last surveyed in 1990. The information about the remaining oil is necessary to determine whether recovery is proceeding at an acceptable rate; to determine whether winter storms have brought subsurface oil to the surface; to help local people assess whether the presence of remaining oil is still affecting shoreline activities; to determine the origin and toxicity of any remaining oil; and to determine if any beaches need additional treatment.

Budget Category:	1994 Project No. . . . . Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment
Personnel	$0.0	$0.0	$179.2	$179.2	$76.3	
Travel	$0.0	$0.0	$28.2	$28.2	$4.0	
Contractual	$0.0	$0.0	$152.4	$152.4	$15.0	
Commodities	$0.0	$0.0	$30.5	$30.5	$3.0	
Equipment	$0.0	$0.0	$20.0	$20.0	$0.0	
Capital Outlay	$0.0	$0.0	$0.0	$0.0	$0.0	
Subtotal	$0.0	$0.0	$410.3	$410.3	$98.3	
General Administration	$0.0	$0.0	$37.5	$37.5	$12.5	
Project Total	$0.0	$0.0	$447.8	$447.8	$110.8	
Full-time Equivalents (FTE)	0.0	0.0	2.6	2.6	1.3	
Dollar amounts are shown in thousands of dollars.						

Budget Year Proposed Personnel: Position Description	Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
See Individual 3A Forms for Personnel Details				
Personnel Total	0.0	$0.0	0.0	$0.0

NEPA Cost: $0.0

*Oct 1, 1994 - Dec 31, 1994

**Jan 1, 1995 - Sep 30, 1995

06/01/94

1995

Printed: 9/12/94 11:33 AM

Project Number: 95027
Project Title: Kodiak Shoreline Assessment
Agency: AK Dept. of Environmental Conservation

FORM 2A
PROJECT
DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

Project Description: This project will determine the presence, areal extent, origin, and toxicity of *Exxon Valdez* oil on the shorelines of the Kodiak Archipelago and will look at the contribution of geomorphological factors to the presence or absence of oil. Most of these shorelines were last surveyed in 1990. The information about the remaining oil is necessary to determine whether recovery is proceeding at an acceptable rate; to determine whether winter storms have brought subsurface oil to the surface; to help local people assess whether the presence of remaining oil is still affecting shoreline activities; to determine the origin and toxicity of any remaining oil; and to determine if any beaches need additional treatment.

Budget Category:	1994 Project No. . . . . Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment
Personnel	$0.0	$0.0	$133.7	$133.7	$69.2	
Travel	$0.0	$0.0	$27.2	$27.2	$4.0	
Contractual	$0.0	$0.0	$152.4	$152.4	$15.0	
Commodities	$0.0	$0.0	$26.5	$26.5	$3.0	
Equipment	$0.0	$0.0	$20.0	$20.0	$0.0	
Capital Outlay	$0.0	$0.0	$0.0	$0.0	$0.0	
Subtotal	$0.0	$0.0	$359.8	$359.8	$91.2	
General Administration	$0.0	$0.0	$30.7	$30.7	$11.4	
Project Total	$0.0	$0.0	$390.5	$390.5	$102.6	
Full-time Equivalents (FTE)	0.0	0.0	1.9	1.9	1.2	The personnel shown permit operation of a four person field crew. Our intention is to have two members of the field crew come nearby communities. We anticipate that will increase community involvement in the surveys. New local crew members would be selected when the crew moves to a new community.
	Dollar amounts are shown in thousands of dollars.					

Budget Year Proposed Personnel: Position Description	Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
Restoration Specialist (R23)	0.0	$0.0	5.0	$34.4
Restoration Specialist (R21)	0.0	$0.0	3.0	$20.6
Restoration Specialist (R18)	0.0	$0.0	7.0	$33.1
Restoration Specialist (R17)	0.0	$0.0	3.0	$13.3
Restoration Specialist (R16) - 2	0.0	$0.0	5.0	$20.8
Overtime (25% of RS 16, 17, 18)		$0.0		$11.5
Personnel Total	0.0	$0.0	23.0	$133.7

NEPA Cost: $0.0

*Oct 1, 1994 - Dec 31, 1994

**Jan 1, 1995 - Sep 30, 1995

Project Number: 95027
Project Title: Kodiak Shoreline Assessment
Sub-Project:
Agency: AK Dept. of Environmental Conservation

FORM 3A SUB-PROJECT DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET
October 1, 1994 - September 30, 1995

	Reprt/Intrm	Remaining
Travel:		
Juneau to Anchorage ($450 per trip + 4 days per diem @ $150/day x 8 trips)	$0.0	$8.4
Anchorage to Kodiak Island ($400/trip + 2 days per diem @ $100/day x 22 trips) Two people times four trips to and from the boat plus ten trips to the various communities plus four oversight trips.	$0.0	$13.2
Kodiak communities to Kodiak ($200/trip x 10 trips) Travel for community participants in survey.	$0.0	$2.0
Per diem for survey team in communities (18 days @ $100/day x 2 people)	$0.0	$3.6
Travel Total	$0.0	$27.2
Contractual:		
Vessel charter (20 days @ $1000/day)	$0.0	$20.0
Vessel charter (RSA with Fish & Game for 32 days @ $540/day)	$0.0	$17.3
Plane/helicopter charter to move personnel and community participants to and from the boat and to and from beaches more effectively accessed by aircraft. This amount is based on similar shoreline assessments in prior years.	$0.0	$40.0
Mail and courier	$0.0	$4.0
Printing and copying	$0.0	$5.0
Equipment rental	$0.0	$5.0
Long distance phone/Fax	$0.0	$4.5
Freight and cartage	$0.0	$4.0
Risk management	$0.0	$10.0
Film processing	$0.0	$3.0
Training	$0.0	$6.0
Newspaper adds/legal announcements	$0.0	$1.8
Cleaning and maintenance of equipment	$0.0	$6.8
Geomorphology Consultant	$0.0	$25.0
Contractual Total	$0.0	$152.4

Project Number: 95027
Project Title: Kodiak Shoreline Assessment
Sub-Project:
Agency: AK Dept. of Environmental Conservation

FORM 3B
SUB-
PROJECT
DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET
October 1, 1994 - September 30, 1995

	Reprt/Intrm	Remaining
Commodities:		
Film/photography/video tape	$0.0	$2.6
Survival equipment < $500	$0.0	$2.0
Consumable office supplies	$0.0	$5.0
Computer supplies including software and upgrades	$0.0	$4.0
Small tools	$0.0	$2.5
Sampling equipment	$0.0	$0.8
Food and fuel for Fish & Game charter ($300/day x 32 days)	$0.0	$9.6
Commodities Total	$0.0	$26.5
Equipment:		
Waterproof video camera	$0.0	$2.5
Portable computer	$0.0	$6.0
Survival equipment	$0.0	$8.0
Fax machine	$0.0	$3.5
Equipment Total	$0.0	$20.0

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Project Number: 95027
Project Title: Kodiak Shoreline Assessment
Sub-Project:
Agency: AK Dept. of Environmental Conservation

FORM 3B
SUB-
PROJECT
DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

Project Description: This project will determine the presence, areal extent, origin, and toxicity of *Exxon Valdez* oil on the shorelines of the Kodiak Archipelago and will look at the contribution of geomorphological factors to the presence or absence of oil. Most of these shorelines were last surveyed in 1990. The information about the remaining oil is necessary to determine whether recovery is proceeding at an acceptable rate; to determine whether winter storms have brought subsurface oil to the surface; to help local people assess whether the presence of remaining oil is still affecting shoreline activities; to determine the origin and toxicity of any remaining oil; and to determine if any beaches need additional treatment.

Budget Category:	1994 Project No. . . . . Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment
Personnel	$0.0	$0.0	$45.5	$45.5	$7.1	This subproject is to analyze and interpret
Travel	$0.0	$0.0	$1.0	$1.0	$0.0	35 hydrocarbon samples collected during the
Contractual	$0.0	$0.0	$0.0	$0.0	$0.0	shoreline assessment for origin and toxicity.
Commodities	$0.0	$0.0	$4.0	$4.0	$0.0	
Equipment	$0.0	$0.0	$0.0	$0.0	$0.0	Some of the FFY 95 money will need to be
Capital Outlay	$0.0	$0.0	$0.0	$0.0	$0.0	rolled into FFY 96 to finish sample analysis.
Subtotal	$0.0	$0.0	$50.5	$50.5	$7.1	The amount to be rolled into FFY 96 will
General Administration	$0.0	$0.0	$6.8	$6.8	$1.1	depend upon when the samples are collected
Project Total	$0.0	$0.0	$57.3	$57.3	$8.2	and laboratory work load.
Full-time Equivalents (FTE)	0.0	0.0	0.7	0.7	0.1	The funds shown in FFY 96 are to participate
Dollar amounts are shown in thousands of dollars.						in data analysis and report writing.

Budget Year Proposed Personnel: Position Description	Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
Senior Chemist (GS-13)	0.0	$0.0	1.5	$10.7
Chemist (GS-11)	0.0	$0.0	7.0	$34.8
Personnel Total	0.0	$0.0	8.5	$45.5

NEPA Cost: $0.0

*Oct 1, 1994 - Dec 31, 1994

**Jan 1, 1995 - Sep 30, 1995

Project Number: 95027
Project Title: Kodiak Shoreline Assessment
Sub-Project: Hydrocarbon Analyses & Data Interpretation
Agency: National Oceanic & Atmospheric Admin.

FORM 3A SUB-PROJECT DETAIL

	Reprt/Intrm	Remaining
Travel:		
Juneau to Anchorage for project coordination and data interpretation ($450 air fare/trip + 2.5 days per diem @ $225/day -- 1 trip)	$0.0	$1.0
Travel Total	$0.0	$1.0
Contractual:		
Contractual Total	$0.0	$0.0

Project Number: 95027
Project Title: Kodiak Shoreline Assessment
Sub-Project: Hydrocarbon Analyses & Data Interpretation
Agency: National Oceanic & Atmospheric Admin.

FORM 3B
SUB-
PROJECT
DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET
October 1, 1994 - September 30, 1995

	Reprt/Intrm	Remaining
Commodities:		
Chemistry laboratory supplies: reagents, solvents, glassware, consumables, etc.	$0.0	$4.0
Commodities Total	$0.0	$4.0
Equipment:		
Equipment Total	$0.0	$0.0

06/01/94

1995

Printed: 9/12/94 11:33 AM

Project Number: 95027
Project Title: Kodiak Shoreline Assessment
Sub-Project: Hydrocarbon Analyses & Data Interpretation
Agency: National Oceanic & Atmospheric Admin.

FORM 3B
SUB-
PROJECT
DETAIL

Sandra

STATE OF ALASKA

DEPT. OF ENVIRONMENTAL CONSERVATION

TONY KNOWLES, GOVERNOR

Memorandum

To: Bob Spies

Copy: Molly McCammon, Ernie Piper, Bob Loeffler

From: Ron Bruyere, Dianne Munson RB, DM

Date: March 13, 1995

Subject: Changes to 95027 DPD

Per our meeting of February 9, 1995, you requested a memo to your office regarding the changes in the Detailed Project Description for the Kodiak Shoreline Assessment with the attached following items:

1) The changes to the objectives which were redrafted by Bob Loeffler

2) Modifications to the budget, see attached copy of the budget with handwritten changes. We will stay within the revised budget, however and as in the past all unused funds will be returned.

3) A copy of the National Marine Fisheries Auke Bay Laboratory memo, stating that the samples collected from the field season in summer 1995 would receive high priority for processing and therefore would be completed in the timely fashion requested by you. I have also had reaffirmation conversations with Stanley Rice regarding the same issue.

Also as a part of the meeting was that we would coordinate with Rita Miraglia and Jim Fall regarding meetings on Kodiak Island so that cost savings could be realized and that efforts would not be duplicated as far as meetings go. Contact has been made with them and we are working at making this happen. At this point the meetings will occur between March 27 and April 19. Rita and Jim are waiting for a response from the villages as to whether the meetings should occur in a centralized site versus going to the villages. Rita and Jim also must go to the Alaskan Peninsula. These meetings will provide local community's input on selection of sites for the assessment.

Ernie Piper is going to negotiate for the geomorphologist's position and is confident that it will be within the constraints of the budget.

If there is no further information needed, this memo therefore completes the concerns raised by peer review of the Detailed Project description for project 95027, Kodiak Archipeligo Shoreline Assessment.

3. Objectives

a. Create a common understanding that does not now exist among the Trustees, local residents, subsistence and recreational users groups, scientists, and the general public about the presence or absence of *Exxon Valdez* oil in the Kodiak Area. The project should take special concern and focus on areas of community concern with respect to the presence or absence of the oil.

b. Achieve the above objective in such a way that the project provides current information ~~about the presence or absence of oil that is~~ useful for all injured resources and services; that is, the project will update the 1991 information base necessary for other research and restoration in the Kodiak area.

c. Where (and if) surface and subsurface oil is found, the project will locate "hot spots" where continued monitoring, and possible treatment, is necessary. Where oil is found, analysis will be done to determine toxicity and origin of the oil. Where oil is not found or found only in trace amounts, the project will end the need for continued shoreline assessments. Thus, this project may be the last comprehensive shoreline for this area.

d. Maintain (and possibly end) the record of the extent, concentration and degradation of surface and subsurface oil from the 1989 *Exxon Valdez* oil spill in these areas.

Revised 2/24/95
95029

Project Title: Population survey of bald eagles in Prince William Sound, Alaska.

Project Number: 95029

Lead Trustee Agency: U. S. Fish and Wildlife Service

Project Start-up and Completion Dates: 4/95-12/95

Project Duration: 1 year.

Cost of Project: $47,500

Geographic Area: Prince William Sound, Alaska

Project Leader:

P.I.

Philip F. Schempf
U. S. Fish and Wildlife Service
Migratory Bird Management-Raptors
3000 Vintage Blvd., Suite 240
Juneau, AK 99801-7100

(907) 586-7243
(907) 786-7378 fax
R7JMB@mail.fws.gov E-mail

Lead Agency Project Manager: Catherine M. Berg 3/10/95

Catherine M. Berg
U. S. Fish and Wildlife Service
1011 E. Tudor Road
Anchorage, AK 99503

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(907) 786-3250 fax

A. Introduction: Bald eagles were directly impacted by the Exxon Valdez Oil Spill (EVOS). Productivity was greatly reduced during the breeding season following the spill, but returned to normal levels the next year. Population surveys did not indicate any significant difference in eagle numbers among surveys conducted in 1982 prior to the spill and in 1989, '90 and '91 after the spill. This project would re-survey the population of bald eagles in Prince William Sound (PWS. The Trustees funded identical population surveys in 1989-91 (Bowman, T. D., P. F. Schempf, and J. A. Bernatowicz. 1993. Effects of the Exxon Valdez oil spill on bald eagles. Bird study no. 4, Final rep., Exxon Valdez Oil Spill Trustees Counc., Anchorage, Alas. 141pp.).

Bald eagles were studied intensive for two years following the spill and at a reduced level for a third year (1991). Eagles are slow to mature and have a long life span. We believe that eagles in Alaska may not enter the breeding population until they are at least 6-8 years old and they are know to live up to at least 28 years. The young that should have been produced in 1989 would just be maturing and few would be entering the breeding population this soon. However, a reduction in numbers of breeding adults would be cause for concern. Loss of breeding adults erodes future productivity potential and exacerbates the effects of reduced productivity. Such losses would require a decade or more for recovery once the debilitating factors were corrected. This survey will help to confirm the recovery of bald eagles.

B. Project Description:

1. Resources and/or Associated Services: The project will provide information to confirm the recovery of bald eagles within the EVOS area.

2. Relation to Other Damage Assessment/Restoration Work: This study is a continuation of the assessment described in Bowman, T. D., P. F. Schempf, and J. A. Bernatowicz. 1993. Effects of the Exxon Valdez oil spill on bald eagles. Bird study no. 4, Final rep., Exxon Valdez Oil Spill Trustees Counc., Anchorage, Alas. 141pp.

3. Objectives:

   A. Determine current (1995) bald eagle numbers in PWS,

   B. Compare with survey data collected in 1982, and 1989-91.

   C. Confirm that the population is following the trajectory modeled from previous survey data.

4. Methods: Stratified random plots would be flown by fixed wing aircraft using standard survey protocol (See Hodges, J. I., Jr., J. G. King, and R. Davies. 1984. Bald eagle breeding population survey of coastal British Columbia. J. Wildl. Manage. 48(3):993-998 and Bowman, T. D., P. F. Schempf, and J. A. Bernatowicz. 1993. Effects of the *Exxon Valdez* oil spill on bald eagles. Final rep., *Exxon Valdez* Oil Spill Trustees Counc., Anchorage, Alas. 141pp.) Island shorelines within the study area would be censused. The area, plots and shorelines surveyed and censused would be the same as in 1989-91. Differences among years will be compared using ANOVA or Kruskal-Wallis tests.

5. Location: The survey location is shown on Figure 1.

6. Technical support: All activities would be conducted by project personnel. No additional technical support is anticipated.

7. Contracts: The aircraft is on a standing contract with the Office of Aircraft Services.

C. Schedule: The survey would be flown in early May, 1995. A final survey report would be completed by December 31, 1995.

D. Existing Agency Program: No agency contributions are planned for this project in this fiscal year. The survey would not be conducted under current agency management.

E. Environmental Compliance, Permitting and Coordination Status: All known environmental requirements will be complied with.

F. Performance Monitoring: The project leader will plan and schedule field activities. He will serve as principal observer with T. D. Bowman, J. A. Bernatowicz and M. J. Jacobson serving as alternates. J. I. Hodges will be pilot in command with B. P. Conant as alternate. Procedures will be the same as during previous surveys.

G. Coordination of Integrated Research Effort: Few other projects will relate with the bald eagle survey. Data may corroborate findings of studies on prey species.

H. Public Process: The public will be involved through proposal and report document reviews.

I. Personnel Qualifications:

Philip F. Schempf, Principal Investigator, conducted initial 3 year assessment of the effects of the EVOS on bald eagles. Project leader for the U. S. Fish and Wildlife Service, MBM-Raptors, since 1980. Extensive experience with bald eagle

surveys and population studies for the past 14 years, including trapping and handling eagles, aerial surveys and satellite telemetry.

John I. Hodges, Pilot/Biologist, conducted the previous population surveys within PWS and throughout the bald eagle's range from British Columbia to the Aleutian Islands. Has worked extensively with bald eagles and has degrees in wildlife biology and statistics.

J. Budget:

Personnel	
Principal investigator (1 month)	$ 5,231.44
Pilot/Biologist (1 month)	$ 5,372.98
Program manager (1 month)	$ 5,162.02
Travel	
Survey crew per diem in PWS	$ 4,568.56
PI to Anchorage (1 trip)	$ 1,169.00
Contractual services	
Aircraft rental (60 hrs. @ $300/hr)	$18,000.00
Commodities	
Aircraft fuel ($1.80/gal, 37 gal/hr, 60 hr)	$ 3,996.00
Misc. (maps, etc.)	$ 500.00
General administration	$ 3,500.00
TOTAL	$47,500.00

95031

EXXON VALDEZ OIL SPILL TRUSTEE COUNCIL
FY95 DETAILED PROJECT DESCRIPTION

Project Title: Reproductive Success as a Factor Affecting Recovery of Marbled Murrelets in Prince William Sound, Alaska

Project Number: 95031

Lead Trustee Agency: U. S. Fish and Wildlife Service

Project Startup/ Completion Dates: 3/94 - 3/96

Project Duration: 3 years[a]

Cost of Project: $250 K (FY95 and write-up in FY96)

Geographic Area: Prince William Sound

Project Leader:

Katherine J. Kuletz, Wildlife Biologist
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[a] Useful results can be obtained in 1 year. A 3-year project is recommended to assess interannual variation in murrelet reproduction relative to forage fish availability.

A. INTRODUCTION

Marbled murrelets (*Brachyramphus marmoratus*) are the most abundant seabird in Prince William Sound (PWS) in the summer, and their population has declined significantly since the early 1970's (Klosiewski and Laing 1994). Although murrelets suffered high mortality in the *Exxon Valdez* oil spill (Ecological Consulting, Inc. 1991, Piatt et al. 1990, Kuletz 1994), the spill cannot account for the 67% reduction in numbers observed in post-spill years (Klosiewski and Laing 1994). There has been no significant increase in the PWS murrelet population since 1989 (Agler et al. 1994). The ultimate goal of this project is to determine if low reproductive success is limiting the recovery of marbled murrelets in Prince William Sound, and if so, if food limitation or predation are responsible. This project is a continuation of previous restoration studies that investigated nesting habitat and foraging patterns of murrelets (Restoration Projects R15, 93051B, 94102).

