This replaces earlier version of DPD that went out in peer reviewer's notebook 5/5/95.

Exxon Valdez OIL SPILL
DETAILED PROJECT DESCRIPTION
FOR A
FY 96 RESTORATION PROJECT

Project Title: **Subtidal Monitoring: Eelgrass Communities**

Project Number:	96106
Restoration Category:	Monitoring
Proposer:	Stephen C. Jewett University of Alaska Fairbanks
Lead Trustee Agency:	Alaska Department of Fish & Game
Cooperating Agency:	None
Duration:	One Year: October 1, 1995 - September 30, 1996
Cost FY 96:	$219,136
Geographic Area:	Field work: Western Prince William Sound Data analyses/reporting: UAF/Vista, CA
Injured Resource/Service:	Subtidal organisms

ABSTRACT

This study has focused on the injury to, and recovery of, shallow (< 20 m) subtidal eelgrass communities in western Prince William Sound following the Exxon Valdez oil spill (EVOS). Effects were assessed in 1990, 1991, and 1993 primarily by examining differences in population parameters (e.g., abundance, biomass) of dominant taxa within the subtidal eelgrass habitat. A final resampling of this habitat is planned for the summer of 1995.

In 1990, we noted significant differences between oiled and control sites with respect to a number of taxa. Among the differences noted were greater densities of eelgrass flowers and shoots, amphipods, trochid snails, *Telmessus* crabs, and *Dermasterias* sea stars at the control sites. Other taxa, including small epifaunal mussels, (*Musculus*) and spirorbid worms, a variety of infaunal polychaetes, and juvenile cod were more abundant at oiled sites.

The infaunal benthic community within the deeper portion (3 to 20 m) of the eelgrass habitat appeared especially affected by the EVOS, as there was a decline in diversity as well as reductions in a number of dominant taxa. On the other hand, the benthic community in shallower portions of the habitat, within the eelgrass bed, showed a general enhancement of both diversity and abundance of several dominant taxa. The notable exception was for amphipods, which declined in all habitats.

By 1991 there was strong evidence of recovery at eelgrass by fewer differences in community parameters and dominant taxa than observed in 1990. Although some recovery was still evident by 1993, e.g., large epifaunal crabs (*Telmessus*) and sea stars (*Dermasterias*), many infaunal and small epifaunal taxa were more prevalent in oiled eelgrass sites, resembling 1990.

Polycyclic aromatic hydrocarbon (PAH) concentrations in sediments were generally higher at oiled than control sites and in the deeper portions of the habitat. The highest concentrations observed were greater than 1000 ng g^{-1} at several eelgrass sites in 1990. PAH concentrations declined to less that 100 ng g^{-1} by 1993, but were still somewhat higher at oiled sites.

Many of the observed effects appeared related to the effects of oil. The reduction in the abundance of amphipods were presumably due to the acute toxicity of oil. However, most other declines in population density were probably related to either the sublethal effects of oil or to indirect effects such as increased predation. Increased abundance of most taxa at oiled sites appeared related, either directly or indirectly, to organic enrichment from either oil or from bioremediation.

INTRODUCTION

The shallow subtidal habitats of Prince William Sound, from the intertidal zone to depths of approximately 20 m, typically has dense macrophyte or seagrass assemblages, and is critical habitat for many commercially and ecologically important animals. Subtidal eelgrass beds contain numerous polychaete worms, small snails and clams, amphipods, isopods, sea urchins, and sea stars, many of which serve as food for coastal-feeding fishes, birds, and otters.

The subtidal eelgrass community was one of the several habitats examined relative to *Exxon Valdez* Oil Spill (EVOS) effects and subsequent recovery. Investigations comparing oiled-control sites in this habitat were conducted in 1990, 1991 and 1993 (no sampling occurred in 1992 and 1994) (Jewett et al., 1994).

Almost all components of the eelgrass habitat were affected by the EVOS by the summer of 1990. The health of the benthic community outside the eelgrass bed, at 6-20 m depths, was generally less robust at oiled sites than at control sites. The oiled sites had significantly less total invertebrate abundance; several dominant invertebrate taxa had less abundance and/or biomass. These included families of clams that are important food for sea otters. Another group less prevalent at oiled sites were the oil-sensitive benthic

amphipods. Measured parameters less prevalent at the oiled sites in the eelgrass bed (≤ 3 m) included eelgrass turions and flowers, benthic amphipods, and helmet crabs (*Telmessus cheiragonus*). However, the benthic community in the bed had greater total invertebrate abundance and biomass at the oiled sites, primarily attributable to opportunistic infauna and small epifauna attached to the eelgrass blades.

The 1991 data revealed partial recovery. Outside the eelgrass bed (6-20 m) oiled sites were more similar to control sites than in 1990. The greatest indication of recovery was with benthic amphipods which revealed no differences between oiled and control treatment groups. Within the bed (≤ 3 m), no differences were now evident in density of eelgrass turions or flowers, benthic amphipods, and helmet crabs. However, several of the dominant taxa had lower abundance or biomass at oiled bed sites, indicative that recovery was lagging within the eelgrass bed.

By 1993, four years after EVOS, a reversal was revealed from the 1991 appearance of recovery. While toxic effects were doubtful, some segments of the community were significantly diminished at oiled sites (e.g., amphipods); other segments reflect enhancement at oiled sites (e.g., infaunal polychaetes and epifauna on eelgrass). Sediment oil concentrations dropped from an average of 544 ng PAH g^{-1} in 1990 to 145 ng g^{-1} in 1991 to 50 ng g^{-1} in 1993. Although sediment oil contentrations declined greatly over the three-year period, the oiled sites still had higher concentrations than control sites in 1993. The 1993 data tended to resemble 1990, especially in the bed (≤ 3 m) where densities of eelgrass flowers (Dean et al., submitted MS), bivalves and oil-sensitive benthic amphipods were greater at control sites. Enhancement (stimulation) at oiled sites was evident in several opportunistic or stress tolerant polychaetes (all depths), as well as small epifauna attached to the eelgrass blades (≤ 3 m). Oil-degrading microbes (Braddock and Richter, 1994) presumably stimulated the faunal increases at oil sites as has been observed elsewhere (e.g., Spies and DesMarais, 1983; Spies, 1987). Preliminary examination of selected nearshore fishes (crescent gunnel and pricklebacks) suggested stress-induced abnormalities (i.e., hemosiderosis: Khan and Nag, 1993) at oiled sites.

We know from other studies (e.g., McConnaughey, 1978; Calkins, 1978; Degrange and Sanger, 1987; Shaw and Hameedi, 1988; Bowyer et al., 1994) and from our work that several of the species impacted are important links to higher trophic levels. For example, benthic amphipods are important prey to a variety of fishes and sea birds. The crab *Telmessus* feeds on eelgrass, *Musculus* mussels, and other epiphytes on eelgrass. In turn, *Telmessus* serves as prey for a variety of vertebrates, including sea otters, river otters, and birds (e.g.,). In addition, *Musculus* is a primary component of the diet of juvenile cod that are abundant in the eelgrass habitat. As noted earlier, some of the infaunal bivalves are important food for sea otters. Also, the fishes examined for hemosiderosis are important food for river otters and selected sea birds (Bowyer et al., 1994; Dan Roby, UAF, Pers. Commun).

Our approach for July 1995 is to monitor the various successional stages of the eelgrass community toward stabilization by comparing components from four pairs of oiled and unoiled sites. We will target most of the sites that were sampled in 1990, 1991 and 1993 using the same methodology. We will quantify eelgrass, infauna, amphipods, small epifauna attached to eelgrass, large epifauna (i.e., crabs and sea stars), and juvenile Pacific cod. In addition, we will examine sediment hydrocarbon concentrations and some dominant demersal fishes for hydrocarbons and hemosiderosis. The benefit of continued monitoring of the natural recovery of this habitat is to provide information on the progress and general health of this community, including some key trophic components.

This Detailed Project Description is for the closeout on the subtidal monitoring of the eelgrass communities. It will include analyses and reporting of subtidal eelgrass community information compiled over the duration of this project, 1990, 1991, 1993, and 1995.

NEED FOR THE PROJECT

A. Statement of Problem

Almost all components of the subtidal eelgrass habitat were affected by the EVOS. Our approach is to monitor the various successional stages of the eelgrass community for one more year. Stabilization is anticipated by 1995.

B. Rationale

No man-made restoration has occurred, nor has any been recommended, for the subtidal eelgrass habitat to date. It has been generally viewed that any restoration activities in this subtidal habitat would be unrealistic. Complete restoration or recovery implies not only a return to prior abundance levels, but moreover, a return to ecological pathways within the community which may have taken years to develop. These ecological pathways involve a range and magnitude of biological, chemical, and physical mechanisms with synergistic effects which are little understood, but are believed to be essential to the stability of the community. Drastic changes induced by EVOS undoubtedly altered these pathways and the resulting community may never return to its pre-spill structure and internal integrity, although abundances may return to pre-spill levels.

C. Summary of Major Hypotheses and Objectives

The overall objective is to monitor the natural recovery of the shallow (< 20 m) subtidal eelgrass community in Prince William Sound that was impacted by the EVOS.

D. Completion Date

September 30, 1996

COMMUNITY INVOLVEMENT

Since this study got underway in 1990, it has had intense internal and public review through workshops, EVOS Symposium, meetings, Final Report reviews, and peer reviews of manuscripts for publication, including in a special publication through the Transactions of the American Fisheries Society. No other community involvement efforts are planned.

FY 96 BUDGET

Personnel	$117843.0
Travel	4770.0
Contractual	57000.0
Commodities	3000.0
Equipment	0.0
Subtotal	182613.0
Indirect cost	36523.0
Gen. Admin.	
Total	$219136.0

PROJECT DESIGN

A. Objectives

The overall objective is to monitor the natural recovery of the shallow (< 20 m) subtidal eelgrass community in Prince William Sound that was impacted by the EVOS. The primary objectives are to: 1) spacially compare richness, diversity, abundance and biomass of dominant taxa between paired (oiled:control) sites; and 2) temporally compare these population parameters. A secondary objective is to examine some of the dominant nearshore demersal fishes for evidence of hemosiderosis.

B. Methods

All samples collected in the stratified sampling design in the eelgrass habitat in July 1995 will be processed at University of Alaska Fairbanks. For the percent cover, abundance, and biomass estimates for each of the dominant infaunal and small epifaunal taxa, and for diversity measures for benthic infauna, we will test the null hypothesis of no significant difference among oiled and control sites using a randomization procedure (Manly, 1991). In addition, some community-level analyses will be conducted using ordination procedures such as principal coordinate analysis, stepwise discriminant analysis, and multidimensional scaling. Data from all years, 1990, 1991, 1993, and 1995, will be analyzed.

C. Contracts and Other Agency Assistance

Coastal Resources Associates, Inc., Vista, CA
CRA has been an integral technical component on the EVOS shallow subtidal investigations since 1989. To ensure project continuity, we will subcontract with CRA for analyses and reporting assistance.

Memorial University, Newfoundland, Canada
Dr. R.A. Khan of Memorial University will be contracted to examine intertidal/shallow subtidal fishes for hemosiderosis as a pathological indicator of exposure of fishes to crude oil. Dr. Khan analyzed a few fishes for us in 1993.

NOAA, NMFS, Auke Bay, Alaska
All hydrocarbon analyses on sediment and fishes will be carried out through the Auke Bay Facility; they have previously provided this support for this project.

D. Location

The analyses and report preparation will be conducted at UAF (Fairbanks) and at CRA (Vista, CA).

SCHEDULE

A. Measurable Project Tasks for FY 96

October - December 1995:	Process benthic, hydrocarbon, and hemosiderosis samples;
January 1996:	Data entry and analyses;
February - May:	Draft final report;
June - July:	Peer review of draft final report;

B. Project Milestones and Endpoints

This is the close-out segment of this project. All project objectives will be met in the Final Report on or before September 30, 1996.

C. Project Reports

A final report will be submitted 60 days after the peer-reviewed draft final report is returned.

COORDINATION AND INTEGRATION OF RESTORATION EFFORT

This project is closely linked to the monitoring of oil in subtidal (< 20 m) sediments (conducted by NOAA). Several study sites are in common between the two projects.

ENVIRONMENTAL COMPLIANCE

The appropriate scientific sampling permit will be obtained from ADF&G prior to sampling. All operations aboard the research vessel will conform to U.S. Coast Guard safety standards. All SCUBA diving activity will conform to the UAF's scientific diving standards (UAF is a member of the American Academy of Underwater Sciences). This project received a categorical exclusion under NEPA from NOAA.

PERSONNEL

Stephen C. Jewett, Principal Investigator and Research Associate at the School of Fisheries and Ocean Science (SFOS), University of Alaska Fairbanks will be responsible for the organization and the management of this project, including interpretation and synthesis of data and writing of reports. Mr. Jewett has been a Research Associate at UAF since 1975. During this time he has been involved in numerous benthic investigations throughout Alaska that emphasize assessment and/or monitoring. He has been the coordinator of the federal/state EVOS shallow subtidal investigations in Prince William Sound (1989-94). Mr. Jewett also serves as the Scientific Diving Officer for UAF, coordinating all scientific diving operations.

Joan Osterkamp, Executive Director of SFOS, University of Alaska Fairbanks, will be the Financial Officer overseeing the project.

Thomas A. Dean, Ph.D., is President of the ecological consulting firm Coastal Resources Associates, Inc. (CRA) in Vista, CA. He has had a major role in both the shallow subtidal and intertidal EVOS investigations conducted through UAF since 1989. His has extensive experience in long-term monitoring studies with marine plants and invertebrates. Dr. Dean will mainly assist in the analyses and reporting necessary in the carrying out of the project objectives.

Amy Blanchard, Laboratory Supervisor for the shallow benthic component, has direct control and involvement of all laboratory analyses, quality control of the data, and submission of the data to Data Management at SFOS .

Max Hoberg, Research Technician, is a diver/benthic invertebrate taxonomist at SFOS. He will assist A. Blanchard in the laboratory.

Project Leader:

_____

Stephen C. Jewett
School of Fisheries & Ocean Sciences
University of Alaska Fairbanks
Fairbanks, AK 99775-1080
(907) 474-7841 (office); (907) 474-7204 (FAX)
E-mail: jewett@ims.alaska.edu

Project Manager:

_____

Joseph Sullivan, Ph.D.
Habitat & Restoration Division
Alaska Department of Fish & Game
333 Raspberry Road
Anchorage, AK 99518-1599
(907) 267-2213 (office); (907) 522-3148 (FAX)

_____

Date prepared

1996 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1995 - September 30, 1996

Budget Category:	Authorized FFY 1995	Proposed FFY 1996	LONG RANGE FUNDING REQUIREMENTS					
			Estimated FFY 1997	Estimated FFY 1998	Estimated FFY 1999	Estimated FFY 2000	Estimated FFY 2001	Estimated FFY 2002
Personnel		$117.8						
Travel		$4.8						
Contractual		$57.0						
Commodities		$3.0						
Equipment		$0.0						
Subtotal	$0.0	$182.6						
Indirect		$36.5						
Project Total	$0.0	$219.1						
Full-time Equivalents (FTE)		2.1						
			Dollar amounts are shown in thousands of dollars.					
Other Resources								

Comments:

NOTE: Indirect Costs are calculated at 20% TDC. However, the University of Alaska and the EVOS Trustee Council are in the process of negotiating a rate agreement, based on the UA current negotiated rate, for projects which are long-term, sole source in origin, and guarantee a minimum amount per year of funding to the University of Alaska. Therefore, this rate is subject to change pending the outcome of the final agreement

1996

Prepared:

Project Number: 96106
Project Title: Subtidal Monitoring: Eelgrass communities
Name: Stephen C. Jewett

FORM 4A
Non-Trustee
DETAIL

5/4/95

1996 EXXON VALDEZ TRUS COUNCIL PROJECT BUDGET
October 1, 1995 - September 30, 1996

Personnel Costs:			Months	Monthly		Proposed
Name	Position Description		Budgeted	Costs	Overtime	FFY 1996
Jewett, S.	Principal Investigator		7.0	7,803		54.6
To Be Named	Technician		5.0	5,133		25.7
To Be Named	Technician		4.0	4,908		19.6
To Be Named	Lab. Asst. II		5.0	3,129		15.6
To Be Named	Student Asst. II		4.0	571		2.3
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
	Subtotal		25.0	21,544	0	
					Personnel Total	$117.8

Travel Costs:	Ticket	Round	Total	Daily	Proposed
Description	Price	Trips	Days	Per Diem	FFY 1996
R/T Fairbanks-Anchorage	300	2	7	170	1.8
R/T Fairbanks-San Diego	800	2	12	115	3.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
				Travel Total	$4.8

1996

Project Number: 96106
Project Title: Subtidal Monitoring: Eelgrass communities
Name: Stephen C. Jewett

FORM 4B
Personnel
& Travel
DETAIL

5/4/95

1996 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET
October 1, 1995 - September 30, 1996

Contractual Costs:	Proposed
Description	FFY 1996
Subcontract to Coastal Resources Associates	35.0
HC Analysis	7.0
Communications	0.5
Homosiderosis analysis	10.0
Sediment analysis	4.5
Contractual Total	$57.0

Commodities Costs:	Proposed
Description	FFY 1996
Laboratory Supplies	3.0
Commodities Total	$3.0

1996

Project Number: 96106
Project Title: Subtidal Monitoring: Eelgrass communities
Name: Stephen C. Jewett

FORM 4B
Contractual & Commodities DETAIL

5/4/95

1996 EXXON VALDEZ TRUS[illegible]COUNCIL PROJECT BUDGET
October 1, 1995 - September 30, 1996

New Equipment Purchases: Description	Number of Units	Unit Price	Proposed FFY 1996
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
Those purchases associated with replacement equipment should be indicated by placement of an R.		**New Equipment Total**	$0.0

Existing Equipment Usage: Description	Number of Units	

1996

Project Number: 96106
Project Title: Subtidal Monitoring: Eelgrass communities
Name: Stephen C. Jewett

FORM 4B
Equipment
DETAIL

5/4/95

1996 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1995 - September 30, 1996

Budget Category:	Authorized FFY 1995	Proposed FFY 1996
Personnel		$15.7
Travel		$1.2
Contractual		$14.1
Commodities		$1.0
Equipment		$0.0
Subtotal	$0.0	$32.0
Indirect		$3.2
Project Total	$0.0	$35.2
Full-time Equivalents (FTE)		0.3
Other Resources		

LONG RANGE FUNDING REQUIREMENTS

Dollar amounts are shown in thousands of dollars.

Estimated FFY 1997	Estimated FFY 1998	Estimated FFY 1999	Estimated FFY 2000	Estimated FFY 2001	Estimated FFY 2002

Comments:

This is the budget for a subcontract for Coastal Resources Associates, Inc. to participate in and assist with project 96106, Stephen C. Jewett, P.I. See attached itemized budget for additional information.

1996

Prepared:

Project Number: 96106
Project Title: Subtidal Monitoring: Eelgrass communities
Name: Stephen C. Jewett

FORM 5A
Non-Trustee
DETAIL

5/10/95

1996 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1995 - September 30, 1996

Personnel Costs:			Months	Monthly		Proposed
	Name	Position Description	Budgeted	Costs	Overtime	FFY 1996
	Thomas Dean	Principal Investigator	2.0	6,391		12.8
	Dennis Jung	Technician	0.8	1,850		1.5
	Bettye Ladd	Secretarial/Clerical	0.7	1,940		1.4
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
		Subtotal	3.5	10,181	0	
					Personnel Total	$15.7

Travel Costs:		Ticket	Round	Total	Daily	Proposed
	Description	Price	Trips	Days	Per Diem	FFY 1996
	R/T San Diego-Anchorage	600	1	5	110	1.2
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
					Travel Total	$1.2

1996

Project Number: 96106
Project Title: Subtidal Monitoring: Eelgrass communities
Name: Stephen C. Jewett

FORM 5B
Personnel
& Travel
DETAIL

5/10/95

1996 EXXON VALDEZ TRUS[illegible]COUNCIL PROJECT BUDGET
October 1, 1995 - September 30, 1996

Contractual Costs:	Proposed
Description	FFY 1996
Telephone and photocopy	0.4
Photocopy	0.1
Insurance	1.8
Rent	1.8
Subcontract-R. Smith	10.0
Contractual Total	$14.1

Commodities Costs:	Proposed
Description	FFY 1996
Office	0.5
Field	0.5
Commodities Total	$1.0

1996

Project Number: 96106
Project Title: Subtidal Monitoring: Eelgrass communities
Name: Stephen C. Jewett

FORM 5B
Contractual & Commodities DETAIL

5/10/95

1996 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET
October 1, 1995 - September 30, 1996

New Equipment Purchases: Description	Number of Units	Unit Price	Proposed FFY 1996
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
Those purchases associated with replacement equipment should be indicated by placement of an R.		**New Equipment Total**	$0.0

Existing Equipment Usage: Description	Number of Units	

1996

Project Number: 96106
Project Title: Subtidal Monitoring: Eelgrass communities
Name: Stephen C. Jewett

FORM 5B
Equipment
DETAIL

5/10/95

CRA BUDGET - RESTORATION OF SUBTIDAL INVERTEBRATES - AKF
1 October '95 to 30 Sept '96

		HRS	RATE	TOTAL
LABOR				
	Thomas Dean	270	$43.00	$11,610
	Dennis Jung (Regular)	120	$14.00	$1,680
	Dennis Jung (Overtime)	0	$21.00	$0
	Richard Smith	0	$40.00	$0
	Bettye Ladd	100	$12.50	$1,250
			Subtotal	$14,540
FRINGE				
	Social Security			$1,112
	Workmans Comp (Clerical)			$11
	Workmans Comp (Lab)			$326
	Workmans Comp (Sampling)			$0
	Workmans Comp (Diving)			$0
			Subtotal	$1,450
TRAVEL				
	Airfare	1 RT SD to Anchorage		$600
	Travel per diem	5 days per diem @$110		$550
			Subtotal	$1,150
SUPPLIES				
	Office Supplies			$450
	Misc field supplies			$0
			Subtotal	$450
OTHER DIRECT				
	Telephone			$240
	Copy Costs			$148
	Postage & Freight			$240
	Insurance			$1,800
	Rent			$1,800
	Subcontract-R. Smith			$10,000
			Subtotal	$14,228
			TOTAL DIRECT	$31,818
INDIRECT				
	Total Direct x 10%			$3,182
			TOTAL COSTS	$35,000

This replaces earlier version of DPD that went out in peer reviewers' notebook 5/5/95.

Coded Wire Tag Recoveries From Pink Salmon in Prince William Sound

Project Number:	96186 (in FY95, was # 95320B)
Restoration Category:	General Restoration and Research/Monitoring
Proposer:	Alaska Department of Fish and Game
Lead Trustee Agency:	Alaska Department of Fish and Game
Cooperating Parties:	Prince William Sound Aquaculture Corp. Valdez Fisheries Development Assoc.
Duration:	Four years
Cost FY 96:	$256,900
Cost FY 97:	$256,900
Cost FY 98:	$256,900
Cost FY 99:	$ 85,000
Cost FY 00:	$0
Cost FY 01:	$0
Cost FY 02:	$0
Geographic Area:	Prince William Sound
Injured Resource/Service:	Pink Salmon

ABSTRACT

Pink salmon play a major role in the Prince William Sound (PWS) ecosystem as well as the economy of Cordova and other PWS communities. There is a growing body of evidence which indicates that the Exxon Valdez Oil Spill (EVOS) has been at least partially responsible for weak pink salmon returns to PWS. Pink salmon runs are dominated by the larger returns from more productive hatchery populations. To sustain production from wild populations, managers need to be able to estimate the relative spatial and temporal abundance of wild fish in the different fishing areas of PWS. This study will provide accurate, real-time and post-season estimates of hatchery and wild contributions to commercial harvests by date and fishing district, and also to hatchery cost-recovery harvests. This information is important for fisheries managers who must anticipate the effects of fishing strategies to protect injured populations. Similar analyses of coded wire tag data funded by the Natural Resource Damage Assessment (NRDA) and Restoration processes have been used to justify time and area

fishery closures and effectively reduce exploitation on oiled pink salmon populations in portions of southwestern PWS in 1990, 1991, 1992, 1993, and 1994.

INTRODUCTION

Pink salmon play a major role in the Prince William Sound (PWS) ecosystem. Migrating pink salmon fry are an important Spring food source for various fish, birds and terrestrial mammals. Marine mammals, birds, and fish also prey on the ocean life stages of pink salmon and returning adult wild salmon comprise a large portion of the summer diet of terrestrial mammals and birds such as bears, river otters, wolverines, bald eagles, gulls, and kittiwakes. Returning adult salmon also provide a pathway for the transfer of nutrients accumulated from high seas marine areas to near shore and terrestrial ecosystems. As the principal species harvested in the PWS salmon purse seine fishery, pink salmon play a major role in the commercial fishing and fish processing industries which are the backbone of the economy in Cordova and other PWS communities. Ex-vessel values for this fishery ranged from 10 to almost 40 million through the 1980's.

PWS pink salmon returns originating from brood years subsequent to the March 24, 1989, T/V Exxon Valdez oil spill (EVOS) have been aberrant or weak, with the exception of those of 1994. Returns of wild and hatchery pink salmon in 1991 arrived late, had very compressed run timing, and the fish were small and of poor commercial quality. Returns of pink salmon in 1992 and 1993 were far fewer than expected, while those of 1994 were more in line with expectations. The 1992 return of wild pink salmon was the fourth smallest even year return in the last 30 years and the hatchery return was less than one third of expected. The 1993 return of wild pink salmon was the third smallest in the last 30 years and the hatchery return was less than one fifth of expected. Both wild and hatchery returns of 1994 were a significant improvement over the preceding two years.

There is a growing body of evidence which indicates that the EVOS was partially responsible for the weak pink salmon returns to PWS. Much of the spawning for wild pink salmon (up to 75% in some years) occurs in intertidal areas. Intertidal spawning areas are susceptible to marine contaminants and there is strong evidence the EVOS adversely affected spawning success and early marine survival in PWS. Mortalities of pink salmon embryos incubating in the intertidal portions of oiled streams in western PWS have been significantly higher than those which incubated in nearby unoiled streams since 1989 (Sharr et. al. 1994a, Bue et al. (in press)). Despite apparent reductions in the amount of observable oil in intertidal salmon spawning areas since 1990, the differences in mortality between oiled and unoiled streams persisted in 1991, 1992 and 1993 and were also observed in spawning areas upstream of oil influence (Sharr et. al. 1994b, Bue et al. (in press)). These findings may be indicative of heritable genetic damage which has resulted in reproductive impairment among first and second generation fish originating from populations whose fry incubated in oiled streams in 1989 and 1990.

In addition to damage incurred during the embryo stages of development, pink salmon fry and juveniles rearing in the western portions of PWS in 1989 also exhibited reduced growth and survival (Willette and Carpenter, 1994). Because almost all wild and hatchery fry exit PWS through the straits and passages that were most heavily oiled, it is likely that at least portions of almost all pink salmon populations in PWS were damaged as rearing fry and juveniles in 1989. There are presently no data to substantiate any heritable damage to populations which traveled and fed in oiled marine waters as fry in 1989. Nevertheless, such a possibility is plausible given the findings of Sharr et al. (1994c).

Although hatchery pink salmon production (see Attachment 1) in PWS began in the 1970's, the large returns associated with maximum permitted fry production did not occur until the late 1980's and early 1990's and coincided with the EVOS era. Returns of wild salmon are dominated by the larger returns from the more productive hatchery populations and are therefore heavily exploited in commercial, sport, and subsistence fisheries. To sustain production from wild populations, managers must insure adequate escapements of wild fish to their natal streams, and that the escapement occurs in a smooth fashion over the season so that the genetic make-up of the populations is maintained. To achieve these goals, mixed-stock fisheries must be managed to achieve exploitation rates appropriate for the less productive wild populations throughout the season. Managers need, therefore, to be able to estimate the relative spatial and temporal abundance of wild fish in the different fishing areas of PWS.

This study will provide accurate, real-time and post-season estimates of hatchery and wild contributions to commercial harvests by date and fishing district, and also to hatchery cost-recovery harvests. Such catch contribution estimates, together with real-time escapement estimates from an Alaska Department of Fish and Game (ADF&G) aerial survey program will be used inseason by fisheries managers to reduce exploitation on wild stocks and target effort on hatchery returns. Post season analyses of tag recovery data will be coupled with escapement data for wild populations to make estimates of total wild returns, which will in turn allow assessment of the effectiveness of various management strategies. Post season analyses will also identify time and area distribution trends for wild and hatchery fish in fisheries. This information is important for fisheries managers who must anticipate the effects of fishing strategies in future years if injured populations are to be protected. Similar analyses of coded wire tag data funded by the Natural Resource Damage Assessment (NRDA) and Restoration processes have been used to justify time and area fishery closures and effectively reduce exploitation on oiled populations in portions of southwestern PWS in 1990, 1991, 1992, 1993, and 1994.

The results of the coded wire tag recovery project are also critical to the success of an integrated package of Sound Ecosystem Assessment (SEA) studies. The SEA proposal has roots in a broader SEA plan developed by the Prince William Sound Fisheries Ecosystem Research Planning Group (PWSFERPG), a bioregional coalition of PWS scientists, resource managers, resource users, aquaculture associations, and

communities, formed to "develop an ecosystem level understanding of the natural and man-caused factors influencing the production of pink salmon...in PWS". Many of the SEA projects, such as those falling under the Salmon Growth Component and the Salmon Predation Component are dependent upon information provided by this coded wire tag study.

In the absence of the improved management capabilities afforded by this project, salmon stocks in western PWS which have been injured and depleted through oil impacts may be over-exploited in the commercial, sport and subsistence fisheries. Population levels of stocks may be reduced below those needed for rapid recovery and in some instances may result in virtual elimination of impacted stocks. In the absence of the information provided to SEA plan, some of the projects under that plan will fail.

NEED FOR THE PROJECT

A. Statement of Problem

Wild pink salmon runs in Prince William Sound which were injured by EVOS need to be protected from overharvest during commercial fisheries. This is difficult to accomplish since these injured wild populations migrate through fishing areas with uninjured populations as well as large hatchery runs. It is not possible to simply close these fishing areas without severely affecting local and state economies which are heavily dependent upon the commercial fishing industry. Inseason and postseason information on the mix of the various runs in fishing areas allows fishery managers to directly fishing effort away from injured wild runs and achieve desired spawning escapement goals.

B. Rationale

Coded-wire tags have been the tool of choice for applying unique marks to hatchery pink salmon in Prince William Sound. This technique has been used in Prince William Sound to estimate hatchery and wild stock contributions to commercial harvests since 1986, and has also been used in preliminary studies of straying. Although placement and recovery of coded-wire tags is expensive and labor intensive, and effects of tags on survival and homing are not well described, this technique has been the most practical and reliable way in which to mark large numbers of small pink salmon fry.