In other areas of its range, marbled murrelet populations have declined primarily due to the loss of old-growth forest nesting habitat (Stein and Miller 1992). However, a comparatively small proportion of potential nesting habitat has been harvested in PWS. Concurrent with murrelet population declines, populations of other apex predators that eat small schooling fish have also declined in PWS (Oakely and Kuletz 1994, Klosiewski and Laing 1994, K. Frost, Alaska Dept. Fish and Game, pers. comm.). During the breeding season murrelets depend on forage fish such as sand lance, (*Ammodytes hexapterous*), capelin (*Mallotus villosus*), herring (*Clupeidae spp*) and pollock (*Gadidae spp*) (Oakely and Kuletz 1979, Krasnow and Sanger 1986, Sanger 1987, Kuletz, unpubl. data). If food is limiting murrelet recovery by affecting their reproductive success, it is possible that recruitment is not replacing adult mortality. Because murrelets are likely long-lived (Beissinger in press), the effects of low reproduction may not be evident in population surveys for a decade after the perturbation that caused the loss.

Murrelet reproduction may be limited by food if adults can not provide sufficient quantity or quality of prey to their chicks. Additionally, nest habitat or adult foraging patterns may affect the vulnerability of chicks to predation. This project is a multi-year study with the overall objective to determine if food availability or predation is limiting the recovery of the PWS murrelet population. This hypothesis will be investigated by comparing annual differences in murrelet reproductive parameters to relative prey abundance in PWS. The first step, in 1995, will be to develop a cost-effective means of assessing reproductive success of the murrelet population in PWS. Once a method of monitoring reproduction of the population is established, efforts can be directed toward examining the effects of prey fluctuation and predation at the nest. Ultimately we will improve our ability to predict how management options will affect the recovery of the population.

As the most abundant apex predator in the PWS marine ecosystem, the murrelet is an important indicator of the health of the marine environment. However, it is not possible to study murrelet reproductive success by standard means because of its highly dispersed, secretive, inland nesting habits. Despite years of effort throughout its range, only 32 nests with known outcome have been available to examine reproductive parameters (Nelson and Hamer, in press). In 1994, we demonstrated that individual murrelets could be radio-tagged and tracked to nests and foraging grounds during the breeding season (Kuletz et al. MSa). While this approach has greatly increased our knowledge of murrelet nesting habitat and their breeding and foraging ecology, it is unlikely to provide a long-term, effective means of monitoring the reproductive health of the population.

Because murrelets can not be counted at their nests, researchers at lower latitudes have used the ratio of juveniles to adults at sea as an index of reproductive success (Beissinger in press, Ralph and Long in press). Juvenile murrelets, once fledged, are on their own and usually solitary, or mix with adults at feeding areas in late summer (Sealy 1975, Sealy and Carter 1984). The problems that arose included: (1) Juveniles were difficult to distinguish from adults in winter plumage, particularly after late August (Carter and Stein in press). (2) The best time to survey was not well defined, because murrelets were not as highly synchronized as colonially breeding seabirds (De Santo and Nelson in press) and juveniles fledged from late May to late September (Hamer and Nelson in press). (3) The post-fledging movements of juveniles and adults were unknown, and thus the interpretation of counts or ratios subject to error (Beissinger in press). (4) The number of juveniles on the water has usually been so low (2-5%; Beissinger in press, Ralph and Long in press) that obtaining sufficient numbers of birds per survey, especially where numbers of adults were also low, restricted rigorous analysis.

In 1994, as part of restoration project 94102 (Kuletz et al. MSa), we conducted late-summer surveys to compare juvenile counts between two study areas in PWS - the Naked Island group and Port Nellie Juan (Fig. 1). We observed the first juvenile on 22 July and juvenile counts peaked on 9 August. Numbers fluctuated but remained relatively high until 29 August, and then declined sharply. Also, the percentage of juveniles increased as adults left the areas and juveniles appeared to remain (Fig. 2). Based on criteria developed by Carter and Stein (in press) and Ralph and Long (in press), we scored black-and-white birds (N = 331) as juveniles (54%), unidentified black/white (22%), or winter birds (24%). The post fledging movements of 1 chick we radio-tagged at its nest substantiated the scenario of juveniles remaining in the general vicinity (< 8 km) of the nest for at least 2 weeks. With peak numbers of >500 murrelets per survey, we easily encountered enough murrelets to detect changes in juvenile/adult ratios; (we assumed a minimum of 2% juveniles, and to detect a change of 50% with 95 % probability, at least 100 birds should be encountered).

Prince William Sound may be uniquely suited for development and application of a murrelet reproductive index because of its large murrelet population, its relatively compressed breeding season (Hamer and Nelson in press, Kuletz unpubl. data), and the migration of adults from the area soon after breeding. Additionally, PWS has solid data on the total summer population (Agler et al. 1994), and the foraging ranges of adults (Burns et al. 1994, Kuletz et al. MSa). In the future, information on the relative abundance of forage fish on which murrelets depend will also provide an important environmental parameter by which to judge the fluctuations of murrelet reproduction. In the first year of this project we will develop an index of reproductive success by using at-sea surveys to assess juvenile / adult ratios at selected sites in Prince William Sound. We will also examine the relationship between juvenile abundance and the seasonal, physical and biological environment, to develop a descriptive model of where juveniles might be found.

B. PROJECT DESCRIPTION

1. Resources and/or Associated Services:

This study focuses on the marbled murrelet, one of the seabird species injured in the *Exxon Valdez* Oil Spill and a threatened species under the Endangered Species Act in California, Oregon and California. By developing a cost-effective index of reproductive success for the marbled murrelet, we will be able to examine the physical and biological factors that may influence murrelet productivity, and determine if low reproductive success is limiting the recovery of murrelets in Prince William Sound.

2. Relation to Other Damage Assessment/Restoration Work:

Damage assessment for the marbled murrelet was completed under Bird Studies No. 2 (Klosiewski and Laing 1994) and No. 6 (Kuletz 1994, Oakley et al. MS). The first restoration studies identified marbled murrelet nesting habitat in the spill zone to guide habitat acquisitions (Kuletz 1991, Kuletz et al. 1994a, Kuletz et al. MSb). In 1994 the murrelet restoration project focused on the foraging patterns of breeding birds, the distances they traveled and the type of marine habitat they used (Kuletz et al. MSa). Since 1989, the murrelet damage assessment and restoration studies have shared logistic support and survey data with the pigeon guillemot (*Cepphus columba*) damage assessment and restoration studies. In 1995 our study sites will be aligned with the areas studied by the Seabird/Forage Fish Interaction project (95163), and pending the project's approval, we will coordinate logistic support. The murrelet project could benefit from information obtained through project 95163 and those components of the PWS System Investigation related to forage fish (Isotope Tracers [95320I], Physical Oceanography [95320M], Nearshore Fish [95320N]). The Project Leader is also in contact with the

Harlequin Duck project (95427) to coordinate logistics of April surveys.

3. Objectives:

1. Develop an index of marbled murrelet reproductive success for Prince William Sound.

2. Determine what factors influence the abundance and distribution of juveniles at sea.

4. Methods:

Study Area.-- The study area will be Prince William Sound, with the selected sites including Tatitlek Narrows near Valdez Arm, Unakwik Inlet, Naked Island group, Port Nellie Juan, northern Knight Island, and Dangerous Passage / Icy Bay near Chenega Island (Fig. 1). These areas were selected because of the availability of historic data on murrelets and/or the location of forage fish studies to be conducted in 1995 and later years. They also have sufficient numbers of murrelets in summer and are separated by approximately 16 km. This distance is the average traveled between feeding and nest sites by murrelets in PWS, and twice the distance that the tagged juvenile murrelet moved from its nest over a 2 week period (Kuletz et al. MSa).

Objective 1: Index of reproductive success

Ideally, the reproductive index would be ground-truthed by an independent measure of murrelet reproduction. One type of independent test would be to follow the reproductive success of individual murrelet nests; nests could be located by ratio-tagging adults and using telemetry to find nests and monitor their outcome. This method requires considerable expense and effort to provide a small sample size, and funding is not sufficient to attempt this in 1995. Productivity of other seabirds, such as for the pigeon guillemot or black-legged kittiwake (*Larus tridactyla*), may also serve as indicators of general environmental conditions. However, pigeon guillemots feed on a variety of bottom fish not used by murrelets, and thus the effect of changes in surface schooling fish abundance on guillemot reproduction may be less drastic than for murrelets. Kittiwakes are surface feeders and would not have access to fish in deeper water. Thus the findings from other studies may not be applicable to murrelets. In particular, predation pressures can vary in importance and involve different predator species, and predation can be an important factor in murrlet nesting success (Marks and Naslund 1994, Nelson and Hamer in press).

This study will use two means of ground-truthing the murrelet reproductive index. First, we will make among-site comparisons. Because it is not possible to derive an independent measure of murrelet reproductive success, we will compare the 6 study areas to determine if there is evidence of sites responding similarly to environmental conditions. Second, in the long term, we will compare the trends in the murrelet and forage fish abundance data to determine if there are correlations.

Data Collection.-- In late summer, murrelets at Naked Island were concentrated nearshore (< 2 km and highest <200m offshore [(Kuletz et al. 1994b]). However, in Oregon and California, Beissinger (in press) found that because adults occurred offshore (>1 km) more than juveniles, the ratio of juveniles in nearshore water tends to be inflated 2 or 3 times that of the true local population. Ideally, surveys would be conducted nearshore and offshore to determine true juvenile ratios. However, to obtain a sample size adequate for examining seasonal and among-site variation in 1995, we will primarily conduct shoreline surveys, and will include offshore transects at only 2 of the 6 sites.

Surveys to determine the distribution and abundance of juvenile murrelets at sea will be conducted by 2 crews of 3 observers operating from 25 ft. vessels or 14 ft inflatables and using FWS protocol (Klosiewski and Laing 1994). Complete shoreline surveys (<200 m from shore) will be conducted at 6 sites. At 2 of those sites, we will also survey 20 randomly selected 2 km transects within 2 km of shore. The surveys will follow established FWS shoreline transects that are digitized on Atlas/GIS files (Strategic Mapping, Inc. 1992). The total area surveyed at each site will be determined by the area that can be surveyed between 0600-1600 hours on the same day (murrelet counts vary significantly earlier or later in the day [Carter and Sealy 1990]), and large enough to encounter >100 murrelets in late August. Data on August abundance is available from FWS boat surveys conducted in previous years (Agler et al., unpubl. data, Kuletz unpubl. data).

The first surveys will be conducted between early-April and mid-May, to determine the timing and dispersal of adult's arrival to breeding areas and the abundance of the local breeding population. This may be a critical stage in reproduction, as an estimated 40-60% of reproductive failures may occur in the pre-egg stage (S. Hatch, National Biological Survey, pers. comm.). The numbers of murrelets in the selected survey areas at this time will be used for comparison to late summer juvenile counts, and to results of the forage fish surveys in early summer.

Juvenile surveys will be conducted at the same 6 locations between mid-July and early-September. The 6 sites will be surveyed at least twice per week,

with the 2 crews rotating among sites so that at least 2 days separate surveys at the same site. Thus in the early season surveys, each site will have at least 4 surveys, for a total of 24 surveys. In the late summer surveys, each site will have 10 surveys, for a total of 60 surveys.

The observers will count all birds $\leq$ 200 m from shore. Records for each transect will be kept separate. Observers will be trained to score birds by plumage and behavioral characteristics using photos, study skins, drawings and on-sight training to standardize observers. In 1994 the percentage of unidentified black/white murrelets and juveniles were closely correlated by date, suggesting that many of the black/white birds were juveniles. In 1995 we will record more detailed data for each black/white bird, to improve our identification criteria: the duration and quality of the observation, the presence or absence of an egg tooth, white on the upper mandible, a dusky breast band, dusky flecking on the flanks, gray or brown coloring on the back, missing or rounded primaries during a wing stretch, diving or flying behavior.

Data analysis. -- We will test for similar trends in abundance curves among the 6 sites. If the distribution of numbers over time are not significantly different, we will accept the null hypothesis that there is no difference in seasonal patterns among sites, which might also suggest that there is no evidence of juvenile movements at that scale. If we find no evidence of juvenile movement in August, a more random approach can be proposed for future juvenile surveys. If the sites show differences in the timing of peaks and declines in juveniles, it could suggest that juveniles are moving large distances soon after fledging, and these areas, or these types of habitats, should be identified for future monitoring efforts.

To determine the optimum survey area, transect type (shoreline or offshore) and transect length, we will test for differences among the transects of each study area. We will begin by testing for differences among individual transects, and expand the shoreline transect length in increments to determine the scale that provides the least variance. We will examine juvenile distribution relative to distance from shore (to 2 km) at the 2 sites with offshore transects.

We will also test for differences in the absolute numbers and ratios of juveniles among sites. For the 2-week peak in juvenile numbers for each site, the ratio of juveniles will be calculated relative to total murrelets in April (presumably the local breeding population) and again, to total murrelets in late summer. Because some portion of the population will not have fledged until after the peak, we will apply the method proposed by Beissinger (in press) to obtain a more accurate estimate of total recruitment. Beissinger used the cumulative frequency distribution of estimated 'known' fledging dates for the region "to

determine what proportion of young would have fledged by the end-point of the census date, and then adjust the juvenile ratio by this factor".

A significant difference in peak juvenile counts or ratios among sites may suggest that there is local variation in productivity. If there is evidence of differences in productivity among sites, studies in following years will investigate the causes of this variation. If the forage fish study is implemented in 1995 we will examine the relationship between murrelet productivity and forage fish distribution, as determined by the forage fish study. In the long-term, we will test for correlations between trends in murrelet productivity and the estimates of forage fish abundance for all of PWS.

Objective 2: Factors influencing the occurrence of juveniles

Prior to each transect we will record water and air temperature, presence of glacial ice, water clarity, sea conditions, precipitation, cloud cover, time and observed feeding activity. We will calculate tide with a Paradox (Borland, Inc. 1992) script (Kuletz / FWS files). The bathymetry of the transect, the associated shoreline features and the distance from shore of offshore transects will be obtained by GIS.

We will combine 1994 and earlier historic data on murrelet abundance and distribution with the 1995 survey data to develop a descriptive model of where juveniles congregate. The independent variables will include year, time of peak juvenile occurrence that year, date, weather and sea conditions, time and tide, water depth and clarity, distance offshore, shoreline type, nearshore bathymetric features (rocky, mud, plateau, shelf edge, trough), and presence of foraging flocks. Multivariate analysis will be used to determine what factors best describe the variation in juvenile numbers. The juvenile surveys will also be examined relative to the distribution and abundance of forage fish as determined by forage fish surveys.

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5. Location:

The primary study sites will be Tatitlek Narrows in lower Valdez Arm, Unakwik Inlet, Naked Island, northern Knight Island, Port Nellie Juan, and Dangerous Passage/Icy Bay near Chenega Island (Fig. 1). Our boats will operate out of Whittier and Valdez, where we will rent dock space and purchase some supplies and services. On most days in the field, crews will camp at temporary sites near study areas. We may seek temporary lodging and gas storage at the Unakwik Inlet Cannery, Main Bay near Port Nellie Juan, Tatitlek and the Naked Island camp established by other projects.

6. Technical Support

The FWS currently has the geographic information system coverage of PWS land and bathymetrics. As other coverages are developed related to the fisheries and nearshore and pelagic areas of PWS, we may require GIS support to obtain files and import them in to the Atlas/GIS format. Our study could eventually integrate data on forage fish and oceanographic conditions obtained by NOAA and the PWS Systems Studies.

7. Contracts:

When possible, we will be refueling our survey vessels at Whittier or Valdez. However, to economize on gas and time, we will also contract a barge to deliver gas barrels for storage at sites in Prince William Sound.

We have the expertise and technical support to perform the majority of our GIS needs. However, if additional coverages are obtained, or more specialized analyses required, it may be necessary to contract some GIS / marine habitat analysis to private consultants.

C. SCHEDULE

1. Milestone Dates

1995	March - April	Hire personnel, begin personnel training, purchase equipment, arrange logistics. Safety training for field personnel, training for murrelet surveys.
	April - May	Conduct early at-sea surveys.
	July - Aug	Conduct late at-sea surveys.
	Sept - Oct	Data entry and analysis.
	Nov - Dec	Data analysis and report writing.
1995	Jan 15	Draft report submitted to OOS.
	Feb 15	Draft report submitted for peer review.
	March 30	Final report to Chief Scientist.

2. Project Personnel

Dave Irons:	Project Manager, responsible for overall management of project, supervises logistics and integration of projects and reviews reports.
Kathy Kuletz	Project Leader, will coordinate activities and data exchange with other projects. Responsible for study design, contract management, data analysis and completion of final products. Will supervise field operations from field locations (at beginning of each segment of project) and Anchorage office.
Field Supervisor	This biologist will supervise data collection in the field in the absence of the project leader. Will implement preparations for field work and conduct at-sea surveys. Following field work, will assist with data entry, analysis and report writing.

Bio Tech Positions (5)	Assist in field preparation and remain in field. Will conduct at-sea surveys and after the field season will assist with data entry and equipment maintenance.

D. EXISTING AGENCY PROGRAM

The FWS does not currently have a seabird monitoring program for PWS. However, due to past agency efforts, and EVOS-sponsored damage assessment and restoration studies, the FWS has extensive experience in at-sea surveys of marine birds and has developed the survey protocols basic to this study. The FWS has the data from previous at-sea surveys in PWS in a database that can be integrated with GIS bathymetric and shoreline type coverage. The FWS has trust responsibility for murrelets and all other seabirds as designated in the Migratory Bird Treaty Act of 1918

E. ENVIRONMENTAL COMPLIANCE, PERMITTING AND COORDINATION STATUS

Under DOI guidlines for the National Environmental Policy Act (NEPA) this project qualifies for a Categorical Exclusion.

F. PERFORMANCE MONITORING

In the event that the Project Leader, Kathy Kuletz, leaves before the project's completion, D. Irons will be acting project leader and will assign the analysis and writing responsibilities until a new project leader can be selected.

Quality control will be provided for the at sea surveys by insuring at least one experienced biologist remain with each crew during all surveys. Personnel will be trained to distinguish between adult and juvenile marbled murrelets using photographs, study skins and training sessions in the field. Data sheets will be field-checked by the field supervisor, entered at the USFWS Anchorage office, checked against the raw data and corrected. Reports will be submitted to Office of Oil Spill, USFWS for internal review, followed by the Trustee Council peer review process.

F. COORDINATION OF INTEGRATED RESEARCH EFFORT

This project is one of several proposals to investigate whether food availability is limiting the recovery of injured species that prey on forage fish. It will share logistical support and data on prey with the Harlequin Duck project (95427) and the pigeon guillemot and kittiwake studies of 95163, pending their funding. This study will complement and benefit from the Seabird/Forage Fish Interaction project (95163) and the PWS System Investigation (95320).

G. PUBLIC PROCESS

The public will be invited to comment on this project if it becomes part of the FY95 work plan. If funded, results will be presented at Trustee Council-sponsored workshops each winter.

H. PERSONNEL QUALIFICATIONS

Project Leader: Kathy Kuletz

Kathy Kuletz received her B.S. degree in Biology from California Polytechnic State University, San Luis Obispo (1974), and her M.S. degree in Ecology and Evolutionary Biology from University of California, Irvine (1983). Her thesis was on the foraging and reproductive success of pigeon guillemots at Naked Island, PWS. Ms. Kuletz has worked in Alaska since 1976 for Dames and Moore Consulting, LGL Alaska Research and the U.S. Fish and Wildlife Service. Since 1989 she has been P.I. for the marbled murrelet damage assessment and restoration studies. She has been active in the development of protocols for murrelet surveys.