C. Summary of Major Hypotheses and Objectives

The principal goal of this project has been to increase fishery managers' abilities to protect injured wild pink salmon stocks in mixed-stock commercial fisheries by providing an inseason method to identify stocks. This program will be continued until thermal mass marking of pink salmon otoliths can be developed as a marking tool to replace coded-wire tags. Specific objectives would be to provide inseason and post season estimates of the stock composition of commercial and hatchery cost-recovery harvests; to provide inseason and postseason estimates of the size of wild and hatchery pink salmon

runs; and to estimate marine survival rates of various hatchery release groups.

D. Completion Date

This multi-year project will be completed in either FY 98 or FY 99. At this time, the Trustee Council has approved only a one year of overlap between the coded-wire tag and otolith marking programs. This would mean that 1997 would be the last year to recover coded-wire tags and only funding for final data analysis and report writing would be made available in FY 98. However, peer reviewers at the 1995 Restoration Workshop unanimously recommended two years of overlap between these programs to ensure that coded-wire tags could continue to be applied and recovered in 1998 if the otolith marking program did not meet its objectives in 1997. This would mean funding for final data analysis and report writing would need to be made available in FY 99.

COMMUNITY INVOLVEMENT

This program is cooperatively funded by both Prince William Sound Aquaculture Association and Valdez Fisheries Aquaculture Corporation, the two private, nonprofit hatchery groups operating within Prince William Sound. These two groups are operated by a mix of individuals with ties to commercial, sport, personal use and subsistence fishing as well as community representatives. Large scale tagging programs have been a cooperative effort between ADF&G and these private, nonprofit aquaculture groups since the 1980's.

Project plans and reports on results of the coded-wire tagging program have been reviewed by the Prince William Sound/Copper River Regional Planning Team as well as interested fishing industry groups. As part of the Trustee Council NRDA and Restoration process, the coded-wire tag recovery program has been subjected to extensive peer review and annual public review and comment. Results of the coded-wire tag program were presented at the March 1993 Oil Spill Symposium sponsored by the Trustee Council, the 1993 Pink and Chum Workshop, the annual spring meeting of the Prince William Sound Aquaculture Corporation Board of Directors, and the 1994 Alaska Board of Fisheries meeting.

The coded-wire tag program is also critical to the success of an integrated package of Sound Ecosystem Assessment (SEA) studies. The SEA proposal has roots in a broader SEA plan developed by the Prince William Sound Fisheries Ecosystem Research Planning Group, a bioregional coalition of PWS scientists, resource managers, resource users, aquaculture associations, and communities, formed to "develop an ecosystem level understanding of the natural and man-caused factors influencing the production of pink salmon...in PWS". Many SEA projects depend upon information provided by coded-wire tags.

The project will employ local residents for data collection activities in fish processing plants located in Cordova, Valdez, Whittier, Seward, Anchorage, Kenai, and Kodiak, and at hatcheries in PWS. The project will also employ residents of Juneau for tag extraction and

decoding activities performed by the ADF&G Tag Laboratory. Permanent ADF&G Biologists stationed in Cordova and biometrics staff stationed in Anchorage will complete data analyses and reports. Goods and services required by the project will be obtained from vendors in the local communities where data are collected.

FY 96 BUDGET

Personnel	$116.2K
Travel	$ 12.7K
Contractual	$100.6K
Commodities	$ 2.9K
Equipment	$ 0.0K
Subtotal	$232.4K
Gen. Admin.	$ 24.5K
Total	$256.9K

PROJECT DESIGN

A. Objectives

Funds which match those contributed by ADF&G, PWSAC, and VFDA will contribute to the completion of the following objectives for the 1996 salmon season in PWS:

1. Using undecoded-tag data, provide timely inseason estimates of the temporal and spatial contributions of tagged hatchery stocks of pink salmon to PWS commercial and hatchery harvests.

2. Assess the properties of a new, faster, but potentially less reliable inseason estimator of contributions of tagged hatchery stocks, which is based upon undecoded tags and estimates of tender loads (catches).

3. Using decoded-tag data, provide hatchery-specific estimates of the temporal and spatial contributions of tagged hatchery stocks to the commercial and cost-recovery harvests in PWS.

4. Estimate marine survival rates for each uniquely coded hatchery release group of pink salmon.

B. Methods

Personnel policy, purchasing practices, field camp operations, safety procedures, and project administration will be in compliance the ADF&G Division of Commercial Fisheries Manual of Standard Operating Procedures (SOP). Data collection and estimation procedures are similar to those used in NRDA F/S Study #3. These procedures have been thoroughly reviewed by the NRDA peer review process and approved by the Management Team.

Commercial and Cost-Recovery Harvests

Recoveries will be stratified by district, week, and processor. This stratification was chosen as a result of the findings of Peltz and Geiger (1990) who detected significant differences between the proportions of some tag codes among such strata. The differences indicate that processors tend to receive catches from only certain parts of a district and is believed to be the result of traditional tendering patterns.

Recoveries of pink salmon tags from commercial and cost-recovery harvests will be made as fish are pumped from tenders onto conveyor belts at land-based processors located in Cordova, Valdez, Seward, Anchorage, Whittier and aboard a floating processor after each opening. Fish will be sampled by technicians standing beside the belt. Each sampled fish will be subjected to a visual and tactile examination for a missing adipose fin. It will never be possible for an observer to census all fish from a tender during the unloading process. However, on occasion, holding tanks in processing plants contain fish from only one tender. In those instances it will be possible for an observer standing on the processing line to get a census of an entire tender load which was previously sub sampled by technicians on the unloading conveyor. A Chi-square test of independence will be used to compare the rate of occurrence of adipose fin clips in the census with that observed in the random sample from the load.

Data recorded for each tender will include harvest type (i.e., commercial or cost-recovery catch), fishing district(s) from which the catch was taken, catch date, processor, and the number of fish examined. Catch data will be obtained later from fish tickets.

Heads of adipose-fin clipped fish will be excised, identified with a uniquely numbered cinch tag, and bagged. These heads will then be individually passed through a tag detector machine which produces an audible signal in the event that the head contains a coded wire tag. This procedure yields numbers of undecoded tags in the sample. Heads will then be frozen for subsequent shipment to the ADF&G Coded Wire Tag Laboratory in Juneau (Tag Lab).

Brood Stock Harvests

Tag shedding from release to return and differential mortality between tagged and untagged fish lead to discrepancies between marking rates at release and recovery. Hatchery brood stocks will be scanned for tags in order to estimate adjustment factors which can be used to account for the loss of tags from the population. Three assumptions inherent in the use of the brood stock for this purpose are a) it consists solely of fish reared at the hatchery, b) the propensity for a fish to lose a tag is similar for all fish marked at the same hatchery, and c) for a specific tag code, the marking rate in the commercial fishery is the same as that in the brood stock. It is believed that the first of these assumptions is violated at all facilities except at the W. Noerenberg hatchery (Sharr et. al. 1994f). Consequently, a historical average adjustment factor calculated from

the brood stock from the W. Noerenberg hatchery is considered an appropriate quantity with which to adjust for tag loss and differential mortality. With respect to the second assumption, tagging practices vary little within a facility, and it is believed that the rate of tag loss and tag-induced mortality are similar for all fish tagged within a hatchery. The third assumption relates to the possibility of tag-induced straying of hatchery fish away from the brood. Some histological evidence to this end was referenced in Sharr et al. (1994d), and some more direct preliminary evidence is discussed by Sharr et al. (1994f).

The adjustment factor for a given year may be defined as that quantity which, when multiplied by the marking rate in returning fish, yields the marking rate at release. The factor is 1.0 when there is no tag loss or differential mortality. The adjustment factor for hatchery h, a_h, will be estimated as the ratio of sampled fish in the brood stock to the expanded number of fish based on tags found in the sample :

$$\hat{a}_h = \frac{s_h}{\sum_{i}^{T} \frac{x_i}{p_i}} , \qquad (1)$$

where

T	=	number of tag codes released from hatchery h,
p_i	=	tagging rate at release for the ith tag code (defined as number of tagged fish released with the ith tag code divided by the total number of fish in release group i),
x_i	=	number of tags of the ith code found in s_h and,
s_h	=	number of brood stock fish examined in hatchery h.

The historical (1989-1994 for inseason, 1989-1995 for postseason) average W. Noerenberg adjustment factor will then be used to adjust contribution estimates (Equation 2) if it can be shown that it was significantly greater than 1.0 at the 90% level.

While only the (historical) adjustment factor associated with the W. Noerenberg facility will be used in any contribution estimation, brood stock samples will be taken during hatchery egg-take operations at each of the four PWS pink salmon hatcheries. Technicians, will examine approximately 95% of the fish through visual and tactile means for missing adipose fins. The number of fish sampled will be recorded and when adipose-clipped fish are found, the heads will be excised and shipped on a weekly basis along with sample data to the Tag Lab.

Tag Extraction, Tag Decoding, and Data Archiving

During the fishing season all sampling data and heads from adipose-clipped fish will be sent daily to the ADF&G Tag Lab. Data received at the Tag Lab will be logged and tag recovery sampling forms edited a for accuracy and completeness. Samples which affect critical fisheries decisions will be processed first. Tag lab staff will locate and remove tags from heads, decode extracted tags, and enter

tag code and sample data into a statewide database accessible to biologists in Cordova. Completed tag recovery data for prioritized samples will be transmitted electronically to Cordova project personnel within 36 hours of the receipt of unprocessed data at the Tag Lab. In the following 12 hours Cordova project personnel will integrate tag recovery and catch data from the ADF&G fish ticket reporting system to estimate hatchery and wild catch contributions. Contribution estimates are used by fisheries managers to implement the inseason management actions required.

Following the fishing season, processing of all lower priority tag recovery samples will be completed by the Tag Lab. All tags recovered throughout the season will be examined a second time to insure that they have been properly decoded. All codes will be validated with a master Pacific States Marine Fisheries Commission (PSMFC) list of codes potentially present in Pacific coast fisheries. Fully edited tag code and sampling data from all samples collected during the season will be forwarded to the Cordova office for final summarization and analyses. A complete historic database of coded-wire tag information from PWS tagging and tag recovery programs will be maintained by the ADF&G Tag Lab, the PSMFC and, the Cordova ADF&G. The ADF&G historic fish ticket catch database is maintained at the ADF&G Juneau headquarters office and in the Cordova area office. All coded wire tagging and recovery data and all fisheries harvest data are freely available from any of these sources.

Postseason Hatchery Contributions and Survival Rates

The contribution of release group t to the sampled common property, cost-recovery, brood stock and special harvests, and escapement, C_t , will be estimated as:

$$\hat{C}_t = \sum_{i=1}^{L} x_{it} \left(\frac{N_i \, \hat{a}_h}{s_i \, p_t} \right) , \qquad (2)$$

where

x_{it} = number of group t tags recovered in ith stratum,
N_i = total number of fish in ith stratum,
s_i = number of fish sampled from ith stratum,
p_t = proportion of group t tagged,
a_h = adjustment factor associated with hatchery h, and
L = number of recovery strata associated with common property, cost-recovery, brood stock, special harvests and escapement in which tag code t was found.

The contribution of release group t to unsampled strata, Cu_t, will be estimated from contribution rates associated with strata which were sampled from the same district-week openings as the unsampled strata:

$$\hat{Cu}_t = \sum_{i=1}^{U} \left[N_i * \left(\frac{\sum_{j=1}^{S} \hat{C}_{tj}}{\sum_{j=1}^{S} N_j} \right) \right], \qquad (3)$$

where

U	=	number of unsampled strata,
N_i	=	number of fish in ith unsampled stratum
S	=	number of strata sampled in the period in which the unsampled stratum resides,
C_{tj}	=	contribution of release coded with tag t to the sampled stratum j, and
N_j	=	number of fish in jth sampled stratum.

When a district-week opening is not sampled at all (an infrequent occurrence), the catch from that opening will be treated as unsampled catch of the subsequent opening in the same district.

An estimate of the contribution of tag group t to the total PWS return for 1995 will be obtained through summation of contribution estimates for sampled and unsampled strata. An estimate of the total hatchery contribution to the PWS return will be calculated through summation of contributions over all release groups. A variance approximation for $\hat{C}_t$, derived by Clark and Bernard (1987) and simplified by Geiger (1988) will be:

$$\hat{V}(\hat{C}_t) = \sum_{i=1}^{L} x_{it} \left[\frac{N_i \hat{a}}{s_i p_t} \right] \left[\frac{N_i \hat{a}}{s_i p_t} - 1 \right]. \qquad (4)$$

Assuming that covariances between contributions of different release groups to a stratum can be ignored, summation of variance components over all tag codes will provide an estimate of the variance of the total hatchery contribution. Inspection of the formula given by Clark and Bernard (1987) for the aforementioned covariances shows them to be negligible for large N and s, and to be consistently negative, so that when ignored, conservative estimates of variance are obtained. Variances associated with unsampled strata are believed to be small (Sharr et al., 1994d).

The survival rate of the release group coded with tag t (S_t), will be estimated as:

$$\hat{S}_t = \frac{\hat{C}_t + C\hat{u}_t}{R_t} , \qquad (5)$$

where

$\underline{C}_t$ = contribution of release coded with tag $\underline{t}$ to sampled strata,

$\underline{Cu}_t$ = contribution of release group coded with tag $\underline{t}$ to unsampled strata,

$\underline{R}_t$ = total number of fish in release group coded with tag $\underline{t}$ released from hatchery.

Assuming the total release of fish associated with a tag code is known with negligible error, and that the cumulative variance contributions associated with the unsampled strata are small, a suitable variance estimate for $\hat{\underline{S}}_t$ is given by:

$$\hat{V}(\hat{S}_t) = \frac{\sum_{i=1}^{L} x_{it} \left[\frac{N_i \hat{a}}{s_i p_t}\right]\left[\frac{N_i \hat{a}}{s_i p_t} - 1\right]}{R_t^2} . \qquad (6)$$

Inseason Hatchery Contributions

Inseason fisheries decisions which must be made on very short notice require rapid, real time analysis of coded wire tag data. Three inseason estimates of hatchery contributions of pink salmon will be generated for each opening. The first and most timely estimate will be calculated using knowledge of numbers of tags (undecoded) found in a sample taken from the catch and an estimate of that catch. The presence of tags in adipose-clipped fish will be discerned by passing their excised heads over a scanner identical to those used by the Tag Lab. The estimate of the catch aboard tenders will be obtained from tender captains or processor operators. In the event that catch estimates cannot be obtained, a simple unweighted average (over sampled tenders) proportion of hatchery fish in the catch will be reported. Estimation using undecoded tags requires that assumptions be made about expansion ($1/\underline{p}_t$) and adjustment ($\underline{a}$) factors (see Equation 2). For fishery openings in the western and northern portions of PWS, late run returns from PWSAC facilities are assumed to be the only hatchery contributors. For openings in the Southwestern district, an expansion factor which is a weighted average of all expansion factors associated with tags released at the A.F. Koernig, W. Noerenberg and Cannery Creek hatcheries in 1993, will be used. The weighting scheme depends upon historical contributions of hatcheries to the district in question. A similar weighting scheme for expansion factors will be used for the Coghill and Northern districts and will involve historical contributions associated with the Cannery Creek and W. Noerenberg hatcheries. For openings in the eastern part of the Sound, returns to the VFDA Solomon Gulch facility are assumed to be

the only hatchery contributors. With respect to an appropriate expansion factor for these openings, the average of all factors associated with tags released from the Solomon Gulch facility in 1993 will be used. An average historical (1989-1994) adjustment factor associated with the W. Noerenberg facility will be used for all inseason contribution estimates. These estimates can be made available at any stage of the unloading process, and only require that some sampling has been conducted. The precision of the estimate is, of course, increased as more of the catch is sampled. Such readily available, but less precise estimates will play a significant role in those fishery management decisions that have to be made before the more precise estimates which require exact catch figures and larger sample sizes are available. Calculations of in-season contributions will follow those used to generate post-season results (Equation 2). The second estimator will be identical to the first, except that it will be calculated only after sampling of an opening is completed and after exact tender loads have been reported. The result will be a less timely but more reliable estimate. The third estimator will be less timely still because it will rely on exact catch data and extracted and decoded tags. Use of code-specific expansion factors will, however, provide hatchery-specific contribution estimates and will mean a reduction in bias of the estimates resulting from use of average expansion factors.

Alternatives

Estimation of stock specific contributions to large commercial fisheries requires some sort of natural or man-induced mark which is characteristic of the stock or groups of stocks to be distinguished. Any mark to be used for estimates of stock specific catch contributions for inseason fisheries management must: (1) be naturally present in all or a fixed portion of the population or easy to apply permanently to a fixed portion of the population in the early life stages before stock mixing occurs, (2) be easy to distinguish in adult returns, (3) be present or can be applied to a large enough portion of the population such that significant numbers can be recovered among adult returns in a cost-effective manner for accurate and precise estimates of catch contributions, and (4) not affect survival or behavior of fish.

Until recently, coded wire tag technology has been the only man-induced mark available which meet most of the above criteria. Although this technology has given us the opportunity to distinguish hatchery and wild fish in commercial harvests with reasonable accuracy and precision, it is not without problems. The pink salmon tagging program in PWS is the largest of its kind in the world and is pushing the limit of the technology for both application and recovery. Application in very small fish such as pink salmon may affect survival, may not be permanent (tag loss), and tagging may affect behavior. Some methods exist and are used to adjust for tag loss from differential mortality and tag shedding. The effect of tag-induced straying, though thought to be small, is, however, difficult to accommodate. On the recovery side, large and expensive sampling programs must be implemented to ensure sufficient precision of contribution estimates.

An alternative mark which circumvents the above drawbacks would be desirable. The most likely alternative to coded wire tags are thermal or chemical otolith marks. Otolith marking methods meet all of the five criteria described above. Thermal marks have been thoroughly tested in all salmon species. They are permanent, are easily applied to every individual in a hatchery population and are less expensive to apply and recover relative to coded wire tags. Because they can be applied to every individual in the population, contribution estimates based on thermal marks will be more accurate and precise than those based on coded wire tags. Differential mortality of tagged fish will no longer be a problem. Because the mark is non intrusive, permanent tag loss through shedding and straying of tagged fish will also be eliminated. A large scale otolith marking program for PWS hatchery pink salmon releases has been proposed for 1995 (Study 95320C). Recoveries of otolith marks from these releases can begin in 1997.

Chemical marking of otoliths has not been tested in salmon to the same degree as thermal marking, but is widely used in other species. Chemical marking requires that young fish be fed or immersed in a chemical agent which leaves a recognizable band on otoliths or skeletal structures. Tetracycline is one widely used chemical which deposits a distinctive skeletal or otolith growth band which is florescent under ultraviolet light. Because it is retained in the tissues, Food and Drug Administration permits for its use in fish destined for human consumption fish were initially difficult to obtain but permitting is now done on a routine basis for many species. The method has promise for marking wild fish where heated water is not available for thermal marks.

To date no natural markers have been discovered in PWS pink salmon which allow researchers to distinguish hatchery stocks from all wild stocks. Genetic marks are a possibility but hatchery parent stocks in PWS originated from wild stocks in the area and are shared by more than one facility, and hence are probably not distinguishable.

Literature Cited

Bue, B.G., S. Sharr, S.D. Moffitt, and A.K. Craig. (in press). Effects of the Exxon Valdez oil spill on pink salmon embryos and preemergent fry. In Rice, S.D., R.B. Spies, D.A. Wolfe, and B.A. Wright, editors. Exxon Valdez Oil Spill Symposium Proceedings. American Fisheries Society Symposium.

Clark, J.E., D.R. Bernard. 1987. A compound multivariate binomial hypergeometric distribution describing coded microwire tag recovery from commercial salmon catches in southeastern Alaska. Informational Leaflet 261. Alaska Department of Fish and Game, Division of Commercial Fisheries.

Geiger, H.J. 1990. Parametric bootstrap confidence intervals for estimating contributions to fisheries from marked salmon populations. American Fisheries Society Symposium 7:667-676.

Geiger, H.J., and S. Sharr. 1990. The 1988 Tag Study of Pink Salmon From The Solomon Gulch Hatchery in Prince William Sound, Alaska. In Pilot Studies in Tagging Prince William Sound Hatchery Pink Salmon With Coded Wire Tags. Fisheries Research Bulletin No. 90-02. Alaska Department of Fish and Game, Division of Commercial Fisheries, Juneau, Ak.

Peltz, L., and H.J. Geiger. 1990. A Tagging Study of the Effect of Hatcheries on the 1987 Pink Salmon Fishery in Prince William Sound, Alaska. In Pilot Studies in Tagging Prince William Sound Hatchery Pink Salmon With Coded Wire Tags. Fisheries Research Bulletin No. 90-02. Alaska Department of Fish and Game, Division of Commercial Fisheries, Juneau, Ak.

Peltz, L., and J. Miller. 1990. Performance of half-length coded-wire tags in a pink salmon hatchery marking program. American Fisheries Society Symposium 7:244-252.

Sharr, S., B.G. Bue, S.D. Moffitt, and A.K. Craig. 1994a. Injury to salmon eggs and preemergent fry in Prince William Sound - F/S 1. State/Federal Natural Resources Damage Assessment Final Report. Exxon Valdez Trustee Council, Anchorage, Alaska.

Sharr, S., J.E. Seeb, B.G. Bue, S.D. Moffitt, A.K. Craig, and G.D. Miller. 1994b. Injury to salmon eggs and preemergent fry in Prince William Sound - R60C. State/Federal Natural Resources Restoration Final Report. Exxon Valdez Trustee Council, Anchorage, Alaska.

Sharr, S., J.E. Seeb, B.G. Bue, A.K. Craig, and G.D. Miller. 1994c. Injury to salmon eggs and preemergent fry in Prince William Sound - R93003. State/Federal Natural Resources Restoration Final Report. Exxon Valdez Trustee Council, Anchorage, Alaska.

Sharr, S., T.M. Willette, C.J. Peckham, D. G. Sharp, J.L. Smith, D.G. Evans, and B.G. Bue. 1994d. Coded Wire Tag Studies On Prince William Sound Pink Salmon, 1989-1991. State/Federal Natural Resources Damage Assessment Final Report. Exxon Valdez Trustee Council, Anchorage, Alaska.

Sharr, S., C.J. Peckham, D. G. Sharp, J.L. Smith, D.G. Evans, and B.G. Bue. 1994e. Coded Wire Tag Studies On Prince William Sound Pink Salmon, 1992. State/Federal Natural Resource Restoration Draft Report .Exxon Valdez Trustee Council, Anchorage, Alaska.

Sharr, S., C.J. Peckham, D. G. Sharp, D.G. Evans, and B.G. Bue. 1994f. Coded Wire Tag Recoveries From Pink Salmon in Prince William Sound Salmon Fisheries, 1993. State/Federal Natural Resource Restoration Draft Report. Exxon Valdez Trustee Council, Anchorage, Alaska.

Willette, T.M. and G. Carpenter. 1994. Early marine salmon injury assessment in Prince William Sound - F/S #4. State/Federal Natural Resources Damage Assessment Final Report. Exxon Valdez Trustee Council, Anchorage, Alaska.

C. Contracts:

This is a cooperative program funded by the Trustee Council, ADF&G, Prince William Sound Aquaculture Corporation, and Valdez Fisheries Development Association. ADF&G, Commercial Fisheries Management and Development Division will ensure that 1) pink salmon catches are scanned for pink salmon with clipped adipose fins; 2) representative samples of heads from adipose-clipped pink salmon are collected and shipped to the Juneau Tag Laboratory; 3) information obtained from this project is adequately documented and cataloged, 4) biometrics review of methods and data analysis is obtained, and 5) reports documenting results are written. The ADF&G Tag Laboratory in Juneau will extract and decode all coded-wire tags from samples of pink salmon heads sent from PWS. Funds from PWSAC and VFDA for coded-wire tag recovery operations will be conveyed to ADF&G through cooperative agreements.

D. Location:

This project will be conducted in the PWS region. Pink salmon fry will be marked at the three hatcheries operated by Prince William Sound Aquaculture Corporation (Armin F. Koerning, Wally H. Nurenberg, and Cannery Creek) and the single hatchery operated by the Valdez Fisheries Development Association (Solomon Gulch). Sampling sites will depend upon disposition of the commercial and hatchery cost-recovery harvests and will most likely occur in various PWS communities (i.e. Cordova, Valdez, and Whittier), Seward, Anchorage, Kenai and Kodiak. Some sampling may also be done aboard processing vessels in PWS as well as at hatchery sites.

SCHEDULE

A. Measurable Project Tasks for FY 96

October 1995 - June 1996:	Hire personnel; order supplies; create and test computer programs and spreadsheets; data analysis and reporting
March - April 1996:	Apply tags to pink salmon fry at hatcheries
April 15, 1996:	Submit annual project report for FY 95
June - Sept 1996:	Scan catches; recover tagged fish in harvests and brood stocks; recover/decode tags; provide inseason catch composition estimates by time and area
April 15, 1997:	Submit annual report for FY 96

B. Project Milestones and Endpoints

March - April 1996:	Apply tags to brood year 1995 pink salmon fry
April 15, 1996:	Annual report for FY 95
June - September 1996:	Estimate harvest stock composition for brood year 1994
March - April 1997:	Apply tags to brood year 1996 pink salmon fry (if two year overlap with otolith marking program approved by Trustee Council)
April 15, 1997:	Annual report for FY 96
June - September 1997:	Estimate harvest stock composition for brood year 1995
April 15 1998:	Completion report for program (if only one year overlap with otolith program approved by Trustee Council)
June - September 1998:	Estimate harvest stock composition for brood year 1996 (if these fry were tagged)
April 15 1999:	Completion report for program (if two year overlap with otolith marking program approved by Trustee Council)

C. Project Reports

An annual project report will be submitted by April 15 of each year.

COORDINATION AND INTEGRATION OF RESTORATION EFFORT

The foundations for this project were firmly established in joint feasibility studies which were conducted by ADF&G and non-profit aquaculture associations in PWS beginning in 1986 and extending through 1988. Results of these studies have been summarized by Peltz and Miller (1990), Peltz and Geiger (1990), and Geiger and Sharr (1990). During the damage assessment process large scale tagging and recovery projects were instituted and perfected by Natural Resources Damage Assessment (NRDA) Fish/Shellfish (F/S) Study #3. Damage assessment funds were expended for tagging hatchery releases of pink salmon in 1989 and 1990 and wild populations of pink salmon in 1990 and 1991 (NRDA F/S Study #3). Tag recovery efforts for wild and hatchery pink salmon were funded by damage assessment funds in 1989, 1990, and 1991 (F/S Study #3) and by restoration funds in 1992 and 1993 (Restoration Studies 60A and 93067). Results of damage assessment and restoration coded wire tag studies have been reported by Sharr et. al. (1994d, 1994e and 1994f). Following the loss of funds for further tagging of hatchery stocks of pink salmon in 1990, the private non-profit aquaculture groups in PWS have continued to tag pink salmon releases at their own expense. Tags applied to pink fry from the four pink salmon hatcheries in PWS in 1993 must be recovered. Prince William Sound Aquaculture Corporation, Valdez Fisheries Development Association, and the ADF&G have pooled their resources to come up with approximately half of the funds required to

field a full fledged pink salmon tag recovery effort in 1995. The additional funds to complete tag recovery efforts and data analyses are to be provided by the Trustee Council.

The pink salmon coded-wire tag recovery program has complimented several other projects since 1989. Improved escapement estimates for PWS pink salmon from NRDA F/S Study 1 and restoration Study 60B were used in conjunction with catch contribution estimates from the coded wire tag recovery projects to adjust fishery exploitation rates and achieve wild stock escapements. Growth and survival estimates from NRDA F/S Study #4 could not have been obtained without F/S Study #3 which provided coded wire tagged fish of known origin and release timing. The pink salmon coded-wire tag recovery program is also integrated with several other salmon restoration projects being conducted in PWS in 1995. It will complement the Sound Ecosystem Assessment (SEA) program, the multi-disciplinary program designed to develop of understanding of the mechanisms regulating ecosystem function in PWS. SEA is focused on interactions of pink salmon and herring with other components of the PWS ecosystem. Marked pink salmon provide a valuable tool for examining interactions between wild and hatchery salmon during the early marine period. The salmon growth component of SEA uses marked pink salmon to evaluate habitat overlap between wild and hatchery salmon, to examine the size composition of wild and hatchery salmon in mixed schools, and to estimate juvenile salmon mortality during the time of ocean residence. The salmon predation component of SEA uses marked pink salmon to determine whether predators select wild or hatchery salmon.

ENVIRONMENTAL COMPLIANCE

This project has qualified for a categorical exclusion to the requirements of the National Environmental Policy Act.

PERSONNEL

The Principal Investigator (PI) for the project will be a permanent full-time Fisheries Biologist III (FB III) for the Alaska Department of Fish and Game. The PI will be responsible for writing project operational plans, administering project budgets, quality control of data collection, supervising data analyses and, co-authoring final reports. A Fisheries Biologist II (FB II) will supervise day to day project operations, maintain data quality, assist in data analyses, and coauthor final reports. The FB II will be assisted by one permanent seasonal Fisheries Biologist I (FB I). The FB I will be in charge of supervising day to day sampling activities in Cordova and will assist the PL in supervising sampling at other ports, on floating processors, and at hatcheries. Non-permanent Fish and Wildlife Technician III's (FWT III) will be stationed in Cordova and Valdez and will assist the FB I as crew leaders. The crews in each port will be non-permanent FWT II's. Each day, two persons on each crew will scan pink salmon at each processing plant. Under the supervision of the FB I, the FWT III's will conduct daily data logging, editing and archiving activities in Cordova and Valdez.

A Biometrician I from the ADF&G Commercial Fisheries and Development Division Region II office in Anchorage will provide biometrics support for the project. The Biometrician I will assist in experimental design, inseason and post season data analyses, and report writing.

The PI, FB II or, FB I will maintain daily phone contact with project technicians stationed in ports other than Cordova or Valdez and at several remote hatchery locations. Copies of data forms from these sites will be faxed to Cordova daily and heads from sampled fish will be shipped once or twice weekly to Cordova via scheduled commercial flights or via chartered aircraft depending upon which is available. The PL, APL, or project Fisheries Biologist I's will make routine supervisory visits to each sampling port via chartered or commercial aircraft at least twice monthly for sampling quality control inspections, data collections, and industry contacts. The Biometrician I will travel to Cordova several times during the season to assist with inseason data analyses and occasionally after the season to assist with final data analyses and report writing.