Pertinent reports and publications (also, see Literature Cited)

Carter. H.R. and K.J. Kuletz. In Press. Mortality of marbled murrelets due to oil pollution in North America. *In*: C.J. Ralph, G.L. Hunt, Jr., M.G. Raphael and J.F. Piatt (eds), Ecology and Conservation of the Marbled Murrelet: An Interagency Scientific Evaluation. USDA For. Serv. Gen. Tech. Rep. PSW-GTR-ØØØ. pp. 235-243.

Kuletz, K.J. In press. Marbled Murrelet Abundance and Breeding Activity at Naked Island, Prince William Sound and Kachemak Bay, Alaska, Before and After the Exxon Valdez Oil Spill. *In*: S.D. Rice, R.B. Spies, D. A. Wolfe, and B.A. Wright (eds.), *Exxon Valdez* oil spill symposium proceedings. Am. Fisheries Soc. Symp. No. 00.

Kuletz, K.J., D.K. Marks, N.L. Naslund, and M.B. Cody. 1994. Marbled murrelet activity in four forest types at Naked Island, Prince William Sound, Alaska. *In*: S.K. Nelson and S.G. Sealy (eds), Biology of Marbled Murrelets: Inland and At Sea. Symposium

Proceedings. Northwestern Naturalist. Vol 75(3).

Kuletz, K.J., D.K. Marks, N.L. Naslund, N.J. Goodson, and M.B. Cody. In press. Inland habitat suitability for marbled murrelets in southcentral Alaska. *In*: C.J. Ralph, G.L. Hunt, Jr., M.G. Raphael and J.F. Piatt (eds), Ecology and Conservation of the Marbled Murrelet: An Interagency Scientific Evaluation. USDA For. Serv. Gen. Tech. Rep. PSW-GTR-ØØØ.

Marks, D.K., K.J. Kuletz, and N.L. Naslund. 1994. Boat-based survey methods and marbled murrelet habitat use in Prince William Sound, Alaska. *In*: S.K. Nelson and S.G. Sealy (eds), Biology of Marbled Murrelets: Inland and At Sea. Symposium Proceedings. Northwestern Naturalist. Vol 75 (3).

Naslund, N.L., K.J. Kuletz, D.K. Marks, and M. Cody. 1994. Tree and habitat characteristics and reproductive success of marbled murrelet tree nests in Alaska. *In*: S.K. Nelson and S.G. Sealy (eds), Biology of Marbled Murrelets: Inland and At Sea. Symposium Proceedings. Northwestern Naturalist. Vol 75 (3).

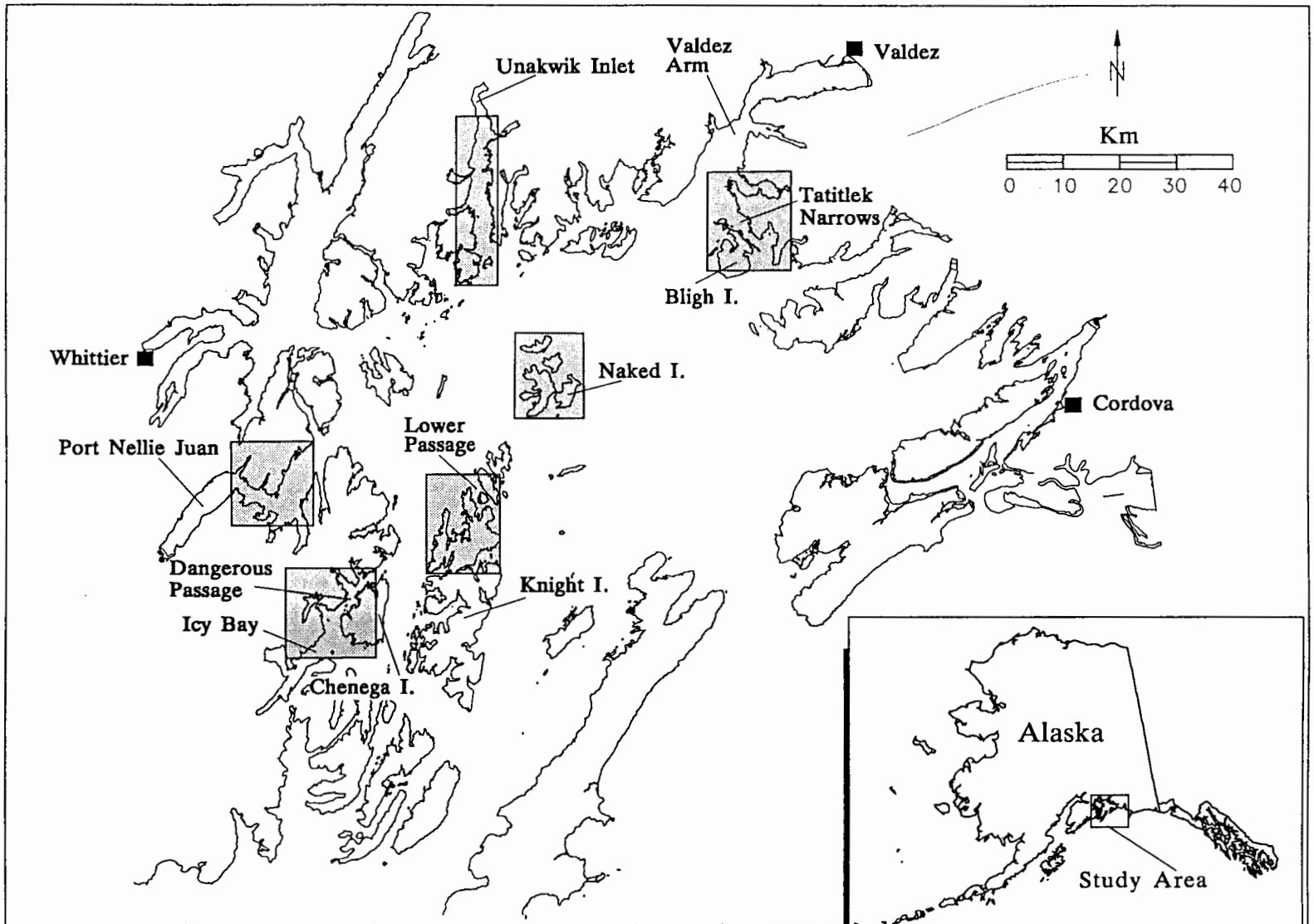

Figure 1. Study areas for Marbled Murrelet Restoration Project 95031

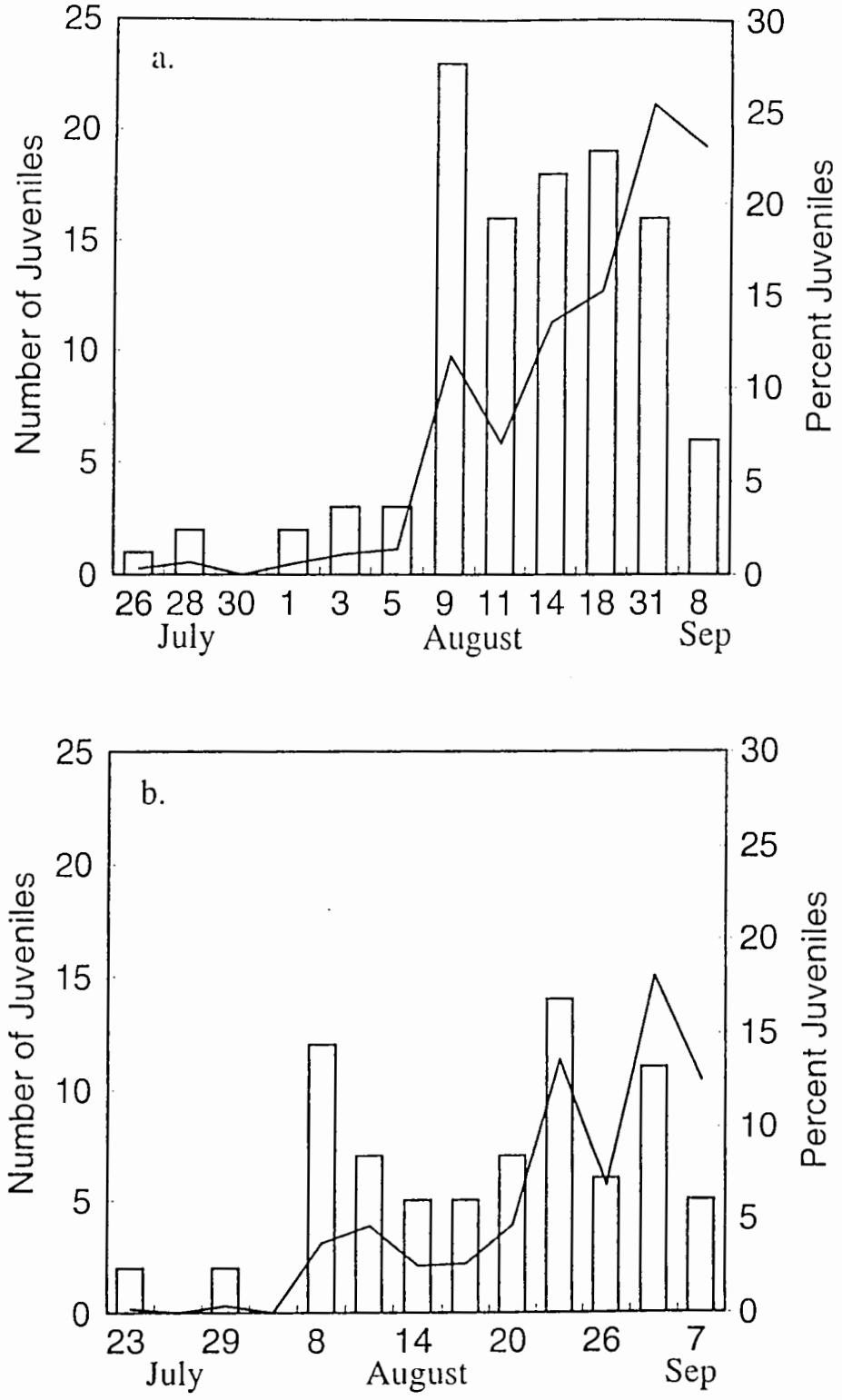

Figure 2. Number of juvenile marbled murrelets and the percentage of juveniles of the total number of murrelets counted during shoreline surveys of Naked Island (a), and Port Nellie Juan (b) in late summer 1994.

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

Project Description: One explanation for the continued decline of the PWS Marbled Murrelet population is that food is limiting recovery by affecting murrelet reproductive success. This project will monitor murrelet productivity using at-sea surveys to assess juvenile/adult ratios at selected sites. Results from this study will compliment studies of forage fish abundance and distribution in relation to oceanographic characteristics. The project location is PWS.

Budget Category:	1994 Project No. . . . . Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment
Personnel		$0.0	$172.2	$172.2		FY95 costs include data analysis and report writing.
Travel		$0.0	$6.6	$6.6		
Contractual		$0.0	$19.0	$19.0		
Commodities		$0.0	$13.2	$13.2		
Equipment		$0.0	$11.8	$11.8		
Capital Outlay		$0.0	$0.0	$0.0		
Subtotal	$0.0	$0.0	$222.8	$222.8	$0.0	
General Administration		$0.0	$27.2	$27.2	$0.0	
Project Total	$0.0	$0.0	$250.0	$250.0	$0.0	
Full-time Equivalents (FTE)		0.0	4.3	4.3		
	Dollar amounts are shown in thousands of dollars.					

Budget Year Proposed Personnel: Position Description	Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
Rept Intrm Project Leader, GS-11			12.0	$51.6
Biologist, GS-9 (1)			12.0	$45.6
Bio. Tech., GS-7 (1)			12.0	$30.0
Bio. Tech., GS-5 (3)			9.0	$18.0
Expediter			3.0	$10.0
Project Manager			2.0	$11.0
Program Manager			1.0	$6.0
Personnel Total	0.0	$0.0	51.0	$172.2

NEPA Cost: $0.0

*Oct 1, 1994 - Dec 31, 1994

**Jan 1, 1995 - Sep 30, 1995

Project Number: 95031

Project Title: Reproductive Success as a Factor Affecting Recovery of Marbled Murrelets in PWS, Alaska

Agency: Dept. of Interior, Fish & Wildlife Service

FORM 2A PROJECT DETAIL

95038

Exxon Valdez Oil Spill Trustee Council
FY 95 Detailed Project Description

Project Title: Symposium on Seabird Restoration

Project Number: 95038

Lead Trustee Agency: U.S. Fish and Wildlife

Cooperating Agencies: None

Project Start-up/Completion Dates: February - December 1995 (possible extension)

Expected Project Duration: 11 months (possible extension)

Cost of Project: $84,600

Geographic Area: No field work in this project

Craig S. Harrison Feb. 17, 1995
Craig S. Harrison
Pacific Seabird Group Vice Chair for Conservation
Project Co-Leader

Kenneth Warheit/CSH Feb-17, 1995
Kenneth Warheit
Pacific Seabird Group Restoration Committee Coordinator
Project Co-Leader

Catherine M. Berg 2/28/95
Catherine Berg
U.S. Fish and Wildlife Service
Project Manager

A. INTRODUCTION

The *Exxon Valdez* Oil Spill (EVOS) in 1989 killed an estimated 100,000 to 435,000 birds totaling 90 species.[1] Many seabird species suffered only minor mortalities while large numbers of other species died and suffered at least short term declines in their populations. In 1992, the Trustee Council concluded that six species of birds had not recovered from the effects of the spill. These were the Bald Eagle, Black Oystercatcher, Harlequin Duck, Common Murre, Pigeon Guillemot and Marbled Murrelet. In 1993, the Trustee Council considered the Bald Eagle and Black Oystercatcher to have recovered while the remaining species had not recovered.[2]

The EVOS Trustees, and other oil spill trustee councils, have struggled with deciding the most efficacious means to restore seabird populations and to spend seabird restoration funds. The development of restoration plans has suffered from a lack of proven seabird restoration options. Seabird restoration, as a discipline, is in its infancy and represents a new approach to seabird research and management. Typically, past seabird research has examined the natural and anthropogenic factors contributing to fluctuations in numbers or affecting breeding productivity. Previous seabird management plans have focused on cataloguing and maintaining populations or removing perturbations (e.g., alien plants and mammals) from breeding colonies. Only recently have seabird biologists and managers had funds to restore seabird populations damaged by oil spills or other pollution events.

To be successful, all seabird restoration programs should have a monitoring component to determine the rate of recovery and a research component to identify the factors that are either contributing to or preventing recovery. When recovery is not either occurring or occurring at a slow rate, restoration techniques that increase the rate of natural recovery may be needed. Seabird restoration techniques typically are aimed at increasing the recruitment of birds into the breeding population, increasing productivity of breeding birds or a combination of both. Although little has been published on seabird restoration, potential restoration methods for the Common Murre in the Gulf of Alaska were reviewed by D. Roby[3] and the Pacific Seabird Group (PSG) Restoration Committee developed a preliminary list of restoration options. Most of the techniques discussed in these reports are untested.

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[1]Piatt, J.F., C.J. Lensink, W. Butler, M. Kendziorek, and D.R. Nysewander. 1990. Immediate impact of the "Exxon Valdez" oil spill on marine birds. Auk 107: 387-397; Ecological Consulting Inc. 1991. Assessment of Direct Mortality in Prince William Sound and the Western Gulf of Alaska: Results From the *Exxon Valdez* Oil Spill. Portland, OR.

[2]EVOS Trustee Council. 1993. Draft EVOS Restoration Plan.

[3]Roby, D.D. 1991: Annotated list of restoration options for common murres in the aftermath of the *Exxon Valdez* spill. Memorandum prepared for *Exxon Valdez* Restoration and Planning Work Group. Anchorage, Alaska.

A comprehensive review and assessment of seabird restoration will provide the EVOS Trustee Council, and others concerned with seabird restoration, with a summary of the status of seabird restoration, principles to apply in implementing a seabird restoration program and potential avenues for future research. PSG will hold a symposium/workshop of recognized experts in seabird biology and management to delineate the necessary components of seabird restoration programs, discuss the suitability of existing and potential restoration techniques, and recommend avenues of research that will allow the testing and development of new techniques.

Through lectures and group discussions the symposium will produce:

- A synopsis of the type of baseline data needed for all seabird restoration programs with specific information for the seabird species that have not yet recovered from the *Exxon Valdez* oil spill.

- A summary of known restoration techniques (what is included in the EVOS Trustee Council's categories of "general restoration" and "habitat acquisition") and an evaluation of these techniques for the seabird species that have yet to recover from the *Exxon Valdez* oil spill.

- A description of untested techniques that have potential and recommended research for testing these techniques.

The report produced from the symposium will be the first comprehensive overview of seabird restoration and provide the EVOS Trustee Council with guidance in deciding the course of future seabird restoration efforts.

PSG is an international professional society founded in 1972 to promote the study and conservation of Pacific seabirds. It facilitates the exchange and distribution of information on seabirds through annual meetings, publishing *Pacific Seabirds* twice each year, and publishing symposia. PSG has held symposia on the biology and management of virtually every seabird species affected by the *Exxon Valdez* oil spill. PSG has commented on EVOS restoration plans and annual work plans for the past three years, hosted symposia on the effects of the spill, and recently formed a Restoration Committee that, among other activities, provides expert comment on restoration plans throughout the Pacific coast of North America.

B. PROJECT DESCRIPTION

1. Resources and/or Associated Services:

While all seabird species affected by the *Exxon Valdez* oil spill will benefit from the results of the symposium, PSG will emphasize the four seabird species the Trustee Council has judged not to be recovering (Harlequin Duck, Common Murre, Pigeon Guillemot, Marbled Murrelet). The EVOS Trustees can use the symposium report in their

review of seabird restoration proposals. The symposium report also will assist federal and state agencies in developing seabird restoration plans elsewhere.

2. Relation to Other Damage Assessment/Restoration Work:

Past and ongoing projects dealing with seabird damage assessment have included all of the EVOS Trustee-funded seabird studies and U.S. Fish and Wildlife research on damage assessment and recovery monitoring. We list projects funded by the Trustee Council for 1994 and 1995 below in Section G. The principal investigators of these projects may be asked to attend the symposium.

3. Objectives:

a. Provide guidelines on the most appropriate expenditure of restoration funds for seabird populations.

b. Determine the information necessary for the development of seabird restoration plans.

c. Evaluate the applicability of existing and potential techniques for seabird restoration and recommend avenues of research for testing to aid in the development of restoration techniques.

4. Methods:

PSG will hold a three day symposium/workshop in the fall of 1995 during which experts in seabird research and management will discuss the status of seabird restoration science. A select group of experienced researchers and managers will discuss the information needed to initiate and assess the success of seabird restoration programs. Some participants will be required to submit written material about a specific topic in seabird restoration before the symposium. The participants also will delineate those areas where future research is required to further the science of seabird restoration. Attendance at the symposium will not exceed forty people and will be by invitation only. The PSG Steering Committee will select participants and balance the group as a whole to reflect appropriate experience and geographical dispersion.

Symposium/Workshop composition

The participants will be researchers and managers who have worked with seabird damage assessment, monitoring, restoration, or detailed breeding biology of seabirds. Identification and notification of participants will be completed in March 1995. Besides invited experts with expertise in the above-mentioned areas, persons with specific expertise in EVOS damage assessment and monitoring will be asked to participate. Invited experts will

be required to perform certain tasks before arriving at the meeting, and those who fail to perform those duties may be removed from participating.

Pre-meeting activities

PSG will send background materials to all participants in April and May 1995. This material will included pertinent literature and reports on: 1) the level of impact and recovery of seabirds in the EVOS area and 2) general seabird restoration. They also will be asked to consider and to respond to several questions relating to seabird restoration well before the symposium. The following are examples of questions.

- What are the specific types of information that restoration managers need to formulate realistic restoration plans?

- When baseline data are insufficient to provide either an estimate of the population size and trend at the time of the impact or the importance of factors regulating the post-impact population, how should restoration proceed?

- When a seabird species or population has been known to recover from decreases similar to that associated with an oil spill should restoration activities, at least initially, be limited to monitoring?

- Does the natural variability of seabird populations make restoration to pre-impact levels a realistic goal?

- In cases where variability in prey and other factors unrelated to the impact is known to be contributing to decreases in seabird populations, how should restoration goals be set?

- How should natural resource trustees establish restoration priorities among damaged seabird populations?

- For those situations where active restoration appears warranted since natural recovery either is not occurring or expected to occur, what are the existing restoration techniques or most promising untested restoration techniques that restoration managers should pursue?

Participants will be formed into working groups and team leaders will encourage discussions and contact among participants well before the symposium. Participants will be asked to inform PSG's contractor[s] of any pertinent literature or reports they believe will help the participants in their discussions. Approximately one month before the symposium the Steering Committee and PSG's contractor[s] will send a packet of information to the participants giving a final agenda instructions concerning meeting content, objectives and logistics. Certain participants will be asked to submit manuscripts on topics for which they

possess specific information not available in publications or for which the Steering Committee believes a pre-symposium summary is needed.

Symposium schedule

The three-day symposium schedule will be as follows:

First day		
	Afternoon	Arrival of participants
	Evening	Introductory remarks by organizers and a short plenary session, followed by social hour
Second day		
	Morning	Plenary session of papers on restoration topics and EVOS seabird damage assessment and recovery
	Afternoon	Completion of paper presentations followed by breaking into subgroups
	Evening	Continuation of subgroup discussions with short plenary session to recap subgroup progress
Third day		
	Morning	Short plenary sessions followed by subgroup discussions
	Afternoon	Subgroup discussion
	Evening	Subgroup discussions and short plenary session to discuss progress
Fourth day		
	Morning	Summary of subgroup discussions by subgroup facilitators Concluding remarks
	Afternoon	Meeting of project co-leaders, contractor[s] and facilitators to establish assignments and schedule for post-symposium activities relating to the production of the report.

A facilitator will lead each subgroup in its discussions and assure that they are structured to produce specific conclusions or recommendations relating to the questions being addressed by the symposium. Subgroups will address both generic restoration topics (monitoring, natural variation, unassisted recovery, active restoration options) and species specific issues.

The Steering Committee and contractor[s] will prepare a draft report within one month after the symposium. Parts of the report will be written by the working group facilitators. Participants not involved in document preparation will review pertinent parts of

the draft report. If additional funds are available, PSG will publish the report in a world class professional outlet.

5. Location:

The symposium/workshop will be held at a hotel/meeting facility near Anchorage or Seattle. The physical location of the meeting will be chosen to maximize small group interactions and the absence of distractions.

6. Technical Support:

None

7. Contracts:

The project will be administered by a Steering Committee overseeing one or more contractors. The contractors will be under the general guidance of the Steering Committee and responsible for the day to day activities involving planning the meeting, corresponding with participants, meeting logistics and report generation. The contractors will be in regular contact with the Steering Committee and will report activities and accomplishments each month. Coordinators, facilitators or others who are asked to devote substantial time to this project also may receive honoraria. PSG's organizational framework does not allow for the work to be done in-house.

C. SCHEDULE

Project Activities
(all dates 1995)

February	Award contracts and select meeting location and dates.
March	Identify and notify suitable scientists and determine their availability.
April	Determine composition of symposium subgroups, facilitators for each subgroup and authors for manuscripts.
May-August	Distribute published and unpublished reports on seabird restoration techniques to participants; development of issues to be discussed and draft issue papers
September	Submittal of first draft of manuscripts by selected participants.
October	Conduct symposium/workshop.
November	Complete draft report.
December	Final report.

Project Personnel

Craig S. Harrison, PSG Vice Chair for Conservation, and Dr. Kenneth Warheit, Coordinator of the PSG Restoration Committee, are the Project Co-leaders. Along with Dr. John Piatt, Mark Rauzon and Bill Everett they comprise the Steering Committee for this project. Contractors for this project and the participants have yet to be chosen.

D. EXISTING AGENCY PROGRAM

None

E. ENVIRONMENTAL COMPLIANCE, PERMITTING AND COORDINATION STATUS

Not applicable.

F. PERFORMANCE MONITORING

The Executive Council of PSG has established a five-person Steering Committee consisting of the past, current, and incoming Executive Council Chairs, Vice Chair for Conservation and Coordinator of the Restoration Committee. They will be in communication with the contractors on at least a weekly basis concerning the progress of meeting organization. Contractors will submit monthly progress reports summarizing accomplishments to date and providing information on activities anticipated in the next month. The Steering Committee will establish a review process for the written report and conclusions of the experts at the symposium with deadlines for obtaining drafts from facilitators.

G. COORDINATION OF INTEGRATED RESEARCH EFFORT

Seabird projects funded for 1994 and 1995 by the EVOS Trustees in 1994 that pertain to this project include the following:

Project No.	Title
94039	Common Murre Population Monitoring
94066	Harlequin Duck Recovery Monitoring
95159	Marine Bird and Sea Otter Boat Surveys
94506	Pigeon Guillemot Recovery
95021	Seasonal Movement and Pelagic Habitat Use by Common Murres from the Barren Islands
95031	Reproductive success as a factor affecting Murrelets in PWS
95039	Common Murre Productivity Monitoring

95041	Introduced Predators Removal from Islands
95102	Murrelet Prey and Foraging Habitat in PWS
94427	Harlequin Duck Recovery Monitoring
95163A	Abundance and Distribution of Forage Fish and their influence on recovery of injured species
95163I	Seabird/Forage Fish Interaction: Program Management and Integration

The Principal Investigators of these projects will be consulted by the Steering Committee and contractors during the development of the program.

H. PUBLIC PROCESS

While the nature of a symposium/workshop of invited experts has to exclude direct public participation in the meeting itself, the Steering Committee will contact a wide range of people in determining the direction of the symposium and in choosing participants. PSG hopes to produce a publication that will have a wide public distribution if additional funds for publication are available.

I. PERSONNEL QUALIFICATIONS
Project co-leaders and Steering Committee

The Steering Committee for this project consists of the following PSG officers: Craig S. Harrison (Project Co-leader), Vice Chair for Conservation; Mark Rauzon, Chair; John Piatt, Past Chair; Bill Everett, Chair-elect, and Ken Warheit (Project Co-leader), Coordinator PSG Restoration Committee. The qualifications for the project co-leaders are as follows:

Craig S. Harrison practices environmental law in the Washington, D.C. office of Hunton & Williams. Mr. Harrison was a wildlife biologist with the U.S. Fish and Wildlife Service (1975-83), supervising seabird research programs regarding oil and gas development in Alaska and marine fisheries development in Hawaii. From 1975-78, he conducted bird surveys under the Outer Continental Shelf Environmental Assessment Program in the EVOS area. He also conducted research on marine environmental issues as the East-West Center's Environment and Policy Institute in Honolulu. Mr. Harrison has written extensively in peer-reviewed journals on wildlife biology and conservation, natural resource law and policy, and pollution. In 1990, Cornell University Press published Mr. Harrison's *Seabirds of Hawaii: Natural History and Conservation,* which was nominated for the Wildlife Society's book award. He has served on the Executive Council of PSG for 12 years, is currently the Vice-Chair for conservation and has been the primary author of the PSG's comments on the EVOS recovery plan and annual work plans.

Kenneth Warheit received his doctorate from the University of California, Berkeley, in 1990. Research conducted by Dr. Warheit at U.C. Berkeley concerned the community ecology of rocky intertidal systems, and also ecology, systematics, morphometry, and paleontology of seabirds, particularly sulids and eastern Pacific Common Murres. From 1990 through 1993 Dr. Warheit was a postdoctoral Fellow at California Academy of Sciences and Smithsonian Institution. During this time, he continued his work on systematics, morphology, and ecology of seabirds. In 1993, Dr. Warheit received a Research Associateship from the Burke Museum, University of Washington, Seattle, and was project leader and coordinator for a National Science Foundation funded project to sort and salvage seabirds killed by the *Exxon Valdez* oil spill. In 1993 Dr.Warheit also joined the Washington Department of Fish and Wildlife and is now the statewide coordinator for oil spill resource damage assessments. The design and implementation of seabird restoration projects for the *Tenya Maru* and *Nestucca* oil spills are among his primary responsibilities. He is Coordinator of the PSG's Restoration Committee, and his duties include preparing PSG's response to proposed restoration plans.

Contractors

The Steering Committee will select contractors with the following minimum qualifications by March 1995.

1. Experience in organizing meetings or workshops

2. Experience with issues and techniques related to seabird restoration, particularly restoring seabird populations injured by oil spills

3. Experience working with domestic and/or foreign researchers, managers, or administrators conducting seabird restoration projects. Personal familiarity is preferable, although not required.

4. Awareness and understanding of the Exxon Valdez-related issues, particularly those associated with seabird damage assessment and restoration.

5. Experience working with PSG

6. Available to conduct work regularly from March 1 to completion of final report by the end of December. An extension into 1996 may be possible.

7. Has access to or possesses adequate office facilities (e.g., computer, fax machine, photocopy machine, e-mail address).

8. Ability to work cooperatively.

9. Single individual with direct accountability to Steering Committee (i.e., if group or organization accepts contract, one individual must be identified as responsible for implementing and completing required tasks).

J. BUDGET

FY 1995 ($K)	
Personnel	6.0
Travel	30.0
Contractual	35.0
Commodities	0.0
Equipment	0.0
Subtotal	71.0
General admin.	3.4
Total	74.4
FY 1996	
Contractual	10.1
Total	10.1
Total Cost	84.5

Common Murre Productivity Monitoring

Project Number:	95039
Restoration Category:	Monitoring (continuation of 94039)
Proposed By:	DOI
Cost FY 95:	$154,200 (includes $30,500 for data analysis and report writing on FY 94 work)
Cost FY 96:	$33,200
Total Cost:	Unknown
Duration:	3 years
Geographic Area:	East Amatuli Island and East Amatuli Light Rock, Barren Islands
Injured Resource/Service:	Common murre

P.I. Roseneau

INTRODUCTION

Common murres *(Uria aalge)* are the injured resource addressed by this project. Both documented and estimated losses of murres were higher than losses suffered by any other avian species following the 24 March 1989 *T/V Exxon Valdez* oil spill. The Barren Islands contained one of the largest nesting concentrations of these diving fish-eating seabirds in the path of the oil.

The proposed FY95 common murre restoration monitoring project focuses on obtaining detailed data on the productivity and nesting chronology of murres in the Barren Islands, a location recently proposed as the key restoration monitoring site for obtaining this information. Implementing the project will provide one year of the multi-year data set required to determine whether common murres are recovering from the *Exxon Valdez* oil spill.

The FY95 work is related to several previous Trustee Council projects including damage assessment studies of common murres during 1989-1991 (Bird Study No. 3; e.g., Nysewander *et al.* 1993), and murre restoration monitoring studies in 1992 (Restoration Project No. 11; Dragoo *et al.* 1993), 1993 (Project 93049, Roseneau *et al.* 1994) and 1994 (Project 94039, currently underway). These projects were designed to collect detailed information on numbers, productivity, and nesting chronology at the injured Barren Islands colonies. The proposed FY95 work is a continuation of the 1993-1994 studies; however, it is specifically designed to monitor only productivity and timing of nesting events. Monitoring of population size will be deferred

until 1996. This approach follows the proposed Recovery Monitoring Strategy formulated during the 13-15 April 1994 workshop.

NEED FOR THE PROJECT

This project is the first part of a potential three to four year-long restoration monitoring program designed to collect additional detailed information on the productivity of injured common murres in the Barren Islands. These productivity data are needed to help determine the recovery status of this injured resource. The FY95 work will provide critical information on numbers of fledged chicks per nest site, timing of nesting events (e.g., egg-laying and hatching dates), and attendance of adults that will be combined with similar data collected during 1993 and 1994. This information will be used in conjunction with at least two (possibly three) more years of data collected during 1996-1997 (possibly 1998) to determine whether reproductive timing and success are within normal ranges, based on prespill data and information from other nesting colonies located outside the spill zone. At least five years of data are required to allow for natural variation.

The draft Recovery Monitoring Strategy suggests that productivity studies for murres should be conducted for four years starting in FY95. However, because detailed productivity information will be available from the FY93 and FY94 studies, two years of work after FY95 will produce a five-year data set that should be sufficient to determine whether production and breeding schedules are within normal ranges for Gulf of Alaska colonies.

Both the injured resource and the public will benefit from the proposed project. Common murres will benefit because 1995 productivity data will help resource managers and the Trustee Council determine whether murres are recovering or whether other measures need to be taken to ensure full recovery of this injured species to pre-spill levels. For example, computer simulation models developed for the Trustee Council that estimate recovery rates for murre populations can utilize the 1995 productivity data to more accurately predict rates of recovery for this injured resource. The general public will benefit because they will have access to new information on the status of the avian species that suffered the greatest known direct mortality from floating oil. Private sector businesses offering sight-seeing and birding tours to the Barren Islands and other Gulf of Alaska colonies will benefit because they will have new information on the status of the injured species that will help them plan trips, prepare lectures, and be of interest to their clientele.

PROJECT DESIGN

A. Objectives

Monitor the recovery of Barren Island murres by collecting data on reproductive timing and success and determining whether these biological variables fall within normal bounds.

B. Methods

This project will collect high quality information for determining whether murre productivity and timing of nesting events are within normal ranges. Funds will be conserved by focusing efforts at East Amatuli Island. Both East Amatuli and Nord islands were included in the 1993 and 1994 studies, but Nord Island is difficult to access, and including Nord Island increases the cost of the study by at least $60K.[1] In 1993, differences in productivity values and timing of nesting events between murres nesting on East Amatuli and Nord islands were not significant. We therefore proposed to limit monitoring efforts to East Amatuli Island and Light Rock, with the exception of placing time-lapse cameras on Nord Island to collect attendance and chronology data.

The objective of the draft Recovery Monitoring Strategy for common murres is to monitor productivity in the Barren Islands for a few more years to ensure that it remains within normal bounds. Data collected at East Amatuli Island and Light Rock in FY95, when combined with information from 1993-1994 and additional work there in 1996-1997, will produce a five year data set that should be sufficient to meet this goal.

The methods employed during the FY93 and FY94 DOI-FWS Barren Islands common murre restoration studies (Projects 93049 and 94039) will be used to collect FY95 productivity data. These methods are based on standard refuge and seabird colony protocols. Data will be collected from at least 10 productivity plots, including 9 on East Amatuli Island and 1 on Light Rock. These plots, first established in 1993, contain about 250 nest sites and sample a variety of nesting habitats. Data will also be collected from at least two new plots that will be set up on East Amatuli Island during FY94. The new plots, located in a different sector of the colony, will contain about 20-30 nest sites each.

Observations will encompass the time from before eggs are laid until chick-fledging peaks. Each plot will be visited every three to four days, weather permitting, and observations will be made with the aid of high quality binoculars and spotting scopes. Data collected during the visits will provide information on productivity (numbers of eggs laid and hatched and chicks fledged per plot, per pair, and per total number of adults). These data will also be used to determine timing of nesting events (first egg-laying dates, and mean and median laying, hatching, and fledging dates).

[1]Camp sites are not available on Nord Island, and crews must camp on nearby Ushagat Island. Because of strong tidal rips and swells backed by westerly winds, the crossing between Ushagat and Nord islands requires, particularly in the late season (August-September), the use of a large, contract vessel.

Information on any factors or events that might adversely affect murre productivity will be collected (e.g., avian predation events, adverse weather conditions, charter boat activities, aircraft overflights). During predation and other disturbance episodes, large numbers of birds often flush from the nesting cliffs. Efforts will be made to quantify both numbers of flushing individuals and numbers of incubating or brooding birds remaining on the nesting ledges during and after these types of events. During flushing events, special care will also be taken to look for falling eggs or chicks.

Two time-lapse cameras will be set up at the East Amatuli Island productivity plots to record attendance of adults during the breeding season. These attendance data will be supplemented with regular counts of adults on the study plots (i.e., counts made during visits to collect productivity data). Two additional cameras will be set up to obtain similar attendance information at the Nord Island productivity plots for comparison with East Amatuli Island data and data collected in previous years.

Because sea surface temperature (SST) can influence timing of nesting events at murre colonies, water temperatures will be taken on a regular basis at several locations near East Amatuli Island with a datalogger device and pre-calibrated hand-held thermometers. Broader-scale breeding season SST data will be obtained via AVHR satellite imagery from the Geophysical Institute at the University of Alaska-Fairbanks for the 1989-1994 breeding seasons. Barren Islands SST information will also be obtained from other sources. All efforts to obtain SST data will be coordinated with principal investigators of other agencies and organizations working on Trustee Council projects (University of Alaska Institute of Marine Science, Prince William Sound Science Center, and NOAA researchers).

When time allows during the productivity study, eight special multi-count plots at East Amatuli Island and Light Rock will be counted several times during appropriate times of day and periods of the nesting cycle (i.e., between 1100-2000 hrs in the late incubation - late chick-rearing period). These small-scale counts, which can be made at no extra cost to the project, will provide a small, but valuable amount of "off-year" information that can be integrated with large-scale population census data that are currently scheduled to be collected every third year beginning in FY96.

C. Schedule

Oct-Dec 94	94039 data analysis
Dec-Jan 95	94039 report writing
Jan-Mar 95	Recruit seasonal employees for '95 field season.
Feb 15 95	94039 draft report due
Mar 31 95	94039 final report
Apr-Jun 95	Field preparations
Jun-Sep 95	Field work
Sep-Dec 95	95039 data analysis
Jan-Mar 96	95039 report writing
Mar 15 96	Submit draft report

D. Technical Support

None. However, some technical support may be required at a later date to help interpret satellite imagery of sea surface temperatures.

E. Location

East Amatuli island in the Barren Islands, about 75 km south-southwest of Homer, between the Kenai Peninsula and the Kodiak Archipelago. The study will be staged from Homer.

PROJECT IMPLEMENTATION

The U.S. Fish and Wildlife Service is the most appropriate entity to implement this project. The Barren Islands are part of the Alaska Maritime National Wildlife Refuge (AMNWR), and the AMNWR office in Homer has an experienced research team that has the technical capabilities needed to successfully carry out this project. The Barren Island murre colonies are particularly dangerous, difficult places to work. Nesting cliffs are located in areas where strong tidal currents and rips develop on a regular basis (1.5-2.5 m-high standing waves and currents exceeding 5-6 kts are common). Productivity plots are only accessible with the aid of boats, and use of running-line mooring systems capable of withstanding 6-9 m seas during storms and technical rock climbing equipment. The proposed project leader and field team leader have the training, experience, and technical knowledge necessary to safely work at remote locations in these situations and conditions. AMNWR staff assigned to this project have a combined total of 12 seasons experience working at these rugged Gulf of Alaska murre colonies and over 40 years combined expertise conducting similar types of seabird studies. This level of knowledge of both the biology of the birds and study area conditions will make it easy to efficiently plan and implement this study.

COORDINATION OF INTEGRATED RESEARCH EFFORT

The FY95 common murre monitoring study is a complete, stand-alone project that is directly related to FY93 and FY 94 Barren Islands murre work. However, it is also part of a larger, integrated ecosystem oriented package of bird and marine mammal restoration projects designed to address the information needs of the Trustee Council. The FY95 work will be coordinated with several studies listed in the package, if they are funded. Projects most likely to produce information relevant to the Barren Islands murre productivity work that have been tentatively selected for coordination efforts include proposed investigations of murre foraging areas, food web relationships, foraging efficiencies at food patches, forage fish assessment, and fisheries oceanography.

The project will also be coordinated with other FWS and National Biological Survey seabird monitoring work in the Gulf of Alaska and elsewhere (e.g., Bering Sea). Data collection and

analysis methods will be reviewed to ensure that data can be compared between studies. Efforts will be made to share personnel and equipment whenever possible.

FY 95 BUDGET ($K)

Personnel	93.2
Travel	29.2
Contractual	0.0
Commodities	11.0
Equipment	6.8
Subtotal	140.2
Gen. Admin.	14.0
Total	154.2

95041

EXXON VALDEZ TRUSTEE COUNCIL
FY 95 DETAILED PROJECT DESCRIPTION

A. COVER PAGE

Project Title: Introduced Predator Removal from Islands

Project ID Number: 95041

Lead Agency: DOI-FWS

Cooperating Agencies: None

Project Start-up/Completion Dates: February 1, 1995/January 31, 1996

Expected Project Duration: 12 months; no funding required in future years

Cost of Project: $66.5K

Geographic Area: Field work will be conducted on Simeonof and Chernabura islands in the Shumagin Islands, western Gulf of Alaska, and data will be analyzed at the DOI-FWS Alaska Maritime National Wildlife Refuge office, 2355 Kachemak Bay Dr. (Suite 101), Homer, Alaska 99603-8021

P.I.