Fisheries Biologist III Principal Investigator - To be announced.

RENATA RIFFE - Fisheries Biologist II Research Biologist

Ms. Riffe has a Master of Science in Statistics from Colorado State University (1994), a Master of Science in Fisheries Management from the University of Alaska, Fairbanks (1987), and a Bachelor of Science in Fishery Biology from Colorado State University (1981). Since October 1994 Ms. Riffe has worked on the coded wire tag project as an FBII Research Biologist in the capacity of Assistant Project Leader. Prior to her current position, (from June 1991 - October 1994), she was employed as a biologist with ADF&G , Sport Fish Division in Fairbanks, Alaska, and assisted in projects concerning abundance estimation and population evaluation of pike, grayling, humpback whitefish, least cisco, rainbow trout, burbot, chum salmon, and king salmon. From May 1982 - January 1991, she worked as a technician with ADF&G, Commercial Fisheries Management and Development Division in Juneau, Alaska. Her primary duties involved sampling commercial salmon fisheries and salmon escapements, with some report writing. She also developed discriminant function models for stock separation of Lynn Canal sockeye salmon, by scale pattern analysis, developed a computer model which simulated migratory timing of salmon escapements, and evaluated truncated escapement counts. She has authored reports for ADF&G on estimates of abundance and survival rates of round whitefish, compilation of age and length data for rainbow trout in southwest Alaska, and migratory timing of salmon in the Situk River, Alaska.

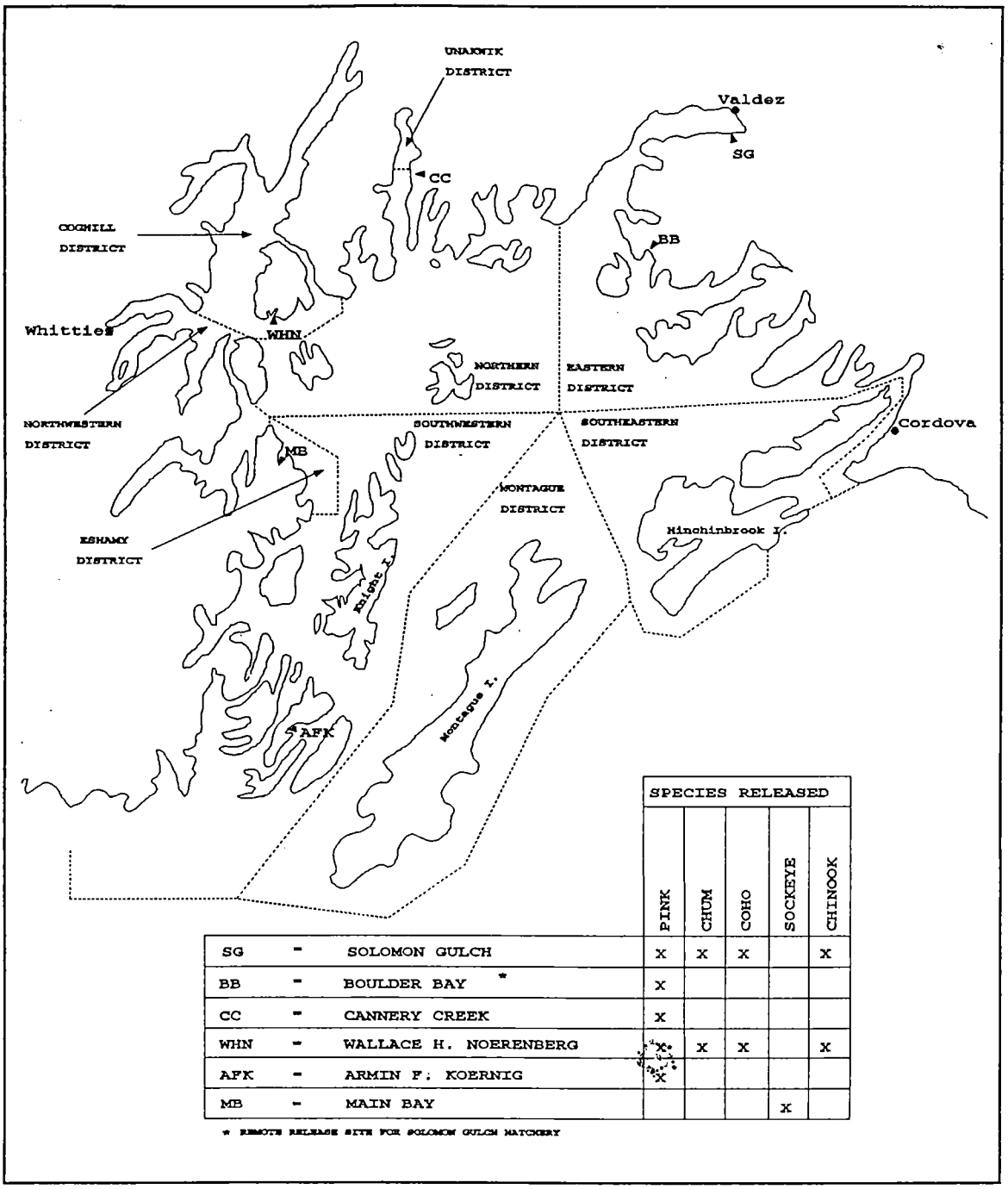
SEAWAN GEHLBACH - Fisheries Biologist I

Ms. Gehlbach has a Bachelor of Science in biology from the University of New Hampshire (1992). Ms. Gehlbach has worked on the coded wire tag project as an FBI for the past two fishing seasons. Her responsibilities include hiring and supervising 20 Fish and Wildlife Technician II's that sample in eight ports around PWS. In the absence

of a project FB-I this previous season, she was also responsible for the duties of the current APL, and produced inseason data analysis for management staff and post season data analysis for the annual coded wire tag reports. Prior to her current position with ADF&G, she worked for Sport Fish Division in Juneau, as a short term Fish and Wildlife Technician II; her duties included collecting coded wire tag data and catch information for the sport fishery. Ms. Gehlbach has also worked for the Douglas Island Pink and Chum (DIPAC) hatchery in Juneau as a field observer, and later in the hatchery as a member of the incubation and broodstock collection crews.

DAVID EVANS - Biometrician I

Mr. Evans has a Bachelor of Science in soil science from the University of Nottingham (U.K.), a Master of Science and a Doctor of Philosophy degree in soil science from the University of Guelph (Ontario, Canada), and a Master of Science in statistics from Oregon State University. David has worked with the Alaska Department of Fish and Game since October, 1991. His primary responsibility has been analysis of coded-wire-tag data from PWS. He has designed the statistical procedures and computer spread sheets used for inseason analysis of tag recovery data, has overseen most of the post season data analyses and has co-authored interim and final reports for the 1991 NRDA F/S Study #3, the 1992 Restoration Study 60C, and the 1993 Restoration study 93067.



			SPECIES RELEASED				
			PINK	CHUM	COHO	SOCKEYE	CHINOOK
SG	-	SOLOMON GULCH	X	X	X		X
BB	-	BOULDER BAY *	X				
CC	-	CANNERY CREEK	X				
WHN	-	WALLACE H. NOERENBERG	X	X	X		X
AFK	-	ARMIN F. KOERNIG	X				
MB	-	MAIN BAY				X	

* REMOTE RELEASE SITE FOR SOLOMON GULCH HATCHERY

Figure 1. Fishing districts and hatcheries of Prince William Sound, Alaska

1996 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET
October 1, 1995 - September 30, 1996

Budget Category:	Authorized FFY 1995	Proposed FFY 1996	LONG RANGE FUNDING REQUIREMENTS					
			Estimated FFY 1997	Estimated FFY 1998	Estimated FFY 1999	Estimated FFY 2000	Estimated FFY 2001	Estimated FFY 2002
Personnel		$116.2						
Travel		$12.7						
Contractual		$100.6						
Commodities		$2.9						
Equipment		$0.0						
Subtotal	$0.0	$232.4						
General Administration		$24.5						
Project Total	$0.0	$256.9	$256.9	$256.9	$85.0	$0.0	$0.0	$0.0
Full-time Equivalents (FTE)		2.2						
	Dollar amounts are shown in thousands of dollars.							
Other Resources								

Comments: This is a cooperative project between the Trustee council, Alaska Department of Fish and Game, Prince William Sound Aquaculture Corporation (PWSAC) and Valdez Fisheries Development Association (VFDA). Following is a breakout of funds provided by each entity:

Trustee Council	$256.9 k
ADF&G	$80.0 k
PWSAC	$100.0 k
VFDA	$26.2 k

1996

Prepared:

Project Number: 96186
Project Title: Coded Wire Tag Recoveries from Pink Salmon, PWS
Agency: AK Dept. of Fish & Game

FORM 3A
AGENCY
PROJECT
DETAIL

5/9/95

1996 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1995 - September 30, 1996

Personnel Costs:			GS/Range/	Months	Monthly		Proposed
PM	Name	Position Description	Step	Budgeted	Costs	Overtime	FFY 1996
	David Evans	Biometrician I	17E	5.0	5,198	0	26.0
	PCN 115062	FBIII	18A	3.0	5,371	0	16.1
		FTII(Valdez)	9A	3.5	2,159	4,922	12.5
		FTII(Anchorage)	9A	2.0	1,945	1,800	5.7
		FTII(Kodiak)	9A	1.0	2,120	1,580	3.7
		FTII(Kenai)	9A	2.0	1,945	1,800	5.7
		FTIII(Cordova)	9A	2.0	2,439	3,593	8.5
	Seawan Gehlbach	FBI	14B	7.0	4,291	0	30.0
*	PCN 117021	FB-III	18L	1.0	6,333	0	6.3
*	PCN 116110	LIB-I	17J	0.3	5,530	0	1.7
							0.0
							0.0
		Subtotal		26.8	37,331	13,695	
Those costs associated with program management should be indicated by placement of an *.						Personnel Total	$116.2

Travel Costs:		Ticket	Round	Total	Daily	Proposed
PM	Description	Price	Trips	Days	Per Diem	FFY 1996
*	Fishery Biologist III and II travel to Anchorage for workshops	224	3	9	150	2.0
	Supervisory trips to Whittier	224	4	8	150	2.1
	Supervisory trips to Anchorage	224	4	8	150	2.1
	Supervisory trips to Seward	224	3	6	150	1.6
	Supervisory trips to Kodiak	610	3	5	150	2.6
	Supervisory trips to Kenai	300	4	7	150	2.3
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
Those costs associated with program management should be indicated by placement of an *.					Travel Total	$12.7

1996

Project Number: 96186
Project Title: Coded Wire Tag Recoveries from Pink Salmon, PWS
Agency: AK Dept. of Fish & Game

FORM 3B
Personnel
& Travel
DETAIL

/95

1996 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET
October 1, 1995 - September 30, 1996

Contractual Costs:	Proposed
Description	FFY 1996
Tag Lab Costs	75.0
Air Charters for brood stock sampling	2.0
Air Charters for Supervision and Data Transport	12.2
Dept. of Transportation Vehicle Rental	3.4
Office Costs	3.6
Renting Magnetic Tag Detectors	4.4
When a non-trustee organization is used, the form 4A is required. **Contractual Total**	$100.6

Commodities Costs:	Proposed
Description	FFY 1996
Rain gear, gloves, knives, sampling kits, supplies	2.9
Commodities Total	$2.9

1996

Project Number: 96186
Project Title: Coded Wire Tag Recoveries from Pink Salmon, PWS
Agency: AK Dept. of Fish & Game

FORM 3B
Contractual & Commodities DETAIL

5/9/95

1996 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET
October 1, 1995 - September 30, 1996

New Equipment Purchases: Description	Number of Units	Unit Price	Proposed FFY 1996
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
Those purchases associated with replacement equipment should be indicated by placement of an R.		**New Equipment Total**	$0.0

Existing Equipment Usage: Description	Number of Units	Inventory Agency

1996

Project Number: 96186
Project Title: Coded Wire Tag Recoveries from Pink Salmon, PWS
Agency: AK Dept. of Fish & Game

FORM 3B
Equipment
DETAIL

/95

This replaces earlier version of DPD that went out in peer reviewers notebook 5/5/95.

Construction of a Linkage Map for the Pink Salmon Genome

96190

Project Number:	
Restoration Category:	Research
Proposer:	Fred W. Allendorf University of Montana
Lead Trustee Agency:	ADFG
Duration:	Five years
Cost FY 96:	$240,000
Cost FY 97:	$250,000
Cost FY 98 - 00:	to be determined
Geographic Area:	Prince William Sound
Injured Resource:	Pink salmon

ABSTRACT

We propose to construct a detailed genetic linkage map for pink salmon by analyzing the genetic transmission of several hundred DNA polymorphisms. The ability to genetically map the location of oil induced lesions will allow the thorough identification, description, and understanding of oil induced genetic damage. This research will also aid other recovery efforts with pink salmon, including estimation of straying rates, description of stock structure, and testing if marine survival has a genetic basis.

INTRODUCTION

We propose to construct a genetic linkage map for the pink salmon genome. Such a map would provide the necessary platform for identifying genetic damage in pink salmon inhabiting oiled streams following the March 1989 *Exxon Valdez* oil spill (EVOS). A detailed genetic map would also aid other recovery efforts with pink salmon, including estimation of straying rates, description of stock structure, and testing if marine survival has a genetic basis.

Genetic linkage maps have provided the necessary information for understanding genetic variation in species since the rediscovery of Mendel's principles early in this century. A genetic map plays a similar role for a geneticist that a geographical map plays for the explorer of new territories. For many years, genetic maps could only be constructed in a very few model species that were suitable for extensive genetic manipulation (e.g., Drosophila and mice). Recent advances in molecular genetics now make it possible to uncover enough genetic markers to construct a detailed genetic linkage map in almost any species (Postlethwait et al. 1994).

This work will have important significance for ongoing work with pink salmon under the project Oil-Related Embryo Mortalities (Restoration Study 95191A). That project proposes to identify germline mutations in pink salmon exposed to oil. As explained in the FY95 Detailed Project Description (95191A), genetic damage induced by oil may either be small changes in

nucleotide sequence (microlesions) or large-scale changes in chromosome structure (macrolesions). Restoration Study 95191A proposes to screen pink salmon DNA in order to detect such lesions. A detailed genetic map for pink salmon would be invaluable for interpreting the results of Restoration Study 95191A in several ways. First, it will be possible by following the inheritance of any DNA lesions to determine if they are micro- or macro-lesions. Second, these lesions can be mapped to determine if they are randomly spread throughout the genome or if they occur at mutational "hot spots" that are susceptible to oil induced damage.

The construction of a detailed linkage map will also serve as a basis for understanding genetic aspects of pink salmon restoration and supplementation. This work will be performed on both odd- and even-year pink salmon because of the known genetic differences between these fish. In addition, the outbreeding depression found in hybrids suggests that there are chromosomal differences between odd- and even-year fish (Gharrett and Smoker 1991).

NEED FOR THE PROJECT

A. Statement of Problem

Elevated embryo mortalities were detected in populations of pink salmon (*Oncorhynchus gorbuscha*) inhabiting oiled streams following the March 1989 *Exxon Valdez* oil spill (EVOS). These increased rates of mortality persisted through the 1993 field season, three generations after the oil spill, suggesting that genetic damage may have occurred as a result of exposure to oil during early developmental life-stages. The consequences of the putative genetic damage include impaired physiological function of individuals and reduced reproductive capacity of pink salmon populations.

The aggregate of evidence from the field studies and incubation experiment suggests that the embryos exposed to oil in 1989 and 1990 accumulated deleterious mutations in the germline (reviewed in Detailed Project Description of Project 95191A). This hypothesis of genetic damage is consistent with previous field observations and laboratory experiments on the effects of crude oil on early life stages of fish. Long term intra-gravel oil exposures (7-8 months) to freshly fertilized eggs provide embryos sufficient time to accumulate polynuclear aromatic hydrocarbons (PAH's) from very low aqueous concentrations of crude oil. PAH's are abundant in crude oil and are potent clastogens (i.e. capable of breaking chromosomes).

Mironov (1969) observed reduced survival of fish embryos and larvae exposed to very low aqueous doses (1 ul oil/l seawater) of oil. Longwell (1977) reported genetic damage in pelagic embryos affected by the ArgoMerchant oil spill. Moles et al. (1987) confirmed that pink salmon embryos take up PAH's and demonstrated that the uptake was much greater in an intertidal environment than in strictly freshwater conditions. Biggs et al. (1991) found greater numbers of chromosome aberrations in larval herring which incubated in oiled areas than in non-oiled areas. It is likely that the same type of damage may have occurred in pink salmon, and this damage could have affected the germline of exposed individuals (Malkin 1994).

B. Rationale

The recovery objective for pink salmon is healthy and productive populations that exist at prespill levels or levels in unoiled areas. An indication of recovery is when egg mortality in oiled areas match prespill or levels in unoiled areas. The genetic map we propose to construct will be essential for detecting and understanding causes of reduced egg and embryo survival in oiled areas.

The genetic damage caused by exposure to oil may persist longer in populations of pink salmon than in other vertebrates because of the tetraploid nature of the salmonid genome. Salmonid fishes went through a tetraploid event some 25 million years ago that duplicated their entire genome (Allendorf and Thorgaard 1984). The extra genes in pink salmon may mask the effects of mutational damage caused by recessive deleterious alleles. The effects of these deleterious mutations may be uncovered in subsequent generations.

This fundamental genetic information would be of great assistance for three of the four Components of the Pink Salmon Restoration Program:

Toxic Effect of Oil on Pink Salmon: genetic mapping is essential for identifying genetic lesions induced by exposure to oil.

Stock Separation and Management: the genetic markers identified in the course of this study will provide greatly increased power and resolution to identify stocks of pink salmon on a very fine scale.

Supplementation: the genetic markers will also be of great value in genetically identifying fish from supplementation programs and detecting their ecological and genetic interactions with wild fish.

Information gained from this study will provide resource managers with insight into the magnitude and persistence of damages sustained by wild pink salmon due to EVOS. Efforts to restore damaged pink salmon populations depend upon the ability of fishery managers to identify sources of reduced survival and to monitor their persistence. The potential of long term oil exposures to cause genetic damage needs to be understood so that spawning escapement goals can be adjusted if necessary. In addition, verification of the genetic hypothesis would provide the first evidence that the germline of fish exposed to chronic or acute sources of oil pollution can be affected.

Our results may have relevance for other fish species as well (e.g., Pacific herring, *Clupea pallasi*). Comparative gene mapping has shown that the linkage groups in a wide variety of vertebrates have been conserved. If we find that certain loci in pink salmon are mutational "hotspots" for oil induced damage, it would be possible to look for similar hotspots in Pacific herring or other fish species (e.g., rockfish, *Sebastes*).

C. Summary of Major Hypotheses and Objectives

Our primary objective is to construct a detailed genetic linkage map for pink salmon by analyzing the genetic transmission of several hundred DNA polymorphisms in pink salmon. We will use several types of different genetic markers. The primary type will be so-called random amplified polymorphic DNA's (RAPD's) using the polymerase chain reaction (PCR). Our goal is to map several hundred of these loci so that we have a detailed saturated linkage map. We will use these RAPD loci as a basis for mapping other DNA polymorphisms (e.g., microsatellite loci), as well as loci encoding protein polymorphisms (allozymes).

This genetic map will allow testing of several hypotheses of Project 95191A related to identifying sites of genetic damage (lesions) induced by exposure to oil. The primary hypotheses are: (1) Genetic lesions have been induced by oil exposure; (2) These lesions are caused by point mutations (microlesions); (3) These lesions are caused by chromosomal breakage and deletions (macrolesions).

Secondary objectives of this proposed research are to develop a large number of genetic markers for estimation of straying rates, stock separation, and management of pink salmon and for evaluating the success and potential detrimental effects of supplementation programs. A genetic map will also allow us to test the hypothesis that marine survival has a genetic basis to it. We also have a variety of specific genetic hypotheses that we will test as explained in the more detailed Project Design.

D. Completion Date

We propose to continue this work for five years. This will allow us to complete multigenerational studies of inheritance with pink salmon. New genetic markers will be developed in the first year of the study. However, it will take several years to map the markers in both males and females in both odd- and even-year fish. Different objectives will be met throughout the course of the research. This project would be carried out in collaboration with Dr. James E. Seeb, Alaska Department of Fish and Game. The primary laboratory aspects of this research would be carried out at the University of Montana. We propose to use the Alaska SeaLife Center Research Facilities at Seward when they are available. Such a facility will greatly strengthen genetic investigations with pink salmon by allowing multigenerational studies. We cannot estimate budget costs after the first two years without knowing the cost structure of using the Alaska SeaLife facility.

COMMUNITY INVOLVEMENT

This is a specialized project that will not benefit directly from the knowledge of local/traditional people. We will hire local residents when possible for assistance (e.g., maintaining of fish). In addition, as an professional educator in a university I am very committed to educational efforts. These will include informational meetings in the communities of Prince William Sound, including the Alaska SeaLife Center in Seward, and articles in the Trustee Council newsletter.

FY 96 BUDGET

Personnel	124.7
Travel	4.5
Commodities	23.5
Equipment	43.1
Subtotal	195.8
Indirect Costs	44.2
Total	240.0

PROJECT DESIGN

A. Objectives

Our primary objective is to construct a detailed genetic linkage map for pink salmon by analyzing the genetic transmission of several hundred DNA polymorphisms. Pink salmon have 26 pairs of chromosomes (2N=52; Allendorf and Thorgaard 1984), and, therefore, should have a total of 27 linkage-groups (LG's): 25 autosomes, an X-chromosome, and a Y-chromosome. We plan to map enough variable markers so that a new marker, such as a putative lesion identified in Restoration Study 95191A, can be assigned with high probability to one of the 27 LG's. It is impossible to know how many markers this will require because we do not know the total length of the pink salmon linkage map. The linkage map of the zebrafish (*Danio rerio*) has been estimated to be 2317 centimorgans (cM; Postlethwait et al. 1994). We expect the pink salmon map in females will be longer than this because of the polyploid ancestry of salmonids. However, the linkage map in males will be shorter than in females because of the reduced recombination rate in male salmonids (Johnson et al. 1987). We anticipate that it will be necessary to map approximately 500 markers to insure that new markers can be assigned to an existing LG with high probability (Van der Beek and Van Arendonk 1993). For example, 99% of all loci in the zebrafish are estimated to be located within 20 cM of a marker on the map based upon 414 markers.

This project has the following specific objectives:

1. Develop several hundred variable DNA markers in pink salmon and test them for Mendelian inheritance.

2. Construct a linkage map based upon joint segregation patterns of the DNA polymorphisms detected in previous objective.

3. Map putative lesions identified in Restoration Study 95191A.

4. Test for Mendelian inheritance of markers throughout the genome in progeny of fish exposed to oil. Regions that show aberrant segregation ratios in progeny of fish exposed to oil and normal 1:1 ratios in fish not exposed to oil would be candidates for oil-induced lesions.

5. Test for regions of the genome that are associated with traits of adaptive significance (e.g., marine mortality or run-timing).

6. Test if protein markers (allozymes) are under natural selection such that they may not provide accurate information about the genetic structure and amount of gene flow among populations.

B. Methods

Linkage Map (Objectives 1 & 2)

A useful genetic map should contain genetic markers that are abundant, randomly distributed throughout the genome, highly polymorphic, and readily detectable in many laboratories (Jacob et al.

1995). A map of random amplified polymorphic DNA's (RAPD's) markers fits these criteria (Postlethwait et al. 1994). Our work has found that a polymerase chain reaction (PCR) with genomic DNA from fish of the genus *Oncorhynchus* as a template and a single, 10-nucleotide-long primer of arbitrary sequence generally amplifies 5-10 DNA fragments. We have found differences in the fragment patterns between individuals (scored as presence or absence of fragments) that are inherited as simple Mendelian markers in rainbow trout (*O. mykiss*) and cutthroat trout (*O. clarki*). A dominant allele amplifies the DNA fragment with a specific primer, whereas a recessive allele results in the absence of that fragment.

We will avoid difficulties of dominance with these markers by using haploid progeny in which recessive alleles are not obscured by their dominant alternatives (Lie et al. 1994). Stanley (1983) reported that haploid embryos of Atlantic salmon (*Salmo salar*) will develop until just prior to the stage of hatching if development of the eggs is activated by sperm in which the DNA has been inactivated by UV-radiation. We have used this technique routinely with fishes of the genus *Oncorhynchus* (Forbes et al. 1994). This will allow us to follow the segregation and linkage relationships in haploid progeny from females.

Differences in meiosis between male and female salmonids have been found in all species that have been examined (Allendorf and Thorgaard 1984; Johnson et al. 1987). There generally is greater recombination in females than in males (Johnson et al. 1987; Allendorf et al. 1994). In addition, only disomic inheritance has been reported in females. However, in males some loci show patterns of segregation that approach those expected with tetrasomic inheritance (Allendorf and Thorgaard 1984). We will have to test for segregation and linkage in males as well as females because of these sex-specific differences.

There are three possible approaches to test for segregation and recombination in males. One is genotyping in diploid progeny from parents that have been chosen so that presence or absence of a RAPD allele can be determined unambiguously. A second approach is the typing of haploid progeny from males by PCR based genotyping of single sperm; this has been carried out successfully with human sperm (Schmitt et al. 1994). Individual sperm from a single male are sorted into microtiter plates by flow cytometry, and then a PCR reaction carried out. We will perform pilot studies to determine if the latter method is feasible with pink salmon. A third possibility is to examine joint segregation in androgenetic haploids which are produced by treating eggs with radiation before fertilization with normal sperm (Scheerer et al. 1986). This treatment would be carried out in collaboration with Restoration Study 95191A in their use of androgenesis to test for elevated occurrence of harmful recessive mutations in haploid-androgens of oil-exposed ancestry.

The completion of a full linkage map is a large task. We will try to use and develop as many time and labor saving procedures as possible (Lincoln and Lander 1992; Taylor et al. 1994; Perlin et al. 1994; Archibald 1994). Our initial linkage map will be based upon progeny from females, and will be constructed by computer assisted analysis (Lander et al. 1987). We will compare the recombination rates based upon this map to rates of selected pairs of loci in males. The reduced recombination rates in salmonid males means that it will be easier to assign new markers to a LG using male parents. We will test joint segregation of individual markers from different LG's in females to determine if some of these separate LG's in females are linked in males and are therefore syntenic (on the same chromosome).

Identification and Location of Oil-Induced Lesions (Objectives 3 & 4)

This work will be done in collaboration with efforts to detect oil-induced genetic damage under Component 3 of Restoration Study 95191A. Lesions identified in that study through DNA assays of introns, microsatellite loci, or mutational hot spot regions will be tested for joint-segregation with several hundred DNA markers to identify the location of such lesions in the pink salmon genome. A recent paper has found that microsatellite loci show genetic hypermutability because of defects in DNA mismatch repair (Parsons et al. 1995).

Perhaps a more promising approach, however, is to test for regions of the genome associated with non-random survival in haploid progeny. Restoration Study 95191A will test for decreased survival in haploid androgens of oil-exposed ancestry. Examining the segregation of markers throughout the genome in these androgens would provide a more powerful test for lesions. Regions of the genome that depart from the expected 1:1 Mendelian ratio would be candidates for lesions. We will also compare Mendelian ratios in haploid gynogens in a similar manner to haploid androgens. The examination of segregation in gynogenetic and androgenetic haploids will also allow testing for oil-induced chromosomal rearrangements (e.g., inversions and deletions).

Phenotypic Effects and Fitness (Objectives 5 & 6)

The completion of a genome map for pink salmon will allow us to address important genetic issues related to two other Components of the Pink Salmon Restoration Program. The numerous genetic markers identified in the course of this study will provide greatly increased power and resolution to identify stocks of pink salmon on a very fine scale (Stock Separation and Management). The genetic map will allow us to test for the presence of genes having major effects on phenotypes of importance for the management of pink salmon, and to test for phenotypes associated with specific combinations of multilocus genotypes (Lander and Schork 1994).

This aspect of the research will be performed at the Alaska SeaLife Center Research Facilities in the latter years of the study. Large numbers of marked fish will be released and then collected when they return to the facility at sexual maturity. A large sample of the fish will be collected at release so that the genetic characteristics of the fish can be described prior to the marine phase of the life cycle. We will test for genetic effects on phenotypes of special importance by comparing the released and returning fish. This will allow us to test for genes having a major effect on marine survival.

In addition, previous work has demonstrated genetic differences between early and late run fish, and that differences in run-timing has a genetic basis (Smoker et al. in press). We will compare the genotypes of fish returning to the facility at different times to test for genes having a major effect on run timing. We will use a suite of genetic markers spread uniformly throughout the genome. Regions of the genome that show major associations with run-timing can then be examined in more detail by comparing additional markers within that region. A similar approach using only 10 protein markers in hatchery rainbow trout revealed several regions of genome associated with time of spawning (Leary et al. 1989)

Karl and Avise (1992) reported concordant patterns of genetic differentiation for mitochondrial DNA and four nuclear DNA loci in the American oyster (*Crassostrea virginica*) along

the east coast of North America. In contrast, previous allozyme studies had not detected these genetic differences among these same populations. Karl and Avise concluded that the pattern observed for the DNA markers reflected the historical patterns of isolation and gene flow among these populations while this pattern is obscured in the allozymes because of "balancing selection" at the allozyme loci. Similar results have been reported recently in the Atlantic cod (Pogson et al. 1995). These results provide an important challenge to the generally accepted utility of allozyme markers for describing historical patterns and amounts of gene flow between populations. That is, if allozymes are under strong natural selection then they may not provide accurate information about the genetic structure and amount of gene flow among populations.

Pink salmon that are more heterozygous at allozyme loci have greater viability and growth rates than more homozygous individuals (Altukhov et al. 1991; Zhivotovsky et al. 1987). Similar results have been reported in other salmonid species for many phenotypes of evolutionary importance (e.g., developmental rate, egg size, and disease resistance; reviewed by Ferguson 1992). Positive associations between heterozygosity at allozyme loci and important phenotypic characters, such as growth rate, survival, fertility, disease resistance, developmental rate, and developmental stability, have been described in many organisms (reviewed by Zouros and Foltz 1986; Allendorf and Leary 1986).

The mechanism underlying these associations remains unknown. The possible explanations most often considered are either the associations are be the consequence of heterozygosity at the loci examined, or the loci examined may be in linkage disequilibrium with other loci that affect the traits being studied (Leary et al. 1987). It has been argued that these relationships between multiple locus heterozygosity and phenotypes have been found with allozymes because these loci are important in ATP production and protein catabolism (Koehn et al. 1988). We propose to distinguish between these hypotheses by comparing the effects on marine survival of DNA markers and protein polymorphisms. If the enzyme loci themselves are responsible for this effect, then we would expect to find an association between enzyme genotypes and survival, but not between genotypes at DNA markers spread throughout the nuclear genome.

C. Contracts and Other Agency Assistance

None anticipated at this time.

D. Location

Gametes for the inheritance studies will be collected from Prince William Sound in collaboration with the project Oil-Related Embryo Mortalities (Restoration Study 95191A). Embryo incubation will take place at the Armin F. Koernig hatchery in Prince William Sound and at the Genetics Lab facilities of ADFG. The initial laboratory phases of the project will be done at the University of Montana.

We propose to use the Alaska SeaLife Center Research Facilities at Seward when it is available for rearing fish and laboratory analyses. This facility will greatly strengthen genetic investigations with pink salmon by allowing multigenerational studies and testing for effects of

specific genotypes on phenotypes of importance (marine survival, run timing, etc.). We anticipate that much of the laboratory analysis will be performed at this facility when it is available.

LITERATURE CITED

Allendorf, F. W., W. A. Gellman, and G. H. Thorgaard. 1994. Sex-linkage of two enzyme loci in *Oncorhynchus mykiss* (rainbow trout). Heredity 72:498-507.

Allendorf, F.W., and R.F. Leary. 1986. Heterozygosity and fitness in natural populations of animals. In: Conservation Biology: The Science of Scarcity and Diversity. M. Soule', editor. Sinauer Assoc. pp. 57-76.

Allendorf, F. W. and G. H. Thorgaard. 1984. Tetraploidy and the evolution of salmonid fishes. Pages 1-53 in B. J. Turner, ed. Evolutionary Genetics of Fishes. Plenum Publishing Corp., New York.

Altukhov, Yu. P., E. A. Salmenkova, and Yu. P. Kartavtsev. 1991. Relation between allozyme heterozygosity and viability and growth rate of pink salmon. Cytology and Genetics 25:47-51.

Archibald, A.L. 1994. From mapping to manipulating the vertebrate genome. Anim. Biotech. 5:233-242.

Biggs, E., T. Baker, M. McGurk, J. E. Hose and R. Kocan. 1991. Injury to Prince William Sound Herring. State/Federal Natural Resources Damage Assessment Draft Preliminary Status Report. Unpub. rep. Alaska Department of Fish and Game, Cordova, AK.

Ferguson, M.M. 1992. Enzyme heterozygosity and growth in rainbow trout - genetic and physiological explanations. Hered. 68:115-122.

Forbes, S. H., K. L. Knudsen, T. W. North, and F. W. Allendorf. 1994. One of two growth hormone genes in coho salmon is sex-linked. Proc. Nat. Acad. Sci. USA 91:1628-1631.

Gharrett, A.J. and W.W. Smoker. 1991. Two generations of hybrids between even-year and odd-year pink salmon (*Oncorhynchus gorbuscha*): A test for outbreeding depression? Can. J. Fish. Aquat. Sci. 48:1744-1749.

Jacob, H.J. and 19 other authors. 1995. A genetic linkage map of the laboratory rat, *Rattus norvegicus*. Nature Genetics 9:63-69.

Johnson, K. R., J. E. Wright Jr., and B. May. 1987. Linkage relationships reflecting ancestral tetraploidy in salmonid fish. Genetics 116:579-591.

Karl, S. A. and J.C. Avise. 1992. Balancing selection at allozyme loci in oysters - Implications from nuclear RFLPs. Science 256:100-102.

Koehn, R.K., W.J. Diehl, and T. M. Scott. 1988. The differential contribution of glycolysis and protein catabolism to the relationship between heterozygosity and growth rate in the coot clam, *Mulina lateralis*. Genetics 118:121-130.

Lander, E.S. and 6 other authors. 1987. MAPMAKER: an interactive computer package for constructing primary genetic linkage maps of experimental and natural populations. Genomics 1:174-181.

Lander, E.S., and Schork, N.J. 1994. Genetic dissection of complex traits. Science 265:2037-2048.

Leary, R.F., F.W. Allendorf, and K.L. Knudsen. 1987. Differences in inbreeding coefficients do not explain the association between heterozygosity at isozyme loci and developmental stability in rainbow trout. Evolution 41:1413-1415.

Leary, R.F., F.W. Allendorf, and K.L. Knudsen. 1989. Genetic differences among rainbow trout spawned on different days within a single spawning season. Progressive Fish-Culturist 51:10-19.

Lie, O., A. Slettan, F. Lingaas, I. Olsaker, I. Hordvik, and T. Refstie. 1994. Haploid gynogenesis: A powerful strategy for linkage analysis in fish. Anim. Biotech. 5:33-45.

Lincoln, S.E., and E.S. Lander. 1992. Systematic detection of errors in genetic linkage data. Genomics 14:604-610.

Longwell, A. C. 1977. A genetic look at fish eggs and oil. Oceanus 20(4):46-58.

Malkin, D. 1994. Germline p53 mutations and heritable cancer. Annual Reviews in Genetics 28:443-465.

Mironov, O. G. 1969. The development of some Black Sea fishes in seawater polluted by petroleum products. Probl. Ichthyol. 9(6):1136-1139

Moles, A., M. M. Babcock and S. D. Rice. 1987. Effects of oil exposure on pink salmon (*Oncorhynchus gorbuscha*) alevins in a simulated intertidal environment. Marine Environment Research 21:49-58.

Parsons, R. and 8 other authors. 1995. Mismatch repair deficiency in phenotypically normal human cells. Science 268:738-740.

Perlin, M.W., M.B. Burks, R.C. Hoop, and E.P. Hoffman. 1994. Toward fully automated genotyping: Allele assignment, pedigree construction, phase determination, and recombination detection in Duchenne muscular dystrophy. Am. J. Hum. Genet. 55:777-787.

Pogson, G. H., K. A. Mesa, and R. G. Boutilier. 1995. Genetic population structure and gene flow in the Atlantic cod *Gadus morhua*: A comparison of allozyme and nuclear RFLP loci. Genetics 139:375-385.

Postlethwait, J.H. and 14 other authors. 1994. A genetic linkage map for the zebrafish. Science

264:699-703.

Scheerer, P.D., G.H. Thorgaard, F.W. Allendorf, and K.L. Knudsen. 1986. Androgenetic rainbow trout produced from inbred and outbred sperm sources show similar survival. Aquaculture 57:289-298.

Schmitt, K., and 8 other authors. 1994. Multipoint linkage map of the human pseudoautosomal region, based on single-sperm typing: Do double crossovers occur during male meiosis? Am. J. Hum. Genet. 55:423-430.

Smoker, W.W., A.J. Gharrett, and M.S. Stekoll. In press. Genetic variation in timing of anadromous migration within a spawning season in a population of pink salmon. In B.E. Riddell, ed. Proc. Int. Symp. on Biol. Interactions of Enhanced and Wild Salmonids. Can. Spec. Publ. Fish & Aquat. Sci.

Stanley, J. G. 1983. Gene expression in haploid embryos of Atlantic salmon. J. Hered. 74:19-22.

Taylor, B.A., A. Navin, and S.J. Phillips. 1994. PCR-Amplification of simple sequence repeat variants from pooled DNA samples for rapidly mapping new mutations of the mouse. Genomics 21:626-632.

Van der Beek, S., and Van Arendonk, J.A.M. 1993. Criteria to optimize designs for detection and estimation of linkage between marker loci from segregating populations containing several families. Theor. Appl. Genet. 86:269-280.

Zhivotovsky, L. A., K. I. Afanasiev, and G. A. Rubtzova. 1987. Selection for enzyme loci in the pink salmon (*Oncorhynchus gorbuscha* Walbaum). Genetika 23:1876-1883.

Zouros, E.W., and D. Foltz. 1986. The use of allelic isozyme variation for the study of heterosis. In: M.C. Rattazzi, J.G. Scandalios, and G.S. Whitt (eds.), Isozymes: Current Topics in Biological and Medical Research, Volume 13. Alan R. Liss, New York, New York.

SCHEDULE

A. Measurable Project Tasks for FY 96

15 Aug 95 - 30 Sep 95:	Obtain gametes and create families for inheritance studies with odd-year fish. This will be done under Restoration Study 95191A (Oil-Related Embryo Mortalities).
1 Oct 95 - 31 Mar 96:	Initial screen of odd- and even-year fish for DNA polymorphisms.
1 Apr 96 - 30 Sep 96:	Screening of DNA polymorphisms to test for Mendelian inheritance and joint segregation.

15 Aug 96 - 30 Sep 96: Obtain gametes and create families for inheritance studies with even-year fish.

B. Project Milestones and Endpoints

Objective 1: This objective will be completed by the end of year 1 (FY96).

Objective 2: This objective will be completed by the end of year 3.

Objective 3: This objective will be completed by the end of year 5.

Objective 4: This objective will be completed by the end of year 5.

Objective 5: This objective will be completed by the end of year 5.

Objective 6: This objective will be completed by the end of year 5.

C. Project Reports

Annual reports will be submitted by 15 April of each year. We will publish results from this project in peer-reviewed journals throughout the life of the project.

COORDINATION AND INTEGRATION OF RESTORATION EFFORT

This work is being done in collaboration with James E. Seeb, Principal Geneticist, ADFG. The inheritance experiments will be in coordination with the project Oil-Related Embryo Mortalities (Restoration Study 95191A). Dr. Seeb and I are also coordinating plans to use the Alaska SeaLife Center Research Facilities at Seward when they are available. Where possible we will share fish samples, gametes, laboratory equipment, and fish rearing facilities.

This work is related to my ongoing genetic research with salmonid fishes that has been supported by the National Science Foundation since 1980. Many of the techniques and approaches proposed here are based upon the results of that research. I also intend to continue seeking support from NSF that will complement the research proposed here. A genetic map for pink salmon will allow us to address a number of fundamental questions in the conservation and genetics of pink salmon and other *Oncorhynchus* species.

ENVIRONMENTAL COMPLIANCE

Our laboratory is regularly screened by the Environmental Health Department of the University of Montana for compliance with all federal, state, and local environmental laws and regulations.

PERSONNEL

Project Leader: FRED W. ALLENDORF

BIRTH: 29 April 1947; Philadelphia, Pennsylvania

MILITARY SERVICE: U.S. Army, 1965-1968 (Vietnam, 1966-1967)

EDUCATION:
B.S., Zoology, Pennsylvania State University, 1971
M.S., Fisheries, University of Washington, 1973
Ph.D., Genetics and Fisheries, University of Washington, 1975 (co-directors, Joe Felsenstein and Fred Utter)

POSITIONS:

1975-1976	Lektor, Department of Genetics and Ecology, Aarhus University, Denmark
1976-1979	Assistant Professor of Zoology, University of Montana
1978-1979	NATO Fellow, Genetics Research Unit, University of Nottingham, England
1979-1984	Associate Professor of Zoology, University of Montana
1983-1984	Visiting Scientist, Department of Genetics, Univ. of California, Davis
1984-1989	Professor of Zoology, University of Montana
1989-1990	Program Director, Population Biology and Physiological Ecology, National Science Foundation (NSF)
1992-1993	Visiting Professor, University of Oregon
1990-	Professor of Biology, University of Montana
1993-	Director, Organismal Biology and Ecology Graduate Program, University of Montana

HONORS:
NATO/NSF Postdoctoral Fellowship, University of Nottingham, 1978-1979
European Molecular Biology Organisation (EMBO), Fellowship, University of Stockholm, 1979
Distinguished Scholar Award, University of Montana, June 1985
Burlington Northern Faculty Achievement Award for Research, University of Montana, June 1987
Elected Fellow, American Association for the Advancement of Science (AAAS), February 1987
Burlington Northern Faculty Achievement Award for Research, University of Montana, May 1991
Elected Member, AAAS Council (Biological Sciences Division)

MAJOR GRANTS:

National Science Foundation Research Grant, EPSCR, 1980-1983, $70,000
National Science Foundation Research Grant, Population Biology, 1980-1982, $60,000
National Science Foundation Research Grant, 1983-1986, $121,000
National Science Foundation, Faculty Research Opportunity Award, 1986, $10,000
United States Department of Agriculture Grant, Aquaculture, 1983-1985, $43,000
National Science Foundation Research Grant, 1986-1989, $148,000

National Science Foundation, Dissertation Research Grant, 1988-1990, $9,850
National Science Foundation Research Grant, 1989-1993, $150,000
National Science Foundation Research Grant, Conservation and Restoration Biology, 1993-1996, $250,000

ASSOCIATE EDITORSHIPS:
Evolution (1987-1990)
Journal of Heredity (1986-1989)
Progressive Fish Culturist (1986-1989)
Molecular Biology and Evolution (1994-)

EDITORIAL BOARDS:
Molecular Biology and Evolution (1983-1989)
Conservation Biology (1990-1993)
Molecular Ecology (1991-present)

PROFESSIONAL SERVICE:

Panel Member, Population Biology and Physiological Ecology, NSF (1987-1989)
Panel Member, International Program, National Science Foundation (1987)
Panel Member, Conservation and Restoration Biology, NSF (1991-1992; 1995)
Council Member, The American Genetic Association (1986-1989)
Genetics Nomenclature Committee, American Fisheries Society (1986-present)
Member, Committee on the Protection and Management of Pacific Northwest Anadromous Salmonids, National Research Council (1992-present)
Chair, Committee of Visitors, Systematic and Population Biology Programs, NSF (1993)

PROFESSIONAL SOCIETIES:
Society for the Study of Evolution
American Society of Naturalists
Genetics Society of America
Society for Conservation Biology
American Association for the Advancement of Science
American Society of Ichthyologists and Herpetologists
American Fisheries Society
American Genetic Association
Desert Fishes Council
Ecological Society of America
Montana Native Plant Society
Society of Systematic Biologists
Society for Molecular Biology and Evolution

BOOK CHAPTERS:

Utter, F.M., H.O. Hodgins, F.W. Allendorf, A.G. Johnson, and J.L. Mighell. 1973. Biochemical variants in Pacific salmon and rainbow trout: their inheritance and application in population studies. In: Genetics and Mutagenesis of Fish, pp. 329-339. Springer-Verlag, Berlin.

Utter, F.M., H.O. Hodgins, and F.W. Allendorf. 1974. Biochemical genetic studies of fishes: potentialities and limitations. In: Biochemical and Biophysical Perspectives in Marine Biology, Vol. 1, pp. 213-238.

Allendorf, F.W., F.M. Utter, and B.P. May. 1975. Gene duplication in the family Salmonidae: II. Detection and determination of the genetic control of duplicate loci through inheritance studies and the examination of populations. In: Isozymes IV: Genetics and Evolution, pp. 415-432. Clement L. Markert, editor. Academic Press, New York.

Allendorf, F.W., and F.M. Utter. 1979. Population genetics. In: Fish Physiology, Volume 8, pp. 407-454. W.S. Hoar, D.J. Randall, and J.R. Brett, editors. Academic Press, New York.

Allendorf, F.W., R.F. Leary, and K.L. Knudsen. 1983. Structural and regulatory variation of phosphoglucomutase in rainbow trout. In: Isozymes: Current Topics in Biological and Medical Research, Vol. 9, pp. 123-142. Alan R. Liss Publ. Co., N.Y.

Allendorf, F.W. 1983. Isolation, gene flow, and genetic differentiation among populations. In: Genetics and Conservation, edited by C. Schonewald-Cox, et al. Benjamin/Cummings. pp. 51-65.

Allendorf, F.W., and G. Thorgaard. 1984. Tetraploidy and the evolution of salmonid fishes. In: The Evolutionary Genetics of Fishes, B.J. Turner, ed., Plenum Press, pp. 1-53.

Allendorf, F.W., and R.F. Leary. 1986. Heterozygosity and fitness in natural populations of animals. In: Conservation Biology: The Science of Scarcity and Diversity. M. Soule', editor. Sinauer Assoc. pp. 57-76.

Allendorf, F.W., N. Ryman, and F.M. Utter. 1987. Genetics and fishery management: Past, present, and future. In: Population Genetics and Fisheries Management, edited by N. Ryman and F.M. Utter. University of Washington Press, pp. 1-19.

Allendorf, F.W., and N. Ryman. 1987. Genetic management of hatchery stocks. In: Population Genetics and Fisheries Management, edited by N. Ryman and F.M. Utter. University of Washington Press, pp. 141-159.

Thorgaard, G.H., and F. W. Allendorf. 1988. Developmental genetics of fishes. In: Developmental Genetics of Animals and Plants, edited by G. M. Malacinski. Macmillan Publishing Company, pp. 363-391.

Powers, D.A., F.W. Allendorf, and T. Chen. 1990. Application of molecular techniques to the study of marine recruitment problems. In: Large Marine Ecosystems: Patterns, Processes, and Yields, ed. by K. Sherman, L.M. Alexander, and B.D. Gold. Amer. Assoc. Advancement Sci., pp. 104-121.

Allendorf, F.W., and M.M. Ferguson. 1990. Genetics. In: Methods for Fish Biology, edited by C.B. Schreck and P.B. Moyle. Amer. Fish. Soc., Bethesda, Maryland, pp. 35-63.

Ferguson, M.M., and F.W. Allendorf. 1991. Evolution of the fish genome. In: Biochemistry and

Molecular Biology of Fishes, edited by P.W. Hochachka and T.P. Mommsen. Elsevier. pp. 25-42.

Allendorf, F.W. 1994. Genetics and demography of grizzly bear populations. In: Principles of Conservation Biology by G.K. Meffe and C.R. Carroll. Sinauer Associates. pp. 155-156.

Allendorf, F.W., and R.S. Waples. In press. Conservation genetics of salmonid fishes. In: Conservation Genetics, edited by J.C. Avise and J.L. Hamrick. Chapman & Hall.

ARTICLES:

Heckman, J.R., F.W. Allendorf, and J.E. Wright, Jr. 1971. Trout leukocytes: growth in oxygenated cultures. Science 173:246-247.

Allendorf, F.W., and F.M. Utter. 1973. Gene duplication in the family Salmonidae: disomic inheritance of two loci reported to be tetrasomic in rainbow trout. Genetics 74:647-654.

Utter, F.M., F.W. Allendorf, H.O. Hodgins, and A.G. Johnson. 1973. Genetic basis of tetrazolium oxidase phenotypes in rainbow trout. Genetics 73:159.

Utter, F.M., F.W. Allendorf, and H.O. Hodgins. 1973. Genetic variability and relationships in Pacific salmon and related trout based on protein variations. Syst. Zool. 22:257-270.

Allendorf, F.W., F.M. Utter, and B.P. May. 1975. Gene duplication in the family Salmonidae: II. Detection and determination of the genetic control of populations. In Isozymes IV: Genetics and Evolution, pp. 415-432. C. L. Markert, editor. Academic Press, New York.

May, B.P., F.M. Utter, and F.W. Allendorf. 1975. Biochemical genetic variation in pink and chum salmon: inheritance of intraspecies variation and apparent absence of interspecies introgression following massive hybridization of hatchery stocks. J. of Heredity 66:227-232.

Allendorf, F.W., and F.M. Utter. 1976. Gene duplication in the family Salmonidae: III. Linkage between two duplicated loci coding for aspartate aminotransferase in the cutthroat trout. Hereditas 82:19-24.

Allendorf, F.W., N. Ryman, A. Stenneck, and G. Stahl. 1976. Genetic variation in Scandinavian populations of brown trout: evidence of distinct sympatric populations. Hereditas 83:73-82.

Utter, F.M., F.W. Allendorf, and B.P. May. 1976. The use of protein variation in the management of salmonid populations. Trans. 1st North American Wildlife and Natural Resources Conference. pp. 373-384.

Utter, F.M., F.W. Allendorf, and B.P. May. 1976. Genetic delineation of salmonid populations. In: Salmonid Genetics: Status and Role in Aquaculture. T. Nosho and W. Hershberger, editors. University of Washington Sea Grant Publication.

Allendorf, F.W., N.J. Mitchell, N. Ryman, and G. Stahl. 1977. Isozyme loci in brown trout (*Salmo trutta*): Detection and interpretation from population data. Hereditas 86:179-190.

Allendorf, F.W. 1977. Genetic variation in populations of fish. In: Fish Genetics-Fundamentals and Implications to Fish Management, pp. 35-39. C.M. Fetterholf, editor. Great Lakes Fishery Commission, Ann Arbor, Mich.

Utter, F.M., and F.W. Allendorf. 1977. Determination of the breeding structure of steelhead trout (*Salmo gairdneri*) populations through gene frequency analysis. Calif. Coop. Fish. Res. Unit Special Report 77-l:44-54.

Allendorf, F.W. 1977. Electromorphs or alleles? Genetics 87:821-822.

Allendorf, F.W. 1978. Electrophoretic distinction of rainbow trout (*Salmo gairdneri*) and cutthroat trout (*S. clarki*). Letter to the editor. J. Fisheries Res. Bd. Canada 35:483.

Allendorf, F.W. 1978. Protein polymorphism and the rate of loss of duplicate gene expression. Nature 272:76-78.

Utter, F.M., F.W. Allendorf, and B. May. 1979. Genetic basis of creatine kinase isozymes in skeletal muscle of salmonid fishes. Biochem. Genet. 17:1079-1091.

Ryman, N., F.W. Allendorf, and G. Stahl. 1979. Reproductive isolation with little genetic divergence in sympatric populations of brown trout (*Salmo trutta*). Genetics 92:247-262.

O'Malley, D.M., F.W. Allendorf, and G.M. Blake. 1979. Inheritance of isozyme variation and heterozygosity in *Pinus ponderosa*. Biochem. Genet. 17:233-250.

Clarke, B., and F.W. Allendorf. 1979. Frequency-dependent selection due to kinetic differences between allozymes. Nature 279:732-734.

Allendorf, F.W., F.B. Christiansen, T. Dobson, W.F. Eanes, and O. Frydenberg. 1979. Electrophoretic variation in large mammals. I. The polar bear, *Thalarctos maritimus*. Hereditas 91:19-22.

Allendorf, F.W. 1979. Rapid loss of duplicate gene expression by natural selection. Heredity 43:247-259.

Allendorf, F.W. 1979. Protein polymorphism and the rate of loss of duplicate gene expression, a reply. Nature 279:456.

Allendorf, F.W., D.M. Espeland, D.T. Scow, and S. Phelps. 1980. Coexistence of native and introduced rainbow trout in the Kootenai River drainage. Proc. Montana Acad. Sciences 39:28-36.

Allendorf, F.W., and S. Phelps. 1980. Loss of genetic variation in a hatchery stock of cutthroat trout. Trans. Amer. Fish. Soc. 109: 537-543.

Allendorf, F.W., and S.R. Phelps. 1981. Use of allelic frequencies to describe population structure. Canadian Journal of Fisheries and Aquatic Sciences 38: 1507-1514.

Krueger, C.C., A. Gharrett, T.R. Dehring, and F.W. Allendorf. 981. Genetic aspects of fisheries rehabilitation programs. Canadian Journal of Fisheries and Aquatic Sciences 38: 1877-1881.

Allendorf, F.W., and S.R. Phelps. 1982. Isozymes and the preservation of genetic variation in salmonid fishes. Ecological Bulletin (Stockholm) 34: 37-52.

Allendorf, F.W., K.L. Knudsen, and G.M. Blake. 1982. Frequencies of null alleles at enzyme loci in natural populations of ponderosa and red pine. Genetics 100: 497-504.

Phelps, S.R., and F.W. Allendorf. 1982. Genetic comparison of upper Missouri River cutthroat trout to other *Salmo clarki lewisi* populations. Proc. Mont. Acad. Sci. 41: 14-22.

Allendorf, F.W., K.L. Knudsen, and S.R. Phelps. 1982. Identification of a gene regulating the tissue expression of a phosphoglucomutase locus in rainbow trout. Genetics 102: 259-268.

Simonsen, V., F.W. Allendorf, W.F. Eanes, and F.O. Kapel. 1982. Electrophoretic variation in large mammals: III. The ringed seal, the harp seal, and the hooded seal. Hereditas 97:87-90.

Phelps, S.R., and F.W. Allendorf. 1983. Genetic identity of pallid and shovelnose sturgeon (*Scaphirhynchus albus* and *S. platorynchus*). Copeia 1983(3):696-700.

Allendorf, F.W. 1983. Linkage disequilibrium generated by selection against null alleles at duplicate loci. American Naturalist 121:588-592.

Daugherty, C.H., F.W. Allendorf, W.W. Dunlap, and K.L. Knudsen. 1983. Systematic implications of geographic patterns of genetic variation in the genus *Dicamptodon*. Copeia 1983(3):679-691.

Woods, J.H., G.M. Blake, and F.W. Allendorf. 1983. Amount and distribution of isozyme variation in ponderosa pine from eastern Montana. Silvae Genetica 32:151-157.

Leary, R.F., F.W. Allendorf, and K.L. Knudsen. 1983. Developmental stability and enzyme heterozygosity in rainbow trout. Nature 101:71-72.

Thorgaard, G.H., F.W. Allendorf, and K.L. Knudsen. 1983. Gene-centromere mapping in rainbow trout: High interference over long map distances. Genetics 103:771-783.

Allendorf, F.W., K.L. Knudsen, and R.F. Leary. 1983. Adaptive significance of differences in the tissue-specific expression of a phosphoglucomutase gene in rainbow trout. Proc. Nat. Acad. Sci. USA 80:1397-1400.

Leary, R.F., F.W. Allendorf, and K.L. Knudsen. 1983. Consistently high meristic counts in natural hybrids between brook trout and bull trout. Syst. Zool. 32: 369-376.

Allendorf, F.W., G. Stahl, and N. Ryman. 1984. Silencing of duplicate genes: Evidence for a common null allele polymorphism for lactate dehydrogenase in brown trout (*Salmo trutta*). Molecular Biology and Evolution 1:238-248.

Leary, R.F., F.W. Allendorf, and K.L. Knudsen. 1984. Major morphological effects of a regulatory gene: Pgm1-t in rainbow trout. Molecular Biology and Evolution 1:183-194.

Leary, R.F., F.W. Allendorf, S.R. Phelps, and K.L. Knudsen. 1984. Introgression between westslope cutthroat and rainbow trout in the Clark Fork River drainage, Montana. Proc. Montana Acad. Sci. 43:1-18.

Leary, R.F., F.W. Allendorf, and K.L. Knudsen. 1984. Superior developmental stability of enzyme heterozygotes in salmonid fishes. American Naturalist 124:540-551.

Allendorf, F.W., and R.F. Leary. 1984. Heterozygosity in gynogenetic diploids and triploids estimated by gene-centromere recombination rates. Aquaculture 43:413-420.

Woods, J.H., G.M. Blake, and F.W. Allendorf. 1984. Using isozyme analysis to aid in selecting ponderosa pine for coal mine spoil reclamation. Northwest Science 58:262-268.

Leary, R.F., F.W. Allendorf, and K.L. Knudsen. 1985. Developmental instability as an indicator of reduced genetic variation in hatchery trout. Trans. Amer. Fish. Soc. 114:230-235.

Leary, R.F., F.W. Allendorf, K.L. Knudsen, and G.H. Thorgaard. 1985. Heterozygosity and developmental stability in gynogenetic diploid and triploid rainbow trout. Heredity 54:219-225.

Leary, R.F., F.W. Allendorf, and K.L. Knudsen. 1985. Inheritance of meristic variation and the evolution of developmental stability in rainbow trout. Evolution 39:308-314.

Danzmann, R.G., M.M. Ferguson, and F.W. Allendorf. 1985. Allelic differences in initial expression of paternal alleles at an isocitrate dehydrogenase locus in rainbow trout. Developmental Genetics 5:117-127.

Ferguson, M.M., R.G. Danzmann, and F.W. Allendorf. 1985. Developmental divergence among hatchery strains of rainbow trout (*Salmo gairdneri*). I. Pure strains. Can. J. Genet. and Cytol. 27:289-297.

Ferguson, M.M., R.G. Danzmann, and F.W. Allendorf. 1985. Developmental divergence among hatchery strains of rainbow trout (*Salmo gairdneri*). II. Hybrids. Can. J. Genet. and Cytol. 27:298-307.

Leary, R.F., F.W. Allendorf, and K.L. Knudsen. 1985. Developmental instability and high meristic counts in interspecific hybrids of salmonid fishes. Evolution 39:1318-1326.

Gyllensten, U., R.F. Leary, F.W. Allendorf, and A.C. Wilson. 1985. Introgression between two cutthroat trout subspecies with substantial karyotypic, nuclear, and mitochondrial genomic divergence. Genetics 111:905-915.

Ferguson, M.M., R.G. Danzmann, and F.W. Allendorf. 1985. Absence of developmental incompatibility in hybrids between rainbow trout and two subspecies of cutthroat trout. Biochemical Genetics 23:557-570.

Danzmann, R.G., M.M. Ferguson, and F.W. Allendorf. 1985. Does enzyme heterozygosity influence developmental rate in rainbow trout? Heredity 56:417-425.

Hedrick, P.W., P.F. Brussard, F.W. Allendorf, J. Beardmore, and S. Orzak. 1986. Protein variation, fitness, and captive propagation. Zoo Biology 5: 91-100.

Allendorf, F.W. 1986. Genetic drift and the loss of alleles versus heterozygosity. Zoo Biology 5: 181-190.

Danzmann, R.G., M.M. Ferguson, and F.W. Allendorf. 1986. Heterozygosity and developmental rate in a strain of rainbow trout. Evolution 40:86-93.

Scheerer, P.D., G.H. Thorgaard, F.W. Allendorf, and K.L. Knudsen. 1986. Androgenetic rainbow trout produced from inbred and outbred sperm sources show similar survival. Aquaculture 57:289-298.

Allendorf, F.W., J.E. Seeb, K.L. Knudsen, G.H. Thorgaard, and R.F. Leary. 1986. Gene-centromere mapping of 25 loci in rainbow trout. J. Heredity 77:307-312.

Allendorf, F.W., and C. Servheen. 1986. Conservation genetics of grizzly bears. Trends in Ecology and Evolution 1:88-89.

Danzmann, R.G., M.M. Ferguson, and F.W. Allendorf. 1987. Heterozygosity and oxygen consumption rate as predictors of growth and developmental rate in rainbow trout. Physiol. Zool. 60:211-220.

Marnell, L.F., R.J. Behnke, and F.W. Allendorf. 1987. Genetic identification of the cutthroat trout (*Salmo clarki*) in Glacier National Park, Montana. Can. J. Fish. Aquat. Sci. 44:1830-1839.

Leary, R.F., F.W. Allendorf, S.R. Phelps, and K.L. Knudsen. 1987. Genetic divergence and identification of seven subspecies of cutthroat trout and rainbow trout. Trans. Amer. Fish. Soc. 116:580-587.