Project Leader: Edgar Bailey Date: 12/8/94

Edgar P. Bailey, Wildlife Biologist,
U.S. Fish and Wildlife Service, Alaska Maritime NWR, 2355 Kachemak Bay Dr. (Suite 101), Homer, Alaska 99603-8021. Ph (907) 235-6546, Fax 235-7783

Project Manager: G. Vernon Byrd Date: 12/8/94
Revised 02/10/95

Vernon Byrd, Wildlife Biologist,
U.S. Fish and Wildlife Service, Alaska Maritime NWR, 2355 Kachemak Bay Dr. (Suite 101), Homer, Alaska 99603-8021. Ph (907) 235-6546, Fax 235-7783

A. INTRODUCTION

Black oystercatchers (*Haematopus bachmani*), murres (*Uria spp.*), and pigeon guillemots (*Cepphus columba*) were injured by the T/V *Exxon Valdez* oil spill (Piatt et al. 1990, Andres 1993, Oakley and Kuletz in press). Few options are available for direct restoration of injured populations in Prince William Sound, but it is possible to take action to cause populations to expand at the western edge of the area affected by oil by removing introduced foxes from islands where they have kept numbers of oystercatchers and guillemots depressed. Both these species are common on fox-free islands with appropriate nesting habitat in the Shumagins (Bailey 1978, Day 1977, Bailey and McCargo 1984), and local breeding populations of both species, particularly oystercatchers, should increase considerably following the removal of foxes.

B. PROJECT DESCRIPTION

Project No. 95041 is designed to restore populations of black oystercatchers and pigeon guillemots at two islands in the Shumagin Island group (Fig. 1), located at the downstream edge of the trajectory of the oil spilled by the T/V *Exxon Valdez*. Populations will be enhanced by removing introduced arctic foxes (*Alopex lagopus*) from Simeonof and Chernabura islands. The response of oystercatcher and guillemot populations to fox removal will be monitored.

1. Resources and/or Associated Services

Black oystercatchers and pigeon guillemots are the injured species that will benefit from removing introduced foxes from Simeonof and Chernabura islands. The work will benefit not only these two species but other insular birds such as puffins, storm petrels, gulls, terns, and auklets. Because of differences in available habitat, black oystercatcher populations will likely sustain larger increases on Simeonof than on Chernabura, and the opposite would be true for pigeon guillemots.

2. Relation to Other Damage Assessment/Restoration Work

Assessment studies - other related studies on oystercatchers and guillemots include: (a) Black Oystercatcher Interaction With Intertidal Communities in Prince William Sound (Project 94020) and (b) Pigeon Guillemot Recovery Monitoring in Prince William Sound (Project 94173).

3. Objectives

The purpose of this project is to enhance populations of black oystercatchers and pigeon guillemots at Simeonof and Chernabura islands by eliminating introduced arctic foxes. Populations of oystercatchers and guillemots are being monitored to

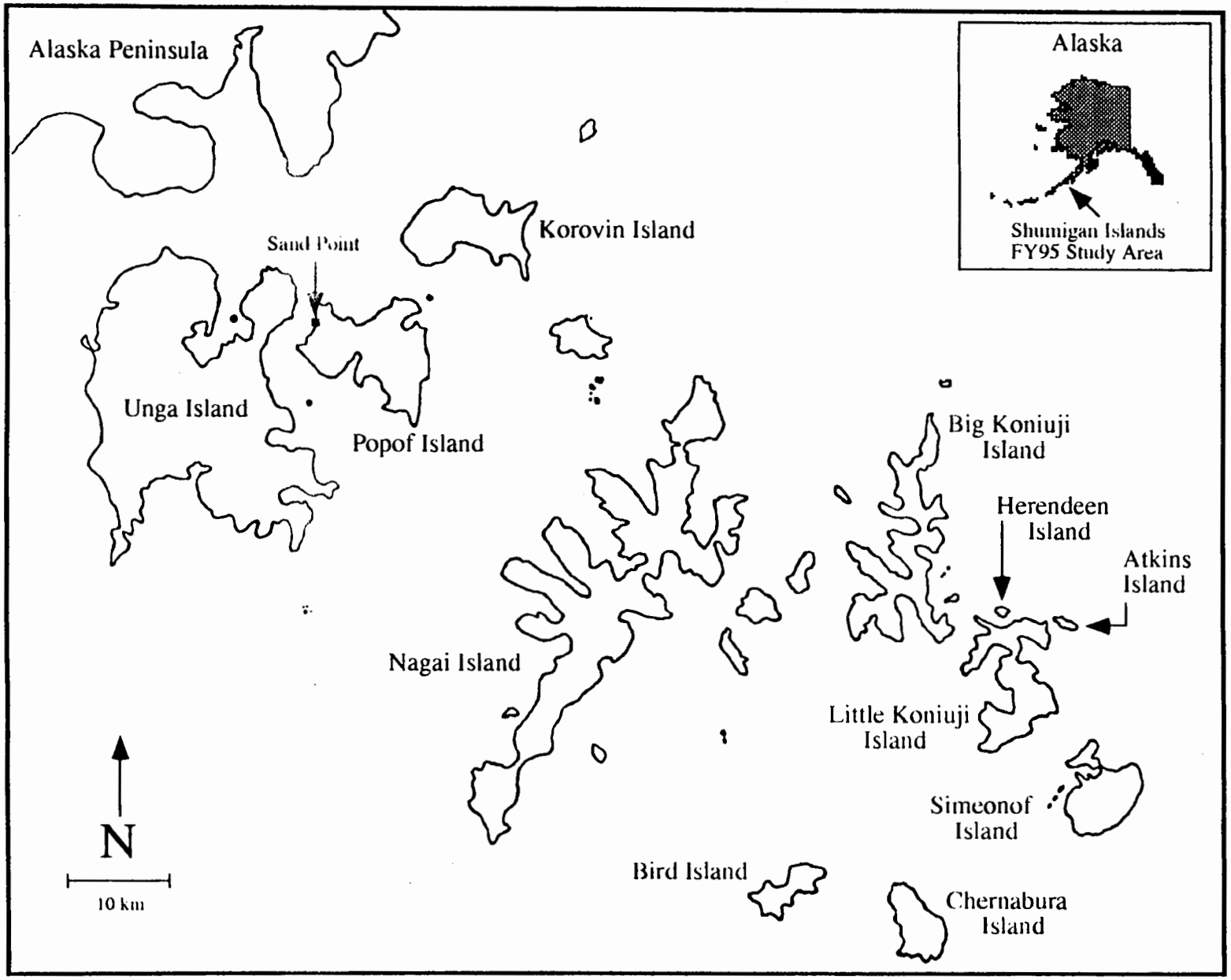

Figure 1. The Shumagin Islands, Alaska Project No. 95041 study area.

document increases following fox removal.

4. Methods

a. Fox Removal

In May 1994 a Fish and Wildlife Service crew consisting of six individuals established camps for about a month each on Simeonof and Chernabura islands to eradicate foxes with firearms and leg-hold traps. Trapping was first conducted on Simeonof beginning on May 26, and operations moved to Chernabura June 24 - July 12. Methods like those employed at other sites in southwestern Alaska were used (Bailey 1993). Totals of 33 and 3 adult arctic foxes were removed from Simeonof and Chernabura islands, respectively; however, crews will need to recheck the islands for sign in 1995. Remaining animals will be removed using methods similar to those employed in 1994.

b. Oystercatcher and Guillemot Surveys

The size of breeding populations and the extent of potential nesting habitat of oystercatchers and guillemots was estimated on Simeonof, Chernabura, and two nearby fox-free "control" sites (Bird I. and Atkins/Herendeen Is.) in 1994. Identical counting procedures will be employed in 1995 to determine whether populations have begun to increase on Simeonof and Chernabura following removal of foxes and to evaluate between-year variability in populations at control sites.

i. Oystercatcher Habitat Mapping

Since black oystercatchers nest on both rocky and sand beaches, all beaches on study islands were divided into segments separated by natural features (e.g., cliffs, streams, substrate changes) in 1994. Segments were delineated on maps and aerial photographs, and each segment was described (length, average width, substrate, etc.). These classifications will be checked for accuracy in 1995.

ii. Oystercatcher Counts

In 1994, black oystercatchers were counted by a two-person team cruising the perimeter of each island in an inflatable boat within 30 m of shore during June,the incubation period (Kenyon 1964, Day 1977). This is the period when pairs are territorial and most conspicuous. The best time to count oystercatchers is from approximately 2 hours before low tide until an hour after low tide, the period when they are most actively foraging (Andres 1993). For each oystercatcher observation, the location (beach segment code--see above) and status (single, pair, or larger

group) were recorded. Beaches where singles or pairs were noted were checked on foot to determine whether nests were present. All areas were surveyed at least three times to reduce chances of missing territorial birds. The same aforementioned procedures will be followed in 1995.

iii. Guillemot Habitat Mapping

Pigeon guillemots nest in rock cavities along boulder beaches, in cliff crevices, in drift log piles, or occasionally in burrows, especially in close proximity to shallow waters for foraging (Ewins 1993, Sanger and Cody 1993, Drent 1965). Due to this diversity of habitat types it was difficult to map all possible nesting areas for guillemots, but attempts were made to delineate the surface areas of talus areas and substantial drift log piles that provide typical guillemot nest sites. In addition, areas of sea cliffs with crevices that could be used by guillemots were mapped and described. Forms like those used by Sanger and Cody (1993) were employed to document colony data. Preliminary habitat maps will be refined in 1995.

iv. Guillemot Counts

Reports in the literature provide differing views on the best time to count guillemots. The relative influence of tide stage, time of day, and time of the breeding season on attendance of guillemots at breeding colonies apparently varies among areas (e.g. California, Ainley and Boekelheide 1990; British Columbia, Drent 1965, Vermeer et al. 1993; and Prince William Sound, Sanger and Cody 1993). Judging from the average number of guillemots present at colonies during the incubation period for comparison among sites and years, it appears the optimum time to census breeding pigeon guillemots is morning hours during the incubation period (about mid-June to mid-July, Day 1977) and within several hours of high tide. Although peak numbers of guillemots occurred at Prince William Sound colonies during the pre-laying period (Sanger and Cody 1993), Vermeer et al. (1993) recommend counts between early incubation to early chick stages when numbers are least variable. Hence, we inventoried guillemots during incubation. This period also offers a much longer period of time in which to make counts when they are most stable. Due to hourly and daily variation in attendance of guillemots at colonies, at least three replicate surveys should be made to estimate guillemot populations.

In 1994, counts were conducted by two individuals slowly circumnavigating islands in an inflatable about 50 m offshore during periods of good visibility and relatively calm seas. All guillemots within approximately 100 m of shore were recorded. Island coastlines were subdivided into segments based on natural features, and counts were recorded within each segment. Concentrations of four or more birds on the water or land near guillemot nesting habitat were delineated as accurately as

possible on maps during at least the first two surveys. The same segments will be used for data recording during surveys in 1995.

v. Data Analysis

Because of variable widths of nesting habitat along shorelines, numbers of oystercatchers and guillemots were expressed as densities (birds per km of shoreline, or birds per km^2 of talus or log pile habitat). Analysis of variance will be used to test for differences among sites and years.

c. Alternatives

There are no other alternatives that would so effectively enhance guillemot and oystercatcher populations. Methods for monitoring injured species are comparable to those used by others engaged in this type of study, namely studies in Prince William Sound pertaining to oystercatchers (Andres, B.A. 1993), and to guillemots (Sanger, G.A. and M. B. Cody 1993).

5. Location

The restoration program will be conducted at Simeonof and Chernabura islands in the Shumagin group, south of the Alaska Peninsula (Figure 1), near the western edge of the trajectory of the oil spilled by the T/V *Exxon Valdez*. These islands are 100 km southeast of the community of Sand Point, but no communities will be affected by the project. The islands are within the Alaska Maritime National Wildlife Refuge.

6. Technical Support

This project does not require technical support.

7. Contracts

No contracts will be used during this project.

8. Literature Cited

Ainley, D.G. and R.J. Boekelheide. 1990. Seabirds of the Farallon Islands. Stanford University Press, Standford, CA.

Andres, B.A. 1993. Potential impacts of oiled mussel beds on higher organisms: black oystercatchers. Unpublished report, U.S. Fish and Wildlife Service, Anchorage, AK.

Bailey, E.P. 1978. Breeding seabird distribution and abundance in the Shumagin Islands, Alaska. Murrelet 59:82-91.

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Oakley, K., and Kuletz. ms. Population, reproduction, and foraging ecology of pigeon guillemots at Naked Island, Prince William Sound, Alaska, before and after the T/V *Exxon Valdez* oil spill. Bird study number 9. Final Report. U.S. Fish and Wildlife Service, Migratory Bird Management, Anchorage, AK.

Piatt, J., C.J. Lensink, W. Butter, M. Kendziorek, and D.R. Nysewander. 1990. Immediate impact of the T/V *Exxon Valdez* oil spill on marine birds. Auk 107:387-397.

Sanger, G.A. and M.B. Cody. Survey of pigeon guillemot colonies in Prince William Sound, Alaska. Unpublished report, U.S. Fish and Wildlife Service, Anchorage, AK.

Vermeer, K., K.H. Morgan and G.E.J. Smith. 1993. Colony attendance of pigeon guillemots as related to tide height and time of day. Colonial Waterbirds 16:1-8.

C. SCHEDULES

1. FY95 Milestones

Mar 95 Refine study plan, procure equipment, and select temporary field personnel.

Apr 95 Continue procurement of equipment and supplies.

May 95 Organize and pack supplies, train field personnel, depart for Shumagin Islands and ascertain whether any foxes remain on Simeonof and Chernabura islands.

Jun 95 Establish camps on Simeonof and Chernabura islands in early June. If necessary, eradicate any remaining foxes on Simeonof and Chernabura islands . Conduct surveys for oystercatchers and guillemots on these two islands along with nearby "control" islands (Bird, Atkins, and Herendeen).

Jul 95 Leave Chernabura Island on or about July 21 and return to Homer.

Aug - Sep 95 Clean and store equipment and supplies; begin data analysis and report.

3. Project Personnel

E.P. Bailey: Project leader oversees all aspects of field work. In addition, three biological technicians and two volunteers will assist in field operations. Two of the technicians will be responsible for conducting surveys of guillemots and oystercatchers and analyzing data; one will be largely responsible for compiling the report on monitoring these two species.

G. Vernon Byrd: Project manager supervises planning, training, data analysis, and completion of report.

4. Logistics

Field camps again will be periodically on Simeonof, Chernabura, Bird, and Little Koniuji islands (base of operations for surveys of Atkins and Herendeen islands).

D. EXISTING AGENCY PROGRAM

The DOI-FWS Alaska Maritime NWR has an existing program for removal of introduced foxes from islands for restoration of threatened Aleutian Canada geese, seabirds, and other

native species. However, this program for restoration of seabirds on islands south of the Alaska Peninsula has had little funding. For example, in 1993 only $8000 was allotted, making it difficult to accomplish the task.

E. ENVIRONMENT COMPLIANCE/PERMIT/COORDINATION STATUS

The removal of alien foxes by trapping and shooting from refuge islands was sanctioned by an environmental assessment in 1985 (Environmental Assessment--Proposed Eradication of Introduced Fox on Alaskan Islands. Alaska Maritime National Wildlife Refuge, Alaska. U.S. Fish and Wildlife Service, Homer, Alaska). No additional approvals or permits are required.

F. PERFORMANCE MONITORING

1. Backup strategy

This project will be monitored by the project manager who is the refuge supervisory wildlife biologist stationed in Homer. If the project leader or biological technicians leave before completion of the project, the project manager will find suitable replacements and assure the quality and timely submission of reports.

2. Quality assurance and control plan

Project quality will be insured by:

a. Using experienced personnel to eradicate foxes and monitor populations of guillemots and oystercatchers.

b. Following accepted, standardized procedures for counting guillemots and oystercatchers.

3. List of products

A report on accomplishments in the summer of 1994 will be written by December 1994. A final report verifying the removal of all foxes from Simeonof and Chernabura islands and resurveys of guillemot and oystercatcher populations on these two islands along with the three previously mentioned fox-free islands used as controls will be completed by December 1995.

H. PUBLIC PROCESS

The public has been apprised of the devastating ecological consequences from introduced foxes on Alaskan islands in various scientific publications and popular literature, such as a

recent article in "Alaska Geographic". Several conservation groups have encouraged the Fish and Wildlife Service to expend more effort in the removal of exotic species on the refuge to restore breeding seabirds, especially those species injured by the oil spill. This proposal has been reviewed by the Exxon Valdez Oil Spill Public Advisory Group, and the public had the opportunity to comment on this project at the January 1994 Trustee Council meeting.

I. PERSONNEL QUALIFICATIONS

The project leader, E.P. Bailey, and the project manager, G.V. Byrd, are well qualified to undertake the proposed action. Brief resumes follow:

1. Project Leader - Edgar P. Bailey

Edgar P. Bailey obtained a B.S. degree in biology from the University of Redlands in California and spent an additional 3 years at Utah State University, receiving a M.S. degree in wildlife biology in 1963. He has worked for Federal resource agencies for over 30 years, including the Forest Service, National Park Service and the Fish and Wildlife Service. He came to Alaska 25 years ago as assistant manager for the former Aleutian Islands National Wildlife Refuge, and during this period he has been continuously involved with marine birds and mammals, specializing on the adverse effects of alien species on island biodiversity and particularly the need to remove introduced foxes from refuge islands. He has published more than 20 papers in various journals and has written numerous unpublished reports. He has thousands of hours of experience operating inflatables and other small boats primarily south of the Alaska and Kenai peninsulas and in the Aleutians.

Selected Publications Pertaining to Alien Species and Seabirds on Islands South of the Alaska Peninsula

Bailey, E.P. 1993. Introduction of foxes on Alaskan islands--history, effects on avifauna, and eradication. U.S. Department of the Interior, Fish and Wildlife Service, Resource Publication 193: 54 pp.

Bailey, E.P. and G.W. Kaiser. 1993. Impacts of introduced predators on nesting seabirds in the northeast Pacific. Pages 218-226 in Vermeer, K., K.T. Briggs, K.H. Morgan, D. Siegel-Causey (eds.). The status, ecology, and conservation of marine birds of the North Pacific. Canadian Wildlife Special publication, Ottawa.

Bailey, E.P. 1992. Red foxes (*Vulpes vulpes*), as biological control agents against arctic foxes (*Alopex lagopus*), on Alaskan Islands. Canadian Field Naturalist 106:200-205.

Bailey, E.P. and N.H. Faust. 1984. Summer distribution and abundance of marine birds and mammals off the coast of the Alaska Peninsula between Amber and Kamishak bays. Western Birds 15:161-174.

Bailey, E.P. and N.H. Faust. 1981. Summer distribution and abundance of marine birds and mammals betwen Mitrofania and Sutwik islands south of the Alaska Peninsula. Murrelet 62:34-42.

Bailey, E.P. and N.H. Faust. 1980. Summer distribution and abundance of marine birds and mammals in the Sandman

Reefs, Alaska. Murrelet 61:6-19.

Bailey, E.P. 1978. Breeding seabird distribution and abundance in the Shumagin Islands, Alaska. Murrelet 59:82-91.

2. Project Manager - G. Vernon Byrd

G. Vernon Byrd received a B.S. degree in wildlife management from the University of Georgia in 1968, did post-graduate studies in wildlife biology at the University of Alaska Fairbanks in 1975, and completed a M.S. degree in wildlife resources management (with an emphasis in applied statistics) from the University of Idaho in 1989. Thesis research was on kittiwakes (*Rissa* spp.) and murres (*Uria* spp.) in the Pribilof Islands. Mr. Byrd has worked for the U.S. Fish and Wildlife Service for over 20 years, focusing on studies of marine birds in Alaska and Hawaii. His major interests have centered around monitoring long-term trends in seabird populations, including numbers of birds and reproductive performance at colonies. He has written over 40 scientific papers and 50 U.S. Fish and Wildlife Service reports on field studies, and he has presented over 15 papers on seabirds at scientific meetings. Mr. Byrd currently serves as supervisory wildlife biologist at the Alaska Maritime National Wildlife Refuge, the premier area for seabirds in the national public land system.