Leary, R.F., F.W. Allendorf, and K.L. Knudsen. 1987. Differences in inbreeding coefficients do not explain the association between heterozygosity at isozyme loci and developmental stability in rainbow trout. Evolution 41:1413-1415.

Ferguson, M.M., R.G. Danzmann, and F. W. Allendorf. 1987. Adaptive significance of developmental rate in rainbow trout: an experimental test. Biol. J. Linnean Soc. 33:205-216.

Leary, R.F., F.W. Allendorf, S.R. Phelps, and K.L. Knudsen. 1988. Population genetic structure of westslope cutthroat trout: Genetic variation within and among populations. Proc. Montana Acad. Sci. 48:57-70.

Danzmann, R. G., M. M. Ferguson, and F. W. Allendorf. 1988. Heterozygosity and components of fitness in a strain of rainbow trout. Biol. J. Linnean Soc. 33:285-304.

Ferguson, M.M., K. L. Knudsen, R. G. Danzmann, and F. W. Allendorf. 1988. Developmental rate

and viability of rainbow trout with a null allele at a lactate dehydrogenase locus. Biochem. Genet. 26:177-189.

Ferguson, M.M., R.G. Danzmann, and F.W. Allendorf. 1988. Developmental success of hybrids between two taxa of salmonid fishes with moderate structural gene divergence. Can. J. Zool. 66:1389-1395.

Allendorf, F.W., and R.F. Leary. 1988. Conservation and distribution of genetic variation in a polytypic species, the cutthroat trout. Conservation Biology 2:170-184.

Allendorf, F. W. 1988. Conservation biology of fishes. Conservation Biology 2:145-148.

Lesica, P., R.F. Leary, F.W. Allendorf, and D.E. Bilderback. 1988. Lack of genic diversity within and among populations of an endangered plant, *Howellia aquatilis*. Conservation Biology 2:275-282.

Harris, R.B., and F. W. Allendorf. 1989. Genetically effective population size of large mammals: Assessment of estimators. Conservation Biology 3:181-191.

Leary, R.F., F.W. Allendorf, and K.L. Knudsen. 1989. Genetic differences among rainbow trout spawned on different days within a single spawning season. Progressive Fish-Culturist 51:10-19.

Leary, R.F., and F.W. Allendorf. 1989. Fluctuating asymmetry as an indicator of stress: Implications for conservation biology. Trends Ecol. Evol. 4:214-217.

Shaklee, J.B., F.W. Allendorf, D.C. Morizot, and G.S. Whitt. 1989. Genetic nomenclature for protein-coding loci in fish: proposed guidelines. Trans. Amer. Fish. Soc. 118:218-227.

Danzmann, R. G., M.M. Ferguson, and F.W. Allendorf. 1989. Genetic variability and components of fitness in hatchery strains of rainbow trout. J. Fish Biol. 35 (Supplement A):313-320.

Ferguson, M.M., R.G. Danzmann, F.W. Allendorf, and K.L. Knudsen. 1990. Metabolic effects of the expression of a phosphoglucomutase locus in the liver of rainbow trout. Canad. J. Zool. 68:1499-1504.

Shaklee, J.B., F.W. Allendorf, D.C. Morizot, and G.S. Whitt. 1990. Gene nomenclature system for protein-coding loci in fish. Trans. Amer. Fish. Soc. 119:2-15.

Leary, R.F., F.W. Allendorf, and K.L. Knudsen. 1991. Effects of rearing density on meristics and developmental stability of rainbow trout. Copeia 1991(1):44-49.

Forbes, S.H., and F.W. Allendorf. 1991. Associations between mitochondrial and nuclear genotypes in cutthroat trout hybrid swarms. Evolution 45:1332-1349.

Forbes, S.H., and F.W. Allendorf. 1991. Mitochondrial genotypes have no detectable phenotypic effects in cutthroat trout hybrid swarms. Evolution 45:1350-1359.

Allendorf, F.W. 1991. Ecological and genetic effects of fish introductions: Synthesis and recommendations. Canadian J. Fish. and Aquatic Sciences 48 (Suppl. 1):178-181:

Scheerer, P.D., G.H. Thorgaard, and F.W. Allendorf. 1991. Genetic analysis of androgenetic rainbow trout. J. Exp. Zool. 260:382-390.

Campton, D.E., F.W. Allendorf, R.J. Behnke, and F.M. Utter. 1991. Reproductive success of hatchery and wild steelhead: A reanalysis. Trans. Amer. Fish. Soc. 120:816-822.

Allendorf, F.W., R.B. Harris, and L.H. Metzgar. 1991. Estimation of effective population size of grizzly bears by computer simulation. Proceedings Fourth International Congress of Systematics and Evolutionary Biology, pp. 650-654. Dioscorides Press, Portland, Oregon.

Leary, R.F., F.W. Allendorf, and K.L. Knudsen. 1992. Genetic, environmental, and developmental causes of meristic variation in rainbow trout. Acta Zoologica Fennica 191:77-93.

Lesica, P., and F.W. Allendorf. 1992. Are small populations of plants worth protecting? Conservation Biology 6:135-139.

Allendorf, F.W. 1993. Delay of adaptation to captive breeding by equalizing family size. Conservation Biology 7:416-419.

Ryman, N., F. Utter, F.W. Allendorf, C. Busack, and J. Shaklee. 1993. Genetic concerns about hatchery populations - A comment on conclusions of Nyman and Ring. J. Fish Biology 42:471-480.

Leary, R.F., F.W. Allendorf, and S.H. Forbes. 1993. Conservation genetics of bull trout in the Columbia and Klamath River drainages. Conservation Biology 7:856-865.

Leary, R.F., F.W. Allendorf, and K.L. Knudsen. 1993. Null allele heterozygotes at two lactate dehydrogenase loci in rainbow trout are associated with decreased developmental stability. Genetica 89:3-13.

Allendorf, F. W., W. A. Gellman, and G. H. Thorgaard. 1994. Sex linkage of two enzyme loci in rainbow trout. Heredity 72:498-507.

Forbes, S.H., K.L. Knudsen, T. W. North, and F.W. Allendorf. 1994. One of two growth hormone genes in coho salmon is sex-linked. Proc. Nat. Acad. Sci. USA. 91:1628-1631.

Allendorf, F.W. 1994. Comparative utility of genetic markers in the management of Pacific salmon: proteins, nuclear DNA, and mitochondrial DNA. NOAA Technical Memorandum NMFS-NWFSC-17, pp. 127-133.

Forbes, S.H., K.L. Knudsen, and F.W. Allendorf. 1994. Genetic variation in coho salmon detected by PCR amplification of growth hormone gene introns. NOAA Technical Memorandum NMFS-NWFSC-17, pp. 29-33.

Utter, F.M., and F. W. Allendorf. 1994. Phylogenetic relationships among species of *Oncorhynchus*:

A consensus view. Conservation Biology 8:864-867.

Kanda, N., R.F. Leary, and F.W. Allendorf. In press. Population genetic structure of bull trout in the Upper Flathead River drainage. Proceedings, Friends of the Bull Trout Conference, Calgary, Alberta, 1994.

Leary, R.F., F.W. Allendorf, and G.K. Sage. In press. Hybridization between introduced and native fishes. Trans. Amer. Fish. Soc.

Allendorf, F.W. In press. Genetics: Defining the units of conservation. Proceedings, Evolution and the Aquatic Ecosystem: Defining Units in Population Conservation. Amer. Fish. Soc.

Luikart, G., and F.W. Allendorf. In press. Conservation genetics and mtDNA variation in bighorn sheep. J. Mammalogy.

Lesica, P.L., and F.W. Allendorf. 1995. When are peripheral populations valuable for conservation? Conservation Biology 9:(in press).

Allendorf, F.W., and N. Kanda. 1995. Genetics and the conservation of salmonid fishes in western North America and Japan. Fish Genetics and Breeding Science (Japan) 21:79-102.

Project Leader:

Fred W. Allendorf
Division of Biological Sciences
University of Montana
Missoula, MT 59812
Phone (406) 243-5503
Fax (406) 243-4184
e-mail: darwin@selway.umt.edu

Lead Agency Project Manager:

_____

Joseph Sullivan (ADFG)

_____

Date Prepared

BUDGET SUMMARY

PERSONNEL	
F. W. Allendorf (2 mo), Project Leader	12,350
Vacant, Research Scientist (12 mo)	33,000
Vacant, Research Assistants (24 mo)	44,400
	89,750
FRINGE BENEFITS	
Project Director (25%)	3,088
Research Scientist (30% + $240/mo health insurance)	12,780
Research Assistants (30% + $240/mo health insurance)	19,080
	34,948
TOTAL PERSONNEL	124,698
OTHER DIRECT COSTS	
Commodities (Laboratory supplies, etc.)	23,500
Travel	4,500
Equipment	43,055
	71,055
SUBTOTAL	195,753
INDIRECT COSTS (49.3% salaries & wages)	44,247
TOTAL	240,000

This replaces the descriptive letter about this project that went out in the peer reviewers' notebook 5/5/95.

CITY OF PORT LIONS, COMMUNITY HALL CONSTRUCTION MATCHING FUNDS REQUEST

Project Number: 96202

Restoration Category:

Proposer: City of Port Lions

Lead Trustee Agency:

Duration: 1 year

Cost FY 96: $150,000

Geographic Area: Kodiak Island

Injured Resource/Service: Recreation and Tourism

ABSTRACT

This request is of for matching funds for the construction of a new Community Hall in Port Lions. This project was interupted by the *Exxon Valdez Oil Spill* due to lack of manpower to complete the project. This project would replace the current Community Hall which has been condemned.

INTRODUCTION

The City of Port Lions had started construction of a new community hall in 1989, however, due to the *Exxon Valdez* oil spill manpower was not available to complete the project and funding was lost. The City of Port Lions has contracted a design firm for new floor plans and design of a new Community Hall. The City of Port Lions has also requested that $175,000 be reallocated for the Port Lions Community Hall. It has been estimated that this money will be enough to complete the shell of the building and not for any furnishings. We are asking for $150,000 from the Trustee Council to add a kitchen, to be used for senior meals and community gatherings, and to purchase furnishings to make the Community Hall functional.

NEED FOR THE PROJECT

A. Statement of Problem

This project is to help replace funding for a new Community Hall that was planned prior to the *Exxon Valdez* oil spill. At the current time there is no adequate place in Port Lions for community gatherings and meetings. This project is designed to restore a recreation facility for the City of Port Lions.

B. Rationale

This project was interupted by the *Exxon Valdez* oil spill. The oil spill activities in and around Port Lions and Kizhuyak Bay required all available manpower, thereby, leaving no man power to build a new Community Hall. Due to the lack of manpower and progress on the project funding was lost. Completion of this project will provide for a gathering place for the community that was lost due to the *Exxon Valdez* oil spill.

C. Summary of Major Hypotheses and Objectives

The sole objective of this project is to construct a new Community Hall that, when completed will be usable by the community for gatherings.

D. Completion Date

Completion of this project is estimated for the end of FY '96.

COMMUNITY INVOLVEMENT

The Community of Port Lions has been involved with this project since it's inception. During the last couple of years the community has become more concerned about completing the project, due to the lack of space for gatherings.

The Port Lions City Council is committed to the completion of this project and is committing all available resources of the City to it's completion. The Port Lions City Council is also committed to using local labor to complete this project to provided needed work for the community.

FY 96 BUDGET

The estimated budget for the amount requested is as follows:

Construction of Kitchen	50,000
Furnishings	25,000
Labor	60,000
Admin Costs	15,000
Total	150,000

PROJECT DESIGN

A. Objectives

This project will include the completition of a new Community Hall for the City of Port Lions. This new hall will include a gathering/meeting hall, commercial kitchen, handicap restrooms, Office for the Village Public Safety Officer, and storage space for old files.

This project will replace the existing hall which has been condemned because of structural failure. The original Community Hall was built after the 1964 earthquake and was used to house and feed the volunteers and villagers from Afognak who came to Port Lions to rebuild and relocate after the village on Afognak was destroyed. After the construction the hall was used as the school and also housing for the teachers until a new elementary school was built. Over the years the hall has been used by many groups, such as the School Districts athletic programs, the senior meals program, community dances and potlatches, Port Lions Tribal Council Offices, Village Public Safety Officer office, City Council meetings, and Coordination Office for the *Exxon Valdez* oil spill response for Port Lions and Kizhuyak Bay.

This project was originally scheduled for completion in 1989, however, due to the lack of manpower to complete the project, funding was lost. The manpower that was to be used for the construction was used for oil spill response and recovery in and around Port Lions.

The City of Port Lions has asked the Alaska Legislature to reappropriate $175,000 from another project to the Community Hall. The Port Lions City Council feels that the Community Hall is a major priority and is needed much more than the other project, which is a water line to the boat harbor. Communication between the City of Port Lions and our representatives is positive and we are anticipating that the reapproriation will be approved.

B. Methods

This project will be completed with the funds requested using local labor. Design, floor plans, and engineering plans have already been completed.

C. Contracts and Other Agency Assistance

The only component of this project to be contracted out is the design and engineering. This part of the project has allready been completed and paid for by the City of Port Lions.

No other agency assistance is perceived, except for the final plan review and approval of the State Fire Marshal's Office.

D. Location

This project will be located within the Port Lions City limits and the building will be built where the existing Community Hall is located.

The community that will be affected most by this project is the City of Port Lions. Outlying settlements on the north end of Kodiak Island and the settlements and residents of Afognak and Shuyak Island will also use this facility as a polling place for elections.

SCHEDULE

A. Measurable Project Tasks for FY 96

This project is expected to be completed by the end of FY96, with the following draft schedule

Design and Engineering	Completed
Demolition of old Hall	June 1, 1995
Construction of new hall	July 1, 1995
Completion of new hall	January 1, 1996
Final report	July 1, 1996

B. Project Milestones and Endpoints

The entire project is estimated to be completed by January 1996. The design and engineering for this project has allready been completed. Demelotion of the old hall is expected to begin June 1, 1995, with construction of the new hall begining July 1, 1995.

C. Project Reports

Project reports will be made on a quarterly basis, with final report prior to July 1, 1996.

COORDINATION AND INTEGRATION OF RESTORATION EFFORT

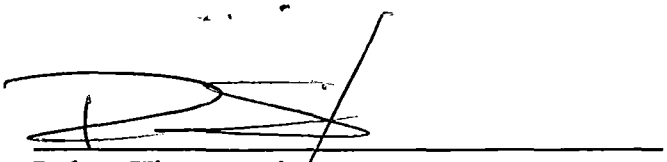
This project has been and will continue to be coordinated by the Port Lions City Council. Efforts have been underway to have funds reappropriated, and reports from our representative indicate that this will be approved.

ENVIRONMENTAL COMPLIANCE

This project is not covered by environmental laws or permit requirements.

PERSONNEL

Pete Squartsoff, Project Leader
Mayor, City of Port Lions
P.O. Box 110
Port Lions, Ak 99550
(907) 454-2332 (0ffice)
(907) 454-2420 (fax)



Robert Himes, Project Manager
Deputy Mayor, City of Port Lions
P.O. Box 110
Port Lions, AK 99550
(907) 454-2332 (office)
(907) 454-2420 (fax)

Community Hall Committee Members:

Pete Squartsoff, Mayor
Wayne Lukin, Council Member
Kevin Adkins, Community Member

Date Prepared: May 10, 1995

1996 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET
October 1, 1995 - September 30, 1996

Budget Category:	Authorized FFY 1995	Proposed FFY 1996						
Personnel		$55.2						
Travel		$24.6						
Contractual		$5.0						
Commodities		$13.8						
Equipment		$6.3	LONG RANGE FUNDING REQUIREMENTS					
Subtotal	$0.0	$104.9	Estimated FFY 1997	Estimated FFY 1998	Estimated FFY 1999	Estimated FFY 2000	Estimated FFY 2001	Estimated FFY 2002
Indirect								
Project Total	$0.0	$104.9	$94.5	$94.5	TBD	TBD	TBD	TBD
Full-time Equivalents (FTE)		12.0						
	Dollar amounts are shown in thousands of dollars.							
Other Resources								

Comments:

Future costs (beyond FY 99) are unknown.

1996

Prepared:

Project Number: 96213-BAA
Project Title: Alaska Native Harbor Seal Commission
Name: Alaska Native Harbor Seal Commission

FORM 4A
Non-Trustee
DETAIL

5/10/95

1996 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET
October 1, 1995 - September 30, 1996

Personnel Costs:			Months	Monthly		Proposed
Name	Position Description		Budgeted	Costs	Overtime	FFY 1996
Currently Vacant	Executive Director		12.0	4.6		55.2
	Executive Director's salaray is $48,000					0.0
	and 15% fringe benefits to cover all required					0.0
	federal and stae payroll taxes,					0.0
	as well as workers comp. insurance.					0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
	Subtotal		12.0	5	0	
					Personnel Total	$55.2

Travel Costs:			Ticket	Round	Total	Daily	Proposed
Description			Price	Trips	Days	Per Diem	FFY 1996
Commissioners:							0.0
Four quarterly board meetings are required in accordance with the Commission's constitution and by-laws.							0.0
To Anchorage From:	Kodiak		176	4	8	150	1.9
	Juneau		311	4	8	150	2.4
	False Pass		1,000	4	8	150	5.2
	Seldovia		350	4	8	150	2.6
	Chenega Bay		200	4	8	150	2.0
							0.0
Staff (Executive Director)							0.0
Cordova to Anchorage			224	10	20	225	6.7
Cordova to Juneau			250	2	6	225	1.9
Cordova to Wash. DC			1,000	1	4	225	1.9
						Travel Total	$24.6

1996

Project Number: 96213-BAA
Project Title: Alaska Native Harbor Seal Commission
Name: Alaska Native Harbor Seal Commission

FORM 4B
Personnel
& Travel
DETAIL

1996 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET
October 1, 1995 - September 30, 1996

Contractual Costs:	Proposed
Description	FFY 1996
As a beginning organization, professional services from a CAP firm and a legal firm will be required to ensure all regulations are being met and that the financial management system is developed in accordance iwht general accounting principles. An audit will also be performed at the end of the fiscal year.	
Accounting/Audit	3.0
Legal	2.0
Contractual Total	$5.0

Commodities Costs:	Proposed
Description	FFY 1996
Office Supplies: Covers the cost of miscellaneous office supplies necessary to operate the program, such as pens, copy paper, paper clips, computer supplies, stationery, envelopes, etc.	2.0
Telephone/Telefax: This lineiitem will cover the cost of two business lines at $50/month each ($1,200), long distance charges at approximately $166/month ($1,400), as well as six teleconference meetings of the commissioners, estimated at $200 per meeting x 6 meetings ($1,200).	3.8
Printing/Postage: Covers the cost of printing business cards, stationery, newsletters, and other materials necessary to the operation of the program. This line item will also cover the cost of mailing the newsletters and other daily business corespondence related to the program to other natural resource related agenceis and organizations.	5.0
Office Space/Utilities: Intitially, a portion of the office space is being provided by Dineega Specialty Furs as an in-kind contribution to the program. The funds in this line item will cover a portion of the office space and utilies est. at $250/month.	3.0
Commodities Total	$13.8

1996

Project Number: 96213-BAA
Project Title: Alaska Native Harbor Seal Commission
Name: Alaska Native Harbor Seal Commission

FORM 4B
Contractual & Commodities DETAIL

5/10/95

1996 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET
October 1, 1995 - September 30, 1996

New Equipment Purchases:	Number	Unit	Proposed
Description	of Units	Price	FFY 1996
As a newly developed organization, an initial purchase of office equipment will be required.			0.0
The funds in this line item will be utilized to purchase a computer, printer, copies, and fax			0.0
Commission office.			0.0
Computer & printer	1	4,500	4.5
Fax	1	1,000	1.0
Copier	1	750	0.8
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
Those purchases associated with replacement equipment should be indicated by placement of an R.		**New Equipment Total**	$6.3

Existing Equipment Usage:	Number	
Description	of Units	
None		

1996

Project Number: 96213-BAA
Project Title: Alaska Native Harbor Seal Commission
Name: Alaska Native Harbor Seal Commission

FORM 4B
Equipment
DETAIL

1996 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET
October 1, 1996 - September 30, 1996

Budget Category:	Authorized FFY 1996	Proposed FFY 1996	PROPOSED FFY 1996 TRUSTEE AGENCIES TOTALS					
			ADEC	ADF&G	ADNR	USFS	DOI	NOAA
Personnel	18.0	24.0						
Travel		9.0						
Contractual	40.0	171.0						
Commodities		23.5						
Equipment		N/C						
Subtotal	58.0	227.5						
General Administration	11.5	7.0						
Project Total	$69.5K	234.5K						
Full-time Equivalents (FTE)								
Other Resources								

LONG RANGE FUNDING REQUIREMENTS						
	Estimated FFY 1997	Estimated FFY 1998	Estimated FFY 1999	Estimated FFY 2000	Estimated FFY 2001	Estimated FFY 2002
	$164.0K					

Dollar amounts are shown in thousands of dollars.

Comments:

1996

Prepared:

Project Number: ~~96xxx~~ 96012B-
Project Title: Killer whale predation on Sea otter stocks
Lead Agency: NOAA

FORM 2A
PROJECT
DETAIL

1996 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET
October 1, 1995 - September 30, 1996

Budget Category:	Authorized FFY 1995	Proposed FFY 1996
Personnel	18.0	24.0
Travel		9.0
Contractual	40.0	171.0
Commodities		23.5
Equipment		N/C
Subtotal	58.0	227.5
General Administration	11.5	7.0
Project Total	69.5K	$234.5K
Full-time Equivalents (FTE)		
Other Resources		

LONG RANGE FUNDING REQUIREMENTS

Dollar amounts are shown in thousands of dollars.

Estimated FFY 1997	Estimated FFY 1998	Estimated FFY 1999	Estimated FFY 2000	Estimated FFY 2001	Estimated FFY 2002
$164.0K					

Comments:

1996

Prepared:

Project Number: 96~~***~~012B
Project Title: Killer whale predation on Lahor seals
Agency: NOAA

FORM 3A
AGENCY
PROJECT
DETAIL

1996 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1995 - September 30, 1996

Personnel Costs:			GS/Range/ Step	Months Budgeted	Monthly Costs	Overtime	Proposed FFY 1996
PM	Name	Position Description					
	Bruce Wright	Program Manager	GS 12	1.5			5.0
	Marilyn Dahlheim	Principal Investigator	GS 12	2.5			10.0
	Field personnel	[redacted]	GS 7/9	3			7.0
		Normal Administrative (NMML)		1.0			2.0
					Subtotal		
Those costs associated with program management should be indicated by placement of an *.						Personnel Total	24.0

Travel Costs:		Ticket Price	Round Trips	Total Days	Daily Per Diem	Proposed FFY 1996
PM	Description					
	Transportation of scientific personnel from Seattle, Washington to other areas within U.S. to Prince William Sound, Alaska. Conduct of field work.		4-5	90	–	6.0K
	Travel for P.I.'s to/from Alaska for workshops/meetings.		3	12-15	–	3.0K
Those costs associated with program management should be indicated by placement of an *.					Travel Total	9.0K

1996

Project Number: 96 ~~###~~ 012B

Project Title: Killer whale predation on Steller sea lions

Agency: NOAA

FORM 3B
Personnel
& Travel
DETAIL

1996 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1995 - September 30, 1996

Contractual Costs: Description	Proposed FFY 1996
1. Logistical Support of field personnel (Vessel charter)	$90.0K
2. Analysis of Data / Report (* Note: $13.0K of this covers budget shortfall from FY95). * includes one field researcher's salary.	81.0K
When a non-trustee organization is used, the form 4A is required. — Contractual Total	$171.0K

Commodities Costs: Description	Proposed FFY 1996
Firm purchase & development costs. Fuel/food. Maintenance of research equipment (Skyffs, Cameras). Transport of scientific gear. Purchase of darts/sampling collection gear & storage.	$23.5K
Commodities Total	23.5

1996

Project Number: 96 ~~XXX~~ 012B
Project Title: Killer Whale predation on Harbor seals
Agency: NOAA

FORM 3B
Contractual & Commodities
All

1996 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1995 - September 30, 1996

New Equipment Purchases: Description	Number of Units	Unit Price	Proposed FFY 1996
No charge year FY96			
Those purchases associated with replacement equipment should be indicated by placement of an R.		New Equipment Total	N/C

Existing Equipment Usage: Description	Number of Units	Inventory Agency

1996

Project Number: 96 ~~xxx~~ 012B

Project Title: Killer whale predation on sea otters

Agency: NOAA

FORM 3B Equipment DETAIL

Exxon Valdez Oil Spill Trustee Council

Restoration Office
645 G Street, Suite 401, Anchorage, Alaska 99501-3451
Phone: (907) 278-8012 Fax: (907) 276-7178

MEMORANDUM

To: Restoration Work Force

From: Molly McCammon
Executive Director

FAX COMPLETE

Date: May 16, 1995

Subj: May 26 RWF Meeting

The next Restoration Work Force meeting will be **FRIDAY, May 26, at 9:00 a.m.** The Juneau location is the Executive Director's Office while the Anchorage location is the Restoration Office.

Topics to be discussed will include:

- DPDs and FY96 Work Plan Review Process
- June 1 & 2 Trustee Council Meeting in Cordova
- Miscellaneous Issues

mm/raw

****
*** MULTI TRANSACTION REPORT ***
****

TX/RX NO. 8137

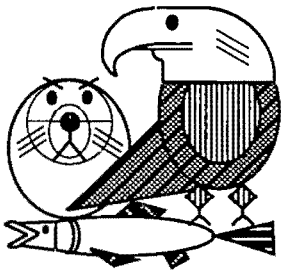
INCOMPLETE TX/RX

TRANSACTION OK	[09] 19075867589	JUNEAU OFFICE
	[10] 19075867555	D.GIBBONS
	[13] 19077896608	MORRIS-WRIGHT
	[15] 5624871	C.FRIES
	[16] 3494712	RITA MIRAGLIA
	[17] 2713992	R.THOMPSON
	[18] 5223148	J.SULLIVAN
	[19] 7863636	L.BARTELS
	[20] 7863350	C.BERG
	[21] 2572517	B.RICE
	[23] 19074655375	D.BRUCE
	[24] 5624026	E.PIPER
	[30] 19074654759	ELLEN FRITTS
	[35] 15103737834	B.SPIES
	[38] 2715827	G.BELT

ERROR

Exxon Valdez Oil Spill Trustee Council

Restoration Office
645 G Street, Suite 401, Anchorage, Alaska 99501-3451
Phone: (907) 278-8012 Fax: (907) 276-7178



May 12, 1995

Mr. Riley Snell, Executive Director
Alaska Industrial Development and Export Authority
480 West Tudor
Anchorage, Alaska 99503

Dear ~~Mr. Snell,~~ Riley

As we discussed earlier today, the Trustee Council has conditionally authorized funding for the Alaska SeaLife Center project, pending completion of certain tasks, including approval "... by the Executive Director of a detailed construction budget and a detailed operating plan that reflects a realistic cash flow for the successful construction and operation..." of the research facility. Following up on our meeting, I would like to again express my interest in having AIDEA review work to date on the development of the construction budget for the facility, and possibly review the operating budget assumptions as well.

The project team — including Livingston-Slone architects, Cambridge 7 consultants, and Heery International — is close to completing the Design Development phase. Two separate cost estimates will be available in the next few weeks. Review of these materials as they become available, together with appropriate briefings from the project team would perhaps be the best way to initiate a review of the project's progress to date by your staff. Following such an initial review, your counsel regarding the appropriateness of any further cost check estimates or independent reviews would be greatly appreciated.

I would be happy to arrange for a briefing of AIDEA staff by the project team at your earliest convenience. I have asked Kim Sundberg of ADF&G (267-2334), project manager for the Trustee Council, and Leif Selkregg of Selkregg & Associates (276-8095), who has been working for the Seward Association for the Advancement of Marine Science (SAAMS), to work with John Olsen of your staff to arrange for a project briefing.

I greatly appreciate your to assistance with this effort. If you have questions about the project, please contact me or Eric Myers in the Restoration Office (278-8012).

Sincerely,

Molly McCammon
Executive Director

cc: Kim Sundberg
Leif Selkregg
John Olsen
Eric Myers
Jim Ayers

****
*** ACTIVITY REPORT ***
****

TRANSMISSION OK

TX/RX NO.	8093	
CONNECTION TEL		5618998
CONNECTION ID		
START TIME	05/15 08:47	
USAGE TIME	01'27	
PAGES	3	
RESULT	OK	

Exxon Valdez Oil Spill Trustee Council

Restoration Office
645 G Street, Suite 401, Anchorage, Alaska 99501-3451
Phone: (907) 278-8012 Fax: (907) 276-7178

FAX COVER SHEET

To: Distribution Number: Ltr 8998

From: M McCammon Date: May 12, 1995

Comments: Total Pages: 3

Riley Snell Attn: John Olsen
x Kirk Sundberg
x Leif Selkregg

Document Sent By: KH

2/15/95

Exxon Valdez Oil Spill Trustee Council

Restoration Office
645 G Street, Suite 401, Anchorage, Alaska 99501-3451
Phone: (907) 278-8012 Fax: (907) 276-7178

MEMORANDUM

TO: Bruce Wright/NOAA

FROM: Molly McCammon
Executive Director

DATE: May 11, 1995

RE: Authorization -- Project 95163A-L/Seabird Forage Fish Interaction (APEX)

The purpose of this memorandum is to formally authorize work to proceed on Project 95163A-L/Seabird Forage Fish Interaction (APEX), as described in the Detailed Project Description and the changes to the DPD outlined in the April 24, 1995 memorandum to the Chief Scientist from Dr. Dave Duffy. I look forward to a late fall/early winter review of the 1995 field work on this project.

In regard to the budget, please be advised that any funding approved by the Trustee Council, but not required for FY 95 because of the unanticipated delay associated with the withdrawal of funds from the court, should be lapsed to the joint trust fund at the end of the fiscal year.

cc: Bob Spies
Traci Cramer
Dave Duffy

****
*** MULTI TRANSACTION REPORT ***
****

TX/RX NO. 8068

INCOMPLETE TX/RX

TRANSACTION OK [09] 19075867589 JUNEAU OFFICE

[35] 15103737834 B.SPIES

ERROR

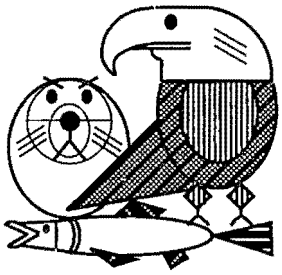
****
*** ACTIVITY REPORT ***
****

TRANSMISSION OK

TX/RX NO.	8070	
CONNECTION TEL		2766847
CONNECTION ID		
START TIME	05/12 09:50	
USAGE TIME	00'45	
PAGES	1	
RESULT	OK	

Exxon Valdez Oil Spill Trustee Council

Restoration Office
645 G Street, Suite 401, Anchorage, Alaska 99501-3451
Phone: (907) 278-8012 Fax: (907) 276-7178



MEMORANDUM

TO: Bruce Wright/NOAA

FROM: Molly McCammon
Executive Director

RE: Authorization -- Project 95290/Hydrocarbon Data Analysis, Interpretation, and Database Maintenance for Restoration and NRDA Environmental Samples Associated with the *Exxon Valdez* Oil Spill

DATE: May 11, 1995

The purpose of this memorandum is to formally approve work to proceed on Project 95290/Hydrocarbon Data Analysis, Interpretation, and Database Maintenance for Restoration and NRDA Environmental Samples Associated with the *Exxon Valdez* Oil Spill, as described in the Detailed Project Description and consistent with the review of the Chief Scientist (see attached).

Attachment

cc: Bob Spies
Traci Cramer

APPLIED
marine
SCIENCES

March 7, 1995

Bruce Wright
National Marine Fisheries Service
P.O. Box 210155
Auke Bay, AK 99821

RE: Detailed Project Description for Project 95290 (Hydrocarbon Data Analysis, Interpretation, and Database Maintenance for Restoration and NRDA Environmental Samples Associated with the *Exxon Valdez* Oil Spill)

VIA FAX and Mail

Dear Bruce:

I have reviewed the Detailed Project Description for the above reference project. I believe that this project needs no further review and is ready for full funding.

Sincerely,

Robert B. Spies
Chief Scientist

cc: Molly McCammon
Tracie Cramer

2155 Las Positas Court, Suite S Livermore, CA 94550 510.373.7142 FAX 510.373.7834

****
*** MULTI TRANSACTION REPORT ***
****

TX/RX NO. 8066

INCOMPLETE TX/RX

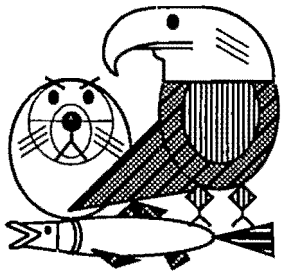
TRANSACTION OK [09] 19075867589 JUNEAU OFFICE

[35] 15103737834 B.SPIES

ERROR

Exxon Valdez Oil Spill Trustee Council

Restoration Office
645 G Street, Suite 401, Anchorage, Alaska 99501-3451
Phone: (907) 278-8012 Fax: (907) 276-7178



MEMORANDUM

TO: Byron Morris/NOAA

FROM: Molly McCammon
Executive Director

RE: Authorization -- Project 95012/Comprehensive Killer Whale Investigation

DATE: May 11, 1995

The purpose of this memorandum is to formally approve work to proceed on Project 95012/Comprehensive Killer Whale Investigation, as described in the Detailed Project Description and consistent with the review of the Chief Scientist (see attached).

Attachment

cc: Bob Spies
Traci Cramer

APPLIED
marine
SCIENCES

May 11, 1995

Molly McCammon
Executive Director
Exxon Valdez Oil Spill Trustee Council
645 G Street Ste.402
Anchorage, AK 99501

Dear Molly,

I have reviewed the detailed project description for "Injury to salmon eggs and pre-emergent fry incubated in oiled gravel (laboratory study)" (95191B). I have no major problems with this fourth-year continuation of the project. I therefore recommend that you approve it for funding. This does not preclude a careful review of the budget by Traci Cramer.

Sincerely,

Robert B. Spies
Chief Scientist

CC: E. Myers
S. Schubert
S. Senner
T. Cramer
J. Rice

3155 Las Positas Court, Suite S Livermore, CA 94550 510.373.7142 FAX 510.373.7834

****
*** MULTI TRANSACTION REPORT ***
****

TX/RX NO. 8064

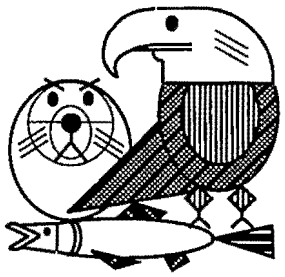
INCOMPLETE TX/RX

TRANSACTION OK	[09] 19075867589	JUNEAU OFFICE
	[35] 15103737834	B.SPIES

ERROR

Exxon Valdez Oil Spill Trustee Council

Restoration Office
645 G Street, Suite 401, Anchorage, Alaska 99501-3451
Phone: (907) 278-8012 Fax: (907) 276-7178



MEMORANDUM

TO: Bruce Wright/NOAA

FROM: Molly McCammon
Executive Director

RE: Authorization -- Project 95191B/Injury to Salmon Eggs and Pre-emergent Fry Incubated in Oiled Gravel (Laboratory Study)

DATE: May 11, 1995

The purpose of this memorandum is to formally approve work to proceed on Project 95191B/Injury to Salmon Eggs and Pre-emergent Fry Incubated in Oiled Gravel, as described in the Detailed Project Description and consistent with the review of the Chief Scientist (see attached).

Attachment

cc: Bob Spies
Traci Cramer

APPLIED
marine
SCIENCES

95012

May 10, 1995

Dr. Byron Morris
NOAA/National Marine Fisheries Service
P.O. Box 210029
Auke Bay, Alaska 99821

Dear Byron,

I have just received the review of the proposal "Comprehensive killer whale investigation" submitted to NOAA in response to the RFP under the 1995 work plan (No. ABNF-5-00090). The reviewer found this to be a very meritorious proposal by a highly qualified group with a good record of successful research on killer whales in Alaska. I have also read the proposal and found it to be worthwhile. No major changes have suggested in the review process, therefore I have no hesitancy in recommending funding as proposed. This does not, of course, obviate the need for a careful review of the budget. Please let me know if there is anything further NOAA requires from our office.

Sincerely,

Robert B. Spies
Chief Scientist

CC: M. McCammon
S. Schubert
E. Myers

2155 Las Positas Court, Suite S Livermore, CA 94550 510.373.7142 FAX 510.373.7834

REVIEW OF:

COMPREHENSIVE KILLER WHALE INVESTIGATION IN PRINCE WILLIAM SOUND, ALASKA

A Proposal from the North Gulf Oceanic Society (NGOS)
Response to solicitation No.: 52 ABNF-5-00090

General Comments:

I find that this proposal is technically sound. It utilizes methodologies that are well established in the field, and the team proposed to undertake the study has an excellent track record in previous studies. I am confident that the objectives of the RFP would be fully met by this proposal.

Specific Comments:

Part 1. Objectives 1 and 2:

This component of the work consists of a photographic census of individual killer whales in Prince William Sound in 1995, and integration of the results of this census with the 1984-94 photo-identification database. This work is vital to ongoing assessments of injuries and recovery to killer whales in the Sound. The methods proposed, including platform type, survey strategy, equipment, etc., are well proven from previous NGOS studies and similar work in British Columbia. The use of a directional hydrophone for locating whales should prove very effective. The field effort, as described in the RFP, seems adequate to accomplish the objectives.

Part 2. Objective 1:

The creation of a GIS database incorporating the considerable body of information collected on killer whales by NGOS over the past decade, and analysis of these data, is a very worthwhile project. The preliminary layout of the database described in the proposal appears comprehensive. It certainly would appear to be the ideal method of organizing the data for efficient analysis.

Part 2. Objective 2:

The approach outlined in the proposal for determining the genetic distinctiveness of resident and transient killer whales is sound. L. Barrett-Lennard has considerable field and lab experience with killer whale genetics in British Columbia.

Observational studies of feeding habits of killer whales in British Columbia have yielded a considerable amount of useful information on diet preferences of the two forms in that area. The techniques proposed are the same as those in the BC studies, and should result in an improved understanding of diet of killer whales in PWS.

****
*** MULTI TRANSACTION REPORT ***
****

TX/RX NO. 8065

INCOMPLETE TX/RX

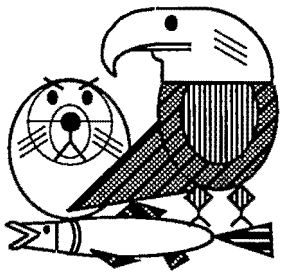
TRANSACTION OK [09] 19075867589 JUNEAU OFFICE

[35] 15103737834 B.SPIES

ERROR

Exxon Valdez Oil Spill Trustee Council

Restoration Office
645 G Street, Suite 401, Anchorage, Alaska 99501-3451
Phone: (907) 278-8012 Fax: (907) 276-7178



MEMORANDUM

TO: Bruce Wright/NOAA

FROM: Molly McCammon
Executive Director

RE: Authorization -- Project 95074/Herring Reproductive Impairment

DATE: May 11, 1995

The purpose of this memorandum is to formally approve work to proceed on Project 95074/Herring Reproductive Impairment, as described in the Detailed Project Description and consistent with the review of the Chief Scientist (see attached).

Attachment

cc: Bob Spies
Traci Cramer

APPLIED
marine
SCIENCES

March 9, 1995

Bruce Wright
National Marine Fisheries Service
P.O. Box 210155
Auke Bay, AK 99821

RE: Detailed Project Description for Project 95074 (Herring Reproductive Impairment)

VIA FAX and Mail

Dear Bruce:

I have reviewed the Detailed Project Description for the above reference project. This is the second year of this research project that is designed to determine if exposure to oil could result in reproductive impairment in Pacific herring, thereby providing a partial explanation for the collapse of the herring fishery in Prince William Sound.

I believe that this project needs no further review and is ready for full funding. The authors present their hypotheses and assumptions very clearly. I would note that in the laboratory emerging herring are very sensitive to the concentration of dissolved oxygen in the water (Kocan, pers. comm.). While I did not note the use of supplemental oxygen in the laboratory methods, I would suggest that the investigators consider whether this is necessary.

Sincerely,

Robert B. Spies
Chief Scientist

cc: Molly McCammon
Tracie Cramer

****
*** MULTI TRANSACTION REPORT ***
****

TX/RX NO. 8067

INCOMPLETE TX/RX

TRANSACTION OK	[09] 19075867589	JUNEAU OFFICE
	[35] 15103737834	B.SPIES

ERROR

Exxon Valdez Oil Spill Trustee Council

Restoration Office
645 G Street, Suite 401, Anchorage, Alaska 99501-3451
Phone: (907) 278-8012 Fax: (907) 276-7178

MEMORANDUM

TO: Catherine Berg/DOI-USFWS

FROM: Molly McCammon
Executive Director

DATE: May 11, 1995

RE: Authorization -- Project 95038/Symposium on Seabird Restoration

The purpose of this memorandum is to formally approve work to proceed on Project 95038/Symposium on Seabird Restoration, as described in the Detailed Project Description dated February 17, 1995 and in the changes to the DPD outlined in the May 8, 1995 letter to you from Craig Harrison (copy attached).

In authorizing the work at this time, I want to emphasize two points:

(1) **Seabird restoration** will be the main topic of the workshop. Page 2 of the DPD indicates that "(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."

(2) As indicated on page A-6 in the Fiscal Year 1995 Work Plan (December 1994), "(f)unding is conditional on expansion of project objectives to include publication of conference proceedings." Although I understand that full publication is not necessarily possible at the funding level approved by the Trustee Council, I note on page 5 of the DPD that the symposium "Steering Committee and contractor[s] will prepare a **draft report** within one month after the symposium" [emphasis added] .

With these points in mind, Project 95038 has my approval. The Trustee Council staff looks forward to a productive meeting and an informative report.

Attachment

cc: Robert Spies
Traci Cramer

APPLIED
marine
SCIENCES

May 10, 1995

Ms. Catherine Berg
USFWS
Department of the Interior
1011 E. Tudor Road
Anchorage, Alaska 99503-6199

Reference: Seabird Symposium (95 038)

Dear Catherine,

I have received your note and a letter dated May 8, 1995 from Craig Harrison (enclosed). I agree with Mr. Harrison that we have resolved the outstanding issue of public participation by advertising the symposium and by providing a public forum during the symposium. I also understand through conversations that Mr Stan Senner, Trustee Council Science Coordinator, has had with Dr. George Divoky of the Pacific Seabird Group that the PSG has agreed not to actively exclude public who may wish to attend any session. With these understandings in place I am now pleased to recommend to the Executive Director that this project be approved for funding. My recommendation does not preclude the need for a careful budgetary review by Traci Cramer.

Sincerely yours,

Robert B. Spies
Chief Scientist

enclosure

CC: M. McCammon
S. Senner
S. Schubert
T. Cramer

FOR: STAN SENNER

Pacific Seabird Group

DEDICATED TO THE STUDY AND CONSERVATION OF PACIFIC SEABIRDS AND THEIR ENVIRONMENT

Craig S. Harrison
Vice Chair for Conservation
4001 North 9th Street #1801
Arlington, Virginia 22203
(202) 778-2340

May 8, 1995

Catherine Berg
U.S. Fish & Wildlife Service
1011 East Tudor Road
Anchorage, Alaska 99503

Re: Seabird Symposium

Dear Ms. Berg:

This letter responds to Dr. Robert B. Spies's letter dated April 20, 1995 concerning PSG's detailed project description for the seabird symposium. We believe that we have resolved the outstanding issues. There was perhaps a misunderstanding regarding honoraria, which would be used in a fairly limited sense. Most of the funds for intellectual work will be spent to prepare for the meeting to insure that the questions are framed in the most useful ways to achieve our desired result. We are now in the processing of negotiating a sub-contract with scientists at the Point Reyes Bird Observatory to prepare several background white papers on pertinent issues that will be the focal point of discussions.

Regarding public participation, we have agreed to advertise the symposium and have a summary session on Sunday, October 1, that will be open to the public. At the public session, we will invite questions and provide responses to the approaches that have been tentatively identified. The public will also have an opportunity to review our draft report.

Finally, we would like to know as soon as possible the agency people and investigators from other EVOS Trustee projects that the Trustees and FWS suggest we invite to the workshop. Our contract does not include funds for these participants, but this information is important for planning the composition of workshop subgroups and determining space and food requirements at Alyseka Resort.

Sincerely,

Craig

****
*** MULTI TRANSACTION REPORT ***
****

TX/RX NO. 8063

INCOMPLETE TX/RX

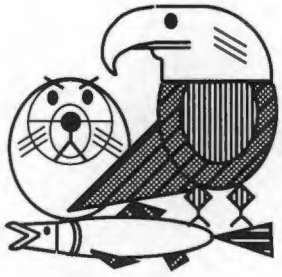
TRANSACTION OK [09] 19075867589 JUNEAU OFFICE

[35] 15103737834 B.SPIES

ERROR

Exxon Valdez Oil Spill Trustee Council

Restoration Office
645 G Street, Suite 401, Anchorage, Alaska 99501-3451
Phone: (907) 278-8012 Fax: (907) 276-7178



May 11, 1995

Dear Proposer:

As you may have noticed, the **FY96 -- LIST OF PROJECT PROPOSALS RECEIVED**, sent to you on May 10, 1995, was incomplete. Enclosed is a complete list for your review.

I apologize for any inconvenience this oversight may have caused. If you have any questions, please do not hesitate to contact me at (907) 278-8012.

Sincerely,

Molly McCammon
Executive Director

Attachment

mm/raw

FY 96 -- LIST OF PROJECT PROPOSALS RECEIVED

PROPOSER	PROJECT TITLE	PROJECT #
ABR, Inc.	Status and Ecology of Kittlitz's Murrelet in Prince William Sound	96142-BAA
ABR, Inc.	Recovery of Bird and Mammal Populations in Prince William Sound After the *Exxon Valdez* Oil Spill	96143-BAA
ADEC	Improving Recovery Rates on Shorelines in PWS Using Enhanced Bioremediation	96094
ADEC	Kodiak Archipelago Shoreline Assessment: Monitoring Surface and Subsurface Oil	96027
ADFG	Herring Natal Habitats	96166
ADFG	Pacific Herring Projects Coordination	96164
ADFG	Genetic Discrimination of Prince William Sound Herring Populations	96165
ADFG	Monitoring, Habitat Use, and Trophic Ineractions of Harbor Seals in Prince William Sound	96064
ADFG	Resource Abnormalities Study	96279
ADFG	Harlequin Duck Recovery Monitoring	96427
ADFG	Subsistence Restoration Planning and Implementation	96428
ADFG	Community Interaction/Traditional Knowledge	96052B
ADFG	Kodiak Subsistence Resource Restoration Planning	96204
ADFG	Chugach Native Region Clam Restoration	96131
ADFG	Genetic Structure of Prince William Sound Pink Salmon	96196
ADFG	Restoration of Coghill Lake Sockeye Salmon	96259
ADFG	Kenai River Sockeye Salmon Restoration	96255
ADFG	Sockeye Salmon Skilak Lake Enclosure Project	96258B
ADFG	Spawning Channel Construction Project Port Dick Creek, Lower Cook Inlet	96139A2
ADFG	Salmon Insream Habitat and Stock Restoration - Little Waterfall Barrier Bypass Improvement	96139A1
ADFG	Salmon Instream Habitat and Stock Restoration - Lowe River and Valdez Arm Drainages	96139C2
ADFG	Sockeye Salmon Overescapement Project	96258A
ADFG	Oil-Related Embryo Mortalities in PWS Pink Salmon Populations	96191A
ADFG	Otolith Thermal Mass Marking of Hatchery Reared Pink Salmon in Prince William Sound	96188
ADFG	Coded Wire Tag Recoveries From Pink Salmon in Prince William Sound	96186
ADNR	Habitat Protection and Acquisition Support	96126
ADNR	Archaeological Index Site Monitoring	96007A
ADNR	Archaeological Site Stewardship, Kachemak Bay, Shelikof Strait, and Chignik	96149
ADNR	Afognak Island State Park - Habitat Restoration Survey	96141
ADNR	Kenai Habitat Restoration & Recreation Enhancement Project	96180
Akhiok City	Kempff Bay Sockeye Enhancement Feasibility Study	96208
Allendorf/UM	Construction of a Linkage Map for the Pink Salmon Genome	96190
Alter/PES	Decontamination and Restoration Process for Oil-Impacted Mussel Beds	96109-BAA
Alutiiq HF	Expansion of Alutiiq Archaeological Repository	96150
ANHSC	Harbor Seal Cooperative Assistance	96244
ANHSC	Alaska Native Harbor Seal Commission	96213-BAA

FY 96 -- LIST OF PROJECT PROPOSALS RECEIVED

PROPOSER	PROJECT TITLE	PROJECT #
ANHSC	Community-Based Harbor Seal Biological Sampling Program	96211
Carpenter/UT	Assessing the Effects of EVOS on Mussels and Fish: Using High Resolution Stable Isotope Records	96108-BAA
Castellini/UAF	Recovery of Harbor Seals from EVOS: Condition and Health Status	96001
Chenega IRA	Chenega Bay Salmon Restoration	96222
Chugach OSIR	Chugach OSIR Community Repositories, Cultural Centers, Subsistence Restoration Facilities Comprehensive Services Development Planning Project	96154
Chugach OSIR	Community Cultural Centers, Repositories and Subsistence Restoration Facilities - Comprehensive Design, Engineering, Financing, and Construction Development Project	96153
Chugach OSIR	Community Museum, Repository, Archaeological, Site Stewardship, Co-Management Training & Human Resource Development Project	96152
Chugach OSIR	Community Involvement & Use of Traditional Knowledge	96052A
Chugach RRC	Prince William Sound Youth Area Watch	96210-BAA
Ck Inl Fish DC	Delight and Desire Lakes Fertilization Project	96254
Coble Geotech.	Supplemental Monitoring for the Proposed Spawning Channel Construction Project, Port Dick Creek, Lower Cook Inlet	96139D
Cook Inl RCAC	Monitoring for Current and Potential Environmental Impacts of Oil Industry Activities in Cook Inlet	96091
Cooney, et al	Sound Ecosystem Assessment (SEA)	96320
Cooney/UAF	Synthesis and Integration	96320Z1
Craig/OSU	Whale Forestomach Anaerobic Microbes to Detoxify Oil Spills	96103-BAA
D. Warner	Sea Otter Transplantation/Clam Restoration	96056
DOI	Status and Potential Recovery of the Black Oystercatcher: An Apex Predator in the Nearshore Environment	96072
DOI	Seasonal Movements and Pelagic Habitat Use by Common Murres and Tufted Puffins	96021
DOI	Removal of Introduced Foxes From Islands	96101
DOI	Common Murre Population Monitoring	96144
DOI	Remote Video System Seabird Monitoring Project	96175
DOI	Kittlitz's Murrelet: Biology, Abundance, and Population Genetics	96148
DOI	Assessment of Recovery from Surface Oiling, Subsurface Oiling, and Subsurface Invertebrate Contamination by Oil on Gulf of Alaska Shorelines	96160
DOI	Mechanism of Impact and Potential Recovery of Nearshore Vertebrate Predators	96025
DOI	Harlequin Duck - Indicator Species for Ecological Monitoring and Recovery	96161
DOI	Development of a Productivity Index to Monitor the Reproductive Success of Marbled and Kittlitz's Murrelets in Prince William Sound, Alaska	96031
DOI	Surveys to Monitor Marine Bird Abundance In Prince William Sound During Winter and Summer 1996	96159
DOI	Kenai River Ecosystem Restoration: Starvation-Temperature Study	96258C
Duffy, et. al.	APEX: Apex Predator Ecosystem Experiment in Prince William Sound and the Gulf of Alaska	96163
Eslinger/UAF	SEA Trophodynamic Modeling and Validation Through Remote Sensing	96320R
Exec Director	Public Information, Science Management, and Administration	96100
Eyak Nat Vill	Eastern PWS Wildstock Salmon Habitat Restoration	96220-BAA

FY 96 -- LIST OF PROJECT PROPOSALS RECEIVED

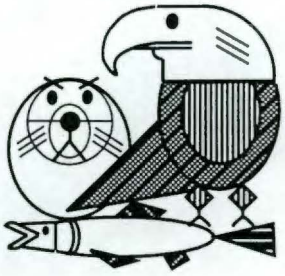
PROPOSER	PROJECT TITLE	PROJECT #
Eyak Nat Vill	Eyak Subsistence Recovery Camp Planning Project	96205
Fairweather	Prince William Sound Information Service	96155
Highsmith/UAF	Herring Bay Monitoring and Restoration Studies	96086
Highsmith/UAF	Coastal Habitat Intertidal Monitoring	96037
Jewett/UAF	Herring Bay Monitoring and Restoration Studies	96106
Kodiak Tribal	PSP Shellfish Restoration Testing Program	96212
Mitchell/MBC	Juvenile Fish Habitat Identification and Assessment	96067-BAA
N Gulf Oceanic	Comprehensive Killer Whale Investigation in Prince William Sound, Alaska	96012A-BAA
Naidu/UAF	Flux and Nutritional Quality of Particulate Organic Carbon: Relationship to Survival of Juvenile Pelagic Fish	96193-BAA
NOAA	Expansion of the Prince William Sound Science Center/Oil Spill Recovery Institute	96151-BAA
NOAA	Impact of Killer Whale Predation on the Recovery of Injured Resources in Prince William Sound	96012B
NOAA	Herring Reproductive Impairment	96074
NOAA	Hydrocarbon Data Analysis, Interpretation, and Database Maintenance	96290
NOAA	Mussel Bed Restoration and Monitoring	96090
NOAA	Pink Salmon Spawning Habitat Recovery	96194
NOAA	Pristane Monitoring in Mussels and Predators of Juvenile Pink Salmon & Herring	96195
NOAA	Effects of Oiled Incubation Substrate on Straying and Survival of Wild Pink Salmon	96076
NOAA	Injury to Salmon Eggs and Pre-emergent Fry Incubated in Oiled Gravel (Laboratory Study)	96191B
NRC, Inc.	Historical Analysis of Sockeye Salmon Growth Among Populations Affected by Overescapement in 1989	96048-BAA
Old Harbor	Old Harbor Lagoon (Midway Culvert) Salmon Enhancement Feasibility Study	96206
Old Harbor City	Ocean Beach Sockeye Enhancement Feasibility Study	96207
Ouzinkie Tribe	Ouzinkie Clam Restoration Project	96218
Ouzinkie Tribe	Ouzinkie Archeological Culture Center Project	96219
Pac Seabird Gr	Publication of Seabird Restoration Workshop	96038
Pauly/UBC	Mass-Balance Model of Trophic Fluxes in Prince William Sound	96054
Port Graham	Port Graham Pink Salmon Subsistence Project	96225
Port Lions	Port Lions Waste Oil/Garbage Collection System for Boat Harbor	96203
Port Lions	Port Lions Community Hall	96202
Port Lions	Port Lions Public Safety Building/Emergency Operations Center	96201
PWS Econ DC	Sound Waste Management Plan	96115
PWSAC	Chenega Chinook Release Program	96272
PWSAC	Restoration of Prince William Sound Pink Salmon by Diversion of Harvest Effort	96093C
PWSSC	Sound Ecosystem Assessment (SEA): Coordination & Communications	96320Z2-BA
Qutekcak Tribe	Resurrection Bay Salmon Stock Enhancement	96226
Scheel/PWSSC	Survey of Octopuses in Intertidal Habitats	96009D-BAA

FY 96 -- LIST OF PROJECT PROPOSALS RECEIVED

PROPOSER	PROJECT TITLE	PROJECT #
Schell/UAF	Isotope Ratio Studies of Marine Mammals in Prince William Sound	96170
Smoker/UAF	Restoration of PWS Pink Salmon by Diversion of Harvest Effort: Population Genetic Assessment of Gene Flow from Early Return Stock	96093B-BAA
Smoker/UAF	Restoration of PWS Pink Salmon by Diversion of Harvest Effort: Quantitative Genetic Assessment of Early-Returning Pink Salmon Broodstock	96093A-BAA
Stekoll/UAF	Fucus as Structure for Other Organisms	96088
Tatitlek IRA	Tatitlek Coho Salmon Release	96127
Tatitlek Village	Documentary on Subsistence Harbor Seal Hunting in PWS	96214
USFS	Cutthroat Trout and Dolly Varden: the Relation Among and Within Populations of Anadromous and Resident Forms	96145
USFS	Relationships Between Stream Habitat and Stream Classification Within Prince William Sound	96179
USFS	Columbia Lake Sockeye Salmon Stocking	96256
USFS	Restoration of Essential Wetland Habitat at San Juan Bay on Montague Island	96176
USFS	Landowner Assistance Project	96058
USFS	Site Specific Archaeological Restoration	96007B
USFS	Second Growth Forest Habitat Enhancement for Injured Wildlife Species	96178
USFS	Mapping Potential Nesting Habitat of the Marbled Murrelet in Prince William Sound Using Habitat Models Linked to Geographic Databases	96122
USFS	Avian Predation on Blue Mussels in Prince William Sound	96104
USFS	Cutthroat Trout, Dolly Varden Char Habitat Restoration, Lake Elsner Area	96177A
USFS	Cutthroat Trout, Dolly Varden Char Habitat Restoration, Port Fidalgo and Port Gravina Area	96177B
USFS	Cutthroat Trout and Dolly Varden Char Population and Habitat Monitoring	96043A
USFS	Monitoring of Cutthroat Trout and Dolly Varden Habitat Improvement Structures	96043B
USFS	Cutthroat Trout Habitat Improvement Structures	96043C
USFS	Solf Lake Sockeye Salmon Stocking	96257
USFS	Montague Riparian Rehabilitation Monitoring Program	96139C1
UW/UCD/SFU	Investigations of Disease Factors Affecting Declines of Pacific Herring Populations in Prince William Sound, AK	96162
Worthy/TXAM	Stable Isotope Ratios and Fatty Acid Signatures of Selected Forage Fish Species in Prince William Sound, AK	96121-BAA
Worthy/TXAM	Proximate Composition and Energetic Content of Selected Forage Fish Species in Prince William Sound, AK	96120-BAA

NUMBER OF PROJECTS PROPOSED **128**

Exxon Valdez Oil Spill Trustee Council
Restoration Office
645 G Street, Suite 401, Anchorage, Alaska 99501-3451
Phone: (907) 278-8012 Fax: (907) 276-7178



FAX COVER SHEET

To: Gary Marty Number: 916-752-7690

From: Date: May 16

Comments: please deliver ASAP Total Pages: (6)

Mr Marty - here is a copy of the complete mailing that was corrected & re-sent!

Also — I have seen to it that your address is corrected on our records.