Selected Publications

Byrd, G.V., E.C. Murphy, G.W. Kaiser, A. J. Kondratyev, and Y.V. Shibaev. (In press). Status and ecology of offshore fish-feeding alcids (murres and puffins) in the North Pacific Ocean. Proceedings of "Symposium on the Status, Ecology, and Conservation of Marine Birds of the Temperate North Pacific". Canadian Wildlife Service, Ottawa.

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Byrd, G.V., J.L. Sincock, T.C. Telfer, D.I. Moriarty, and B.G. Brady. 1984. Across fostering experiment with Newell's race of Manx shearwater. J. Wildl. Manage. 48:163-168.

Byrd, G.V., D.I. Moriarty , and B.G. Brady. 1983. Breeding biology of wedge-tailed shearwaters at Kilauea Point, Hawaii. Condor 85:292-296.

J. BUDGET

A detailed budget showing estimated cost breakdowns for this $66.5K project are attached (Forms 2A and 2B).

EXXON VALDEZ TRUSTEE COUNCIL
1995 Federal Fiscal Year Project Budget
October 1, 1994 - September 30, 1995

Project Description: This project is designed to restore populations of American Black oystercatchers *(Haematopus bachmani)* and pigeon guillemots *(Cepphus columba)* by removing introduced foxes from Simeonof and Chernabura islands in the western Gulf of Alaska. The FY95 study is the follow-up work that is required to make certain that both islands are indeed fox-free (it normally takes two years to successfully remove foxes from islands).

Budget Category	1994 Project No. 94041 Authorized FY94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment
Personnel	$24.0	$16.0	$16.0	$32.0	$4.6	Note: The target islands are remote & not
Travel	$17.0	$1.0	$11.8	$12.8	$1.6	inhabited by people. Successful removal of
Contractual	$0.0	$0.0	$0.0	$0.0	$0.0	foxes requires experienced personnel familiar
Commodities	$13.2	$1.0	$6.5	$7.5	$0.0	with the environments & methods for eradicating
Equipment	$26.2	$0.0	$2.5	$2.5	$0.0	foxes. Contracting is not a viable option
Capital Outlay	$0.0	$0.0	$0.0	$0.0	$0.0	because experienced people are difficult to find at
Subtotal	$80.4	$18.0	$36.8	$54.8	$6.2	the time of year personnel are needed, & because
General Administration	$3.6	$2.4	$2.4	$4.8	$0.7	of logistical costs (the FWS vessel *Tiglax*
Project Total	$84.0	$20.4	$39.2	$59.6	$6.9	normally travels these waters & this helps
						minimize costs). Costs for two workshop
Full-time Equivalents (FTE)	1.0	0.8	0.7	1.0	0.3	meetings are included in the FFY96 portion of
	Dollar amounts are shown in thousands of dollars.					the budget.

Budget Year Proposed Personnel: Position Description	Reprt/Intrim Months	Reprt/Intrim Cost	Remaining Months	Remaining Cost
Program Manager, GS-12	(0.5)*	$0.0	(1.0)*	$0.0
Project Manager, GS-11	(0.5)*	$0.0	(1.0)*	$0.0
Project Leader, GS-11	(2.0)*	$0.0	(3.0)*	$0.0
1 Temporary Biologist, GS-7	4.0	$9.6	4.0	$9.6
1 Temporary Biologist, GS-6	3.0	$6.4	3.0	$6.4
	7.0	$16.0	7.0	$16.0

* Note: In FY95, the services of the GS-12 Program Manager, the GS-12 Project Manager, & the GS-11 Project Leader will be provided by DOI-FWS at no cost to the project.

NEPA Cost: $0.0

*Oct 1, 1994 - Jan 31, 1995

**Feb 1, 1995 - Sep 30, 1995

07/14/93

Project Number: 95041
Project Title: Introduced Predator Removal from Islands (Follow-up Surveys)
Agency: Dept. of Interior, Fish & Wildlife Service

FORM 2A PROJECT DETAIL

EXXON VALDEZ TRUSTEE COUNCIL
1995 Federal Fiscal Year Project Budget
October 1, 1994 - September 30, 1995

Travel:	Reprt/Intrm	Remaining
2 days of ship time on *M/V Tiglax* @ $3.2K/day		$6.4
5 trips from Sand Point to Homer plus per diem (5 trips @ $700.00/trip + 10 days per diem @ $125.00/day)		$4.8
Per diem for field (per diem for field personnel is calculated at $3.00/day x 200 person days = $0.6K—this token daily amount must be paid to all FWS employees and non-SCA volunteers for each day spent in the field)		$0.6
Travel Total	$0.0	$11.8

Contractual:		
[No contracts are required for this project.]		
Contractual Total	$0.0	$0.0

07/14/93

Project Number: 95041
Project Title: Introduced Predator Removal from Islands (Follow-up Surveys)
Agency: Dept. of Interior, Fish & Wildlife Service

FORM 2B PROJECT DETAIL

EXXON VALDEZ TRUSTEE COUNCIL
1995 Federal Fiscal Year Project Budget
October 1, 1994 - September 30, 1995

Commodities:	Reprt/Intrm	Remaining
Food for field camps for 4 people for 40 days @ $14.00/day/person (160 person days x $14.00/day = $2.2K)		$2.2
Fuel (kerosene, gas and oil for outboard engines, blazo)		$1.0
Office and other field data recording supplies (e.g., notebooks, tally counters, maps)		$0.3
Camping supplies (e.g., replacement rain gear, rubber boots, float-coats, gloves, sleeping bags & pads, ropes, tarps)		$2.0
Trapping supplies (e.g., survey tape, stakes, lures/bait, ammunition)		$1.0
[Note: All other necessary camping supplies will be furnished by FWS.]		
Commodities Total	$0.0	$6.5
Equipment:		
Equipment repairs and cleaning (includes checking, cleaning and repairing, as necessary, binoculars, spotting scopes, cameras, radios, inflatable rafts, and outboard engines)		$2.5
[Note: FWS will supply other necessary equipment, including back-up outboard engines, additional radio equipment (e.g., hand-held radios & back-up radios), & other camping & trapping equipment.]		
Equipment Total	$0.0	$2.5

Rec 6/16/95

95043B

5/27/94

EXXON VALDEZ OIL SPILL SUB-PROJECT DESCRIPTION

Title: Cutthroat Trout and Dolly Varden Rehabilitation in Western Prince William Sound

Project Identification Number: western Prince William Sound portion of ~~94043~~ Ray Thompson/Dave Gibbons, USFS say consider as 95043

Project Type: Restoration

Name of Sub-Project Leader: Kate Wedemeyer P.I.

Lead Agency: USFS, Glacier Ranger District

Cooperating Agency: None

Cost of Sub-Project, FY94: $7 K **Cost of Sub-Project, FY95:** $119.5 K

Project Startup Date: March 94 **Duration:** 4 years

Geographic Area: Prince William Sound

Project Leader, Glacier Ranger District, Chugach National Forest
Kate Wedemeyer, Fisheries Biologist

Lead Agency Project Manager

A. Introduction

Although cutthroat trout (*Oncorhynchus clarki*) and Dolly Varden (*Salvelinus malma*) overwinter and spawn in freshwater, these fish use nearshore and estuarine habitat for feeding throughout their lives. The highest concentrations of petroleum hydrocarbon metabolites in bile of all fish sampled in 1989 were found in Dolly Varden. The larger cutthroat trout also showed higher levels of mortality in oiled than in unoiled areas.

Tagging studies demonstrated that the annual mortality of adult Dolly Varden in oiled areas was 32 percent greater than in unoiled areas. In 1989-1990, there was 57 percent greater mortality, and in 1990-1991, a 65 percent greater mortality, in oiled streams versus unoiled streams.

Cutthroat trout growth rates in oiled areas were 68 percent in 1989-1990 and 71 percent in 1990-1991 of those in unoiled areas. Although concentrations of bile hydrocarbons were greatly reduced in 1990 and 1991, indicating less exposure to oil, it is unclear why differences persist in survival rates between oiled and unoiled streams.

Prince William Sound (PWS) is the northern extent of the range of cutthroat trout. The cutthroat stocks known to exist within PWS are few in number, rarely number more than 1,000 individuals, and are geographically isolated from each other. Of 143 streams surveyed for spawning salmon in PWS in 1989, only 10 contained anadromous cutthroat trout. These fish have a limited home range and do not migrate over great expanses of water. These small populations are vulnerable to exploitation and habitat alterations. Dolly Varden and cutthroat trout in oiled areas may have sustained a sublethal injury (slower growth in oiled areas). Scientists cannot estimate a recovery time without further study.

A combination of habitat improvements and decreased harvests could increase overall survival of those stocks impacted by the oilspill. By decreasing mortality in the freshwater phases of the life cycle, habitat improvements in the freshwater environments can mitigate the increased mortality experienced in the nearshore and estuarine habitats. As the principal land manager in Prince William Sound, the US Forest Service will undertake habitat improvements in the freshwater habitats of Dolly Varden and cutthroat trout. ADF&G has promulgated regulations and emergency closings which increase survival by a decreased harvest of Dolly Varden during spawning periods and eliminating the harvest of cutthroat trout in the oiled areas of Prince William Sound.

B. Project Description

1. Resources and/or Associated Services:

Cutthroat trout and Dolly Varden will primarily benefit. Sport fishing for these species will improve.

2. Objectives:

The objectives are to restore, improve, and enhance cutthroat trout and Dolly Varden rearing and spawning habitat in PWS.

3. Methods:

Field surveys in 1994 will test for presence\absence and further evaluate the proposed structures at each site in order to write the NEPA documents. The interim report will consist of copies of NEPA documents prepared at that date. Habitat improvements will be constructed in 1995. Pre-monitoring will also occur in 1995.

This project entails the use of some or all of the approved instream habitat techniques, including: channel blocks, boulder placement, cover logs and root wads, tree cover, bank cribs with cover logs, logs and bank shelters, single-wing and double wing deflectors, deflectors and cover logs, channel constrictors, cross logs and revetments, wedge dams, and K dams.

Channel Blocks:

Channel blocks consolidate braided channels into a single, deeper channel and, subsequently, create additional fish holding habitat. These structures may also be used to maintain stream meanders where flood flows have eroded a channel through the meander. These structures hold normal or moderately high flows in the meander channels, but still allow flood waters to overflow in the blocked channels. They can also collect gravels suitable for spawning.

Boulder Placement:

Boulders provide overhead cover and resting areas. Added depth is also created by scouring as a result of reduced channel capacity and increased velocity.

Cover Logs and Rootwads:

These structures provide overhead cover in sections of stream where existing water depth may be adequate but cover is lacking.

Tree Covers:

Trees placed in proper locations provide excellent overhead cover and an ideal substrate for aquatic organisms. In addition, trees serve as deflectors which constrict wide, shallow channels and increase stream velocity. This results in sediment flushing and the creation of deeper scour pools and pockets of spawning substrate.

Bank Cribs with Cover Logs:

These structures protect unstable banks, while at the same time providing excellent overhead cover for fish.

Log and Bank Shelters:

Log and bank shelters provide overhead cover. Some streambank protection is also provided, although less than with cribs. Brush and other woody material attached to the platforms provide additional benefit by harboring insects and other fish food organisms.

Single-Wing Deflectors:

These structures constrict and divert water flow so that stream meanders and pools and pockets of spawning gravel are formed by scouring and relocation of fine sediment and gravel.

Double-Wing Deflectors:

Double-wing deflectors create midchannel pools through scouring action in shallow sections of streams.

Deflectors and Cover Logs:

Deflector and cover logs are similar to a single-wing deflectors. Cover logs ensure bank stability where suitable boulders, tree stumps, or stable banks are lacking.

Channel Constrictors:

These structures serve as modified deflectors designed to create overhead cover similar to that provided by undercut banks.

Cross Log and Revetment:

Cross log and revetments create scour pools by the action of water pouring over or under cross logs. Revetment logs create overhead cover and protect the bank at the same time.

Wedge Dam and K Dam:

These structures create pools or deeper water through scouring action in shallow sections of stream. In continuous, steep gradients, the short, upstream break in gradient also provides resting and spawning area, often holding more fish than the deeper pool below. The quiet water above the structure and the edges of the pool below also act as a trap for spawning gravel and organic material used as food by stream invertebrates.

Gabions:

Where proper size rocks are available, gabions can be used in lieu of logs for structure designs such as deflectors, dams, and bank abutments.

Brush Bundles:

Brush bundles can be used to provide fish hiding cover in a stream or lake which can decrease competition for space with more aggressive species. Bundles create visual obstructions, reducing interspecific competitive interactions, allowing more fish to inhabit preferred habitats.

4. Alternatives

In addition to the present proposal, alternatives considered to mitigate effects on cutthroat trout and Dolly Varden included: decreasing fishing mortality, transplanting cutthroat trout and Dolly Varden char from healthy populations, starting new cutthroat trout and Dolly

Varden populations, and redirecting sport fisheries by planting other species in barriered lakes. These alternatives were dropped from further consideration for reasons described below.

Decrease fishing mortality

Decreasing fishing mortality, especially during the vulnerable spawning seasons, can increase the overall survival of cutthroat and Dolly Varden trout. The most effective method of changing fishing mortality is through controlling fishing seasons, bag limits and areas. This alternative is not available to the principle land manager, the US Forest Service under the present management authorities but is being implemented by ADF&G. Harvest regulation for sport and commercial fishing is managed by the Alaska Department of Fish and Game. ADF&G has promulgated regulations and emergency closings which increase survival by a decreased harvest of Dolly Varden during spawning periods and eliminating the harvest of cutthroat trout in the oiled areas of Prince William Sound.

Transplant cutthroat trout and Dolly Varden char from healthy populations

Populations sustaining higher mortalities or decreased reproductive success due to hydrocarbon metabolites could be supplemented by trout from other healthy populations. Because no genetic evaluations of stock separation among the populations in Prince William Sound have been undertaken, and because little information is known of immigration between geographic areas, there is little basis for evaluating whether a potential donor stock is available.

Start new cutthroat trout and Dolly Varden populations

New populations established in presently uninhabited locations could increase the effective population size of the cutthroat trout and Dolly Varden metapopulations in Prince William Sound. Because competitive abilities of these two species is low compared to other salmonids, this would need to be habitats in which pacific salmon are at low abundance or absent. At this time, no areas have been identified in which to start new populations. Due to lack of information on present stocks, there is little basis for selecting either parent stocks or appropriate locations for stocking.

Redirect sport fisheries by planting other species in barriered lakes

Harvest mortality on cutthroat and Dolly Varden trout could be decreased by substituting other sport fishing opportunities. New fishable populations of trout such as rainbow or grayling could decrease fishing pressure on cutthroat and Dolly Varden trout. These would have to be planted in lakes in which they will not cause harm to other species, such as barren or barriered lakes. Because rainbow trout and grayling are not endemic to Prince William Sound, it is likely that they will have limited survival ability. Monitoring of rainbow planted Granite Bay Lake, western PWS in 1990 by ADF&G will give further information relevant to their ability to survive in Prince William Sound and to substitute for cutthroat trout and Dolly Varden sport fisheries.

5. Location

All sites are located in Prince William Sound. Potential improvements which will be further investigated include:

Otter Creek and Lake, Bay of Isles, Knight Island

Otter Creek is the site of a fish pass which is being modified to improve passage for pinks and cutthroat (project 94139). The value of brush bundles for hiding cover, structures to collect spawning gravel and brush cover structures in the steeper area with larger substrate will be investigated.

Cowpen Lake, Unakwik Inlet

The emphasis at this lake will be cover structures in the inlet and outlet stream to provide additional cover and spawning gravel for cutthroat trout competing with coho salmon. Structures to collect spawning gravel and create resting pools with hiding cover are planned for the inlet stream. Cover in the form of increased pool size and hiding areas made of brush bundles are being considered in the upper end of the outlet stream which flows intermittently in dry periods trapping cutthroat trout and Dolly Varden in pools.

Gunboat Lakes, Eshamy Bay

The creek, also called Gumboot Creek, is located in a muskeg flat on the northeastern shore of the lake. The channel has two small faces which impede fish passage upstream. Potential enhancements include blasting two pools in the lower gradient boulder/bedrock section to lower the gradient and provide pools and placing five brush bundles in the upper section.

Billy's Hole, Long Bay (Northern PWS near Columbia Bay)

A short, wide and shallow channel connects a small lake to the larger 80 acre lake. Small structures to provide cover would be provided in this short connecting stream. Trout habitat can potentially be improved by constructing cover structures in a large semi-braided inlet channel.

Sockeye Creek and Lake, Bay of Isles, Knight Island

The major western inlet will be considered for large structures to stabilize gravel in the high gradient section and brush bundles will be considered for the lower gradient areas where no salmon spawning is occurring. Large woody debris may be placed in the upper end of the southeast tributary of the lake to stabilize gravel. Implementation of the project on this site must await confirmation that moneys can legally be spent by the Forest Service on private lands.

Unnamed lake in Heather Inlet, Columbia Bay,

This site is an alternate site that will be considered if approval to expend money on private lands is delayed. Structures designed to create pool habitat for cutthroat trout in the shallow, low gradient inlet stream are being considered. Possible modification of barriers in the outlet stream will be evaluated.

6. Benefits

By increasing habitat and survival in the freshwater phases of the life cycle, habitat improvements in the freshwater environments can mitigate the possible mortality cutthroat and Dolly Varden experienced in the nearshore and estuarine habitats. Cutthroat trout and Dolly Varden will primarily benefit. Sport fishing for these species will improve.

7. Technical Support

The Forest Service hydrologist will be requested to review the suitability of the proposed structures for the hydrological regime of each stream.

8. Contracts

A contract for a boat will be required if the schedule for boats operated by the Glacier Ranger District prevents their use for this project. Where possible, this will be combined with other projects such as fish pass modifications at Shrode and Otter Creeks.

9. Mitigation Measures

Work in the streams will be conducted within timing windows to protect eggs in substrates and spawning adults. Structures will be designed to blend with the natural environment in the Wilderness Study Area.

10. Bibliography

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Trotter, PC, 1989. Coastal Cutthroat Trout: A Life History Compendium. Transactions of the American Fisheries Society (118:463-473).

C. Schedules and Planning:

Because approval and funding of projects were delayed, the anticipated schedule listed in the proposal (Table 1) must change. The National Environmental Policy Act (NEPA) requires that actions affecting resources on the National Forest be analyzed for their potential effects on the environment prior to implementation of the project.

The original timeline scheduled the EA's to be completed between 10/93 and 1/94. Prior to 10/93 all the instream field reconnaissance had not been completed. The funding and the opportunity to complete the field work were not available during the fall and winter of 1993. Without site specific stream habitat information the EA cannot be completed.

Construction of habitat improvements in 1994 was predicated on completion of NEPA documents prior to planning for the 1994 summer field season. Since potential effects of construction of instream structures are to be mitigated by limiting these activities to timing windows outside those periods in which spawning adults or eggs are present in the streams, streams with both spring and fall spawning species may have severely constricted windows limited to two to four weeks in May and June.

The Forest Service initiated public scoping in January 1994. Habitat surveys must precede the EA decisions. These surveys would be completed during the 1994 field season (5/94-10/94). After the surveys are complete the EA's can be completed for public review and a decision made. Instream enhancement activities could then be allowed, depending on the decision that is made. These enhancements would most likely be constructed in May and June, 1995, to meet the narrow construction time window allowed for instream habitat improvements. The attached budget reflects the changes requested to complete the project in 1995.

Table 1: Anticipated schedule of events for proposed projects. Time periods listed in brackets are the time period projected in the original proposal.

Activity	Time Period
Habitat surveys	05/94-11/94 (02/94 - 07/94)
Stream monitoring	05/94-5/95 (02/94 - 06/94)
NEPA scoping & writing	1/94-12/94 (10/93-01/94)
Project construction	05/95-07/95 (05/94-07/94)
Estimate fish abundance & distribution	08/95-11/96 (08/94-11/94)
Analyze data, write project report	12/94-06-95, 12/95-06/96 (10/94-04/95)
Submit annual project report	06/96 ,6/97 (04/95)

D. Environmental Compliance/Permit/Coordination Status

EA's will be required with information specific to each project. EA's must be reviewed for compliance with Coastal Zone Management regulations by the State of Alaska. Projects in eastern Prince William Sound may require review at the District level while projects in the Wilderness Study Area in western Prince William Sound require extensive review at the District, Forest and Regional levels of the Forest Service. These projects also require coordination with the land owners and are as follows.