Document Sent By: Kris Hill

2/15/95

BEVERLY ALGER
USFWS MIGRATORY BIRD MANAGEMENT
1011 E TUDOR RD
ANCHORAGE, AK 99503

FRED W. ALLENDORF
DIV OF BIOLOGICAL SCIENCES
UNIVERSITY OF MONTANA
MISSOULA, MT 59812

WILLIAM A. ALTER III, PH.D.
PES
POB 680488
SAN ANTONIO, TX 78268-0488

WILLIAM A. ANDERSON, PRESIDENT
OUZINKIE NATIVE CORPORATION
3333 DENALI ST, STE 220-J
ANCHORAGE, AK 99503

IGOR APPEL, SENIOR SCIENTIST
FAIRWEATHER MARINE SERVICES
POB 103296
ANCHORAGE, AK 99510-3296

MALIN BABCOCK
NOAA NMFS AUKE BAY LABORATORY
11305 GLACIER HIGHWAY
JUNEAU, AK 99801-8626

MARY ANNE BISHOP
COPPER RIVER DELTA INST. - USFS
POB 1460
CORDOVA, AK 99574-1460

KENNETH E. BLATCHFORD, TRIBAL CHAIRMAN
QUTEKCAK NATIVE TRIBE
POB 1467
SEWARD, AK 99664

PATTY BROWN-SCHWALENBURG, EXECUTIVE DIRECTOR
CHUGACH REGIONAL RESOURCES COMMISSION
4201 TUDOR CENTRE DR, SUITE 211
ANCHORAGE, AK 99508

CARL V. BURGER
NBS ALASKA SCIENCE CENTER
1011 E TUDOR RD
ANCHORAGE, AK 99503

SCOTT J. CARPENTER
PROGRAMS IN GEOSCIENCES, UT AT DALLAS
POB 830688
RICHARDSON, TX 75069-0688

MIKE CASTELLINI
INSTITUTE OF MARINE SCIENCE
UAF GENERAL DELIVERY
FAIRBANKS, AK 99775-1080

GEOFFREY COBLE
COBLE GEOTECHNICAL SERVICES
POB 1637
HOMER, AK 99603-1637

A. MORRIE CRAIG
OSU, COLLEGE OF VETERINARY MEDICINE
MAGRUDER HALL 105
CORVALLIS, OR 97331-4802

MARILYN DAHLHEIM
NMFS-NMML
7600 SAND POINT WAY N.E., BUILDING 4
SEATTLE, WA 98115-6349

ROBERT H. DAY
ABR, INC.
POB 80410
FAIRBANKS, AK 99708-0410

ROBERT L. DEVELICE
USFS CHUGACH NATIONAL FOREST
3301 C STREET, STE 300
ANCHORAGE, AK 99503

NICK DUDIAK
ALASKA DEPARTMENT OF FISH & GAME
3298 DOUGLAS ST
HOMER, AK 99603-7942

DAVID CAMERON DUFFY
ENRI, UNIVERSITY OF ALASKA
707 A ST
ANCHORAGE, AK 99501-3625

STEVE EBBERT
DOI-FWS AK MARITIME NAT'L WILDLIFE REFG
2355 KACHEMAK BAY DR, SUITE 101
HOMER, AK 99603

GLENN ELISON
USFWS
1011 E TUDOR RD
ANCHORAGE, AK 99503

DR. JIM FALL
ADFG SUBSISTENCE DIV
333 RASPBERRY RD
ANCHORAGE, AK 99518

HOWARD FERREN
PWS AQUACULTURE CORP.
POB 1110
CORDOVA, AK 99574

LINDA FINN YARBOROUGH
USFS CHUGACH NATIONAL FOREST
3301 C ST
ANCHORAGE, AK 99503-3998

CLIFF FOX, PROJECT LEADER
USFS
POB 129
GIRDWOOD, AK 99587

CAROL FRIES
AK DEPARTMENT OF NATURAL RESOURCES
3601 C ST STE 1210
ANCHORAGE, AK 99503-5921

KATHRYN FROST
ALASKA DEPARTMENT OF FISH & GAME
1300 COLLEGE RD
FAIRBANKS, AK 99701-1559

A.J. GHARRETT
POB 210082
AUKE BAY, AK 99821-0082

DAVE GIBBONS
USFS
POB 21628
JUNEAU, AK 99802-1628

DAN GILLIKIN
USFS, GLACIER RANGER DISTRICT
POB 129
GIRDWOOD, AK 99587

BUDDY GOATCHER
KATMAI NATIONAL PARK & PRESERVE
202 CENTER AVE, SUITE 204
KODIAK, AK 99615-6312

CRAIG HARRISON, VICE-CHAIR
PACIFIC SEABIRD GROUP
4001 N. 9TH, APT 1801
ARLINGTON, VA 22203

SCOTT HATCH
US FISH AND WILDLIFE SERVICE NBS
1011 E TUDOR RD
ANCHORAGE, AK 99503-6119

WILLIAM HAUSER
ALASKA DEPARTMENT OF FISH & GAME
333 RASPBERRY RD
ANCHORAGE, AK 99518-1565

RONALD A. HEINTZ
N.M.F.S. AUKE BAY LABORATORY
11305 GLACIER HWY
JUNEAU, AK 99801-8626

BOB HENRICHS, CHIEF & PROJECT COORDINATOR
NATIVE VILLAGE OF EYAK TRIBAL COUNCIL
POB 1388
CORDOVA, AK 99574-1000

RAY HIGHSMITH
INSTITUTE OF MARINE SCIENCE UAF
ROOM 217 O'NEIL BLDG
FAIRBANKS, AK 99775

ROBERT HINES, DEPUTY MAYOR
CITY OF PORT LIONS, ADMIN OFFICES
POB 110
PORT LIONS, AK 99550

KEN HODGES
USDA FOREST SERVICE, CORDOVA RANGER DIS
POB 280
CORDOVA, AK 99574

KEN HOLBROOK
USFS CHUGACH NATIONAL FOREST
3301 C ST, STE 300
ANCHORAGE, AK 99503-3998

CLAIRE HOLLAND, DISTRICT RANGER
KODIAK DISTRICT OFFICE
POB 3800
KODIAK, AK 99615

LESLIE HOLLAND-BARTELS
NBS ALASKA FISH & WILDLIFE RESEARCH CTR
1011 E TUDOR RD
ANCHORAGE, AK 99503-6119

STEVE HONNOLD
ALASKA DEPARTMENT OF FISH & GAME
211 MISSION RD
KODIAK, AK 99615-6327

GAIL IRVINE
NATIONAL BIOLOGICAL SURVEY
1011 E TUDOR RD
ANCHORAGE, AK 99503

STEPHEN JEWETT
INSTITUTE OF MARINE SCIENCE
UAF GENERAL DELIVERY
FAIRBANKS, AK 99775-9999

DR. LORA L. JOHNSON
CHUGACH REGIONAL ARCHAEOLOGIST
4201 TUDOR CENTRE DR, STE 210
ANCHORAGE, AK 99508

SCOTT W. JOHNSON
NOAA NMFS AUKE BAY LABORATORY
11305 GLACIER HIGHWAY
JUNEAU, AK 99801

RICHARD A. KNECHT
ALUTIIQ MUSEUM & ARCHAEOLOGICAL REPISTRY
215 MISSION ROAD
KODIAK, AK 99615

GARY KOMPKOFF, PRESIDENT
TATITLEK IRA COUNCIL
POB 170
TATITLEK, AK 99677-0170

KATHERINE KULETZ
USFWS NONGAME MIGRATORY BIRD MANAGEMENT
1011 E TUDOR RD
ANCHORAGE, AK 99503

MARK KUWADA
ADFG DIV OF HABITAT & RESTORATION
333 RASPBERRY RD
ANCHORAGE, AK 99518-1599

RICHARD LANCTOT, PROJECT LEADER/MANAGER
NATIONAL BIOLOGICAL SURVEY
1011 E TUDOR ROAD
ANCHORAGE, AK 99503

DAN LOGAN
USFS CORDOVA RANGER DISTRICT
POB 280
CORDOVA, AK 99574-0280

DAN H. MANN, PROJECT CO-LEADER
ALASKA QUATERNARY CENTER
UNIVERSITY OF ALASKA
FAIRBANKS, AK 99775

GARY MARTY
~~MV-PAC~~ MV-APC
UNIVERSITY OF CALIFORNIA
DAVIS, CA 95616

CRAIG MATKIN
NORTH GULF OCEANIC SOCIETY
POB 15244
HOMER, AK 99603-6244

ELIZABETH ANNE MCCORD
REGIONAL CITZENS ADVISORY COUNCIL
910 HIGHLAND AVE
KENAI, AK 99611

ELENORE MCMULLEN, CHIEF
PORT GRAHAM IRA COUNCIL
POB 5543
PORT GRAHAM, AK 99603

RITA A. MIRAGLIA
ADFG
333 RASPBERRY RD
ANCHORAGE, AK 99518

CHARLES T. MITCHELL
MBC APPLIED ENVIRONMENTAL SCIENCES
3040 REDHILL AVE
COSTA MESA, CA 92626

MICHAEL L. MURPHY
NMFS AUKE BAY LABORATORY
11305 GLACIER HIGHWAY
JUNEAU, AK 99801-8626

STEPHEN MURPHY
ALASKA BIOLOGICAL RESEARCH, INC.
POB 80410
FAIRBANKS, AK 99708-0410

A. SATHY NAIDU, PROFESSOR OF MARINE SCIENCE, SFOS
UNIVERSITY OF ALASKA
POB 757220
FAIRBANKS, AK 99775-7220

DR. DANIEL PAULY, PROFESSOR
FISHERIES CENTRE, UNIV BRITISH COLUMBIA
2204 MAIN MALL
VANCOUVER, BC V6G 1K5

JOHN PIATT
NATIONAL BIOLOGICAL SURVEY
1011 E TUDOR RD
ANCHORAGE, AK 99503-6119

ERNIE PIPER
DEPT OF ENVIRONMENTAL CONSERVATION
3601 C STREET, SUITE 1334
ANCHORAGE, AK 99503

ERIC PRESTEGARD
PWS AQUACULTURE CORPORATION
POB 1110
CORDOVA, AK 99574

GORDON REEVES
USFS, PACIFIC NORTHWEST RESEARCH STATION
3200 SW JEFFERSON WAY
CORVALLIS, OR 97331

DOUGLAS REGER
ADNR OFFICE OF HISTORY & ARCHAEOLOGY
3301 C ST, SUITE 1278
ANCHORAGE, AK 99503-5921

STEVE RIEDEL
POB 1005
CORDOVA, AK 99574

MONICA RIEDEL, ACTING CHAIR
ALASKA HARBOR SEAL COMMISSION
POB 1005
CORDOVA, AK 99574

MARGARET ROBERTS, PRESIDENT
KODIAK TRIBAL COUNCIL
POB 1974
KODIAK, AK 99615

PAUL ROETMAN, EXECUTIVE DIRECTOR
PWS ECONOMIC DEVELOPMENT COUNCIL
POB 2353
VALDEZ, AK 99686-2353

DAN ROSENBERG
ALASKA DEPARTMENT OF FISH & GAME
333 RASPBERRY RD
ANCHORAGE, AK 99518-1565

D.G. ROSENEAU
DOI FWS AK MARITIME NAT'L WILDLIFE REFG
2355 KACHEMAK DR STE 101
HOMER, AK 99603-8021

GREGORY T. RUGGERONE
NATURAL RESOURCES CONSULTANTS, INC.
4055 21ST AVENUE WEST
SEATTLE, WA 98199

DAVID SCHEEL
PRINCE WILLIAM SOUND SCIENCE CENTER
POB 705
CORDOVA, AK 99574-0705

DANA SCHMIDT
ALASKA DEPARTMENT OF FISH & GAME
34828 KALIFORNSKY BEACH RD
SOLDOTNA, AK 99669

JOHN SCHROEDER, PROJECT LEADER
NORTH PACIFIC RIM, INC. REG'L HOUSING AU
4201 TUDOR CENTRE DR, STE 210
ANCHORAGE, AK 99508

JIM SEEB
ALASKA DEPARTMENT OF FISH & GAME
333 RASPBERRY RD
ANCHORAGE, AK 99518-1565

LISA SEEB
ALASKA DEPARTMENT OF FISH & GAME
333 RASPBERRY RD
ANCHORAGE, AK 99518-1565

PETER SELANOFF
CHENEGA BAY IRA COUNCIL
GENERAL DELIVERY
CHENEGA BAY, AK 99574

JEFFREY W. SHORT
N.M.F.S. - AUKE BAY LABORATORY
11305 GLACIER HWY
JUNEAU, AK 99801-8626

JAMES SINNETT
CHUGACH HERITAGE FOUNDATION
4201 TUDOR CENTRE DR, STE 210
ANCHORAGE, AK 99508

WILLIAM W. SMOKER
UAF, JUNEAU CTR, SCHOOL OF FISHERIES
11120 GLACIER HIGHWAY
JUNEAU, AK 99801-8677

MICHAEL STEKOLL
SCHOOL OF FISHERIES AND OCEAN SCIENCES
11120 GLACIER HIGHWAY U OF A
JUNEAU, AK 99801

JOE SULLIVAN
ALASKA DEPARTMENT OF FISH & GAME
333 RASPBERRY RD
ANCHORAGE, AK 99518-1565

GARY THOMAS, PRINCIPAL INVESTIGATOR
PRINCE WILLIAM SOUND SCIENCE CENTER
POB 705
CORDOVA, AK 99574-0705

RAY THOMPSON
USFS CHUGACH NATIONAL FOREST
3301 C STREET, SUITE 300
ANCHORAGE, AK 99503

ALEX VITERI, JR., P.E.
ADEC
410 W WILLOUGHBY AVE
JUNEAU, AK 99801

CHARLES WALKDEN, SR., PRESIDENT
COOK INLET SEINERS ASSOCIATION
POB 4311
HOMER, AK 99603

DAVID WERNER
POB 1092
CORDOVA, AK 99574

ALEX WERTHEIMER
N.M.F.S. AUKE BAY LABORATORY
11305 GLACIER HWY
JUNEAU, AK 99801-8626

MARK WILLETTE
ALASKA DEPARTMENT OF FISH & GAME
POB 669
CORDOVA, AK 99574-0669

GRAHAM A.J. WORTHY, PH.D.
MARINE MAMMAL RESEARCH PROG, TEXAS A&M
4700 AVENUE U, BLDG 303
GALVESTON, TX 77551

STEVE ZEMKE
CHUGACH NATIONAL FOREST
3301 C STREET, SUITE 300
ANCHORAGE, AK 99503

Exxon Valdez Oil Spill Trustee Council

Restoration Office
645 G Street, Suite 401, Anchorage, Alaska 99501-3451
Phone: (907) 278-8012 Fax: (907) 276-7178

MEMORANDUM

TO: Bill Brighton, U.S. Department of Justice
Gina Belt, U.S. Department of Justice
Barry Roth, U.S. Department of Interior
Maria Lisowski, U.S. Department of Agriculture
Alex Swiderski, Alaska Department of Law

FROM: Molly McCammon
Executive Director

DATE: May 11, 1995

RE: Legal review of FY1996 project proposals

We have received 128 project proposals for the FY96 Work Plan, totaling almost $39 million in requests. The large two-volume set is your review copy. A major difference from last year is that these proposals are in the form of Detailed Project Descriptions (i.e., 20-page proposals on average, as compared to three-page Brief Project Descriptions). As a result, there is considerably more paper to review than in the past. I would like to have the preliminary legal review of these proposals completed before the Draft FY96 Work Plan is published in late June. Rebecca Williams will be calling you to set up a teleconference early next week to discuss the legal review process and schedule.

Although the amount of paper may appear daunting at first, many of these proposals would continue FY95 projects or are similar to projects previously funded or considered by the Trustee Council. A preliminary analysis of the submissions shows that of the 128 projects, 71 are new proposals. Of these, 34 are for research of the type typically funded by the Trustee Council. An additional 14 projects are for fish supplementation efforts that will be evaluated by the core reviewers using the criteria developed at the supplementation workshop attended by Bill Brighton and Alex Swiderski in January described on pp. 34-35 of the FY96 Invitation. Most of the new proposals are ideas similar to others proposed to or funded by the Council in the past. I believe we are fast approaching the time when the proposals submitted are mainly variations of past and current efforts.

The core reviewers, led by Chief Scientist Bob Spies, will be conducting the scientific and technical review of these proposals from May 23-25. They will be looking at these factors:

• The potential contribution of the proposal to the identified needs. For research proposals, this should reflect the priority given to the research need to which the proposal is addressed. In other words, to what extent will the proposal help achieve the restoration objectives identified for that resource, using the objectives listed in the invitation and in the Restoration Plan.

• The overall scientific merits of the proposal as demonstrated through understanding of the problem, soundness of the technical approach, innovation and uniqueness of the project, and feasibility.

• The organization's capabilities and experience, past performance record, facilities, experience of key personnel or unique combinations thereof that are integral factors for achieving the proposal objectives.

• The cost effectiveness of the project proposal.

• An assessment of how well the proposal fits into the overall restoration program.

To aid this technical review, staff in the Anchorage office are putting together a spreadsheet analysis of whether or not (and how) each proposal might implement a particular goal, objective or strategy described in the Restoration Plan. I will forward this to you as soon as it is completed. In addition, staff will be looking at crafting a program that is financially sustainable, that meets the objectives and strategies described in the Restoration Plan, and that has a balance of research, monitoring and general restoration. I do not envision a lot of new projects, and in fact, we may recommend dropping or reducing some in scope. Given the Council's commitment to habitat protection and the Restoration Reserve, we are looking at a reduced work plan for FY96.

Pink Salmon Projects

Seventeen proposals submitted, 11 as continuation projects. Of the **new** proposals, two (96093A and B) are genetics analyses related to a Prince William Sound Aquaculture Corporation proposal (96093C) intended to evaluate the feasibility of changes in hatchery returns to reduce impacts on injured wild stocks. Project 96093C is still being developed in conjunction with the state fisheries managers and the state geneticist. I will forward it to you as soon as we get it. 96139D would provide hydrologic monitoring for the proposed Port Dick Pink and Chum Salmon Spawning Channel that has been under review since the supplementation workshop. The other

three (96179, 96190, and 96194) are miscellaneous research proposals that are similar in type to others funded by the Trustees and which will be reviewed for technical merit and in light of the overall pink salmon effort. Significant legal issues: possibly for 96093.

Sound Ecosystem Assessment

The SEA project is a continuation of the FY95 effort, with three additional proposed components (96320R, Z1 and Z2): synthesis and integration, coordination and communication, and a trophodynamic modeling effort. Three **new**, although related, research proposals also were submitted (96054, 96193, 96195).

Sockeye Salmon Program

Of the nine projects proposed, three are continuation efforts. Of the **new** proposals, two (96258B and C) are proposed for consideration only if the Kenai River sockeye stocks crash this summer; another is a typical Council research effort (96048). Three projects (96254, 96256, and 96257) would restore sockeye salmon in three lake systems through fertilization or stocking. These are similar to the already funded Coghill Lake project, which is a replacement project for injured commercial fishing services. The new proposals will be closely examined to determine if they are restoration, replacement, or enhancement efforts, and if they make sense from an overall programmatic perspective. In addition, they will be reviewed to determine if they are consistent with the supplementation criteria (pp. 34-35 of the Invitation). Significant legal issues: nothing new, although project 96254 is located on private land within Kenai Fjords National Park.

Cutthroat and Dolly Varden Trout Projects

Six projects are proposed, of which three are continuations. Of the **new** projects, one is for research (96145) and two are for studies of damage due to timber harvests and the potential for restoration (96177A and B). These would be viewed as replacement restoration projects.

Marine Mammal Program

Seven projects are proposed, of which five are continuations. The two **new** projects (96211 and 96213) are the direct outgrowth of the Seal and Sea Otter Cooperative Subsistence Harvest Assistance project from 1994 and 1995. They both have significant local community and subsistence user support.

Nearshore Ecosystem Projects

Of the 19 projects proposed, seven are continuation efforts. Of the **new** projects, seven are typical research proposals (96037, 96067, 96072, 96088, 96104, 96108, 96161). One calls for transplanting sea otters (96056). While this proposal may present legal questions, it is unlikely to receive a positive scientific review. Four are related to assessment and cleanup of subsurface oil, and the use of various treatment methods (96094, 96103, 96109, 96160). There is still significant support in the community of Chenega for continued cleanup of residual oil. However, we will be relying heavily on the recommendations generated by Project 95266 in analyzing the usefulness and cost-effectiveness of continued efforts, as well as the potential for inflicting further stress on recovering ecosystems.

Seabird/Forage Fish and Related Projects

Fourteen proposals; 9 are continuations. Of the **new** projects, four are general research and monitoring (96120, 96142, 96148, 96175). Two of these are for Kittletz's murrelets (96142 and 96148). The Trustees have received a petition to add Kittletz's murrelets to the Injured Resources and Services list published in the Restoration Plan. The Trustees will soon have under consideration a recommendation from the Chief Scientist to change the listing to "murrelet species", as opposed to specifying either marbled or Kittletz's since both were injured. One project (96101) is for fox removal from an island outside the spill area, similar to previously funded Projects 94041 and 95041.

Subsistence Projects

Twenty-five subsistence proposals were submitted, only eight of which are continuations. Of the **new** projects, two appear to be clearly outside the purview of the Trustee Council's mission (96201 and 96202). Six are for fisheries enhancement projects that will be scrutinized using the criteria on pp. 34-35 of the FY96 Invitation (96206, 96207, 96208, 96220, 96225, 96226). One project (96203) is for a waste oil project that appears to dovetail with Project 95417 and use of that funding will be explored. One project (96205) is related to the cultural aspect of the oil spill and is similar to projects that were not funded by the Trustees last year. One project (96204) is for subsistence planning in Kodiak, similar to Projects 94428 and 95428 that were previously funded. One project (96210) would get local youths involved in research projects, similar to 95052 that has already been funded. Project 96212 relates to food safety of subsistence shellfish, similar to the already funded 94279 and 95279.

Projects 96214 and 96244 would use a video, workshops and other means to enhance restoration and traditional knowledge of harbor seals. Project 96218 would add Ouzinkie to the clam restoration project (95131).

Archaeological Resources

Eight projects; two are continuations. Of the six **new** proposals, five specifically address the need for additional archaeological repositories. These will be reviewed from a regional perspective based on need, appropriateness for the community, community support, and financial sustainability, making use of the draft report developed as a result of Project 94007, Spill Area Site and Collection Protection Plan, March 1995. One project (96149) is for a site stewardship program similar to one proposed several years ago, but not funded by the Council.

Reducing Marine Pollution

One continuation project; one **new**. Significant legal issues: Project 96091 needs to be reviewed to determine its importance for restoration of injured resources, not its value as providing baseline information for future oil spills. The staff and scientific review will address that issue.

Habitat Protection

Six projects are proposed; four are new. All four **new** projects would restore/rehabilitate/enhance habitat for injured fish and wildlife. Policy questions concern scope of effort and how much Trustee Council wants to get involved in these efforts.

Administration, Public Information & Science Management

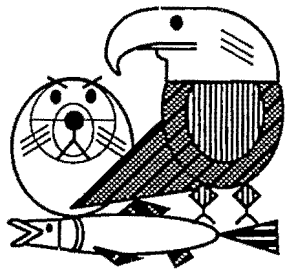
Current administration budget at reduced level, plus a new proposal for an integrated information system.

Research Facilities

Project 96151 would fund a new building for the Prince William Sound Science Center. Legal question: connection between need for this proposed facility and overall restoration program. The Science Center would like at least $300,000 this year for planning.

Exxon Valdez Oil Spill Trustee Council

Restoration Office
645 G Street, Suite 401, Anchorage, Alaska 99501-3451
Phone: (907) 278-8012 Fax: (907) 276-7178



MEMORANDUM

TO: Trustee Council

FROM: Molly McCammon, Executive Director

DATE: May 10, 1995

SUBJ: Small Parcel Program

At the February 13, 1995 Trustee Council meeting, I was directed to report back to the Trustee Council by June 15 with an initial recommendation regarding those small parcels that should be protected using joint settlement funds. The purpose of this memorandum is to provide you with certain information concerning the small parcel program, particularly as it pertains to the Phase II parcel evaluations. A more comprehensive briefing on the small parcel program will be provided at the June 1 Trustee Council meeting in Cordova.

The Habitat Work Group has evaluated and rated the Phase II small parcel nominations. As a result of the Phase II process, an additional 23 parcels were nominated. Of these, two Phase II parcels were ranked "high":

KEN 1001	Deep Creek	Ninilchik Native Assoc. Inc.	172 ac.
KEN 1004	Stephanka Tract	Kenai Natives Assoc. Inc.	803 ac.

No Phase II parcels have been identified in the "moderate" category at this time. However, six Phase II parcels were identified as having scores of 18, that is, just below the "moderate" break point (ie., <20 = Low, 20-39 = Moderate, and 40/above = High).

The six Phase II parcels that scored at 18 are:

KEN 1005	Ninilchik River	Ninilchik Native Assoc. Inc.	16 ac.
KEN 1006	Girves Property	Irene Girves	110 ac.
KEN 1009	Cooper Property	David & Wanda Cooper	~30 ac.
PWS 1010	Jack Bay	University of Alaska	942 ac.
KEN 1014	Anderson Property	Dean Anderson	64 ac.
KEN 1015	Lowell Point	James E. McCracken	19.4 ac.

Several of these parcels have generated substantial interest from either the nearby community (KEN 1010/Jack Bay-Valdez, KEN 1015 Lowell Point-Seward) or an agency (KEN 1005/Ninilchik River-ADFG, KEN 1006/Girves-ADFG). Together, a total of eight Phase I and Phase II parcels have been scored at 18 (two in Phase I and six in Phase II).

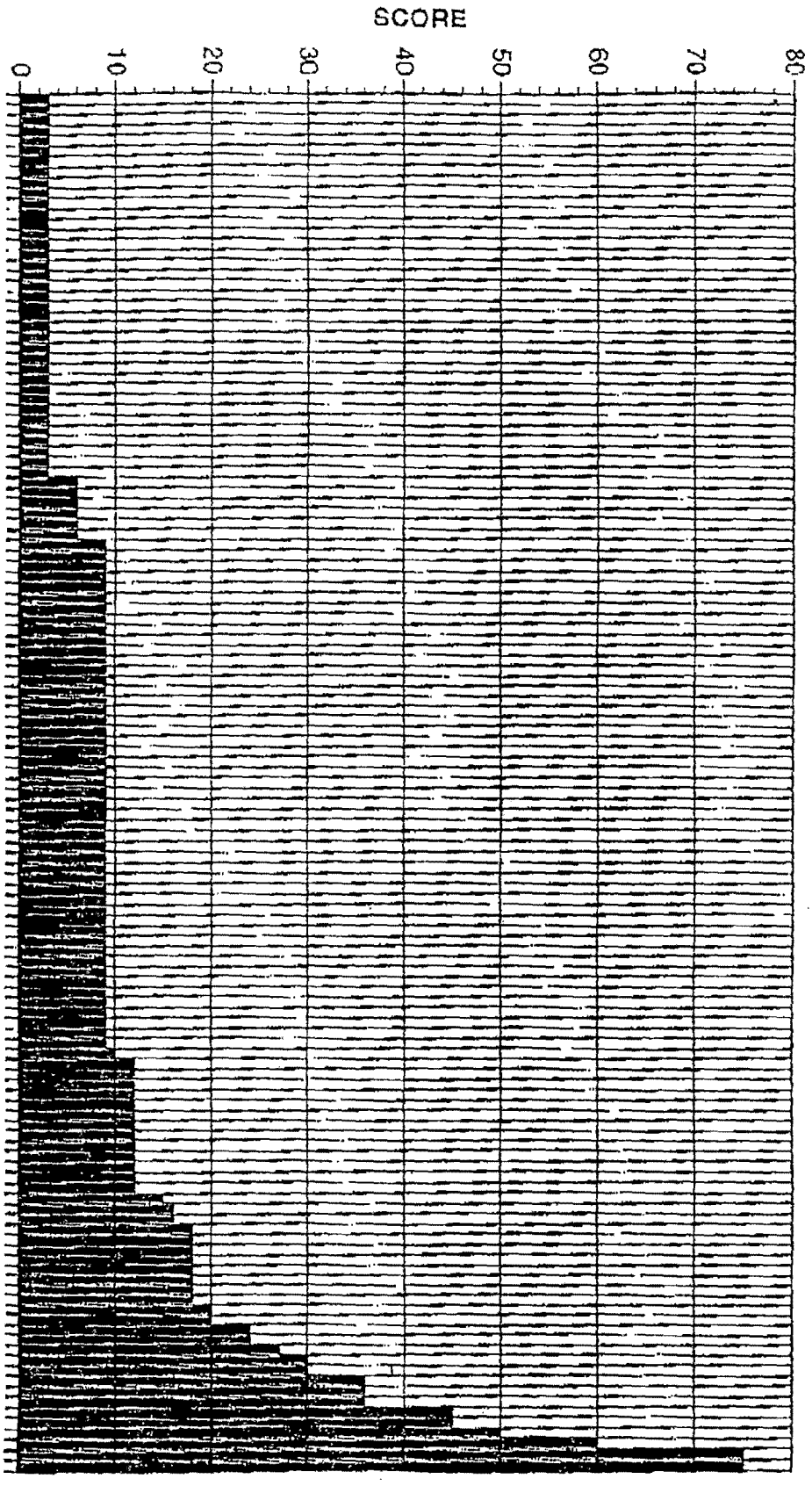
A copy of the most recent small parcel score bar chart is attached for your reference. As you will recall, the Trustee Council discussed the issue of the moderate/low break point during the Phase I review. With the addition of the Phase II parcels, there is now a cluster of parcels that scored 18. Most of the Phase II parcels that scored 18 are likely candidates for "special merit" designation because of public and agency support. In addition, the two Phase I parcels that scored 18 are both already in the preliminary negotiation process (KAP 220 was identified as a "special merit" parcel and KAP 162 is part of the larger "moderate" KAP 226 parcel).

The RFPs/contracts for appraisals of the Phase I and II small parcels are now being drafted. If the incremental six Phase II parcels that were rated 18 are included, the cost will be relatively inexpensive (rather than possibly being added later). In order to move forward efficiently with the appraisal and negotiation process, I recommend that the break point between moderate/low be 18 (rather than 20). If the break point goes to 18, the total number of Phase I and II parcels undergoing further consideration would be 27 (i.e., 6 high, 17 moderate, and 4 special merit), rather than 21.

I will contact each of you in the near future to discuss this further.

enclosure

cc: Alex Swiderski
Glenn Elison
Carol Fries
Mark Kuwada
Dave Gibbons



SMALL PARCEL SCORES
PHASE I & II

****
*** MULTI TRANSACTION REPORT ***
****

TX/RX NO. 8052

INCOMPLETE TX/RX

TRANSACTION OK	[15] 5624871	C.FRIES
	[18] 5223148	J.SULLIVAN
	[39] 3491723	MARK KUWADA

ERROR

****
*** ACTIVITY REPORT ***
****

TRANSMISSION OK

TX/RX NO.	8053
CONNECTION TEL	7863640
CONNECTION ID	G.ELISON
START TIME	05/11 16:01
USAGE TIME	01'37
PAGES	3
RESULT	OK

****
*** MULTI TRANSACTION REPORT ***
****

TX/RX NO. 8051

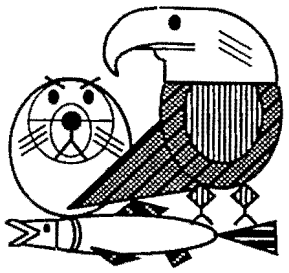
INCOMPLETE TX/RX

TRANSACTION OK	[09] 19075867589	JUNEAU OFFICE
	[10] 19075867555	D.GIBBONS
	[13] 19077896608	MORRIS-WRIGHT
	[15] 5624871	C.FRIES
	[18] 5223148	J.SULLIVAN
	[20] 7863350	C.BERG
	[25] 19075867840	P.JANIK
	[26] 19074652075	B.BOTELHO
	[27] 12022084684	G.FRAMPTON
	[28] 19075867249	S.PENNOYER
	[29] 19074652332	F.RUE
	[31] 19074655070	G.BURDEN
	[36] 2787022	ALEX-CRAIG

ERROR

Exxon Valdez Oil Spill Trustee Council

Restoration Office
645 G Street, Suite 401, Anchorage, Alaska 99501-3451
Phone: (907) 278-8012 Fax: (907) 276-7178



May 10, 1995

Dear Proposer:

Thank you for submitting a proposal for a restoration project for FY 96. We received 128 proposals requesting about $39 million, or twice the estimated amount available. I have enclosed a list of all 128 projects. I encourage you to locate reference to your proposal and take note of the project number associated with it.

Over the next four months, these proposals will be reviewed by independent scientists, agencies, and the public. Key dates in the review process are:

June 5-7	The Chief Scientist, agency representatives, and two members of the Public Advisory Group will meet in Anchorage to advise the Executive Director on which projects should be funded for FY 96. The Executive Director's recommendations will be included in the *Draft Work Plan*.
June 27 - Aug. 1	Public review of the *Draft Work Plan*.
August 25	Trustee Council is scheduled to meet to approve funding for FY 96 projects.

I will send you a copy of the *Draft Work Plan* at the end of June so you can see my recommendations on all 128 proposals. The *Draft Work Plan* will include reasons for proposed recommendations. Your comments on all aspects of the *Draft Work Plan* will be welcomed.

If you have questions about the proposal review process, please call Bob Loeffler at 278-8012 in Anchorage or at the following toll-free numbers: 1-800-478-7745 in Alaska and 1-800-283-7745 outside Alaska.

Sincerely,

Molly McCammon
Executive Director

Enclosure

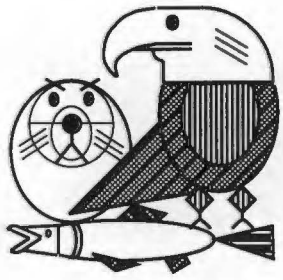
FY 96 -- LIST OF PROJECT PROPOSALS RECEIVED

PROPOSER	PROJECT TITLE	PROJECT #
ABR, Inc.	Status and Ecology of Kittlitz's Murrelet in Prince William Sound	96142-BAA
ABR, Inc.	Recovery of Bird and Mammal Populations in Prince William Sound After the *Exxon Valdez* Oil Spill	96143-BAA
ADEC	Improving Recovery Rates on Shorelines in PWS Using Enhanced Bioremediation	96094
ADEC	Kodiak Archipelago Shoreline Assessment: Monitoring Surface and Subsurface Oil	96027
ADFG	Herring Natal Habitats	96166
ADFG	Pacific Herring Projects Coordination	96164
ADFG	Genetic Discrimination of Prince William Sound Herring Populations	96165
ADFG	Monitoring, Habitat Use, and Trophic Ineractions of Harbor Seals in Prince William Sound	96064
ADFG	Resource Abnormalities Study	96279
ADFG	Harlequin Duck Recovery Monitoring	96427
ADFG	Subsistence Restoration Planning and Implementation	96428
ADFG	Community Interaction/Traditional Knowledge	96052B
ADFG	Kodiak Subsistence Resource Restoration Planning	96204
ADFG	Chugach Native Region Clam Restoration	96131
ADFG	Genetic Structure of Prince William Sound Pink Salmon	96196
ADFG	Restoration of Coghill Lake Sockeye Salmon	96259
ADFG	Kenai River Sockeye Salmon Restoration	96255
ADFG	Sockeye Salmon Skilak Lake Enclosure Project	96258B
ADFG	Spawning Channel Construction Project Port Dick Creek, Lower Cook Inlet	96139A2
ADFG	Salmon Insream Habitat and Stock Restoration - Little Waterfall Barrier Bypass Improvement	96139A1
ADFG	Salmon Instream Habitat and Stock Restoration - Lowe River and Valdez Arm Drainages	96139C2
ADFG	Sockeye Salmon Overescapement Project	96258A
ADFG	Oil-Related Embryo Mortalities in PWS Pink Salmon Populations	96191A
ADFG	Otolith Thermal Mass Marking of Hatchery Reared Pink Salmon in Prince William Sound	96188
ADFG	Coded Wire Tag Recoveries From Pink Salmon in Prince William Sound	96186
ADNR	Habitat Protection and Acquisition Support	96126
ADNR	Archaeological Index Site Monitoring	96007A
ADNR	Archaeological Site Stewardship, Kachemak Bay, Shelikof Strait, and Chignik	96149
ADNR	Afognak Island State Park - Habitat Restoration Survey	96141
ADNR	Kenai Habitat Restoration & Recreation Enhancement Project	96180
Akhiok City	Kempff Bay Sockeye Enhancement Feasibility Study	96208
Allendorf/UM	Construction of a Linkage Map for the Pink Salmon Genome	96190
Alter/PES	Decontamination and Restoration Process for Oil-Impacted Mussel Beds	96109-BAA
Alutiiq HF	Expansion of Alutiiq Archaeological Repository	96150
ANHSC	Harbor Seal Cooperative Assistance	96244
ANHSC	Alaska Native Harbor Seal Commission	96213-BAA

FY 96 -- LIST OF PROJECT PROPOSALS RECEIVED

PROPOSER	PROJECT TITLE	PROJECT #
Eyak Nat Vill	Eyak Subsistence Recovery Camp Planning Project	96205
Fairweather	Prince William Sound Information Service	96155
Highsmith/UAF	Herring Bay Monitoring and Restoration Studies	96086
Highsmith/UAF	Coastal Habitat Intertidal Monitoring	96037
Jewett/UAF	Herring Bay Monitoring and Restoration Studies	96106
Kodiak Tribal	PSP Shellfish Restoration Testing Program	96212
Mitchell/MBC	Juvenile Fish Habitat Identification and Assessment	96067-BAA
N Gulf Oceanic	Comprehensive Killer Whale Investigation in Prince William Sound, Alaska	96012A-BAA
Naidu/UAF	Flux and Nutritional Quality of Particulate Organic Carbon: Relationship to Survival of Juvenile Pelagic Fish	96193-BAA
NOAA	Expansion of the Prince William Sound Science Center/Oil Spill Recovery Institute	96151-BAA
NOAA	Impact of Killer Whale Predation on the Recovery of Injured Resources in Prince William Sound	96012B
NOAA	Herring Reproductive Impairment	96074
NOAA	Hydrocarbon Data Analysis, Interpretation, and Database Maintenance	96290
NOAA	Mussel Bed Restoration and Monitoring	96090
NOAA	Pink Salmon Spawning Habitat Recovery	96194
NOAA	Pristane Monitoring in Mussels and Predators of Juvenile Pink Salmon & Herring	96195
NOAA	Effects of Oiled Incubation Substrate on Straying and Survival of Wild Pink Salmon	96076
NOAA	Injury to Salmon Eggs and Pre-emergent Fry Incubated in Oiled Gravel (Laboratory Study)	96191B
NRC, Inc.	Historical Analysis of Sockeye Salmon Growth Among Populations Affected by Overescapement in 1989	96048-BAA
Old Harbor	Old Harbor Lagoon (Midway Culvert) Salmon Enhancement Feasibility Study	96206
Old Harbor City	Ocean Beach Sockeye Enhancement Feasibility Study	96207
Ouzinkie Tribe	Ouzinkie Clam Restoration Project	96218
Ouzinkie Tribe	Ouzinkie Archeological Culture Center Project	96219
Pac Seabird Gr	Publication of Seabird Restoration Workshop	96038
Pauly/UBC	Mass-Balance Model of Trophic Fluxes in Prince William Sound	96054
Port Graham	Port Graham Pink Salmon Subsistence Project	96225
Port Lions	Port Lions Waste Oil/Garbage Collection System for Boat Harbor	96203
Port Lions	Port Lions Community Hall	96202
Port Lions	Port Lions Public Safety Building/Emergency Operations Center	96201
PWS Econ DC	Sound Waste Management Plan	96115
PWSAC	Chenega Chinook Release Program	96272
PWSAC	Restoration of Prince William Sound Pink Salmon by Diversion of Harvest Effort	96093C
PWSSC	Sound Ecosystem Assessment (SEA): Coordination & Communications	96320Z2-BA
Qutekcak Tribe	Resurrection Bay Salmon Stock Enhancement	96226
Scheel/PWSSC	Survey of Octopuses in Intertidal Habitats	96009D-BAA

Exxon Valdez Oil Spill Trustee Council
Restoration Office
645 G Street, Suite 401, Anchorage, Alaska 99501-3451
Phone: (907) 278-8012 Fax: (907) 276-7178



FAX COVER

FAX COMPLETE

TO: Ken Holbrook

FROM: Eric F. Myers

DATE: 5/9/95

SUBJ: Chuck Dennis Inquiry re: University Parcel

I consider it a fundamental responsibility of my job to assist members of the public to obtain accurate answers to their questions. Attached is a copy of the letter that I sent to Mr. Chuck Dennis, after consulting with Dave Gibbons.

As you can see, the letter simply informs Mr. Dennis that the USFS is in the process of reassessing possible habitat protection in the vicinity of the Valdez Duck Flats parcel that is currently under consideration. Because the USFS has the lead for this effort, I suggested Mr. Dennis speak with Dave Gibbons to obtain further details.

cc: Jim Wolfe
Dave Gibbons
Molly McCammon

Pages (2)

Exxon Valdez Oil Spill Trustee Council

Restoration Office
645 G Street, Suite 401, Anchorage, Alaska 99501-3451
Phone: (907) 278-8012 Fax: (907) 276-7178

May 2, 1995

Mr. Chuck Dennis
P.O. Box 3229
Valdez, Alaska 99686

COPY

Dear Mr. Dennis,

Thank you for stopping by the Restoration Office to discuss the Trustee Council's small parcel protection program. I want to let you know what I have learned since we spoke on Monday.

I spoke with Mr. Dave Gibbons of the US Forest Service. (The USFS is the Trustee agency that has the lead role to work with the University of Alaska concerning the Valdez Duck Flats parcel.) As a result of comments from the Trustee Council's Public Advisory Group (a 17-member public advisory body) and other members of the public, Mr. Gibbons has been examining the possibilities regarding habitat protection in the vicinity of the Valdez Duck Flats parcel that is currently under consideration.

Mr. Gibbons informed me that he has determined that there are three parcels with separate owners between Parcel 447 and the Valdez Duck Flats parcel. As a first step to reassessing possible interest in Parcel 447, Mr. Gibbons is trying to contact the parcel owners between the Valdez Duck Flats and Parcel 447. If you are interested in learning more about these efforts, I urge you to contact Mr. Gibbons directly. His phone number in Juneau is 586-8784.

I hope that this information is helpful to you. For your reference, I have also enclosed a copy of the Trustee Council's most recent annual report.

Sincerely,

Eric

Eric Myers
Director of Operations

enclosure

cc: Dave Gibbons
Nancy Lethcoe

****
*** ACTIVITY REPORT ***
****

TRANSMISSION OK

TX/RX NO.	7980
CONNECTION TEL	2713992
CONNECTION ID	HOLBROOK
START TIME	05/09 15:12
USAGE TIME	01'00
PAGES	2
RESULT	OK

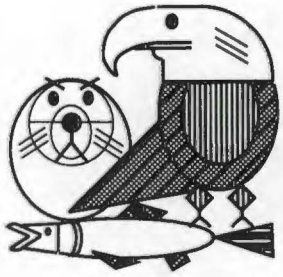
****
*** ACTIVITY REPORT ***
****

TRANSMISSION OK

TX/RX NO.	7981
CONNECTION TEL	19075867555
CONNECTION ID	D.GIBBONS
START TIME	05/09 15:17
USAGE TIME	00'56
PAGES	1
RESULT	OK

Exxon Valdez Oil Spill Trustee Council

Restoration Office
645 G Street, Suite 401, Anchorage, Alaska 99501-3451
Phone: (907) 278-8012 Fax: (907) 276-7178



MEMORANDUM

To: Restoration Work Force

FAX COMPLETE

From: Molly McCammon
Executive Director

Date: May 9, 1995

Subj: May 11 RWF Meeting

This weeks Restoration Work Force meeting will be **THURSDAY, May 11**, at 9:00 a.m. The Juneau location is the Executive Director's Office while the Anchorage location is the Restoration Office.

Topics to be discussed will include:

- DPDs and FY96 Work Plan Review Process
- June 1 & 2 Trustee Council Meeting in Cordova
- Small Parcel Update
- Miscellaneous Issues

mm/raw

****
*** MULTI TRANSACTION REPORT ***
****

TX/RX NO. 7976

INCOMPLETE TX/RX	[35] 15103737834	B.SPIES
TRANSACTION OK	[09] 19075867589	JUNEAU OFFICE
	[10] 19075867555	D.GIBBONS
	[13] 19077896608	MORRIS-WRIGHT
	[15] 5624871	C.FRIES
	[16] 3494712	RITA MIRAGLIA
	[17] 2713992	R.THOMPSON
	[18] 5223148	J.SULLIVAN
	[19] 7863636	L.BARTELS
	[20] 7863350	C.BERG
	[21] 2572517	B.RICE
	[23] 19074655375	D.BRUCE
	[24] 5624026	E.PIPER
	[30] 19074654759	ELLEN FRITTS
	[38] 2715827	G.BELT
ERROR		

****
*** ACTIVITY REPORT ***
****

TRANSMISSION OK

TX/RX NO.	7976
CONNECTION TEL	15103737834
CONNECTION ID	B.SPIES
START TIME	05/09 14:55
USAGE TIME	01'31
PAGES	2
RESULT	OK

Exxon Valdez Oil Spill Trustee Council

Restoration Office
645 "G" Street, Anchorage, AK 99501
Phone: (907) 278-8012 Fax: (907) 276-7178

May 9, 1995

TO: Legal Reviewers
Alex Swiderski, State of Alaska
Barry Roth, US Department of Interior
Bill Brighton, US Department of Justice
Gina Belt, US Department of Justice
Maria Lisowski, US Department of Agriculture, Forest Service

FROM: Bob Loeffler
Director of Planning

SUBJECT: Legal Review: FY 96 Work Plan

Memo outlining draft focus for preliminary legal review will be faxed separately.

Exxon Valdez Oil Spill Trustee Council
Restoration Office
645 "G" Street, Anchorage, AK 99501
Phone: (907) 278-8012 Fax: (907) 276-7178

MEMORANDUM

TO: Molly McCammon
Executive Director

THRU: Traci Cramer
Director of Administration

FROM: Mary Rivera MR
Administrative Assistant II

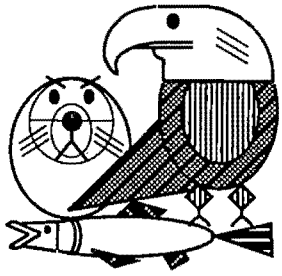
DATE: May 8, 1995

RE: Resignation

This is a notice of my resignation as Administrative Assistant II with the EVOS Trustee Council. I have been offered the position of Support Services Supervisor with the USDA Forest Service, with which I accepted.

My last day of work with the Council will be Monday, May 22. It has been a pleasure working with everyone.

Exxon Valdez Oil Spill Trustee Council
Restoration Office
645 G Street, Suite 401, Anchorage, Alaska 99501-3451
Phone: (907) 278-8012 Fax: (907) 276-7178



MEMORANDUM

TO: Martha Vlasoff

FROM: Eric F. Myers

DATE: 5/8/95

SUBJ: GAO Briefing Report (August 1993) and Update Response Regarding Status of Recommended Actions (April 1995)

Please find attached:

1. a memo dated April 17, 1995, prepared by Trustee Council agency staff, providing an update on issues noted by the GAO Briefing Report prepared in August of 1993;

2. a press release issued by the Trustee Council at the time of the release of the GAO Briefing Report; and

3. a copy of the GAO Briefing Report.

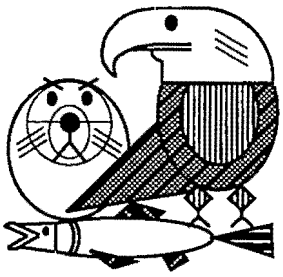
I apologize for the delay, but wanted to make sure that you had a copy of the final update on issues.

If you have questions, please let me know.

cc: Molly McCammon

Exxon Valdez Oil Spill Trustee Council

Restoration Office
645 G Street, Suite 401, Anchorage, Alaska 99501-3451
Phone: (907) 278-8012 Fax: (907) 276-7178



MEMORANDUM

TO: Joe Sullivan/ADFG

FROM: Molly McCammon
Executive Director

RE: Authorization -- Project 95255/Kenai River Sockeye Restoration

DATE: May 8, 1995

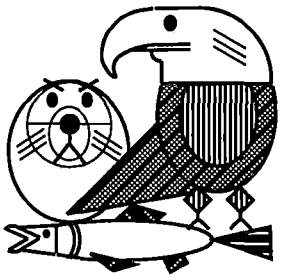
The purpose of this memorandum is to formally approve work to proceed on Project 95255/Kenai River Sockeye Restoration, as described in the Detailed Project Description and consistent with the review of the Chief Scientist (see attached). Please note that it is the Chief Scientist's recommendation that 1995 be the final year of Trustee Council funding for this project, unless there is a catastrophic collapse of the Kenai River sockeye run in 1995.

Attachment

cc: Bob Spies
Traci Cramer
Dan Moore

Exxon Valdez Oil Spill Trustee Council

Restoration Office
645 G Street, Suite 401, Anchorage, Alaska 99501-3451
Phone: (907) 278-8012 Fax: (907) 276-7178



MEMORANDUM

TO: Bob Spies
Andy Gunther
Applied Marine Sciences

FROM: Molly McCammon
Executive Director

DATE: May 8, 1995

RE: Scientific Support Tasks for April 1, 1995 - June 30, 1995

I concur with the attached list of scientific support tasks with the following exceptions:

1. With the addition of the Scientific Coordinator on staff, I don't believe it is necessary for the Chief Scientist or his assistant to participate in all Restoration Work Force meetings. This appears to be one area in which we can reduce your scope of work. You will continue to receive copies of any work force agendas. However, you will only need to be on-line for specific items at the request of this office.

2. Visits to field studies in progress are important, but costly. Any plans for these efforts should be done in consultation with the Executive Director in order to ensure that we stay within budget.

3. The Restoration Office will be responsible for distributing FY 1996 proposals for the initial peer review.

4. Time spent on your participation on the SAAMS Board of Directors should be monitored closely. Consideration should be given to making additional use of the Scientific Coordinator when possible.

Pursuant to our contract, I would also like to note that I have been very pleased with the services provided by the Chief Scientist and Assistant in the past quarter. Through your efforts, we held a very successful Restoration Workshop in January. In addition, the hydroacoustics and intertidal reviews were very helpful. I have also been very pleased with Dr. Spies' contributions on the SAAMS Board of Directors.

cc: Stan Senner
Carol Fries

March 31, 1995

TO: Molly McCammon

FROM: Andy Gunther

RE: Scientific Support Tasks for
April 1, 1995 – June 30, 1995

Pursuant to our contract with the Department of Natural Resources, it is time to prepare a set of tasks for the next quarter. I offer the following list of tasks for you to consider in preparation of your request for scientific support services. I would recommend that you review this list with Stan Senner to determine how his activities might be best coordinated with the tasks assigned to the Chief Scientist.

Adaptive Management

1. Prepare recommendation and follow-up on results from the hydroacoustic workshop.

Plans and Projects

1. Continue review of 1995 Detailed Project Descriptions.
2. Continue review of 1993-94 final reports.
3. Obtain and distribute FY1996 proposals for peer review.
4. Conduct peer review of 1996 proposals with core reviewers in Alaska
5. Meet with Executive Director & RWF to prepare draft FY96 Work Plan.
6. Tour communities with Executive Director to discuss draft 1996 Work Plan.
7. Visit field studies in progress

Special Projects

1. SAAMS Board of Directors
2. Information Management

Miscellaneous

1. Participate in Restoration Work Force Meetings
2. Assisting the Scientific Coordinator
3. Newsletter editorial board
4. Unanticipated communications and projects

MEMORANDUM **5 April 1995**

TO: Molly McCammon

FR: Stan Senner Stan

RE: Projects and Tasks for Science Coordinator

Here is a list of the things we put on my agenda for the next 2-3 months. In cooperation with Bob Spies and Andy Gunther:

-Revise injured species list
    -action on petitions
    -review of existing list

-Evaluate and facilitate proposals to collect specimens (Herring Predation & Nearshore Ecosystem projects)
    -recommendation from Chief Scientist
    -recommendation from Executive Director
    -inform/action by Trustee Council and PAG

-Facilitate APEX project review and coordination for '95 season

-Assist core peer review of FY '96 science program in late May/early June

-Develop next iteration of longer-term Draft Restoration Program

-Foster inter-relationships among SEA-Nearshore-APEX projects

-Develop science component of Seward Sealife Center

-Undertake such other projects as requested by the Executive Director

Some of these are more immediate than others (e.g., specimen collections). Several are clearly long-term (e.g., Seward Sealife Center). In some of these, the lead is up to Bob and Andy. In all cases, close cooperation with them in required.

cc: Eric Myers
Robert Spies
Andy Gunther

Exxon Valdez Oil Spill Trustee Council
Restoration Office
645 G Street, Suite 401, Anchorage, Alaska 99501-3451
Phone: (907) 278-8012 Fax: (907) 276-7178

FAX COVER SHEET

To: Bob Spies Number:

From: Molly McCammon Date: May 9, 1995

Comments: Total Pages: 4

Pls forward to Bob and Andy.
Thanks

Document Sent By: Rebecca

2/15/95

****
*** ACTIVITY REPORT ***
****

TRANSMISSION OK

TX/RX NO.	7955
CONNECTION TEL	15103737834
CONNECTION ID	B.SPIES
START TIME	05/09 08:19
USAGE TIME	02'28
PAGES	4
RESULT	OK

Exxon Valdez Oil Spill Trustee Council

Restoration Office
645 "G" Street, Anchorage, AK 99501
Phone: (907) 278-8012 Fax: (907) 276-7178

May 8, 1995

TO: PAG Members

FROM: Bob Loeffler

SUBJECT: May teleconference scheduled for Monday, May 15, 1:00 PM

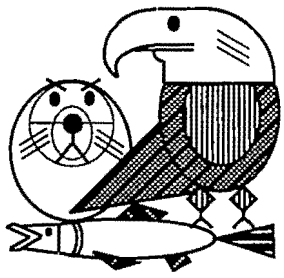
On the basis of your response to last week's request, we have scheduled the May PAG teleconference at May 15, 1:00 PM. To the few of you who cannot make it on that date, please accept my apologies. It was impossible to schedule a time that met everybody's schedule.

In a few days, you will receive information concerning the proposals we received, and a brief, draft agenda for the teleconference.

Look forward to talking to you on May 15.

Exxon Valdez Oil Spill Trustee Council

Restoration Office
645 G Street, Suite 401, Anchorage, Alaska 99501-3451
Phone: (907) 278-8012 Fax: (907) 276-7178



May 8, 1995

To Whom It May Concern:

Please be advised that Dr. Christopher Haney is traveling on behalf of the State of Alaska and the U.S. Government, and, in that capacity is entitled to receive government rates for airfare and accommodations.

He will be working on government business until September 30, 1995. Any questions relating to this matter should be directed to:

Executive Director
Exxon Valdez Oil Spill Restoration Office
645 G Street Suite 401
Anchorage AK 99501-3451
(907) 278-8012

Thank you for your cooperation.

Sincerely,

Molly McCammon
Executive Director

mm/raw

Exxon Valdez Oil Spill Trustee Council

Restoration Office
645 G Street, Suite 401, Anchorage, Alaska 99501-3451
Phone: (907) 278-8012 Fax: (907) 276-7178

May 3, 1995

Eric
Wasn't
here, so
I signed. RAW

Natalie Phillips
Staff Writer
Anchorage Daily News
POB 149001
Anchorage, Alaska 99514-9001

Dear Ms. Phillips:

This is in response to your March 30, April 14, and April 28, 1995, requests for appraisals for certain "packages of land that the Trustee Council has either purchased or has offered to purchase."

As noted in my previous response to you, the Trustee Council has copies of only eight appraisals or draft appraisals, since most appraisals are held by the acquiring agencies. Three are available at the Oil Spill Public Information Center. At this time I am able to make all of them available to you, except the appraisal report on Shuyak Island prepared for the Kodiak Borough. I expect to release the Shuyak appraisal to you in ten days (May 12) and am notifying the Kodiak Borough of this proposed release by copy of this letter.

Thank you for your patience in this matter. Let me know if I can be of any further assistance.

Sincerely,

Molly McCammon by RAW

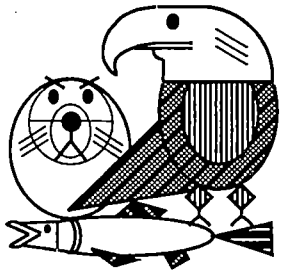
Molly McCammon
Executive Director

cc: Joel H. Bolger, Esq.
Jamin, Ebel, Bolger & Gentry
For the Kodiak Island Borough

mm/raw

Exxon Valdez Oil Spill Trustee Council

Restoration Office
645 G Street, Suite 401, Anchorage, Alaska 99501-3451
Phone: (907) 278-8012 Fax: (907) 276-7178



May 2, 1995

Mr. Chuck Dennis
P.O. Box 3229
Valdez, Alaska 99686

Dear Mr. Dennis,

Thank you for stopping by the Restoration Office to discuss the Trustee Council's small parcel protection program. I want to let you know what I have learned since we spoke on Monday.

I spoke with Mr. Dave Gibbons of the US Forest Service. (The USFS is the Trustee agency that has the lead role to work with the University of Alaska concerning the Valdez Duck Flats parcel.) As a result of comments from the Trustee Council's Public Advisory Group (a 17-member public advisory body) and other members of the public, Mr. Gibbons has been examining the possibilities regarding habitat protection in the vicinity of the Valdez Duck Flats parcel that is currently under consideration.

Mr. Gibbons informed me that he has determined that there are three parcels with separate owners between Parcel 447 and the Valdez Duck Flats parcel. As a first step to reassessing possible interest in Parcel 447, Mr. Gibbons is trying to contact the parcel owners between the Valdez Duck Flats and Parcel 447. If you are interested in learning more about these efforts, I urge you to contact Mr. Gibbons directly. His phone number in Juneau is 586-8784.

I hope that this information is helpful to you. For your reference, I have also enclosed a copy of the Trustee Council's most recent annual report.

Sincerely,

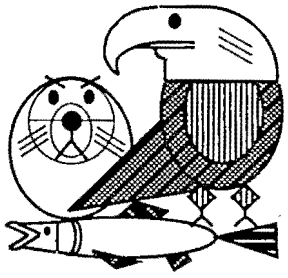
Eric

Eric Myers
Director of Operations

enclosure

cc: Dave Gibbons
Nancy Lethcoe

Exxon Valdez Oil Spill Trustee Council
Restoration Office
645 G Street, Suite 401, Anchorage, Alaska 99501-3451
Phone: (907) 278-8012 Fax: (907) 276-7178



835-5926

FAX COVER

Number of pages: 9 (includes cover)

TO: Phillip Hayward

FROM: Eric F. Myers

DATE: 5/2/95

SUBJ: Trustee Council members/TAT 06 (Port Fidalgo)

Please find attached:

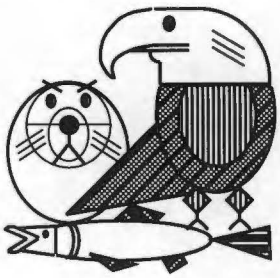
1. a listing of Trustee Council members; and
2. information regarding TAT 06 (Port Fidalgo).

I hope this information is of help.

attachments

(A hard copy will follow in the mail.)

Exxon Valdez Oil Spill Trustee Council
Restoration Office
645 G Street, Suite 401, Anchorage, Alaska 99501-3451
Phone: (907) 278-8012 Fax: (907) 276-7178



MEMORANDUM

TO: Restoration Work Force

FAX COMPLETE

FROM: Eric F. Myers

DATE: 5/2/95

SUBJ: Restoration Work Force Meeting

There will **not** be a Restoration Work Force meeting tomorrow (Wednesday, May 3).

Please plan on a RWF meeting next week (Wednesday, May 10).

****
*** MULTI TRANSACTION REPORT ***
****

TX/RX NO. 7795

INCOMPLETE TX/RX

TRANSACTION OK	[09] 19075867589	JUNEAU OFFICE
	[10] 19075867555	D.GIBBONS
	[13] 19077896608	MORRIS-WRIGHT
	[15] 5624871	C.FRIES
	[16] 3494712	RITA MIRAGLIA
	[17] 2713992	R.THOMPSON
	[18] 5223148	J.SULLIVAN
	[19] 7863636	L.BARTELS
	[20] 7863350	C.BERG
	[21] 2572517	B.RICE
	[23] 19074655375	D.BRUCE
	[24] 5624026	E.PIPER
	[30] 19074654759	ELLEN FRITTS
	[35] 15103737834	B.SPIES
	[38] 2715827	G.BELT

ERROR

Exxon Valdez Oil Spill Trustee Council

Restoration Office
645 G Street, Suite 401, Anchorage, Alaska 99501-3451
Phone: (907) 278-8012 Fax: (907) 276-7178

MEMORANDUM

TO: Leslie Holland-Bartles/DOI-NBS

FROM: Molly McCammon
Executive Director

DATE: May 1, 1995

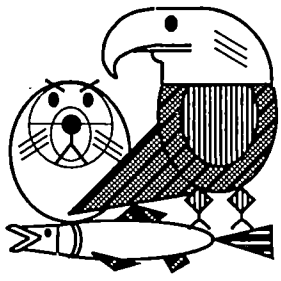
RE: Authorization -- Project 95025/Mechanisms of Impact and Potential Recovery of Nearshore Vertebrate Predators

The purpose of this memorandum is to formally authorize work to proceed on Project 95025/Mechanisms of Impact and Potential Recovery of Nearshore Vertebrate Predators, as described in the Detailed Project Description and consistent with the review of the Chief Scientist. This authorization does not include the collections component of Project 95025, which is under separate review.

In regard to the budget, please be advised that any funding approved by the Trustee Council, but not required for FY 95 because of the unanticipated delay associated with the withdrawal of funds from the court, should be lapsed to the joint trust fund at the end of the fiscal year.

cc: Bob Spies
Traci Cramer

Exxon Valdez Oil Spill Trustee Council
Restoration Office
645 G Street, Suite 401, Anchorage, Alaska 99501-3451
Phone: (907) 278-8012 Fax: (907) 276-7178



MEMORANDUM

TO: Carol Fries/ADNR
Alex Swiderski/DOL
Mark Kuwada/ADFG
Glenn Elison/USFWS
Judy Robinson/ADNR
Dave Gibbons/USFS
John Harmening/USFS

FROM: Eric F. Myers

DATE: 5/1/95

SUBJ: Small Parcel Meeting — Friday, May 5 (9:00 am)

The purpose of this memo is to confirm that there will be a **meeting of the small parcel negotiators on Friday, May 5 at 9:00 am**.

The purpose of this meeting will be to discuss:

— the status of the negotiations or other work re: high, moderate or special merit parcels identified to date;

— the status of Phase II nomination evaluations; and

— what briefings or other information may be needed prior to the next Trustee Council meeting scheduled for June 1-2 (in Cordova).

The meeting will be held in the 4th floor conference room at 645 G Street. Please let Tami Yockey know if you need to participate via teleconference. Thank you.

cc: Molly McCammon
Tami Yockey
Art Weiner
Ken Holbrook
Tom Gerlach