Title 16 compliance is needed for activities on private lands. Cooperative agreements with the land owners will specify the need for them to apply for Title 16 permits.

Table 2: Land ownership and Wilderness status of proposed sites, and NEPA documentation required for proposed projects.

Project Location	Land Owner	NEPA
Otter Creek and Lake	USFS land, within Wilderness Study Area	EA
Cowpen Lake	USFS land, within Wilderness Study Area	EA
Gunboat Creek and Lakes	USFS land, within Wilderness Study Area	EA
Billy's Hole Lake	USFS land, within Wilderness Study Area	EA
Sockeye Creek and Lake	CAC land, within Wilderness Study Area	EA
Columbia Bay	USFS land, within Wilderness Study Area	EA

Performance Monitoring

The distribution of cutthroat trout and Dolly Varden will be monitored in the study areas and a report will be submitted to the Trustees.

Monitoring originally proposed for this project included estimating numbers of trout in the Lake basins and in nearby streams which contain cutthroat and Dolly Varden to provide a reference to untreated control sites and to normal year to year variability. We propose to limit that monitoring to fish numbers at the sites before and after construction of habitat enhancements.

F. Personnel Qualifications

The project leader, kate Wedemeyer, is the District Fisheries Biologist for the Glacier Ranger District which encompasses most of the western Prince William Sound streams being considered for habitat enhancement. Kate has completed Masters of Science degrees in Fisheries Science and Natural Resource Management.

She has worked extensively in fish habitat enhancement in the Tongass and Chugach National Forests of Alaska since 1988. She has attended training sessions by two nationally recognized experts on instream habitat structures. She has designed and installed approximately 20 such structures.

Fisheries technicians for the project will be selected on the basis of their experience in stream habitat enhancements and stream survey techniques.

G. FY94 Budget ($K)

The attached budget reflects changes in schedule described above.

Personnel			
GS 9 Biologist	1.0 mo	2.9K	
GS 11 Biologist detailer	0.25 mo	1.9K	
GS 8 Bio Tech	0.5 mo	1.2K	
Equipment			
Boat maintenance		1.0K	
TOTAL FY 94			7.0K

FY95 Budget ($K)

Personnel			82.9
Resources Staff Officer, GS II	4.0 mo	13.2	
Fisheries Biologist, GS11	7.5 mo	33.8	
Fisheries Biologist detailer, GS 9	3.0 mo	15.5	
Fisheries Tech , GS 8	3.5 mo	1.2	
Fisheries Tech, GS 7	3.5 mo	9.2	
Commodities			16.8
Field food @ $20/day x 120 days		2.4	
Safety equipment		1.0	
Sampling and monitoring equipment		0.8	
Construction supplies		4.3	
Field gear and camping supplies		3.0	
Equipment maintenance		1.0	
Fuel		0.8	
Hand tools		3.5	
Equipment			13.8
Boat Rental		7.5K	
Vehicle		1.5	
Photo		0.9	
Seasonal housing		2.0	
Boat maintenance		1.9	
Contract			6.0
Air charter @ $400/hr x 11		4.4	
Train		1.6	
TOTAL FY 95			119.5

95052

Exxon Valdez Oil Spill Trustee Council
FY 95 Detailed Project Description

Project Title: Community Interaction/Traditional Knowledge

Project Number: 95052

Lead Trustee Agency: Alaska Department of Fish and Game

Cooperating Agency: Alaska Department of Natural Resources

Project Start-up/Completion Dates: 1/1/95-9/30/95

Expected Project Duration: Multiple years

Cost of Project FY 95: $152,000
FY 96: $152,000

Geographic Area: Oil spill area

Name/Signature of Project Leader:

Rita Miraglia
Rita L. Miraglia
Subsistence Division
Alaska Department of Fish and Game
333 Raspberry Road
Anchorage, Alaska 99518
phone number: 267-2358
fax number: 349-4712

Name/Signature of lead agency Project Manager:

P.I. J. FALL

Dr. Joseph R. Sullivan
Joseph R. Sullivan
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Restoration Project 95052

A. INTRODUCTION

The *Exxon Valdez* oil spill caused severe disruption of the lives of many people living in the spill impact area. The spill also caused residents of the area to be concerned about the safety of their wild food sources, and the integrity of the surrounding natural environment. While scientific studies aimed at restoring the resources and services damaged by the oil spill have occurred throughout the spill area, most of the researchers work for agencies or institutions based in Anchorage, Fairbanks, or outside Alaska. Residents have complained of a lack of involvement by spill area communities in the restoration efforts, and incomplete communication to spill area inhabitants of study proposals and results. At the same time, researchers have recognized that local residents have traditional knowledge that could help them answer questions they have not been able to answer through conventional scientific means. People living in the spill area have detailed knowledge about the condition of resources, which can significantly add to data collected as part of scientific studies, and possibly even enhance the success of restoration efforts. Local people have expressed a desire to be involved in all aspects of restoration projects, and a willingness to work with researchers. This project intends to increase the involvement of spill area communities in the restoration efforts of the Trustee Council, and to improve the communication of findings and results of restoration efforts to spill area inhabitants.

One means of improving the involvement of the impacted communities in restoration activities is to hire local people to serve as facilitators. To assess how effective such a program can be, a pilot study will be conducted as part of this project. Local facilitators will be funded in three communities, Chenega Bay and Tatitlek in Prince William Sound, the area most impacted by the oil spill, and Port Graham, selected as a representative community for the lower Kenai Peninsula. The effectiveness of the pilot program will be evaluated, and if appropriate, the project may be expanded in the subsequent years to include other communities.

B. PROJECT DESCRIPTION

1. Resources and/or Associated Services:

At present, there is no formal program in place to effectively facilitate communication between the Trustee Council, researchers working on oil spill restoration projects, regional organizations and residents of communities impacted by the oil spill. This project will initiate a program to encourage and facilitate such communication. The goal is to make optimal use of the complementary nature of scientific data and traditional knowledge.

2. Relation to Other Damage Assessment/Restoration Work:
The community outreach efforts of other restoration projects will be coordinated under this project, including information exchange and local hiring.

3. Objectives:
The objective of the project will be to increase the involvement of spill area communities in the restoration efforts of the Trustee Council, and to improve the communication of findings and results of restoration efforts to spill area inhabitants and the appropriate regional organizations.

4. Methods:
The project will be coordinated by the Trustee Council's Director of Operations, and implemented by the Alaska Department of Fish and Game's Division of Subsistence. Subsistence Division representatives will work closely with other Trustee Council agencies, scientists, regional organizations, and community members in implementing the project. In particular, the Alaska Department of Natural Resources will assist with the assembly of materials dealing with cultural resources, and will participate in community meetings, evaluation of the success of the pilot portion of the project, and writing of the final report.

The objectives will be achieved using the following methods:

a. Publishing a newsletter in conjunction with the Trustee Council newsletter. Currently, the Subsistence Division publishes a quarterly newsletter which focuses primarily on food safety issues and is sent to all subsistence users in the spill area The Trustee Council also publishes a newsletter approximately six times a year to update interested members of the public about actions and plans of the Trustee Council. The newsletter proposed under this project will be a collaboration of these two efforts. The focus of the newsletter will include discussion of ongoing research and restoration efforts, and study findings and results.

b. Identifying those projects funded by the Trustee Council for which a community outreach component would be appropriate, and working with the principal investigators of those projects to design and implement community outreach components. The goal of community outreach will be to develop an informal partnership between the people of the oil spill region and scientific researchers. Outreach will include communication of traditional knowledge and local interests, as well as communication of research proposals and study results. Community meetings, as well as informal networking facilitated

by the Subsistence Division (i.e., telephone calls, letters, household visits), will take place.

c. In each of three pilot communities (Tatitlek, Chenega Bay, and Port Graham), contracting with the village council to provide a local person to facilitate the community outreach described in (b) above. The local facilitators will serve as liaisons between the community and researchers, and between the community and Trustee Council/Agency staff. In addition, the local facilitators will arrange local support and equipment for researchers working in their communities.

5. Location:
This project will be conducted throughout the spill area. The communities proposed for the pilot component of the project are Tatitlek, Chenega Bay, and Port Graham.

6. Technical Support:
None required.

7. Contracts:
Sole-source contracts will be negotiated with the village councils of each of the following communities: Chenega Bay, Tatitlek and Port Graham to provide a local person to facilitate communication and assistance as described in the Methods section above.

C. SCHEDULE

February 1995	Hire local facilitators in pilot communities Informational newsletter issued
Feb/March 1995	Develop contract guidelines, evaluate bids, award contract for design/ moderation of elders/youth conference (Project 95138)
March 1995	Complete identification of projects in need of a public outreach component; work with PIs to design and implement outreach
April 1995	Informational newsletter issued Have outreach components in place in time for start of field season
June 1995	Informational newsletter issued
September 1995	Informational newsletter issued

D. EXISTING AGENCY PROGRAM

As part of existing agency programs, researchers with the Division of Subsistence have developed close ties with residents of communities in the oil spill impact area.

E. ENVIRONMENTAL COMPLIANCE, PERMITTING AND COORDINATION STATUS

This project is categorically excluded under NEPA guidelines.

F. PERFORMANCE MONITORING

The Alaska Department of Natural Resources will assist in evaluating the success of the pilot portion of the program and in writing the final report.

G. COORDINATION OF INTEGRATED RESEARCH EFFORT

The project will provide for greater involvement of inhabitants of the oil spill area in the restoration and research effort of the Trustee Council.

H. PUBLIC PROCESS

The Division of Subsistence will enter into contracts with the village councils of the pilot communities to provide local facilitators to serve as liaisons between the communities and the researchers and Trustee Council/Agency staff. Goals of the outreach component will include the communication of traditional knowledge and community interests, as well as communication of research proposals and study results. Community meetings and informal networking facilitated by the Subsistence Division (i.e., telephone calls, letters, household visits), will take place.

I. PERSONNEL QUALIFICATIONS

James Fall: Dr. Fall is the regional program manager for the Division of Subsistence, Alaska Department of Fish and Game, for southcentral and southwest Alaska. He has held this position since 1981. Since 1989, he has supervised the division's oil spill response and research program. Also, he has served as the department's representative on the Oil Spill Health Task Force. Dr. Fall has written several articles and reports on the effects of the *Exxon Valdez* oil spill on subsistence activities and harvests, based upon division research.

Rita Miraglia: Ms Miraglia has served as the oil spill coordinator for the Division of Subsistence since 1990. As such, she has organized and participated in the subsistence resource collection and testing programs of 1990 and 1991. She has also been

the lead communicator of study findings to communities through organizing community meetings and writing newsletters. She has also assisted the Oil Spill Health Task Force's activities.

Craig Mishler: Dr. Mishler has been a Subsistence Resource Specialist with the Division of Subsistence since 1989, with primary responsibility for Kodiak Island. He is project leader for the Division's seal and sea lion harvest monitoring program.

Ron Stanek: Mr. Stanek has been a Subsistence Resource Specialist with the Division of Subsistence since 1980, with substantial research experience in the lower Cook Inlet Region.

Bill Simeone: Dr. Simeone was added to the Division staff in 1995 as a Subsistence Resource Specialist. He has extensive prior research experience in most communities in the oil spill area.

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET
October 1, 1994 - September 30, 1995

Project Description: The objective of the project is to increase the involvement of spill area communities in the restoration efforts of the Trustee Council, and to improve the communication of findings and results of restoration efforts to spill area residents. New project.

Budget Category:	1994 Project No. . . . . Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment
Personnel	$0.0	$0.0	$51.7	$51.7	$51.7	Figures for 1996 are estimates. The cost of the project would increase if the pilot portion of the project is expanded in 1996.
Travel	$0.0	$0.0	$14.8	$14.8	$14.8	
Contractual	$0.0	$0.0	$72.0	$72.0	$72.0	
Commodities	$0.0	$0.0	$0.7	$0.7	$0.7	
Equipment	$0.0	$0.0	$0.0	$0.0	$0.0	
Capital Outlay	$0.0	$0.0	$0.0	$0.0	$0.0	
Subtotal	$0.0	$0.0	$139.2	$139.2	$139.2	
General Administration	$0.0	$0.0	$12.8	$12.8	$12.8	
Project Total	$0.0	$0.0	$152.0	$152.0	$152.0	
Full-time Equivalents (FTE)	0.0	0.0	1.1	1.1	0.0	

Dollar amounts are shown in thousands of dollars.

Budget Year Proposed Personnel: Position Description	Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
See Individual 3A Forms for Personnel Details				
Personnel Total	0.0	$0.0	0.0	$0.0

NEPA Cost: $0.0

*Oct 1, 1994 - Dec 31, 1994

**Jan 1, 1995 - Sep 30, 1995

Project Number: 95052
Project Title: Community Interaction/Traditional Knowledge
Agency: AK Dept. of Fish & Game

FORM 2A
PROJECT
DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

Project Description: The objective of the project is to increase the involvement of spill area communities in the restoration efforts of the Trustee Council, and to improve the communication of findings and results of restoration efforts to spill area residents. New project.

Budget Category:	1994 Project No. . . . . Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment
Personnel		$0.0	$42.4	$42.4	$42.4	
Travel		$0.0	$10.6	$10.6	$10.6	
Contractual		$0.0	$72.0	$72.0	$72.0	
Commodities		$0.0	$0.7	$0.7	$0.7	
Equipment		$0.0	$0.0	$0.0	$0.0	
Capital Outlay		$0.0	$0.0	$0.0	$0.0	
Subtotal	$0.0	$0.0	$125.7	$125.7	$125.7	
General Administration		$0.0	$11.4	$11.4	$11.4	
Project Total	$0.0	$0.0	$137.1	$137.1	$137.1	
Full-time Equivalents (FTE)		0.0	0.9	0.9		

Dollar amounts are shown in thousands of dollars.

Budget Year Proposed Personnel: Position Description	Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
Subsistence Resource Specialist III			5.2	$25.6
Administrative Clerk II (Part time)			6.0	$16.8
Personnel Total	0.0	$0.0	11.2	$42.4

NEPA Cost: $0.0

*Oct 1, 1994 - Dec 31, 1994

**Jan 1, 1995 - Sep 30, 1995

Project Number: 95052

Project Title: Community Interaction/Traditional Knowledge

Sub-Project:

Agency: Alaska Depar[illegible]t of Fish & Game

FORM 3A SUB-PROJECT ETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

Travel:		Reprt/Intrm	Remaining
3RT Anch.-Chenega Bay @ .9	$2.70		$2.7
3RT Anch.-Tatitlek @ .55	$1.65		$1.7
3RT Anch.-Port Graham/Nanwalek @ .2	$0.60		$0.6
2RT Anch.-Kodiak @ 190	$0.38		$0.4
1 RT Kodiak-Karluk @ .11	$0.11		$0.1
1RT Kodiak-Akhiok @ .15	$0.15		$0.2
1RT Kodiak-Larsen Bay @ .8	$0.80		$0.8
1RT Kodiak-Old Harbor @ .1	$0.10		$0.1
1RT Kodiak-Ouzinkie @ .06	$0.06		$0.1
1 RT Kodiak-Port Lions @ .1	$0.10		$0.1
2 RT Anch.-Valdez @ .16	$0.16		$0.2
2 RT Anch-Cordova @ .2	$0.20		$0.2
22 days per diem @ .15	$3.35		$3.4
	Travel Total	$0.0	$10.6
Contractual:			
Telephone			$1.0
Photocopying			$1.0
Newsletters (Printing, labelling, mailing)			$10.0
Local facilitator contracts (Chenega, Tatitlek and Port Graham)			$60.0
	Contractual Total	$0.0	$72.0

Project Number: 95052
Project Title: Community Interaction/Traditional Knowledge
Sub-Project:
Agency: Alaska Department of Fish & Game

FORM 3B
SUB-PROJECT DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET
October 1, 1994 - September 30, 1995

	Reprt/Intrm	Remaining
Commodities:		
Office supplies, paper, pens, notebooks, et.		$0.7
Commodities Total	$0.0	$0.7
Equipment:		
Equipment Total	$0.0	$0.0

06/01/94

1995

Printed: 10/24/94 10:51 AM

Project Number: 95052
Project Title: Community Interaction/Traditional Knowledge
Sub-Project:
Agency: Alaska Department of Fish & Game

FORM 3B
SUB-
PROJECT
DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

Project Description: The objective of the project is to increase the involvement of spill area communities in the restoration efforts of the Trustee Council, and to improve the communication of findings and results of restoration efforts to spill area residents. New project.

Budget Category:	1994 Project No. . . . . Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment
Personnel		$0.0	$9.3	$9.3	$9.3	
Travel		$0.0	$4.2	$4.2	$4.2	
Contractual		$0.0	$0.0	$0.0	$0.0	
Commodities		$0.0	$0.0	$0.0	$0.0	
Equipment		$0.0	$0.0	$0.0	$0.0	
Capital Outlay		$0.0	$0.0	$0.0	$0.0	
Subtotal	$0.0	$0.0	$13.5	$13.5	$13.5	
General Administration		$0.0	$1.4	$1.4	$1.4	
Project Total	$0.0	$0.0	$14.9	$14.9	$14.9	
Full-time Equivalents (FTE)		0.0	0.1	0.1		
	Dollar amounts are shown in thousands of dollars.					

Budget Year Proposed Personnel: Position Description	Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
Archaeologist II			1.5	$9.3
Personnel Total	0.0	$0.0	1.5	$9.3

NEPA Cost: $0.0

*Oct 1, 1994 - Dec 31, 1994

**Jan 1, 1995 - Sep 30, 1995

Project Number: 95052

Project Title: Community Interaction/Traditional Knowledge

Sub-Project:

Agency: Alaska Department of Natural Resources

FORM 3A SUB-PROJECT DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

		Reprt/Intrm	Remaining
Travel:			
1RT Anch.-Chenega Bay @ .9	$0.90		$0.9
1RT Anch.-Tatitlek @ .55	$0.55		$0.6
1 RT Anch.-Port Graham/Nanwalek @ .2	$0.20		$0.2
1RT Anch.-Kodiak @ .19	$0.19		$0.2
1 RT Kodiak-Karluk @ .11	$0.11		$0.1
1RT Kodiak-Akhiok @ .15	$0.15		$0.2
1RT Kodiak-Larsen Bay @ .08	$0.08		$0.1
1RT Kodiak-Old Harbor @ .1	$0.10		$0.1
1RT Kodiak-Ouzinkie @ .06	$0.06		$0.1
1 RT Kodiak-Port Lions @ .1	$0.10		$0.1
1 RT Anch.-Valdez @ .16	$0.16		$0.2
1 RT Anch-Cordova @ .2	$0.20		$0.2
8 days per diem @ .15	$1.20		$1.2
	Travel Total	$0.0	$4.2
Contractual:			
	Contractual Total	$0.0	$0.0

Project Number: 95052
Project Title: Community Interaction/Traditional Knowledge
Sub-Project:
Agency: Alaska Depart[illegible]t of Natural Resources

FORM 3B
SUB-
PROJECT
:TAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET
October 1, 1994 - September 30, 1995

Commodities:	Reprt/Intrm	Remaining
Commodities Total	$0.0	$0.0
Equipment:		
Equipment Total	$0.0	$0.0

06/01/94

1995

Printed: 10/24/94 10:51 AM

Project Number: 95052
Project Title: Community Interaction/Traditional Knowledge
Sub-Project:
Agency: Alaska Department of Natural Resources

FORM 3B
SUB-
PROJECT
DETAIL

95058 (project description revised after 12/2 mtg.

Exxon Valdez Oil Spill Trustee Council
FY 95 Detailed Project Description

Project Title: Restoration Assistance to Private Landowners

Project Number: 95058

Lead Agencies: U.S.D.A. Forest Service
Alaska Dept. Fish and Game

Cooperating Agencies: Alaska Department of Natural Resources

Project Start-up/Completion Dates: December 2, 1994
September 30, 1995

Expected Project Duration: Pilot project for one year or more

Cost of Project: $115,800 for the first year

Geographic Area: Prince William Sound, Gulf of Alaska

Contact: Ken Holbrook
P.I. U.S. Forest Service
Calais Bldg.
Anchorage, AK Phone: 271-2819

Mark Kuwada
Alaska Dept. Fish and Game
333 Raspberry Rd.
Anchorage, AK 99518-1599 Phone: 267-2277

A. INTRODUCTION

The project is proposed to take advantage of opportunities to enhance or restore injured species habitats or service values on private lands throughout the oil spill area. This differs from the Comprehensive Habitat Protection Process by focusing on site-specific mitigation and enhancement opportunities that can be implemented in conjunction with on-going development activities.

This project is conceived as a pilot effort to provide information and assistance to private landowners who wish to minimize the impacts of their on-going and proposed activities on injured resources and services. Too often, impacts occur because landowners and development contractors lack an awareness of resource sensitivities during pre-project planning. This is especially true of many spill-injured resources and services that are not specifically protected by law but, nevertheless, are important elements of a healthy and diverse ecosystem. Moreover, these resources may need additional levels of protection during their recovery period. The project, on an as needed basis, will attempt to make development and restoration objectives compatible so that land use activities do not impede natural recovery. Enhancement activities may even accelerate the rate and degree of recovery for some resources.

B. PROJECT DESCRIPTION

1. Resources and /or Associated Services: Injured resources and services that will potentially benefit from this project include: harlequin duck, marbled murrelet, pink salmon, sockeye salmon, Dolly Varden, cutthroat trout, river otter, sea otter, harbor seal, bald eagle, recreation, Wilderness, archeological resources, and subsistence.

2. Relation to Other Restoration Work: Land owners in the oil spill area have expressed an interest in receiving assistance and advice on how to do a better job of protecting and or enhancing habitat during resource development activities. This project will complement the Habitat Protection Program. By providing assistance to private land owners in designing and implementing resource development projects in the oil spill area, injured resources and service will be better protected. No other restoration project has provided these services.

3. Objectives

a. Conduct an initial survey of normal agency responsibilities as they relate to on-going development activities that affect injured resources/services;

b. Identify critical habitat requirements of injured resources;

c. Survey appropriate mitigation measures and best management practices that could be applied to the types of development that are presently occurring on private lands;

d. Meet with private landowners to provide information and data interpretation of recent and ongoing studies, identify data sources, review development plans, and assess landowner interests in pursuing potential restoration opportunities.

4. Methods: In addition to providing information on injured resource habitats and service values, the project can assist landowners in identifying potential restoration opportunities. Restoration opportunities may be considered within the context of three general categories:

a. Enhancement projects - increasing fish production by constructing fish passes, spawning channels, rearing areas and overwintering sites; developing coastal wetlands with impoundments; increasing bird production by constructing nesting boxes or islands; installing recreational use amenities including trails and other access-related improvements as a result of Trustee Council acquisitions.

b. Mitigation projects - increasing stream buffers; modifying timber slash removal techniques; providing wildlife corridors; maintaining adequate wildlife cover; removing debris dams; modifying the design or areal scope of development, timing and siting of support facilities to minimize impacts to critical life stages and key habitats.

c. Reclamation/rehabilitation projects - modifying planting techniques or plant species to accelerate revegetation; tree planting to accelerate forest maturity; stabilizing or revegetating discontinued logging roads.

5. Location: The project will initially focus on locations where development activities are occurring, or are planned to occur, throughout the oil spill area.

6. Technical Support: Technical support will be needed in the fields of forest ecology and management, project permitting, fisheries biology, wildlife conservation. Support will be obtained primarily from principal investigators and agency scientists.

7. Contracts: No contracts are planned.

C. SCHEDULE January 1 - June 1, 1995: Project planning, includes a survey of agency responsibilities and development recommendations, best management practices and current mitigation techniques, key habitat and use requirements for injured resources and services. Meetings with private landowners to convey information and determine individual landowner interests in pursuing restoration opportunities. Conduct an information workshop, if needed. Inform the Executive Director of landowner interest and response.

June 1 - September 30, 1995: Field inspections of potential project sites, if necessary. Continued meetings with landowners to identify restoration opportunities.

D. EXISTING AGENCY PROGRAM

The project will be conducted as a cooperative effort between the Trustee Council, U.S. Forest Service, the Alaska Department of Fish and Game, and the Alaska Department of Natural Resources. Each agency has extensive experience in permitting timber harvests, mining and other development projects on state and federal lands. The agencies have frequently worked together to design and implement restoration and enhancement projects for fish and wildlife. No existing agency program provides these services.

E. ENVIRONMENTAL COMPLIANCE, PERMITTING AND COORDINATION STATUS

There is no requirement for NEPA or other permits for this project, but all projects developed by this project will comply with all state and federal laws and permits.

F. PERFORMANCE MONITORING

The Executive Director will be informed of all on-going activities.

G. COORDINATION OF INTEGRATED RESEARCH EFFORT

Project personnel will serve as liaisons between the Trustee Council's restoration office, resource agencies and private landowners to accomplish objectives such as identifying opportunities for mitigating development impacts, conveying information on best management practices, and assessing the potential for enhancement activities. This will require coordination with principal investigators and agency personnel that are knowledgeable about planned development activities and injured species habitats.

H. PUBLIC PROCESS

Private landowners will be contacted and encouraged to participate, along with their contractors and land management representatives.

I. PERSONNEL QUALIFICATIONS

Mark Kuwada - Habitat Biologist with the Alaska Department of Fish and Game for 14 years. Extensive experience in coordinating departmental policy and mitigating major project impacts: Project Manager for Federal OCS Oil and Gas Leasing Program; Susitna Hydroelectric Project; Bradley Lake Hydroelectric Project; Diamond Chuitna Coal Project. ADF&G Response Coordinator, Exxon Valdez oil spill.

Ken Holbrook - Fisheries Biologist and Forest District Ranger for 20 years. Extensive experience in fisheries/wildlife management, enhancement and restoration. Supervised the design and construction of many fish stream improvements, fish passes, and other habitat protection projects on Forest Service lands. District Ranger in Yakutat; fisheries biologist in Cordova.

J. BUDGET

	USDA	ADF&G	ADNR
Personnel	30.0	30.0	30.0
Travel	2.5	2.5	2.5
Contractual	1.5	1.5	1.5
Commodities			
Equipment			
Capitat Outlay			
GA	4.6	4.6	4.6
Agency Total	38.6	38.6	38.6
Project Total	115.8		

EXXON VALDEZ TRUSTEE COUNCIL
1995 Federal Fiscal Year Project Budget
October 1, 1994 - September 30, 1995

PROJECT DESCRIPTION: Landowner Assistance Program. This project will provide information and assistance to private landowners who wish to minimize the impacts of their on-going and proposed activities on injured resources and services. The project will include enhancement projects, mitigation projects, reclamation/ rehabilitation projects, monitoring/research projects, and education projects.

Budget Category:	1994 Project No. Authorized FFY 94	'94 Report/ '95Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment
Personnel	$0.0	$33.6	$56.4	$90.0	$0.0	
Travel	$0.0	$3.0	$4.5	$7.5	$0.0	
Contractual	$0.0	$0.0	$4.5	$4.5	$0.0	
Commodities	$0.0	$0.0	$0.0	$0.0	$0.0	
Equipment	$0.0	$0.0	$0.0	$0.0	$0.0	
Capital Outlay	$0.0	$0.0	$0.0	$0.0	$0.0	
Subtotal	$0.0	$36.6	$65.4	$102.0	$0.0	
General Administration	$0.0	$5.1	$8.7	$13.8	$0.0	
Project Total	$0.0	$41.7	$74.1	$115.8	$0.0	
Full-time Equivalents (FTE)	0.0	0.4	0.6	1.0	0.0	
Dollar amounts are shown in thousands of dollars.						

Budget Year Proposed Personnel: Position Description	Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
See Individual 3A Forms for Personnel Details				
Personnel Total	0.0	$0.0	0.0	$0.0

NEPA Cost:
*Dec 1, 1994 - March 31, 1995
**Apr 1, 1995 - Sep 30, 1995

Project Number: 95058
Project Title: Landowner Assistance Program
Lead Agency: US Forest Service/ADF&G-Habitat

FORM 2A
PROJECT
DETAIL

1995

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EXXON VALDEZ TRUSTEE COUNCIL
1995 Federal Fiscal Year Project Budget
October 1, 1994 - September 30, 1995

PROJECT DESCRIPTION: Landowner Assistance Program. This project will provide information and assistance to private landowners who wish to minimize the impacts of their on-going and proposed activities on injured resources and services. The project will include enhancement projects, mitigation projects, reclamation/ rehabilitation projects, monitoring/research projects, and education projects.

Budget Category:	1994 Project No. Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment
Personnel		$11.2	$18.8	$30.0		
Travel		$1.0	$1.5	$2.5		
Contractual		$0.0	$1.5	$1.5		
Commodities		$0.0	$0.0	$0.0		
Equipment		$0.0	$0.0	$0.0		
Capital Outlay		$0.0	$0.0	$0.0		
Subtotal		$12.2	$21.8	$34.0	$0.0	
General Administration		$1.7	$2.9	$4.6		
Project Total		$13.9	$24.7	$38.6	$0.0	
Full-time Equivalents (FTE)		0.1	0.2	0.3		
	Dollar amounts are shown in thousands of dollars.					

Budget Year Proposed Personnel: Position Description	Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
Reprt				
Intrm				
Natural Resource Manager II	1.5	$11.2	2.5	$18.8
Personnel Total	1.5	$11.2	2.5	$18.8

NEPA Cost:
*Dec 1, 1994 - March 31, 1995
**Apr 1, 1995 - Sep 30, 1995

Project Number: 95058
Project Title: Landowner Assistance Program
Agency: AK Dept. of Natural Resources

FORM 3A
SUB-
PROJECT
DETAIL

1995

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EXXON VALDEZ TRUSTEE COUNCIL
1995 Federal Fiscal Year Project Budget
October 1, 1994 - September 30, 1995

	Reprt/Intrm	Remaining
Travel:		
Reprt		
Intrm		
Travel to meet with land owners	$1.0	$1.5
Travel Total	$1.0	$1.5
Contractual:		
Reprt		
Intrm		
Air charter to work on habitat protection projects		$1.5
Contractual Total	$0.0	$1.5

1995

Project Number: 95058
Project Title: Landowner Assistance Program
Agency: AK Dept. of Natural Resources

FORM 3B
SUB-
PROJECT
DETAIL

Printed:12/16/949:38 AM

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EXXON VALDEZ TRUSTEE COUNCIL
1995 Federal Fiscal Year Project Budget
October 1, 1994 - September 30, 1995

	Reprt/Intrm	Remaining
Commodities:		
Reprt		
Intrm		
Commodities Total	$0.0	$0.0
Equipment:		
Reprt		
Intrm		
Equipment Total	$0.0	$0.0

1995

Project Number: 95058
Project Title: Landowner Assistance Program
Agency: AK Dept. of Natural Resources

FORM 3B
SUB-
PROJECT
DETAIL

Printed:12/16/949:38 AM

DRAFT

EXXON VALDEZ TRUSTEE COUNCIL
1995 Federal Fiscal Year Project Budget
October 1, 1994 - September 30, 1995

PROJECT DESCRIPTION: Landowner Assistance Program. This project will provide information and assistance to private landowners who wish to minimize the impacts of their on-going and proposed activities on injured resources and services. The project will include enhancement projects, mitigation projects, reclamation/ rehabilitation projects, monitoring/research projects, and education projects.

Budget Category:	1994 Project No. Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment
Personnel		$11.2	$18.8	$30.0		
Travel		$1.0	$1.5	$2.5		
Contractual		$0.0	$1.5	$1.5		
Commodities		$0.0	$0.0	$0.0		
Equipment		$0.0	$0.0	$0.0		
Capital Outlay		$0.0	$0.0	$0.0		
Subtotal		$12.2	$21.8	$34.0	$0.0	
General Administration		$1.7	$2.9	$4.6		
Project Total		$13.9	$24.7	$38.6	$0.0	
Full-time Equivalents (FTE)		0.1	0.2	0.3		
	Dollar amounts are shown in thousands of dollars.					

Budget Year Proposed Personnel: Position Description	Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
Reprt				
Intrm				
Habitat Bio	1.5	$11.2	2.5	$18.8
Personnel Total	1.5	$11.2	2.5	$18.8

NEPA Cost:
*Dec 1, 1994 - March 31, 1995
**Apr 1, 1995 - Sep 30, 1995

Project Number: 95058
Project Title: Landowner Assistance Program
Agency: AK Dept. of Fish & Game

1995

FORM 3A
SUB-
PROJECT
DETAIL

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DRAFT

EXXON VALDEZ TRUSTEE COUNCIL
1995 Federal Fiscal Year Project Budget
October 1, 1994 - September 30, 1995

	Reprt/Intrm	Remaining
Travel:		
Reprt		
Intrm		
Travel to meet with land owners	$1.0	$1.5
Travel Total	$1.0	$1.5
Contractual:		
Reprt		
Intrm		
Air charter to work on habitat protection projects		$1.5
Contractual Total	$0.0	$1.5

1995

Project Number: 95058
Project Title: Landowner Assistance Program
Agency: AK Dept. of Fish & Game

FORM 3B
SUB-
PROJECT
DETAIL

Printed:12/16/949:38 AM

DRAFT

EXXON VALDEZ TRUSTEE COUNCIL
1995 Federal Fiscal Year Project Budget
October 1, 1994 - September 30, 1995

	Reprt/Intrm	Remaining
Commodities:		
Reprt		
Intrm		
Commodities Total	$0.0	$0.0
Equipment:		
Reprt		
Intrm		
Equipment Total	$0.0	$0.0

1995

Project Number: 95058
Project Title: Landowner Assistance Program
Agency: AK Dept. of Fish & Game

FORM 3B
SUB-
PROJECT
DETAIL

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DRAFT

EXXON VALDEZ TRUSTEE COUNCIL
1995 Federal Fiscal Year Project Budget
October 1, 1994 - September 30, 1995

PROJECT DESCRIPTION: Landowner Assistance Program. This project will provide information and assistance to private landowners who wish to minimize the impacts of their on-going and proposed activities on injured resources and services. The project will include enhancement projects, mitigation projects, reclamation/ rehabilitation projects, monitoring/research projects, and education projects.

Budget Category:	1994 Project No. Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment
Personnel		$11.2	$18.8	$30.0		
Travel		$1.0	$1.5	$2.5		
Contractual		$0.0	$1.5	$1.5		
Commodities		$0.0	$0.0	$0.0		
Equipment		$0.0	$0.0	$0.0		
Capital Outlay		$0.0	$0.0	$0.0		
Subtotal		$12.2	$21.8	$34.0	$0.0	
General Administration		$1.7	$2.9	$4.6		
Project Total		$13.9	$24.7	$38.6	$0.0	
Full-time Equivalents (FTE)		0.1	0.2	0.3		
	Dollar amounts are shown in thousands of dollars.					

Budget Year Proposed Personnel: Position Description	Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
Reprt Intrm				
Habitat Biologist	1.5	$11.2	2.5	$18.8
Personnel Total	1.5	$11.2	2.5	$18.8

NEPA Cost:
*Dec 1, 1994 - March 31, 1995
**Apr 1, 1995 - Sep 30, 1995

Project Number: 95058
Project Title: Landowner Assistance Program
Agency: Dept. of Agriculture, Forest Service

1995

FORM 3A
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PROJECT
DETAIL

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DRAFT

EXXON VALDEZ TRUSTEE COUNCIL
1995 Federal Fiscal Year Project Budget
October 1, 1994 - September 30, 1995

	Reprt/Intrm	Remaining
Travel:		
Reprt		
Intrm		
Travel to meet with land owners	$1.0	$1.5
Travel Total	$1.0	$1.5
Contractual:		
Reprt		
Intrm		
Air charter to work on habitat protection projects		$1.5
Contractual Total	$0.0	$1.5

1995

Project Number: 95058
Project Title: Landowner Assistance Program
Agency: Dept. of Agriculture, Forest Service

FORM 3B
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PROJECT
DETAIL

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DRAFT

EXXON VALDEZ TRUSTEE COUNCIL
1995 Federal Fiscal Year Project Budget
October 1, 1994 - September 30, 1995

	Reprt/Intrm	Remaining
Commodities:		
Reprt		
Intrm		
Commodities Total	$0.0	$0.0
Equipment:		
Reprt		
Intrm		
Equipment Total	$0.0	$0.0

1995

Project Number: 95058
Project Title: Landowner Assistance Program
Agency: Dept. of Agriculture, Forest Service

FORM 3B
SUB-
PROJECT
DETAIL

Printed:12/16/949:38 AM

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FINAL

Spruce Bark Beetle Impacts

Project Number:	95060
Restoration Category:	Research
Proposed By:	ADEC
Cost FY 95:	$26,800
Cost FY 96:	$0
Total Cost:	$26,800
Project Duration:	1 year
Geographic Area:	Prince William Sound, Kenai Peninsula, Gulf of Alaska
Injured Resource/Service:	Multiple resources

INTRODUCTION

Spruce bark beetles are infesting white, Lutz, and Sitka spruce trees within the range of fish and wildlife species injured by the *Exxon Valdez* Oil Spill. There is only minimal knowledge of the geographic extent, intensity, or effects of the role of mature spruce trees as habitat for injured species, and the geographic extent, intensity, or effects of the beetle infestation on injured fish and wildlife species and their habitats. Decreases in essential habitat resulting from bark beetle infestations may further stress these populations and prevent population recovery or lead to further population declines.

Specifically, the information about the importance of beetle-affected habitat for injured resources, and the methods available to prevent or control the infestation may allow private and public owners to protect habitat on their lands where are important for the recovery of injured resources and service, and may influence habitat protection and acquisition decisions by the Trustee Council.

Injured resources that may benefit from this project include: marbled murrelets, harlequin ducks, pink salmon, sockeye salmon, Dolly Varden, cutthroat trout, river otters, bald eagles, and the forest ecosystem upon which they depend and with which they interact.

Information is available from various sources about the role and spread of spruce bark beetles. This project would use a competitive solicitation to direct a private contractor to review available information and write a synthesis article that describes for scientists, managers, and the general public: 1) the current understanding of the importance of beetle-

affected habitat for injured resources and services; 2) the methods available and the consequences of preventing or controlling infestation to protect habitat.

NEED FOR THE PROJECT

The Restoration Plan adopted by the Trustee Council on November 2, 1994, states that "Habitat protection and acquisition is one of the principal tools of restoration. it is important in ensuring continued recovery in the spill area...Protecting and acquiring land may minimize further injury to resources and services already injured by the spill, and allow recovery to continue with the least interference."

In many cases the habitat value of public and private lands that are used by injured resources depends on the availability and health of the forest. In many locations in southcentral Alaska, spruce bark beetles have and continue to kill portions of the spill-area forest. A review article that synthesizes available information about the beetle infestation, and about methods of control would give the public and private land managers, and the Trustee Council information to help determine whether actions are appropriate to minimize damage to the habitat to aid the recovery of injured resources and service dependent upon the healthy forests.

PROJECT DESIGN

A. Objectives

Use an RFP to choose a contractor who will compile available information on spruce bark beetles and write a synthesis for scientists, managers, and the general public. The synthesis article will outline available information on:

1. the importance of beetle-affected habitat for injured resources and services; and

2. the methods available and consequences of preventing and controlling infestation to protect habitat important to injured resource.

B. Methods

Developing an RFP and directing the contractor will be done in cooperation with managers from the US Forest Service, the Alaska Department of Fish and Game, and the Alaska Department of Natural Resources.

The RFP will be used to choose the contractor. Management agencies with much accumulated information on the subject will make information available to the contractor.

C. Schedule

December 1994 - January 1995	Write and distribute RFP
March 1995	Choose Contractor
July 1995	Draft article due from contractor (which is also Draft Report)
September 1995	Final Report

E. Location

There is no field work for this project. However, the subject matter -- the beetle infestation in the spill area focuses on the Kenai Peninsula, with lesser benefits to other parts of the spill area.

PROJECT IMPLEMENTATION

The project will be implemented by an RFP administered by the Alaska Department of Environmental Conservation. The RFP will be written and administered in cooperation with the Alaska Department of Fish and Game, Alaska Department of Natural Resources, and the U.S.D.A. Forest Service.

FY 95 BUDGET ($K)

Personnel	$0.0
Travel	$0.0
Contractual	$25.0
Commodities	$0.0
Equipment	$0.0
Subtotal	$25.0
Gen. Admin.	$1.8
Total	$26.8